AEI Consultants

October 2018

REMEDIAL INVESTIGATION WORK PLAN

Property Identification:
682 9th Avenue
New York, New York 10036

AEI Project No. 368024
BCP # C231106

Prepared for:
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Qualified Environmental Professional:

I, Anthony Cauterucci, certify that I am currently a Qualified Environmental professional as defined in 6 NYCRR Part 375 and that this Report was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

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Senior Environmental Project Manager

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1.0 INTRODUCTION AND PURPOSE

1.1 Background Information

This Remedial Investigation Work Plan (RIWP) is being prepared under the New York State Brownfield Cleanup Program for site ID C231106, named MJW 47 LLC, and located at 682 9th Avenue in the borough of Manhattan in the City of New York, (the "Site"). The Site is defined on the New York City Department of Finance records as Block 1038, Lot 1, (see Figure 1). The lot size is 2,590 square feet. The Participant in the BCP is MJW 47 LLC.

The Site was most recently occupied by a coffee shop on the ground floor and residential tenants on the upper floors, from approximately 2000 to 2013, and has been vacant since 2013. From approximately 1993 to 2000, the Site was occupied by a clothing retailer. Prior to 1990, a dry cleaner operated at the Site.

A subsurface investigation was conducted at the Site in September 2016. The results of this investigation indicate that a typical dry cleaning fluid, tetrachloroethene ("PCE") has contaminated soils beneath the basement slab of the Site building. It is suspected that this release is associated with the former onsite dry cleaning operations. The NYSDEC was notified of the findings on May 4, 2017, and NYSDEC Spill #1701031 was issued. A copy of the Limited Phase II Subsurface Investigation Report is included as Appendix B.

The owner undertook a remedial action that included the excavation of contaminated soil. Approximately 50 tons of PCE laden soil were excavated from beneath the basement slab and disposed of at a licensed hazardous waste disposal facility.

Based upon the investigations and excavation conducted to date, the primary contaminants of concern for the Site are PCE and its degradation products.

This RIWP is prepared in accordance with the NYSDEC's DER-10/Technical Guidance for Site Investigation and Remediation in order to fully-delineate the impacts of the release at the Site. This RIWP is prepared by AEI Consultants with assistance from John A. Rhodes, PE.

1.2 Statement of Purpose

This remedial investigation is planned to define the nature and extent of all contamination at the Site and support the subsequent evaluation and development of remedial actions, as appropriate. This investigation will also determine if other compounds of concern are present at the site. (e.g., SVOCs, metals, pesticides/herbicides, and PCBs) and emerging contaminants.

The work scope proposed here is based on the investigation and remediation work completed to date, and an understanding of the Site from records searches and site visits. This RIWP details specific tasks that will facilitate Site characterization, full delineation of contamination, and compliance with the NYSDEC and DOH requirements. Specifically, the data gathered as part of this work will be used in conjunction with prior investigation results to:

- Identify the sources of contamination, the migration pathways, and actual or potential receptors of contaminants

- Evaluate the amount, concentration, persistence, mobility, and other characteristics of the contamination present
- Delineate the horizontal and vertical extent of contaminants in all media at, or emanating from, the Site
- Characterize the material beneath the Site
- Evaluate the potential for contaminant migration and threats to sensitive receptors
- Provide information to allow for the identification and preliminary evaluation of viable remedial alternatives.

These findings will be summarized in a Remedial Investigation Report (RIR) that will be submitted to the NYSDEC for review and approval. Remedial Action Objectives (RAOs) will also be developed for the Site based on the contaminant characterization results, current land use, and potential exposure pathways. Based on an understanding of potential Site issues and the presence of Chlorinated Volatile Organic Compounds (CVOCs), the RAOs for the Site may require soil removal and the implementation of a sub-slab depressurization system.

2.0 SITE HISTORY AND DESCRIPTION

2.1 Site and Surrounding Neighborhood Descriptions

2.1.1 Site Description

The Site is located on the east side of 9th Avenue in a mixed residential and commercial area of New York City, New York, (Figure 1). On the Site is a four-story building with a basement approximately eight (8) feet below the grade of the adjacent sidewalk on 9th Avenue. The lot size is 37 feet by 70 feet and the building size is 25 feet by 60 feet.

The Site building was formerly occupied by a commercial tenant on the ground floor; the space is currently vacant. Vacant residential apartments are present on the top floors. A dry cleaners previously operated on the ground floor and basement of the Site building.

2.1.2 Surrounding Area

The Site is located in a mixed residential and commercial area. The building to the north, 684 9th Avenue, is occupied by a restaurant in the basement and ground floor, and residential apartments in the upper floors. The building to the east, 361 47th Street, is a multi-tenant residential apartment building. The building to the south, beyond 47th Street, 678 9th Avenue, is occupied by a barber shop on the ground floor with residential apartments in the upper floors. The buildings to the west, beyond 9th Avenue, are generally occupied by commercial tenants on the ground floor with residential apartments in the upper floors.

The nearest school to the Site is the Professional Performing Arts School, located at 328 West 47th Street, New York, NY 10036, approximately 285 feet (0.05 mile) to the east of the Site. The nearest preschool/daycares are Star America Preschool, located at 780 8th Ave, New York, NY 10036, approximately 0.16 mile to the southeast of the Site, and Cravath Children's Center, located at 825 8th Ave, New York, NY 10019, approximately 0.17 mile to the northeast of the Site.

The Fountain House, a residential treatment facility for people with mental illness, is located at 359 W 47th St, New York, NY 10036, approximately 30 feet to the east of the Site. Additionally, Encore Community Services, a Senior Citizen Center, is located at 220 W 49th St, New York, NY 10019, approximately 0.24 miles to the east of the Site. No other sensitive populations such as medical or senior citizen facilities were identified within the vicinity of the Site.

2.2 Previous Investigation and Remediation

2.2.1 Previous Investigation

On September 8th and 9th, 2016, a limited soil and soil vapor investigation was conducted at the Site. A copy of the Limited Phase II Subsurface Investigation Report is included as Appendix B.

Two (2) soil borings were completed in the basement of the Site, where former dry cleaning-operations were apparently present. The locations and summary analytical results of the soil borings are presented on Figure 2. Laboratory analysis of the soil samples indicated that tetrachloroethene ("PCE"), trichloroethene ("TCE"), and cis-1, 2-dichloroethene ("DCE") were detected in soil beneath the basement slab at concentrations greater than their respective New York State Department of Environmental Conservation (NYSDEC) soil cleanup objectives.

In addition to soil sampling, sub-slab vapor samples, indoor air, and outdoor/ambient air samples were collected at the Site. Vapor and air sample locations and summaries of analytical results are provided on Figure 2. The investigation methodology was consistent with the New York State Department of Health (NYSDOH) Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006). Two indoor air samples (IA-1a and IA-1b) and an exterior background (i.e., ambient) air sample (sample AA-1) were collected over a 24-hour period. The indoor air samples were collected from the basement (sample IA-1a) and the first floor in the former commercial tenant space (sample IA-1b). Two sub-slab soil vapor samples (SSSV-1 and SSSV-2) were also collected in the western room of the basement at locations proximal to the soil boring locations (Figure 2).

Analysis of sub-slab soil vapor samples SSSV-1 and SSSV-2 indicated that PCE and TCE were detected at concentrations greater than the applicable NYSDOH guidance levels. Based on the results of SSSV-1 and SSSV-2, indoor air samples IA-1a, IA-1b and ambient air sample AA-1 were analyzed. Analysis of indoor air samples also indicated that detected concentrations of PCE and TCE were greater than the NYSDOH guidance criteria for indoor air.

As per May 2017 updates to the 2006 Guidance for Evaluating Soil Vapor Intrusion in New York State, Matrix Table A, TCE levels in both sub-slab vapor samples SSSV-1 and SSSV-2 exceeded the 60 micrograms per cubic meter ($\mu g/m^3$) threshold for sub-slab vapor concentrations. When compared with the TCE concentration detected in indoor air sample IA-1a, which exceeded the 1 ug/m^3 threshold for indoor air concentrations, Matrix A specifies that mitigation is required. Additionally, per the May 2017 updates, Matrix Table B, PCE levels in both sub-slab vapor samples SSSV-1 and SSSV-2 exceed the 1,000 ug/m^3 threshold for sub-slab vapor concentrations. When compared with the PCE concentration detected in indoor air sample IA-1a, which exceeds the 10 ug/m^3 threshold for indoor air concentrations in Matrix B, the matrix specifies that mitigation is required.

The results of the investigation indicate that a release of PCE has contaminated soils in soils located between the base of the building slab and the top of the bedrock surface encountered between approximately one (1) foot and four (4) feet beneath the slab surface, (approximately nine (9) and 12 feet below sidewalk grade). Additionally, the associated soil vapor and basement air are contaminated in exceedance of the applicable NYSDOH air guidelines.

The NYSDEC was notified of the release on May 4th, 2017. NYSDEC Spill #1701031 was issued.

2.2.2 Sample Analytical Results

The results of the September 2016 investigation were presented to the NYSDEC in May of 2017 in the Limited Phase II Subsurface Investigation Report, a copy of which is provided as Appendix B. The data summarized below is also included in Tables 1-3 and Appendix B. The following is a summary of the findings:

VOCs in Soil

- PCE was detected in soil sample AEI-SB8 at 23,000 milligrams per kilogram (mg/kg) and at 23 mg/kg in soil sample AEI-SB9. The concentration detected in AEI-SB8 exceeds the NYSDEC Commercial Use Soil Cleanup Objective (CUSCO) of 150 mg/kg for PCE, and the concentration detected in AEI-SB9 exceeds the NYSDEC Unrestricted Use Soil Cleanup Objective (UUSCO) of 1.3 mg/kg for PCE.
- TCE was detected in soil sample AEI-SB8 at 120 mg/kg, a concentration which exceeds the NYSDEC UUSCO of 0.47 mg/kg for TCE. TCE was not detected in soil sample AEI-SB9.
- Cis-1,2-Dichloroethene was detected in soil sample AEI-SB8 at 46 mg/kg, a concentration which exceeds the NYSDEC UUSCO of 0.25 mg/kg for cis-1,2-dichloroethene. cis-1,2-Dichloroethene was not detected in soil sample AEI-SB9.

VOCs in Sub-Slab Soil Vapor

- PCE was detected in sub-slab soil vapor sample SSSV-1 at 47,300,000 ug/m^3, and sub-slab soil vapor sample SSSV-2 at 2,130,000 ug/m^3. These concentrations exceed the NYSDOH Matrix B guidance level of 100 ug/m^3 for PCE.
- TCE was detected in sub-slab soil vapor sample SSSV-1 at 425,000 ug/m^3, and sub-slab soil vapor sample SSSV-2 at 8,810 ug/m^3. These concentrations exceed the NYSDOH Matrix A guidance level of 6 ug/m^3 for TCE.
- Trans-1,2-Dichloroethene was detected in sub-slab soil vapor sample SSSV-1 at 2,360 ug/m^3, and sub-slab soil vapor sample SSSV-2 at 323 ug/m^3. There is currently no NYSDEC or NYSDOH standard for trans-1,2-dichloroethene.
- cis-1,2-Dichloroethene was detected in sub-slab soil vapor sample SSSV-1 at 531,000 ug/m^3, and sub-slab soil vapor sample SSSV-2 at 6,580 ug/m^3. These concentrations exceed the NYSDOH Matrix A guidance level of 6 ug/m^3 for cis-1,2-dichloroethene.

VOCs in Indoor Air

- PCE was detected in indoor sample IA-1a at 5,270 ug/m^3 and indoor air sample IA-1b at 286 ug/m^3. These concentrations exceed the NYSDOH guidance criteria of 30 ug/m^3 for PCE in indoor air.
- TCE was detected in indoor sample IA-1a at 42.3 ug/m^3 and indoor air sample IA-1b at 3.07 ug/m^3. These concentrations exceed the NYSDOH guidance criteria of 2 ug/m^3 for TCE in indoor air.

- Trans-1,2-Dichloroethene was detected in indoor sample IA-1a at 0.472 ug/m^3 and indoor air sample IA-1b at 0.079 ug/m^3. There is currently no NYSDEC or NYSDOH standard for trans-1,2-dichloroethene in indoor air.
- cis-1,2-Dichloroethene was detected in indoor sample IA-1a at 62.2 ug/m^3 and indoor air sample IA-1b at 5.59 ug/m^3. These concentrations exceed the NYSDOH Matrix a guidance level of 1 ug/m^3 for cis-1,2-dichloroethene in indoor air.

2.2.3 Limited Soil Excavation

A limited excavation of soil in the basement of building 682 was conducted between May 15 and May 23, 2017, as an interim measure to permanently remove the most-contaminated soils in the basement area. The excavation work was discontinued on May 23, 2017, pursuant to a request from the NYSDEC, until a complete Remedial Investigation Work Plan (RIWP) could be completed for the Site. Following the discontinuation of the soil excavation work, a vapor suppressant foam was applied to the base and sidewalls of the excavation. Additionally, the wall on the north side of the basement that is shared with the 684 9th Avenue basement space was treated with 4EVERCRETE™, a one-time permanent application specially engineered to waterproof and greatly reduce vapor transmission through concrete. The excavation currently remains open with vapor suppressant foam applied and has not been backfilled.

3.0 CONCEPTUAL SITE MODEL

In order to evaluate the significance of the impacted media at the Site, the potential pathways by which individuals may come in contact with these media must be determined. The combination of factors (chemical source, media of concern, release mechanisms, and potential receptors) that could produce a complete exposure pathway and lead to human uptake of chemicals is assessed in this Conceptual Site Model ("CSM").

3.1 Receptors

Based on the current land use and the anticipated future land use of the Site the following potential receptors may be exposed to on-Site media:

- Resident (future)
- Retail customer or worker (future)
- Construction worker (future)
- Trespasser (current/future)

Impacted media at the Site include subsurface soil and soil vapor, and indoor air. Ingestion, dermal contact, and inhalation are the potential routes of exposure.

Groundwater beneath the Site has not yet been encountered or sampled, but will be studied as part of this RIWP. Groundwater at the Site is not currently used as potable drinking water source. The potable water for the Site and the surrounding area is currently supplied by a municipal source and this is expected to continue.

In addition, off-Site receptors may be exposed to contaminants that have migrated. Potential off-Site receptors include the following:

- Residents in adjacent buildings on 9th Avenue and 47th Street (current/future)
- Retail customers and workers, including the restaurant occupying the basement and first floor of 684 9th Avenue (current/future)

3.2 Geology and Topography

According to information obtained from the US Geological Survey (USGS), the area surrounding the Site is underlain by pelitic schist and gneiss deposits of the Manhattan Formation of the Ordovician-era. Bedrock in the immediate area of the Site is expected to slope to the west; observations of the exposed bedrock within the basement of building 682 suggest western slope. To the west, bedrock slopes steeply toward the Hudson River.

For the limited Site investigation performed by AEI, the basement was measured to be approximately eight (8) feet below the grade of the sidewalk on 9th Avenue, (elevation 45 feet msl). AEI also identified bedrock at one (1) foot below the basement floor slab [nine (9) feet below the grade of the sidewalk on 9th Avenue] in the eastern portion of the basement; and ranging to four (4) feet below the basement (12 feet below the sidewalk) toward the western end of the building. These observations of shallow bedrock are consistent with the Site being located in the midtown area of skyscrapers built to take advantage of shallow bedrock conditions.

Based on a review of the USGS Central Park, New York Quadrangle Topographic Map, 7.5 Minute Series, 2016, the Site is located at an elevation of approximately 45 feet above mean sea level and slopes to the southwest. The closest surface water body is the Hudson River located approximately 0.50 mile to the west of the Site, [approximate elevation of zero (0) msl].

A section schematic of the location of bedrock and groundwater is provided as Figure 6. A detail of this section in the immediate area of the Site is provided as Figure 7. In addition to the above sources and observations, data for these figures were obtained from NYC Office of Environmental Remediation (OER) Environmental Project Information Center (EPIC) records of the following contaminated sites: #18CVCP067M, 18EHAZ397M, 607-611 West 47th Street, #12RHAN406M, 13CVCP083M, 545 West 48th St. / 540 West 49th St., and #12EHAN533M, 14CVCP219M, 618 West 47th Street. NYC OER records from the above sites indicate that in the area of 11th Avenue, between 47th and 48th Streets, bedrock has been encountered between 1 and 15 feet bgs, no groundwater has been encountered in the overburden, and that when bedrock wells have been installed, groundwater was observed to be under artesian pressure rising to a depth of 8 to 12 feet below grade after being encountered and the artesian pressures released. Additionally, topographic maps and the Google image dated 6/8/2017 were used to confirm ground elevations and the locations of tall buildings confirming shallow bedrock.

3.3 Groundwater

The depth and flow of groundwater are uncertain. There is no shallow groundwater in the shallow overburden under the Site. The previous investigation did not examine the presence of groundwater in the bedrock. This investigation is proposed in this RIWP.

The regional topographic gradient direction slopes toward the southwest and, therefore, typically the direction of groundwater flow beneath the Site would be inferred to be in a southwesterly direction. However, the local movement of groundwater may be more complex; influenced by the local bedrock slope; infiltration, if any; leakage from water or sewer utilities; and the nature of groundwater presence and flow in the bedrock.

As noted above, the nearestNYC OER contaminant investigation sites were located 1,500 to 2,000 feet to the west in the area of 11th Avenue, between 47th and 48th Streets. At these sites, bedrock was reported approximately ten (10) feet below sidewalk grade, consistent with the subject Site. Groundwater at these sites was encountered at a depth of 20 to 25 feet below grade. Groundwater was observed to be under artesian pressure rising to a depth of 8 to 12 feet below grade after being encountered and the artesian pressures released. Groundwater is likely to be at a similar depth and under artesian pressure at the subject Site.

Based on a review of the United State Department of Agriculture (USDA) Soil Survey for the area of the Site, the soils in the vicinity of the Site are classified as Urban Land. The Urban Land designation indicates that more than 85 percent of the original soils have been disturbed or covered by paved surfaces, buildings or other structures. The soil recovered in the borings advanced during the September 2016 investigation generally consisted of a light brown sandy silt along with weathered schist (Appendix A). It is anticipated that most if not all (100%) of soils encountered above bedrock will be disturbed soils or fill placed for the construction of utilities, roadways, sidewalks, basement entrances and building foundations.

The Site and the adjacent buildings at 684 9th Avenue and 361 47th Street will most likely have foundations constructed directly on bedrock based on common construction practices and the proximity to bedrock. Both buildings have basements at approximately the same depths. Similarly, interior supporting walls are also likely to extend to bedrock. Foundations extending to bedrock will have an effect on the migration of any liquids discharged beneath the basement slab and contaminated vapors, and therefore, their presence and effect on fluid movement will be investigated.

Utilities are located along both 9th Avenue and 47th Street. Connections are apparent between these utilities and the Site building. Utilities are difficult to locate in mid-town Manhattan, and therefore, will be located using ground penetrating radar (GPR) and other methods. As utilities can affect boring and well locations and the sampling results, their locations will be investigated. Figure 8 is a Google Earth street level view of the Site that shows the visibly identifiable utilities.

3.4 Contaminant Source

In the Site's basement, piping and a raised slab suggest the location of the former dry cleaning machines, but other historical information does not provide additional detail. The elevated levels of soil and vapor contamination were detected near this suspected location. There is also a floor drain near the suspected location.

Based on the above, it is likely a release(s) occurued through the mishandling/spill of dry cleaning fluid, PCE, to the floor of the basement where it penetrated beneath the slab through the floor drain or imperfections in the floor slab in the vicinity of the raised platform. PCE, and/or water and vapor contaminated with PCE may have penetrated further into the ground or migrated laterally.

4.0 SPECIFIC CHEMICAL OBJECTIVES

Soil Cleanup Objectives (SCOs): As the Site will be used for commercial and residential activities in the future, the Restricted Residential Use Soil Cleanup Objectives (RRUSCOs) have been targeted, (see Table A below). Soil testing results will be compared to the Residential Use SCOs (RUSCOs) and the Unrestricted Use SCOs (UUSCOs). The CVOCs that have been identified in soil were detected in soil beneath the basement slab at concentrations exceeding the RRUSCOs: PCE detected as high as 23,000 mg/kg (RRUSCO is 19 mg/kg) and TCE detected as high as 120 mg/kg (RRUSCO is 21 mg/kg).

Table A – CVOC Soil SCOs

Contaminant	CAS Number	Residential (mg/kg)	Restricted Residential (mg/kg)	Unrestricted Use (mg/kg)
1,1,1-Trichloroethane	71-55-6	100	100	0.68
1,1-Dichloroethane	75-34-3	19	26	0.27
1,1-Dichloroethene	75-35-4	100	100	0.33
1,2-Dichlorobenzene	95-50-1	100	100	1.1
1,2-Dichloroethane	107-06-2	2.3	3.1	0.02
cis-1,2-Dichloroethene	156-59-2	59	100	0.25
trans-1,2-Dichloroethene	156-60-5	100	100	0.19
1,3-Dichlorobenzene	541-73-1	17	49	2.4
1,4-Dichlorobenzene	106-46-7	9.8	13	1.8
1,4-Dioxane	123-91-1	9.8	13	0.1
Acetone	67-64-1	100	100	0.05
Benzene	71-43-2	2.9	4.8	0.06
Butylbenzene	104-51-8	100	100	12
Carbon tetrachloride	56-23-5	1.4	2.4	0.76
Chlorobenzene	108-90-7	100	100	1.1
Chloroform	67-66-3	10	49	0.37
Ethylbenzene	100-41-4	30	41	1
Hexachlorobenzene	118- 74-1	0.33	1.2	0.33
Methyl ethyl ketone	78-93-3	100	100	0.12
Methyl tert-butyl ether	1634-04-4	62	100	0.93
Methylene chloride	75-09-2	51	100	0.05
n Propylbenzene	lO3-65-1	100	100	3.90
sec-Butylbenzene	l35-98-8	100	100	11
tert-Butylbenzene	98-06-6	100	100	5.9
Tetrachloroethene	127-18-4	5.5	19	1.3
Toluene	108-88-3	100	100	0.7
Trichloroethene	79-01-6	10	21	0.47
1,2,4-Trimethylbenzene	95-63-6	47	52	3.6
1,3,5-Trimethylbenzene	108-67-8	47	52	8.4
Vinyl chloride	75-01-4	0.21	0.9	0.02
Xylene (mixed)	l330-20-7	100	100	0.26

Sub-slab Vapor and Indoor Air: The DOH document NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006), updated in May 2017, will be used as a tool in evaluating and addressing current and potential exposures related to soil vapor intrusion. PCE, TCE, DCE were identified at elevated concentrations in onsite indoor air and sub-slab vapor requiring mitigation in their current concentrations. The same document will be used to evaluate off-Site contaminants.

Groundwater: The New York State Water Quality Standards and Guidance Values, Class GA (Groundwater), will be used to evaluate groundwater contaminants. The values for PCE and its principal degradation products are shown below in Table B.

Table B - NYS Groundwater Standards and Guidance Values

Contaminant	CAS Number	Groundwater Standard (µg/L)
Tetrachloroethene	127-18-4	5
cis-1,2-Dich1oroethene	156-59-2	5
Trichloroethene	79-01-6	5
Vinyl chloride	75-01-4	2

5.0 SAMPLING PLAN AND RATIONALE

5.1 Sampling Strategy – Triad Approach

Sampling will follow the Triad approach whereby the approved sampling plan may be modified based on initial results. Modifications would be done only after consultation with and approval by the NYSDEC and NYSDOH. The intent is to provide flexibility in the sampling plan to take advantage of the initial information developed by the program and to avoid the pitfalls of drilling in a highly urbanized area in mid-town Manhattan.

The Triad Approach[1] is a three-pronged approach for managing all forms of project uncertainty to improve decision-making and streamline environmental cleanup projects. The Triad approach draws on science and technology advancements and practitioner experience to develop strategies for making site work more scientifically defensible, resource-effective, and adaptive to changing project needs.

The three integrated Best Management Practices (BMPs) of the Triad Approach are:

- Systematic project planning (SPP): An efficient method for comprehensive planning, design, and implementation for all stages of hazardous waste site investigation and cleanup projects. Generally recognized to be common practice for all projects, SPP is uniquely applied and critical to the successful design and execution of a Triad-based project.
- Dynamic work strategies (DWS): A sequence of dynamic data collection activities that efficiently addresses identified project concerns, which are implemented and managed in the field using real-time information to target and manage data and decision uncertainty.

[1] Best Management Practices: Use of Systematic Project Planning Under a Triad Approach for Site Assessment and Cleanup, US EPA, September 2010.

Streamlined workplans, developed in the context of a project's regulatory framework, are used to document DWS.

- Real-time measurement technologies: Any data generation that enables reliable measurement or collection and analysis of environmental media in a time frame that facilitates execution of a DWS. These measurements typically result in a much greater density of information and are available to direct field activities in time frames shorter than those commonly achieved with conventional sampling and analytical methods. Together with the DWS, real-time measurement technologies are used to focus when and where collaborative sampling and analyses can provide the greatest benefit.

The Triad Approach can be used to significantly reduce data collection costs, expedite project schedules, enhance stakeholder communication, and improve the quality of project and site decisions.

The Triad approach may be most beneficial for the groundwater investigation. The records search has indicated that groundwater may be present over 20 to 25 feet below ground surface (bgs) in bedrock and under artesian pressures obviating traditional well installation protocols. Additionally, the direction of flow is uncertain; and therefore, the locations of wells relative to expected groundwater flow directions are currently difficult to determine. Finally, drilling in the sidewalk of 9th Avenue and 47th Street is a burden on the numerous pedestrians and vehicles that use these streets, and contain aged and frail utilities whose locations cannot be known with certainty. Therefore, an approach is proposed to prepare to make all rock cores and install all wells, and then evaluate the plan as the initial cores and wells are completed. Specifically, one (1) or two (2) rock cores will be done within the Site in the basement, completing these cores as double cased wells (as outlined in Section 6.4.1 paragraph 8) if groundwater is encountered. Rock cores and well installations will continue unless the initial wells suggest that a modification to the approved plan would be appropriate. In this latter case, communications with the NYSDEC would be made to evaluate the initial results and determine any modifications to the rock coring and well installation plan are appropriate.

Similarly, a Triad approach is proposed for the two vapor probes planned to be installed in the sidewalks of 9th Avenue and 47th Street. As with the monitoring wells, the difficulties in drilling on 9th Avenue and 47th Street due to the disruption of pedestrian traffic and the presence of aged, frail utilities whose location cannot be known with certainty it of concern. Therefore, it is proposed that all vapor testing within the Site building and adjacent buildings, and the communication test to evaluate the effect on vapor movement by the building foundations be completed before the vapor probes in the sidewalks are completed. If vapor migration toward 9th Avenue and/or 47th Street is indicated, then the vapor probes proposed for 9th Avenue and 47th Street would be installed per the RIWP. However, if vapor migration is limited and foundations are restricting this movement, the results would be discussed with the NYSDEC and NYSDOH to reconsider the need for the vapor probes in the 9th Avenue and 47th Street, or to consider alternative locations for these probes.

Therefore, the sampling plan presented below makes worse case assumptions and specifies a fuller scope of testing than may ultimately be appropriate. The program will be implemented such that initial information can be used to modify the approach, if appropriate, without delaying the overall progress of the RIWP.

5.2 Summary of Samples and Media to be Sampled

The proposed scope of sampling is designed to complement the existing data to provide a more complete characterization in order to support the evaluation of remedial goals and alternatives. Table C below provides a summary of the samples to be collected during the remedial investigation. Proposed sample locations are shown on Figures 3, 4, and 5.

Table C - Analytical Program Summary
Remedial Investigation 682 9th Avenue, New York, New York 10036

Sample Media	Number of Samples[1]					Analysis[2]
	Field Samples	Duplicates	MS/MSD	Field Blank	Trip Blank	
Soil	28 (3 samples from each boring and 4 from the open excavation)	2	2	2	2	-VOCs+TICs per Method 8260C -SVOCs+TICs by Method 8270D -TAL Metals by EPA 6010C / 7471B -TCL PCBs and Pesticides by Method 8082A/8081B -Herbicides by Method 8151A
Sediment Sample (from floor drain)	1	1	0	0	0	-VOCs+TICs per Method 8260C -SVOCs+TICs by Method 8270D -TAL Metals by EPA 6010C / 7471B -TCL PCBs and Pesticides by Method 8082A/8081B -Herbicides by Method 8151A
Sub-Slab Soil Vapor	5	0	0	0	0	-VOCs per Method TO-15
Exterior Soil Vapor	2	0	0	0	0	-VOCs per Method TO-15
Indoor/Ambient Air	6 (5 indoor air and 1 ambient/outdoor air sample)	0	0	0	0	-VOCs per Method TO-15
Bedrock Core	5	0	0	0	0	-VOCs+TICs per Method 8260C
Groundwater	5	1	1	1	1	-VOCs+TICs per Method 8260C -SVOCs+TICs by Method 8270D -TAL Metals by EPA 200.7 / 200.8/ 245.2 / 6010C / 6020A / 7470A -TCL PCBs and Pesticides by Method 8082A/8081B -Herbicides by Method 8151A -1,4-Dioxane by EPA Method 8270D-SIM - PFAS[3] by modified EPA Method 537

[1] Number of samples may be modified in accordance with the Triad approach presented in Section 5.1

[2]Target Compound List (TCL) VOCs, including Tentatively Identified Compounds (TICs); Semi-volatile organic compounds; Target Analyte List (TAL) Metals; Polychlorinated Biphenyls (PCBs); Per- and Polyfluoroalkyl substances (PFAS).
[3] Full list of 21 PFAS will be analyzed

6.0 SAMPLING PLAN DETAILS

6.1 Building Interior, Drainage Facilities and Foundation Construction Evaluation

In order to fully understand the sources and pathways of contamination at the Site, the building interior will be evaluated in accordance with DER-10 Section 3.4.

6.1.1 Interior Inspection

An additional inspection will be performed on the interior of the Site building and adjacent buildings in which limited inspections have been done to date. Specifically, in the Site basement, plywood sheeting that currently restricts access in one area of the basement where a former dry cleaning machine was potentially present will be removed so this area can be inspected. Last, because it appears that water pipe leaks in the basement are causing pooling of water on the concrete slab, the pipes will be evaluated for leaks and repaired or closed if no longer active. Similar conditions in adjacent buildings will be observed and evaluated.

6.1.2 Floor Drain Sediment Sampling

An evaluation of floor drains inside the basement of the Site building and in the basement of the adjacent building to the north at 684 9th Avenue will be conducted. One (1) sediment sample will be collected from the floor drain in the basement of the Site building. The sediment sample will be a direct grab sample and will be transferred into laboratory supplied glassware and placed into a cooler with ice immediately following sample collection. Additional sediment samples may be taken as a result of the interior inspection if contaminants are indicated by field instrumentation.

6.1.3 Pneumatic Sub-slab Communication Study

In order to evaluate site-specific conditions relative to sub-slab soil vapor flow, and the type of equipment necessary to design and install an effective sub-slab depressurization system (SSDS) at the Site, pneumatic sub-slab communication testing will be conducted inside the basement of the Site building and the adjacent building to the north at 684 9th Avenue. This study will be conducted to evaluate the following: (1) separate foundation areas within the overall building footprints; (2) sub-slab obstructions that may impede pressure field extension; and, (3) pressure field extension throughout the building footprints. This study will be completed after the collection of sub-slab soil vapor and indoor air samples as described in Section 6.3.

In order to conduct the pneumatic sub-slab communication study, three (3) ¾-inch probes will be drilled into the building slab and a 1.5-inch diameter hose with an adapter connected to a portable vacuum that will create negative pressure beneath the building slab. The vacuum will be equipped with bleed valves and pressure gauges to control the pressure and flow rate applied. Exhaust from the vacuum will be filtered before being discharged outdoors. The distribution of the pressure beneath the slab will be monitored at four (4) temporary monitoring probes, vapor sampling probes, and unused vacuum probes installed though the basement slabs of the two buildings. The flow rate/pressure will be modified, as needed, to evaluate correlations between pressure/flow at the air application point and the gauging probes as the sub-slab pressure field stabilizes. Preliminary intrinsic permeability and zone of influence will be evaluated. Once readings are collected and recorded, the communication gauging probes and pressurized probe will be sealed using a temporary silicone plug to enable future use. The locations of the pilot test monitoring and vapor sampling probes are illustrated on Figure 5.

6.2 Soil Borings and Samples

Soil borings will be completed in eight (8) locations in the subsurface as per DER-10 Section 3.5.2. Six (6) borings will be completed inside the basement of the Site building and two (2) will be completed in the basement of the adjacent building to the north (684 9th Avenue) in the locations shown on Figure 3 (access to the adjacent properties has been arranged). At each location, the soil borings will be completed using manual equipment (i.e., concrete corer and jack hammer).

Prior to installing soil borings, the public underground utility locating service will be notified to mark out utilities in the work area and a private geophysical survey will be conducted to evaluate the presence of underground structures and subsurface features using GPR, electromagnetic induction and possibly utility tracing instruments in order to clear the boring locations of utilities.

Soils will be sampled to a maximum depth of approximately 4 feet bgs or to refusal, whichever is shallower. The borings will be advanced using a jack hammer equipped with 2.25-inch outer diameter Macro-Core® samplers (rods), and samples will be collected continuously by advancing the two-foot-long rods equipped with acetate sample liners. After each interval, the core will be retrieved, core barrel disassembled, and the sample liner will be removed, transferred to the onsite geologist, inspected, logged and field screened from grade surface to the final depth of each boring using a PID.

One soil sample from each boring will be collected at the depth interval that represents the highest likelihood of contamination based on field screening results; and one soil sample will be collected from the terminus of each boring. Each soil sample will be a direct grab sample from a 6-inch interval and will be transferred into laboratory supplied glassware and placed into a cooler with ice. The sample results shall be compared to the applicable NYSDEC Residential, Restricted Residential and Unrestricted Use SCOs, with the goal of delineating and remediating to the RRUSCOs.

Additionally, four (4) soil samples will be collected from the base of the open excavation within the Site building. Soils will be sampled from a depth of approximately 1.5 to 4 feet bgs depending on the depth of encountered bedrock in that location.

6.3 Vapor and Air Sampling

6.3.1 Sub-slab and Exterior Soil Vapor Sampling

Prior to completing the Pneumatic Sub-slab Communication Study described in Section 6.1.3 and the soil sampling described in Section 6.2, five sub-slab vapor samples will be obtained from building interiors: comprised of two (2) sub-slab vapor probes in the basement of the Site, two (2) sub-slab soil vapor probes in the basement of the adjacent building to the north at 684 9th

AEI Consultants

Avenue, and one (1) sub-slab vapor probe in the basement of the adjacent building to the east at 361 West 47th Street (Figure 4).

Foundations for the Site building and adjacent buildings are comprised of mortored brick and concrete block, and are likely to extend to the shallow bedrock. This is based on the observations of foundations and shallow bedrock during the initial Site investigation and remedition. Additionally, shallow bedrock is known to be in the area of the Site and the construction of foundations on bedrock when available is the common practice for similar buildings. Therefore, the building foundations are likely inihibiting horizontal migration of soil vapor from the Site building to areas beneath the adjacent buildings and under the sidewalks. However, this will be evaluated in the first step of the Triad plan. Sub-slab soil vapor probes will be completed in the basement of the adjacent building to the north at 684 9th Avenue and in the basement of the adjacent building to the east at 361 West 47th Street to evaluate the vapor intrusion pathway including the effects of foundation walls. The sub-slab communication study will also evaluate the foundation walls and their effect on vapor migration. Additionally, bedrock depths will be obtained during the initial rock cores.

Two (2) exterior soil vapor probes will be completed from underneath the sidewalks located to the south (along 47th Street) and west of the Site (along 9th Avenue), unless modified by the Triad approach described above in Section 5.1 Sampling Strategy. These two (2) probes in the sidewalks would be subjected to review by the NYSDEC and NYSDOH using the Triad approach if interior vapor results show limited migration and the communication study indicates that the exterior foundations are inhibiting vapor movement. The real time measurements of air pressures and chemical concentrations using field instrumentation, backed up by rapid turn-around laboratory analyses of vapor chamical concentrations will provide information for the Triad team to modify the work plan if appropriate.

Soil vapor sampling will be conducted in accordance with the the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006), updated in May 2017and DER-10 Section 3.6.. The sub-slab soil vapor probes will be installed to a depth of 2 inches beneath the existing building slab. Exterior soil vapor samples will be installed using manual coring equipment to a maximum depth of 10 feet bgs, or refusal of drilling equipment.

Temporary sub-slab soil vapor ports will be constructed with inert tubing of 0.25-inch diameter. The tubing will not extend more than 2 inches beneath the floor slab. The port will be sealed to the surface with non-VOC-containing and non-shrinking products for temporary installations. After sub-slab port installation and prior to sampling, a helium leak test will be performed and a one to three volume purge will occur in order to ensure vapors are not leaking from the port and a representative sample will be collected.

The exterior soil vapor points will be advanced by drilling up to 10 feet bgs, inserting tubing into the base of the borehole, filling the bottom three feet of the annular space around the sample port with sand, and sealing the remainder of the borehole with bentonite clay. Like the sub-slab probes, the annular space will be leak-checked using an inert tracer gas (i.e., helium) to verify that the soil vapor probes are not drawing ambient air during sample collection.

The soil vapor samples will be collected in a stainless steel Summa® canister (e.g. 1-Liter etc.) The canister will be individually cleaned, tested, and certified by a NYSDOH-certified laboratory for air tightness and proper vacuum prior to sampling. Prior to sampling, a vacuum gauge will be attached to the flow controller to measure and record the initial Summa® canister vacuum pressure. The Summa® canister will collect a sample for approximately 24 hours at a flow rate not to exceed 200 ml/min. Once sampling is complete, each Summa® canister valve will be closed tightly while maintaining a slight vacuum prior to sealing [approximately -5 inches of mercury (Hg)]. The following will be recorded for each sample:

- Sample identification (ID)
- Start and stop time
- Initial and final vacuum pressure
- Summa® canister and flow controller IDs
- Sample location
- Identity of the sampler
- Helium leak test results
- Soil vapor purge volume

The soil vapor samples will represent a 24-hr average, and will be analyzed for VOCs using EPA method TO-15.

6.3.2 Indoor and Outdoor Air Sampling

The indoor air (IA) and outdoor/background air sampling will be conducted in accordance with the Guidance for Evaluating Soil Vapor Intrusion in the State of New York by the NYSDOH.

The indoor air samples will be co-located with the five (5) interior sub-slab soil vapor samples collected in each building. The IA samples will be collected from within the breathing zone; approximately three (3) to five (5) feet above the ground surface. The air sampling equipment will be provided by a NYSDEC-certified laboratory. The IA and background air samples will be collected using 6-L capacity SUMMA canisters equipped with a regulator-flow controller. Each canister will be individually cleaned, tested, and certified by the laboratory for air tightness and proper vacuum. The regulator flow controller will be calibrated by the laboratory to allow for air samples to be collected over a 24-hour period.

Five (5) indoor air samples will be collected: two (2) samples from the basement of the Site building co-located with the sub-slab vapor probes in the basement of the Site, two (2) samples from the basement of the adjacent building to the north at 684 9th Avenue co-located with the sub-slab vapor probes in the north adjacent building, and one (1) indoor air sample in the basement of the adjacent building to the east at 361 47th Street, co-located with the sub-slab vapor probe in the east adjacent building. One (1) outdoor/background air sample will be collected from an outdoor area between 361 47th Avenue and 682 9th Avenue. The proposed locations are illustrated on Figure 4. The samples will be collected into 6-Liter stainless steel SUMMA canisters. Prior to sampling, a vacuum gauge will be attached to the flow controller to measure and record the initial SUMMA canister vacuum pressure. Once sampling is complete, each SUMMA canister valve will be closed tightly while maintaining a slight vacuum prior to sealing (approximately -5 inch Hg). The following will be recorded for each sample:

- Sample identification (ID);
- Start and stop time;
- Initial and final vacuum pressure;
- SUMMA canister and flow controller IDs;
- Sample location;
- Identity of the sampler;

The indoor and ambient air samples will represent a 24-hr average, and will be analyzed for VOCs per EPA method TO-15. Per NYSDOH requirements, laboratory detection/reporting limits for TCE, cis-1, 2-dichloroethene, 1, 1-dichloroethene, carbon tetrachloride, vinyl chloride in indoor air will be 0.20 ug/m3 and all laboratory data will be reported in units of ug/m3.

A Building Questionnaire and Product Inventory will also be completed for each sampled structure. This inventory will be compared to indoor air results.

6.4 Bedrock Coring, Monitoring Well Installation, and Groundwater Sampling

6.4.1 Bedrock Coring and Monitoring Well Installations

The Sampling Plan calls for five (5) bedrock cores finished as double cased (as outlined in Section 6.4.1 paragraph 8), groundwater monitoring wells; however, this plan may be modified by the Triad approach as explained above in Section 5.1 Sampling Strategy. A minimum of three (3) monitoring wells will be installed to evaluate the depth of groundwater and flow direction. Modifications would be done only after consultation with and approval by the NYSDEC and NYSDOH. The intent is to provide flexibility in the sampling plan to take advantage of the initial information developed by the program. Unless modified, the five (5) proposed rock cores and monitoring well locations shown on Figure 3 will be completed.

The Triad approach may be most beneficial for the groundwater investigation. The records search has indicated that groundwater may be present at 20 to 25 feet bgs in bedrock and under artesian pressure (as illusted in Figure 6). Additionally, drilling in the sidewalk of 9th Avenue and 47th Street is a burden on the numerous pedestrians and vehicles that use these streets, and contain aged and frail utilities whose locations cannot be known with certainty. Therefore, an approach is proposed to prepare to make all rock cores and install all wells, but then evaluate the plan as the initial cores and wells are completed.

Initially, one (1) rock core, BC/GW-1, will be completed following the double casing protocol (as outlined in Section 6.4.1 paragraph 8) and in an area of the basement outside the area of highest soil and vapor contamination. Both the double casing and initial location will minimize the risk of pulling contamination to deeper levels while drilling is done to evaluate the depth of groundwater. Using what is learned from this first core, a second core, BC/GW-2, will be completed in the area of highest contamination. A major objective of these installations is to determine if sufficient groundwater is present within the shallow bedrock to finish the cores as monitoring wells and to warrant the installation of additional wells. If groundwater is present in the bedrock, then these cores will be finished as permanent groundwater monitoring wells. If completed as wells, then water pressures, well recharge and head space chemical concentrations will be measured in real time to assist the Triad decision making.

Following the completion of the two cores and wells within the Site building, the additional wells in the sidewalks of 9th Avenue and 47th Street, and the well in 361 47th Street will be completed unless this plan is modified by the NYSDEC. Modification may be appropriate if no groundwater is encountered, or the groundwater encountered is under artesian pressures such that an impact from Site contamination is unlikely. Since the presence of dense non-aqueous phase liquid (DNAPL) was indicated in soil sample AEI-B8 collected from the basement of the Site building, there is the possibility that PCE DNAPL may overcome expected hydraulic gradients at the Site; therefore, futher characterization may be required even if groundwater is observed to be under artesian pressure. This determination would be made by the NYSDEC after consultation in the event conditions warrant modification.

Bedrock cores will be advanced using a track access Geoprobe® and remote access portable mud rotary rock coring unit. In the direct-mud rotary drilling method, the borehole is advanced by rapid rotation of a drill bit mounted on the end of the drill rods. The bit cuts and breaks the material at the bottom of the hole into small pieces (cuttings). The cuttings are removed by pumping drilling fluid (water mixed with a fluid enhancer, such as bentonite) down through the drill rods and bit and up the annulus between the borehole and the drill rods. The drilling fluid also serves to cool the drill bit and stabilize the borehole wall, to prevent the flow of fluids between the borehole and surrounding earth materials, and to reduce cross-contamination between aquifers.

The rock cores will be completed using a tri-pod mounted remote access portable mud rotary rock coring unit which has the capability of advancing a maximum of 20 feet below grade. The rock cores will be advanced to the maximum capabilities of the drilling technology in use, 20 feet below the basement floor, which equates to adepth of approximately 30 feet bgs.

The wells will be drilled from the surface down to a minimum of five (5) feet into competent bedrock. Since weathered/friable bedrock is the most transmissive, the double-cased portion of the well must be drilled into competent bedrock to prevent potential cross-contamination from the shallow interval to the lower water-bearing unit. If groundwater is encountered in the weathered / friable bedrock, a sample of that groundwater will be collected.

Rock Quality Designation (RQD), a measure of quality of rock core taken from a borehole which signifies the degree of jointing or fracture in a rock mass measured in percentage, will be employed to determine when competent rock is encountered. The initial cores will be advanced to an interval where RQD is 75% or more and then the casing will be placed from the surface of the well into the terminus of the drilled hole and tremmie grouted. Once the grout sets, drilling will then continue within the grouted casing through to a deeper bedrock interval (RQD of at least 75-80%) approximately 10 to 20 feet below the basement floor. Screened PVC will be installed in the deeper interval in order to sample the groundwater within the competent bedrock. By drilling the well in this manner, the deeper interval will be isolated from shallow contamination.

As described above, since the well will traverse through a known or suspected contaminated area into a lower water bearing unit, they will be double-cased (as outlined in Section 6.4.1 paragraph

8). The outer-most well casing will be constructed into the first significant confining layer which separates the lower water bearing unit from any such contamination.

Continuous cores will be collected and continuously screened using a PID and visual methods for evidence of contamination, presence of DNAPL, and observed for inflow of water from leaking pipes in the building. Cores will be screened using a hydrophobic dye (Sudan IV dye or Red Oil O) to identify free-phase or residual DNAPL in the subsurface, both above and below the water table through the use of a jar shake test.

Bedrock cores will also be observed for fractures using core orientation. Core orientation is the process by which the original in situ position or orientation of a core cylinder is determined by a, a mark, groove, or line placed on the surface of the core and the in situ azimuth of the marking is determined with respect to geographic north. The cores will be oriented to facilitate measurement of directional properties in the rock including features such as bedding, cross-bedding, and fractures.

The interior of the cores will be screened using a PID and visual methods for evidence of contamination. One (1) bedrock core sample will be selected from each core location for laboratory analysis at the depth interval that represents the highest likelihood of contamination based on field screening results.

The newly installed monitoring wells will be developed by purging and/or pumping the water in the well to loosen and remove suspended fines. Measurements of the water volume removed and water quality parameters including temperature, pH, conductivity, and turbidity will be recorded at regular intervals throughout the development process. Development will continue until the NYSDEC standard of 50 Nephelometric Turbidity Unit (NTU) is measured with a nephelometer and water is visibly free of sediment.

While the direction of local groundwaster flow is uncertain, the regional hydraulic gradient will likely be west toward the Hudson River. Local flow will likely be controlled by the weathered zone of bedrock or the discrete fracture network of joints in the schist. In order to determine the local groundwater flow direction, the top of the PVC casing for each well will be surveyed by a NY-licensed surveyor and depth to groundwater measurements will be recorded in each well..

6.4.2 Groundwater Sampling and Testing

If groundwater is present in the well, groundwater sampling will be conducted as per the groundwater guidance in DER-10 Section 3.7.2. Prior to collecting each groundwater sample, the well will be gauged for groundwater depth/NAPL using a decontaminated oil-water interface probe. The groundwater samples will be collected from each well with low-flow sampling techniques using dedicated non-teflon lined high density polyethylene (HDPE) and silicon tubing and a peristaltic pump to purge and collect samples for laboratory analysis. When sampling for PFAS, the special precautions and guidelines outlined outlined in the attached Quality Assurance Project Plan (QAPP) will be employed to avoid contamination of environmental samples or site media with PFAS. During purging, groundwater field parameters including pH, specific conductivity, temperature, turbidity, and dissolved oxygen will be measured using a calibrated water quality meter equipped with a flow-through cell. Depending on the yield of the well, a minimum of three well volumes will be removed prior to sample collection. Analytical samples will be collected when water quality parameter measurements have stabilized. Each well will be sampled for analysis listed in the table above.

All groundwater samples will be collected in laboratory supplied sample bottles in accordance with protocols for analysis shown in Table C of Section 5.2. Appropriate QA/QC samples will be collected for the groundwater sampling event including one trip blank, one field duplicate sample, one matrix spike sample, and one matrix spike duplicate sample per day of sampling. Subsequent to sample collection, the groundwater samples will be placed in an ice-filled shipping cooler, and transported under chain-of-custody to a NY-certified analytical laboratory.

Laboratory reporting limits for PFAS in groundwater will be 2 nanograms per liter (ng/L).

The method detection limit for 1,4-dioxane will not exceed 0.35 micrograms per liter (ug/L).

6.5 Field Management of Investigation Derived Waste

Following completion of sample collection, the soil borings and soil vapor points will be backfilled with sand and hydrated bentonite chips. The borings will be completed at the surface to match existing conditions. Soil boring cuttings and purge water from the monitoring well installations will be placed in 55 gallon drums for future disposal, pending receipt of soil and groundwater analytical results.

The following documentation will be established and reported for each disposal destination used in this project to document that the disposal of regulated material exported from the site conforms with applicable laws and regulations: (1) a letter to each disposal facility describing the material to be disposed and requesting written acceptance of the material. This letter will state that material to be disposed is generated at an environmental remediation site in NYC under a governmental remediation program. The letter will provide the project identity and the name and phone number of the Professional Engineer or Volunteer. The letter will include as an attachment a summary of all chemical data for the material being transported; and (2) a letter from each disposal facility stating it is in receipt of the correspondence and is approved to accept the material. These documents will be included in the RIR.

The RiR will include an itemized account of the destination of all material removed from the site during the investigation. Documentation associated with disposal of all material will include records and approvals for receipt of the material. This information will be presented in the RIR.

All soil/fill or other waste removed from the site will be managed and disposed in accordance with applicable laws and regulations. Any soil/fill or other waste that is characterized as non-hazardous material taken off site will be disposed of at a Soil Recycling Facility.

Waste characterization will be performed for off-site disposal in a manner required by the receiving facility and in conformance with its applicable permits. Waste characterization sampling and analytical methods, sampling frequency, analytical results and QA/QC will be reported in the RIR. A manifest system for offsite transportation of exported materials will be employed. Manifest information will be reported in the RIR. Hazardous wastes derived from the site will be stored, transported, and disposed of in compliance with applicable laws and regulations.

6.6 Quality Exposure Assessment

As per the DER-10 Section 3.3, a qualitative exposure assessment for both human health and/or fish and wildlife resources will be completed during the RI to determine the route, intensity, frequency and duration of potential exposures to contaminants. A description of the nature and size of the population potentially exposed to the contaminants that are present at or migrating from a site will follow the DER-10 guidance.

7.0 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

A Quality Assurance Project Plan (QAPP) has been prepared and reviewed by the NYSDEC and NYSDOH. It is provided in this RIWP as Appendix D, and summarized below.

7.1 Analytical Methods

All samples collected during the RIWP will be analyzed using EPA-approved analytical methods that follow the most recent edition of the EPA's "Test Methods for Evaluating Solid Waste" (SW-846), Methods for Chemical Analysis of Water and Wastes" (EPA 600/4-79-020), and Standard Methods for Examination of Water and Wastewater" (prepared and published jointly by the American Public Health Association, American Waterworks Association and Water Pollution Control Federation).

7.2 Laboratory

The subcontracted laboratory will be certified by the New York State Department of Health to perform Contract Laboratory Program (CLP) analysis on all media to be sampled during this investigation. The laboratory will perform the sample analysis in accordance with the most recent NYSDEC Analytical Services Protocol (ASP).

7.3 Data Submittal

Analytical data will be submitted in complete ASP category B data packs. Procedures for chain of custody, laboratory instrumentation calibration, laboratory analyses, reporting of data, internal quality control, and corrective actions shall be followed as per SW-846 and as per the laboratory's Quality Assurance Plan. Where appropriate, trip blanks, field blanks, and field duplicates shall be performed at a rate of 5% and will be used to assess the quality of the data. The laboratory's in-house QA/QC limits will be utilized whenever they are more stringent than those suggested by the EPA methods. Preliminary data will be submitted to the NYSDEC and the NYSDOH as soon as the data becomes available.

7.4 Data Usability Summary Report

The data package will be evaluated for accuracy and precision of the analytical results. A Data Usability Summary Report (DUSR) will be prepared to describe the compliance of the analyses with the analytical method protocols detailed in the NYSDEC Analytical Services Protocol (ASP).

The DUSR will provide a determination of whether the data meets the project-specific criteria for data quality and data use. The validation effort will be completed in accordance with NYSDEC Division of Environmental Remediation DUSR guidelines.

8.0 HEALTH AND SAFETY

Field tasks will be performed using industry standard health and safety procedures. A site-specific Health and Safety Plan (HASP) has been prepared, reviewed and approved by the NYSDEC and NYSDOH. This plan details known and potential hazards of the Site and field tasks as well as air monitoring and emergency procedures. The HASP is included with this RIWP as Appendix C.

9.0 COMMUNITY AIR MONITORING

All of the planned RIWP work will be completed within the Site building and the adjacent building to the north. Where intrusive drilling operations are planned, community air monitoring will be performed to protect the downwind community. An AEI representative will monitor the breathing air in the work area and exclusion zone using PID instrumentation capable of measuring total VOCs in air at concentrations as low as 1 part per million (ppm). The air in the work zone also will be visually monitored for dust generation. If sustained VOC measurements above 5 ppm, or visible dust generation is observed in the work area, work will be suspended until dust and VOC levels return to acceptable levels. If elevated dust and/or VOC levels persist, mitigation measures (i.e., water for dust control, odor-suppressant foam, etc.) and alternate work practices will be employed to control fugitive dust/VOC levels. At no time will work continue if elevated dust or VOC levels at the exclusion zone are detected. More rigorous monitoring of VOCs and dust using recordable meters may be utilized, as appropriate, in accordance with the NYSDOH Generic Community Air Monitoring Plan (CAMP). CAMP data will be reported to the NYSDEC and NYSDOH Project Managers on a daily or weekly basis; if exceedances of action levels are detected, information regarding CAMP action level exceedances and Corrective Actions taken will be provided to the NYSDEC and the NYSDOH project managers the same business day of occurrence. CAMP reports will include a figure depicting daily work zones, wind direction, and other appropriate site information including specific work activities.

A copy of the CAMP is provided with the HASP in Appendix C.

10.0 PROJECT ORGANIZATION

AEI has established a project team for this project whose collective qualifications and experience are strongly suited for successful completion of the project. The proposed responsibilities of the key staff are summarized below:

Anthony Cauterucci, CHMM, will be the Project Manager for the work. In this capacity Mr. Cauterucci will be responsible for the successful completion of each task including coordination and supervision of subcontractors, engineers and scientists, and adherence to the work plan, schedule and budget.

David Bausmith, PE, will be the Quality Leader, responsible for the development of the work plan, and maintaining quality assurance policies that pertain to all aspects of sample acquisition and data management.

John A. Rhodes, PE, will act as an advisor for initial remedial investigation activities as preparations are made for remediation. Mr. Rhodes will be the supervising professional engineer for remediation activities.

11.0 REPORTING

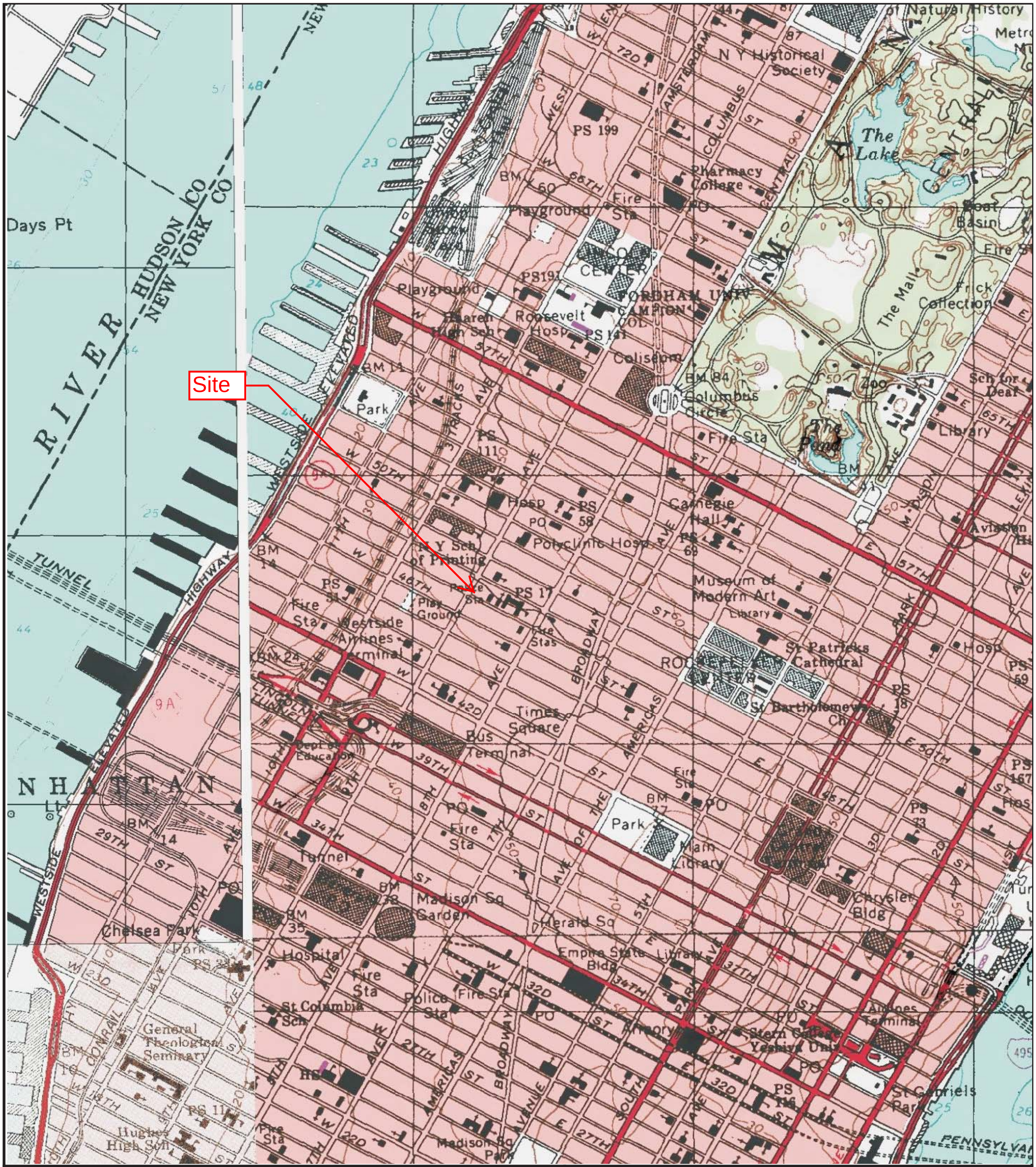
Following receipt of the validated analytical results, AEI will prepare a Remedial Investigation Report. Preparation of the report will entail a summary of fieldwork performed to date; data collected, and will include appropriate summary data tables, soil boring logs, analytical results, and maps. As requested by the NYSDEC and NYSDOH, draft soil vapor, sub-slab soil vapor, indoor, and ambient air sampling data will be provided to the NYSDEC and NYSDOH as soon as the data becomes available. The data will be accompanied by a completed Building Questionnaire and Product Inventory Form.

12.0 PROJECT SCHEDULE

The following is the anticipated schedule for execution of the RIWP:

- Submission of revised RIWP – October 12, 2018
- NYSDEC Review/Approval of RIWP – October 2018
- Soil, Soil Vapor, Rock Core, and Groundwater Sampling – November 15-30, 2018
- Submit RIR to DEC – December 2018
- Submit Remedial Action Work Plan (RAWP) – Draft RAWP – January 2019
- RAWP – NYSDEC RAWP review – January 2019
- RAWP – Final RAWP preparation – 45-day public comment period – February 2019
- RAWP – NYSDEC approval of Final RAWP and issuance of Decision Document – March 2019
- Implementation of Remedial Action (RA) – Preparation – March 2019
- Implementation of RA – April 2019
- Submit Site Management Plan (SMP) – May 2019
- Draft Final Engineering Report – May/June 2019
- Final Engineering Report Approval/Certificate of Approval – July 2019

FIGURES



LEGEND

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Source: USGS

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20 Gibson Place, Suite 310, Freehold, New Jersey

TOPOGRAPHIC MAP

682 9th Avenue
New York, NY 10036

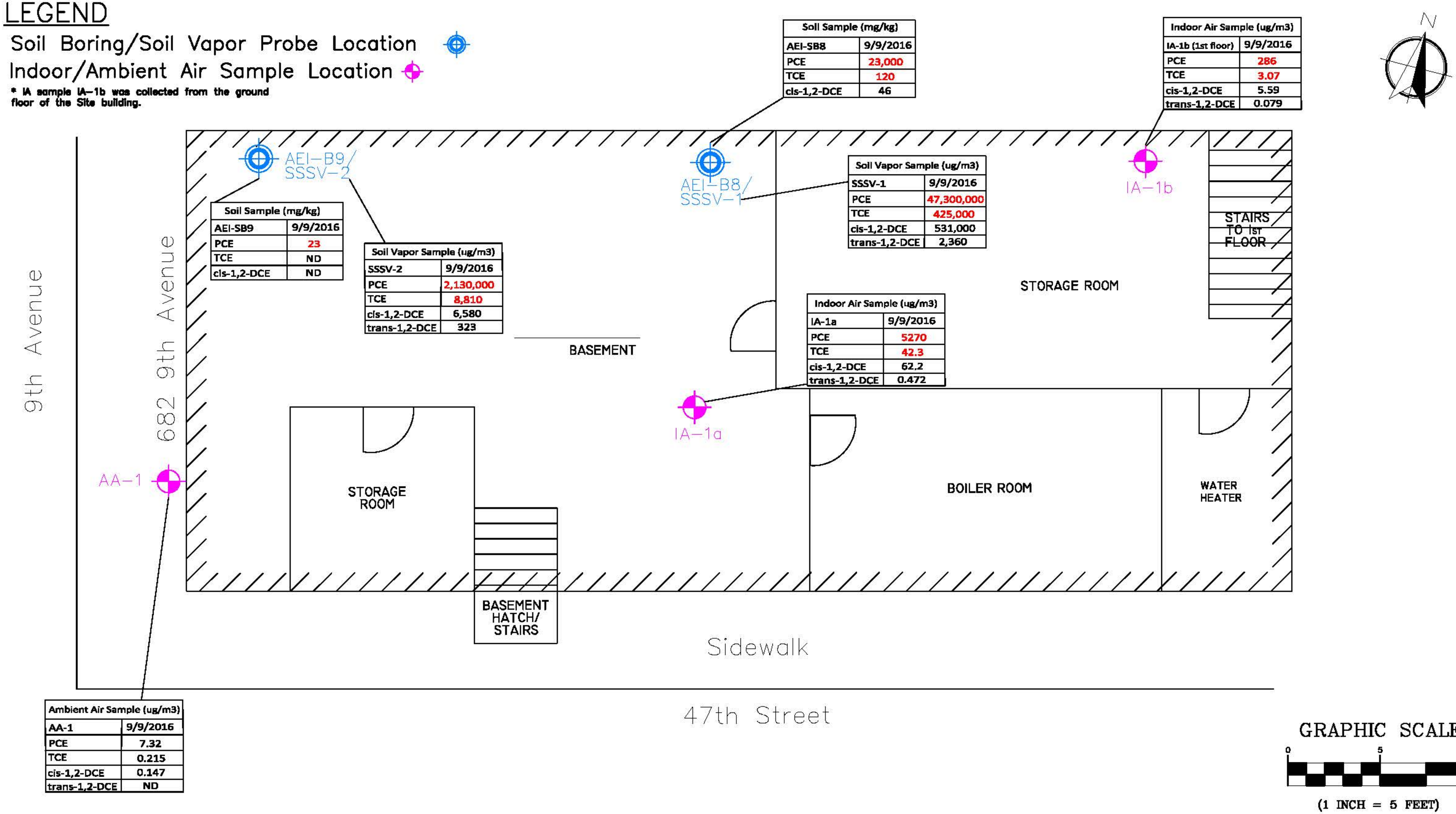
FIGURE 1
Project No. 368024

LEGEND

Soil Boring/Soil Vapor Probe Location

Indoor/Ambient Air Sample Location

* IA sample IA-1b was collected from the ground floor of the Site building.



Soil Sample (mg/kg)	
AEI-SB9	9/9/2016
PCE	23
TCE	ND
cis-1,2-DCE	ND

Soil Vapor Sample (ug/m3)	
SSSV-2	9/9/2016
PCE	2,130,000
TCE	8,810
cis-1,2-DCE	6,580
trans-1,2-DCE	323

Soil Sample (mg/kg)	
AEI-SB8	9/9/2016
PCE	23,000
TCE	120
cis-1,2-DCE	46

Soil Vapor Sample (ug/m3)	
SSSV-1	9/9/2016
PCE	47,300,000
TCE	425,000
cis-1,2-DCE	531,000
trans-1,2-DCE	2,360

Indoor Air Sample (ug/m3)	
IA-1b (1st floor)	9/9/2016
PCE	286
TCE	3.07
cis-1,2-DCE	5.59
trans-1,2-DCE	0.079

Indoor Air Sample (ug/m3)	
IA-1a	9/9/2016
PCE	5270
TCE	42.3
cis-1,2-DCE	62.2
trans-1,2-DCE	0.472

Ambient Air Sample (ug/m3)	
AA-1	9/9/2016
PCE	7.32
TCE	0.215
cis-1,2-DCE	0.147
trans-1,2-DCE	ND

AEI Consultants
Environmental & Engineering Services

DRAWN BY: A Cauterucci

REVIEWED BY: D Bausmith

APPROVED BY D Bausmith

Date: 6/14/2017

SITE MAP

682 9th Avenue
New York, New York 10036

AEI Project #368024

NYSDEC BCP #C231106

FIGURE 2

LEGEND

AEI Soil Boring/Soil Vapor Sample (September 2016)

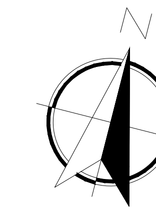
Area of Excavation (May 2017)

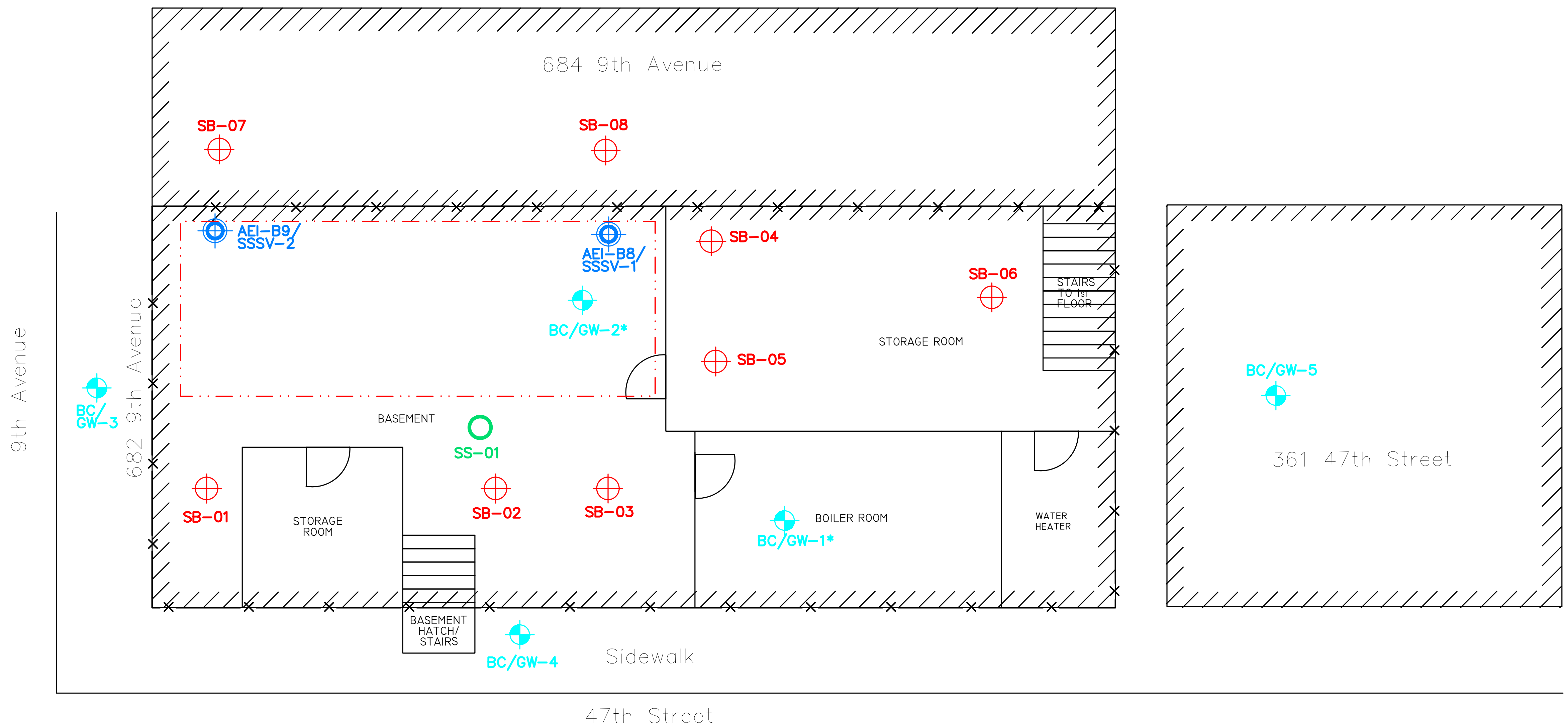
Proposed Soil Boring Location

Proposed Floor Drain Sediment Sample Location

Proposed Bedrock Core/Groundwater Monitoring Well

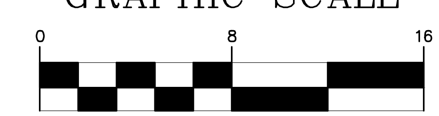
Site Boundary





* BC/GW–1 will be completed first, followed by BC/GW–2, then information will be used to discuss modification to plan for installing remaining rock cores and wells per the Triad approach as outlined in DER–10.

GRAPHIC SCALE



(1 INCH = 8 FEET)

AEI Consultants	DRAWN BY: A Cauterucci	REVIEWED BY: D Bausmith	Proposed Remedial Investigation Plan Soil And Groundwater 682 9th Avenue New York, New York 10036	AEI Project #368024 NYSDEC BCP #C231106	FIGURE 3
	APPROVED BY J Rhodes	Date: 7/13/2018			

LEGEND

AEI Soil Boring/Soil Vapor Sample (September 2016)

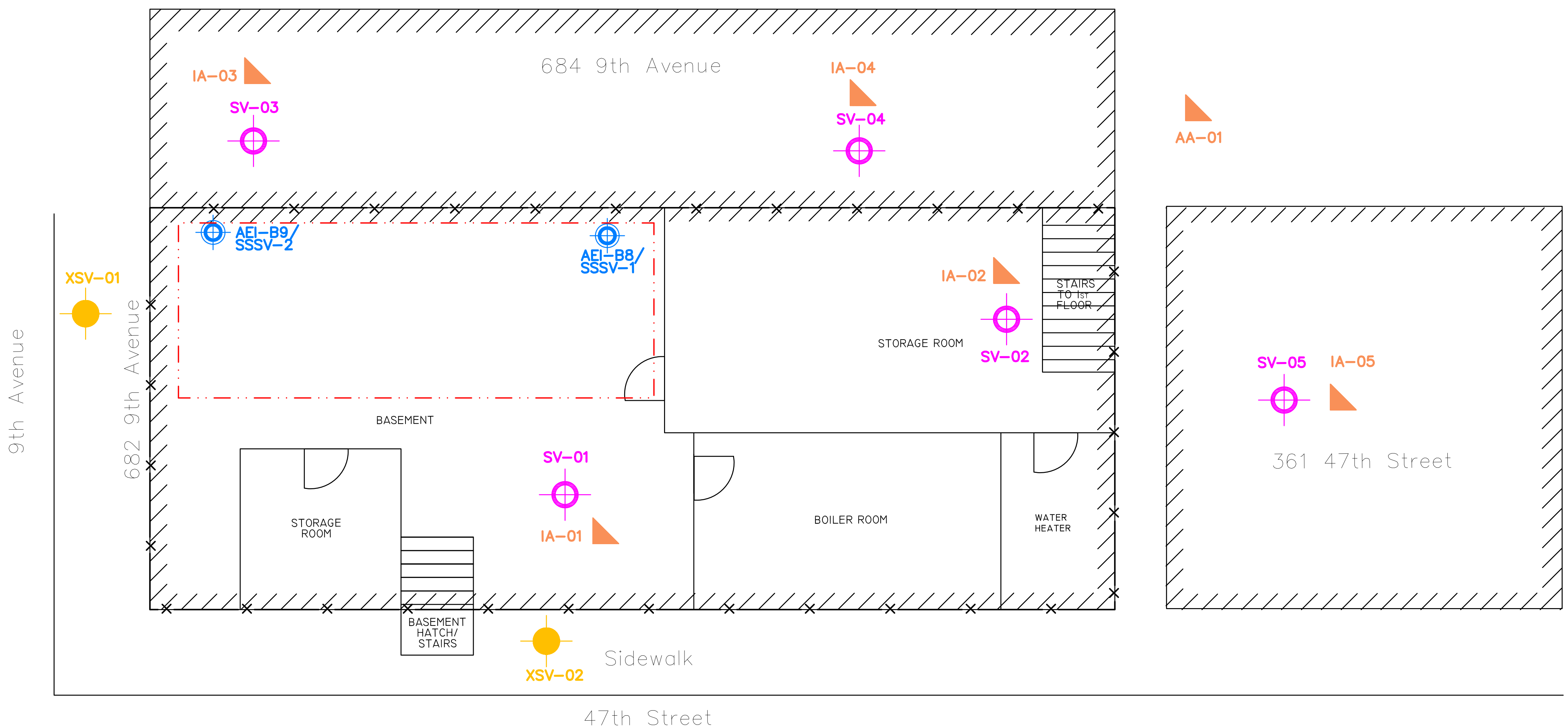
Area of Excavation (May 2017)

Proposed Sub-Slab Soil Vapor Probe

Proposed Exterior Soil Vapor Probe*

Proposed Indoor/Ambient Air Sample

Site Boundary



*Sub–slab soil vapor probes SV–01 through SV–05 will be completed first, then information will be used to discuss modification to plan for installing exterior soil vapor probes XSV–01 and XSV–02 per the Triad approach as outlined in DER–10.

GRAPHIC SCALE

0 8 16

(1 INCH = 8 FEET)

AEI Consultants

DRAWN BY: A Cauterucci	REVIEWED BY: D Bausmith
APPROVED BY J Rhodes	Date: 9/5/2018

Proposed Remedial Investigation Plan
Soil Vapor and Indoor Air

682 9th Avenue
New York, New York 10036

AEI Project #368024
NYSDEC BCP #C231106

FIGURE 4

LEGEND

AEI Soil Boring/Soil Vapor Sample (September 2016)

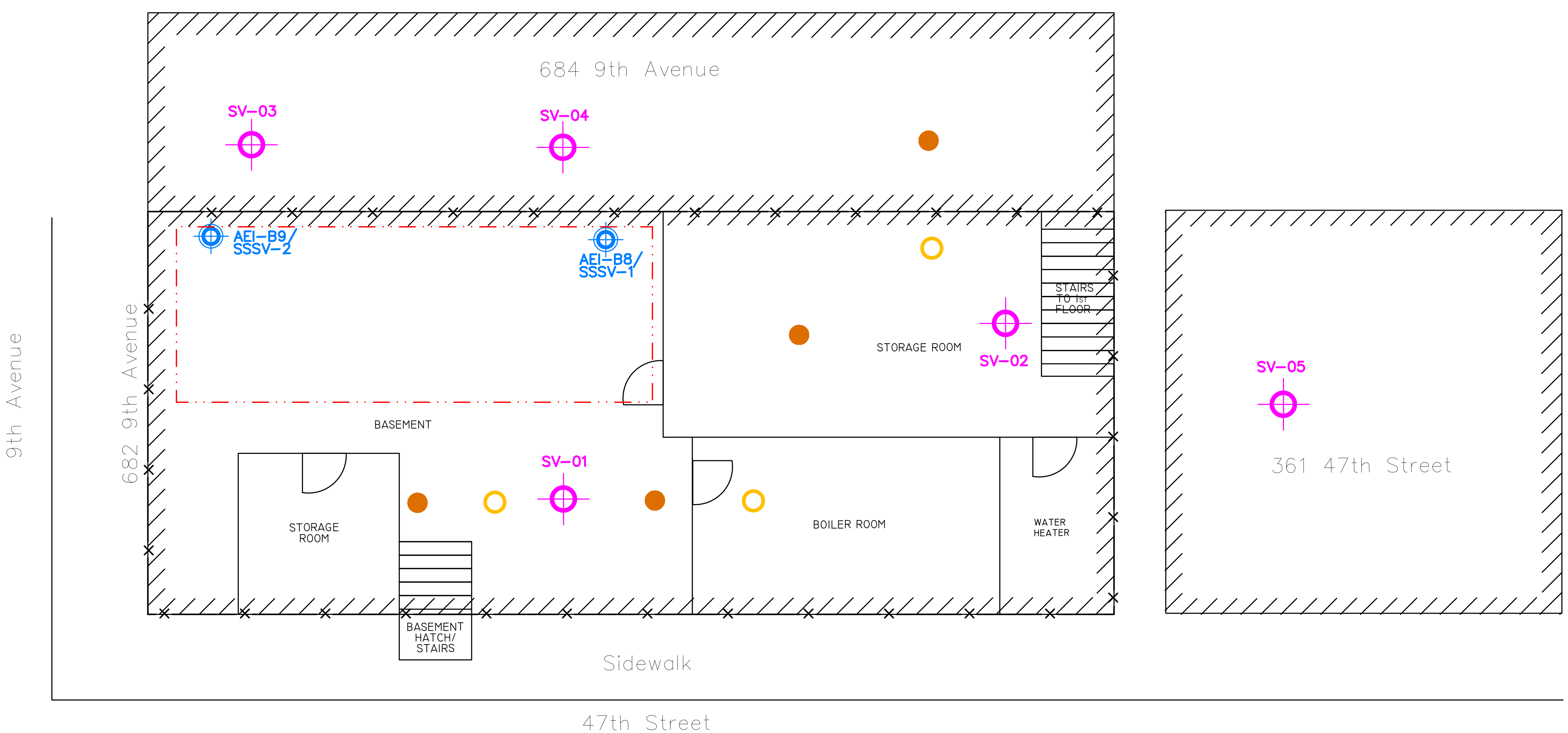
Area of Excavation (May 2017)

Proposed Sub–Slab Soil Vapor Probe

Proposed Negative Pressure (Air Extraction Point) Probe

Proposed Communication Gauging Probe

Site Boundary

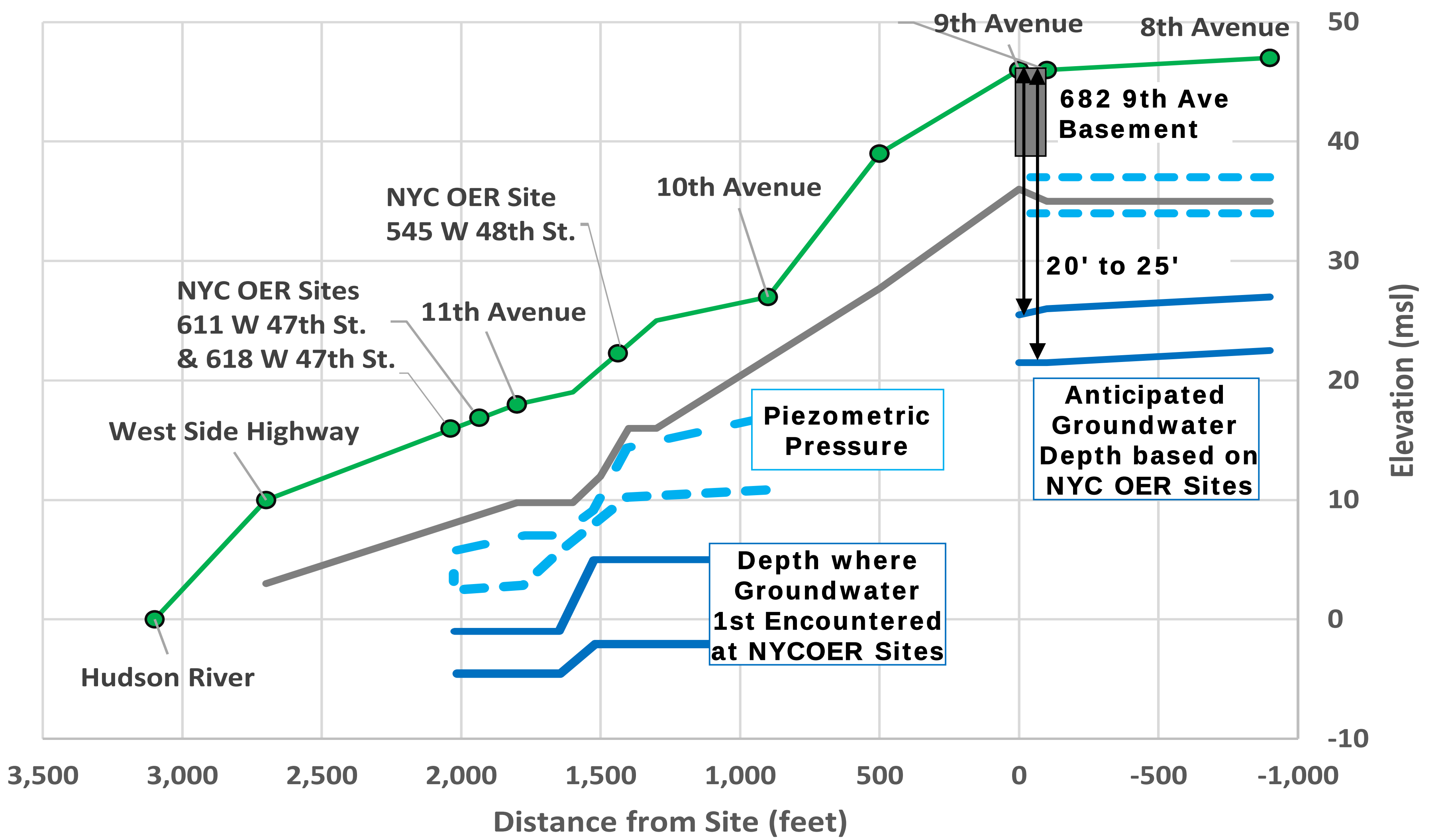


GRAPHIC SCALE

0 8 16

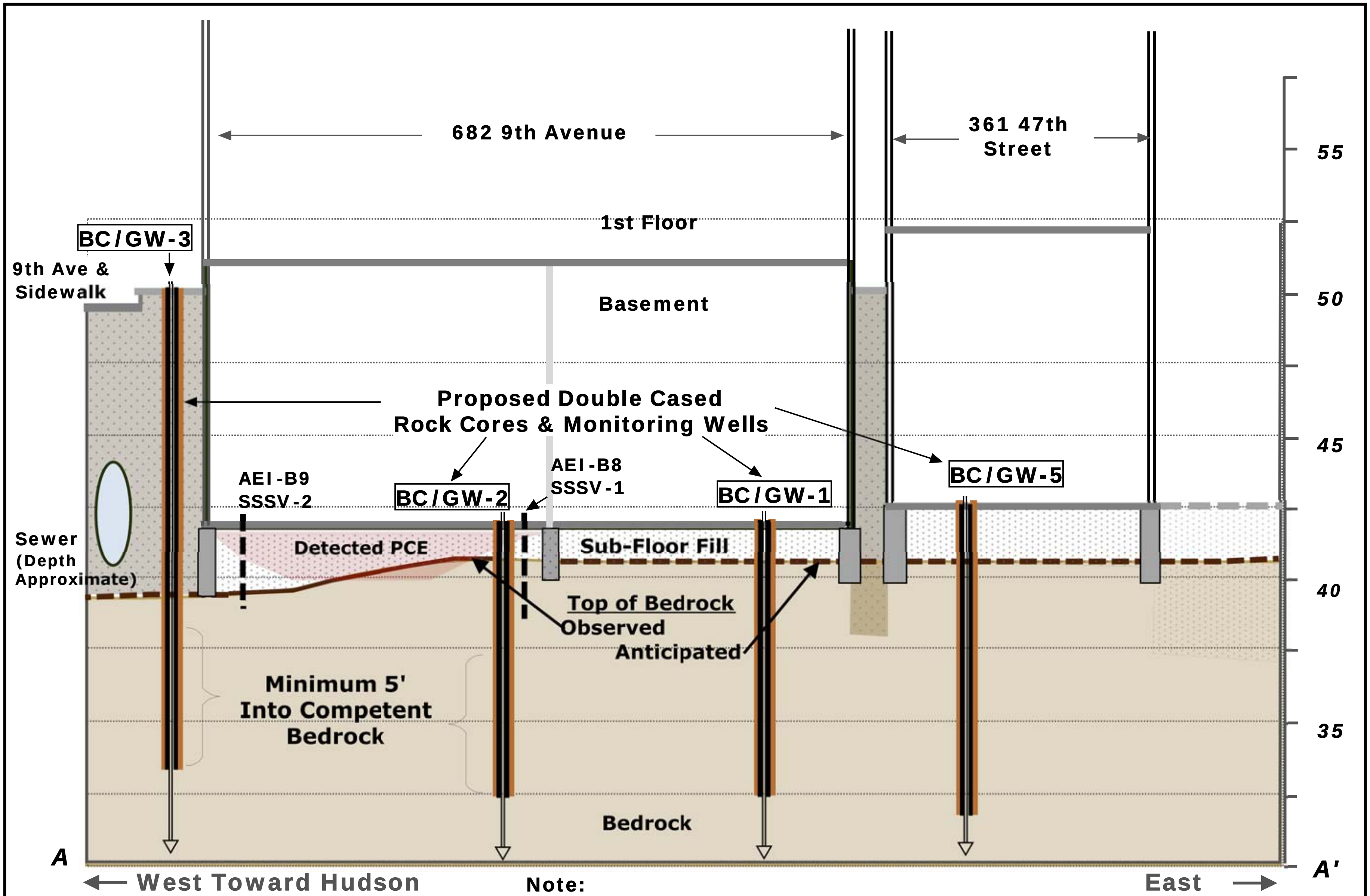
(1 INCH = 8 FEET)

AEI Consultants	DRAWN BY: A Cauterucci	REVIEWED BY: D Bausmith	Proposed Remedial Investigation Plan Sub–Slab Communication Study 682 9th Avenue New York, New York 10036	AEI Project #368024 NYSDEC BCP #C231106	FIGURE 5
	APPROVED BY J Rhodes	Date: 7/13/2018			



John A. Rhodes, PE

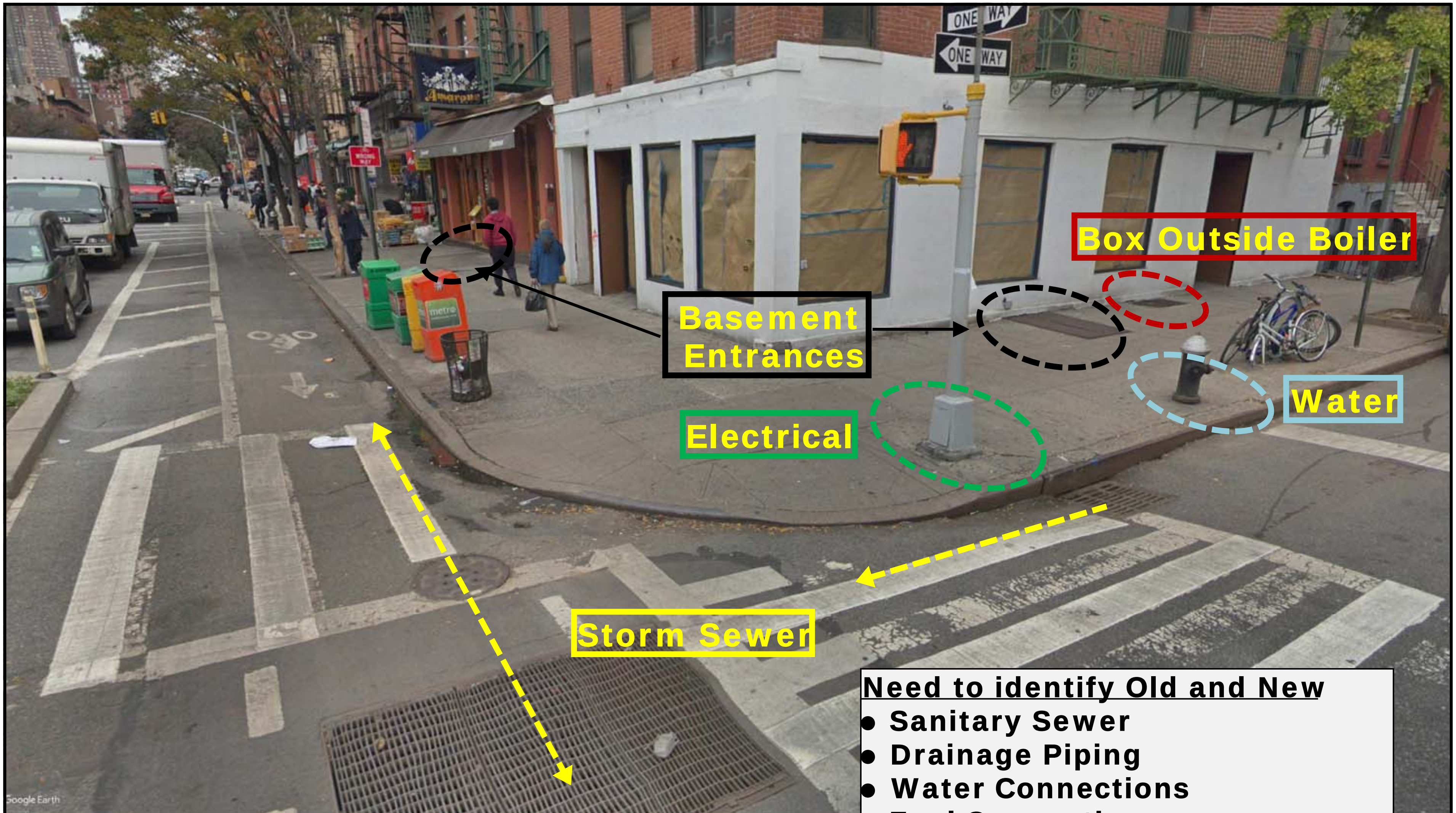
Figure 6 Regional Section
Along 47th Street



Note:
This is a conceptual plan.
Locations are approximate.
Not for construction.

John A. Rhodes, PE

Figure 7 Building Section



Need to identify Old and New

- Sanitary Sewer
- Drainage Piping
- Water Connections
- Fuel Connections
- Electrical Connections
- Former PCE Connections, if any
- Data Lines

Figure 8 Google Street Level View

John A. Rhodes, P.E.

TABLES

TABLE 1: SOIL SAMPLE DATA SUMMARY
682-684 9th Avenue, New York, NY 10036

Analysis	Units	AEI-SB8 9/9/2016 2.5-3.0 (feet bgs)	AEI-SB9 9/9/2016 2.5-3.0 (feet bgs)	NYSDEC Unrestricted SCO	NYSDEC Restricted Commercial SCO
CVOCs via 8260:					
Tetrachloroethene	mg/kg	$\boxed{23,000}$	**23**	1.3	150
Trichloroethene	mg/kg	**120**	ND	0.47	200
cis-1,2-Dichloroethene	mg/kg	**46**	ND	0.25	500
1,2-Dichloroethene, Total	mg/kg	46	ND	NS	NS
All Other CVOCs	mg/kg	ND	ND	NS	NS

Notes:

mg/kg	milligrams per kilogram
bgs	below ground surface
NS	no standard
Bold	Result exceeds applicable NYSDEC Unrestricted SCO
Boxed	Result exceeds applicable NYSDEC Restricted Commercial SCO

Comparision Values:

NYSDEC Unrestricted SCO	New York State Department of Environmental Conservation - Unrestricted Soil Cleanup Objective
NYSDEC Commercial Residential SCO	New York State Department of Environmental Conservation - Restricted Commercial Soil Cleanup Objective

TABLE 2: SUB-SLAB SOIL VAPOR SAMPLE DATA SUMMARY
682-684 9th Avenue, New York, NY 10036

Analysis	Units	SSSV-1 9/9/2016	SSSV-2 9/9/2016	NYSDOH Matrix 2 SSV Criteria	NYSDOH Matrix 1 SSV Criteria
CVOCs via TO-15:					
Tetrachloroethene	ug/m3	**47,300,000**	**2,130,000**	100	NS
Trichloroethene	ug/m3	$\boxed{425,000}$	$\boxed{8,810}$	NS	5
cis-1,2-Dichloroethene	ug/m3	531,000	6,580	NS	NS
trans-1,2-Dichloroethene	ug/m3	2,360	323	NS	NS
All Other CVOCs	ug/m3	ND	ND	NS	NS

Notes:

ug/m3	micrograms per cubic meter
NS	no standard
Bold	Result exceeds applicable NYSDOH Matrix 2 SSV Criteria
Boxed	Result exceeds applicable NYSDOH Matrix 1 SSV Criteria

Comparision Values:

NYSDOH Matrix 1 - SSV Criteria	New York State Department of Health - Matrix 1 - Sub-Slab Vapor Concentration for TCE
NYSDOH Matrix 2 - SSV Criteria	New York State Department of Health - Matrix 2 - Sub-Slab Vapor Concentration for PCE

TABLE 3: INDOOR/AMBIENT AIR SAMPLE DATA SUMMARY
682-684 9th Avenue, New York, NY 10036

Analysis	Units	IA-1a 9/9/2016	IA-1b 9/9/2016	AA-1 9/9/2016	NYSDOH IA Guidance Criteria
CVOCs via TO-15:					
Tetrachloroethene	ug/m3	5270	286	7.32	30
Trichloroethene	ug/m3	42.3	3.07	0.215	2
cis-1,2-Dichloroethene	ug/m3	62.2	5.59	0.147	NS
trans-1,2-Dichloroethene	ug/m3	0.472	0.079	ND	NS
All Other CVOCs	ug/m3	ND	ND	ND	NS

Notes:

ug/m3	micrograms per cubic meter
NS	no standard
Boxed	Result exceeds applicable NYSDOH IA Guidance Criteria

Comparision Values:

NYSDOH IA Guidance Criteria — New York State Department of Health - Indoor Air Guidance Criteria

APPENDIX A

BORING LOGS

BORING NUMBER AEI-SB8

AEI Consultants
Environmental & Engineering Services

CLIENT MJW 47
PROJECT NAME 682 9th Avenue
PROJECT NUMBER 368024
PROJECT LOCATION 682 9th Ave., NYC, NY
DATE STARTED 9/9/16 **COMPLETED** 9/9/16
GROUND ELEVATION **HOLE SIZE** 2 inches
DRILLING CONTRACTOR AEI
GROUND WATER LEVELS:
DRILLING METHOD Hand Auger
AT TIME OF DRILLING ---
LOGGED BY Anthony Cauterucci **CHECKED BY**
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS	PID DATA (ppm)	GRAPHIC LOG	MATERIAL DESCRIPTION	COMPLETION
0					Concrete	
				0.5	Light brown sandy silt with weathered schist	
1						
2						
	AEI-SB8					
3				3.0		

Bottom of borehole at 3.0 feet.

BORING NUMBER AEI-SB9

AEI Consultants
Environmental & Engineering Services

CLIENT MJW 47
PROJECT NAME 682 9th Avenue
PROJECT NUMBER 368024
PROJECT LOCATION 682 9th Ave., NYC, NY
DATE STARTED 9/9/16 **COMPLETED** 9/9/16
GROUND ELEVATION **HOLE SIZE** 2 inches
DRILLING CONTRACTOR AEI
GROUND WATER LEVELS:
DRILLING METHOD Hand Auger
AT TIME OF DRILLING ---
LOGGED BY Anthony Cauterucci **CHECKED BY**
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS	PID DATA (ppm)	GRAPHIC LOG	MATERIAL DESCRIPTION	COMPLETION
0					Concrete	
0.5					Light brown sandy silt with weathered schist	
1						
2						
3	AEI-SB9					
3.0					Bottom of borehole at 3.0 feet.	

APPENDIX B

SEPTEMBER 2016 - LIMITED PHASE II INVESTIGATION REPORT

June 13, 2017

LIMITED PHASE II SUBSURFACE INVESTIGATION

Property Identification:
682 9th Avenue
New York, New York 10036

AEI Project No. 368024
NYSDEC Spill #1701031

Prepared for:
MJW 47 LLC
302 East 52nd Street, Suite 200
New York, New York 10021

Prepared by:
AEI Consultants
20 Gibson Place, Suite 310
Freehold, New Jersey 07728
(732) 414-2720

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APPENDICES

June 13, 2017

Robert Schwartz
MJW 47 LLC
302 East 52nd Street, Suite 200
New York, New York 10021

Subject: **Limited Phase II Subsurface Investigation**
682 9th Avenue
New York, New York 10036
AEI Project No. 368024

AEI Consultants (AEI) is pleased to provide this report which describes the activities and results of the Limited Phase II Subsurface Investigation (Phase II) performed at the above-referenced Site (Figures 1 and 2).

1.0 SITE DESCRIPTION

The Site is located on the east side of 9th Avenue in a mixed residential and commercial area of New York, New York, and consists of one (1) four-story building with a basement. The location of the Site is depicted on Figure 1. The Site was formerly occupied by a commercial tenant on the ground floor but the space is currently vacant. Vacant residential apartments are present on the top floors. A dry cleaners formerly operated on the ground floor of the Site building.

Based on a review of the United States Geological Survey (USGS) Central Park, New York Quadrangle Topographic Map, the Site is located at an elevation of approximately 46 feet above mean sea level and slopes to the southwest. The regional topographic gradient direction also slopes toward the southwest and, therefore, the direction of groundwater flow beneath the Site is inferred to be in a southwesterly direction. The closest surface water body is the Hudson River located approximately 0.50 mile to the west of the Site. Groundwater flow is inferred based on topography to be to the southwest, towards the Hudson River.

According to information obtained from the USGS, the area surrounding the Site is underlain by pelitic schist and gneiss deposits of the Manhattan Formation of the Ordovician-era. Based on a review of the United State Department of Agriculture (USDA) Soil Survey for the area of the Site, the soils in the vicinity of the Site are classified as Urban Land. The Urban Land designation indicates that more than 85 percent of the original soils have been disturbed or covered by paved surfaces, buildings or other structures. The soil recovered in the borings advanced during this investigation generally consisted of a light brown sandy silt along with weathered schist (Appendix A).

Refer to Section 4.1 below for additional information on the site geology and groundwater conditions.

2.0 BACKGROUND

A commercial dry cleaning facility formerly operated at 682 9th Avenue, New York, New York (the Site).

For this reason, AEI proposed an investigation to evaluate if the former onsite dry cleaning facility has impacted the subsurface of the Site.

3.0 INVESTIGATION EFFORTS

AEI performed an investigation, including the collection of soil samples, sub-slab soil vapor samples, and indoor air samples to evaluate the presence of tetrachloroethylene (PCE), trichloroethylene (TCE) and related chlorinated volatile organic compounds (VOCs) in the subsurface at the Site, and potential vapor intrusion (VI) of these compounds.

3.1 Health and Safety Plan

A site-specific health and safety plan was prepared, reviewed by onsite personnel, and kept onsite for the duration of the fieldwork.

3.2 Permitting and Utility Clearance

Drilling permits were not required for this investigation. The public underground utility locating service was notified to identify public utilities in the work area.

3.3 Indoor Air Sample Collection

On September 8th and 9th, 2016, two indoor air samples (IA-1a and IA-1b) and an exterior background (i.e., ambient) air sample were collected. The air sampling was conducted in accordance with the guidelines outlined in the New York State Department of Health (NYSDOH) – Guidance for Evaluating Soil Vapor Intrusion in the State of New York, dated October 2006. The locations of the indoor air and ambient are samples are listed below:

- Indoor air sample IA-1a was collected in the basement of the Site building.
- Indoor air sample IA-1b was collected on the first floor of the Site building, in the former commercial tenant space.
- The ambient air sample, AA-1, was collected from the courtyard area to the east of the building.

The air samples were collected from within the breathing zone; approximately 3 to 5 feet above the ground surface. The air sampling equipment was provided by a state-certified laboratory. The air samples were collected using 6-liter capacity summa canisters equipped with a flow controller. Each canister was individually checked, tested and certified by the laboratory for air tightness and proper vacuum prior to shipping. The flow controller was calibrated by the laboratory to allow for air samples to be collected over a 24-hour period.

The initial vacuum for each summa canister was checked and recorded prior to beginning sampling activities. After the vacuum was recorded, the air sample collection began and the air sample was drawn into the summa canister through a dedicated flow controller. Following the designated time period of sample collection (approximately 24-hours), each summa canister was sealed with a slight vacuum remaining. Once the final vacuum was recorded, the sample collection ceased and the valve to the summa canister was closed. The end of the summa canister was sealed with an air-tight cap. The indoor air samples were placed on hold at the laboratory pending the results of the sub-slab soil vapor sampling described in Section 3.4.

3.4 Soil Vapor Sample Collection

On September 9, 2016, sub-slab soil vapor sampling was conducted from within the basement area of Site (Figure 2). This sampling was also conducted in accordance with the guidelines outlined in the NYSDOH – Guidance for Evaluating Soil Vapor Intrusion in the State of New York, dated October 2006. The locations of the sub-slab soil vapor samples are listed below:

- Probe SSSV-1 was advanced in the northeastern corner of the western room in the basement of the Site building.
- Probe SSSV-2 was advanced in the northwestern corner of the western room in the basement of the Site building.

The sub-slab soil vapor samples were collected just beneath the concrete slab. The concrete slab was cored using a rotary hammer drill to create an approximate ½-inch diameter hole. A temporary vapor probe consisting of an implant connected to 0.25-inch polyethylene tubing was inserted into the core space just beneath the slab. The annular space surrounding the tubing and the surface was sealed with bee's wax. The sampling tubing was connected to a laboratory prepared 2.7-liter Summa canister equipped with a laboratory supplied flow controller set at 200 milliliters per minute (mL/min) for the collection of a soil gas sample.

Each Summa canister was individually checked, tested and certified by the laboratory for air tightness and proper vacuum prior to shipping. Prior to sampling, a vacuum gauge was used to measure and record the initial summa canister vacuum pressure. Once sampling was conducted, each summa canister was sealed with a slight vacuum prior to sealing.

3.5 Drilling and Soil Sample Collection

On September 9, 2016, two soil borings (SB-8 and SB-9) were advanced in the basement of the Site (Figure 2). The borings were advanced by AEI using a 4" core drill and a hand auger. Recovered soils were collected, field screened using a portable photo-ionization detector (PID), and logged by the onsite geologist. The borings were advanced to refusal, which occurred at a depth of 3 feet bgs. The locations of the borings are listed below:

- Boring SB-8 was advanced in the northeastern corner of the western room in the basement of the Site building.
- Boring SB-9 was advanced in the northwestern corner of the western room in the basement of the Site building.

The soil borings were logged using the Unified Soil Classification System. One soil sample was collected at each boring location and transferred into laboratory supplied glassware and then placed into a cooler with ice.

Down-hole equipment was decontaminated between boring locations.

3.6 Boring Abandonment

Upon completion of the soil sampling, the borings were backfilled with the recovered soil and bentonite chips. The surface was repaired with fast setting concrete to match the surrounding conditions.

3.7 Laboratory Analyses

The collected soil samples were labeled, placed into a cooler with ice following sampling and transferred under appropriate chain-of-custody documentation to Alpha Analytical Laboratory (Alpha) of Mahwah, New Jersey. Additionally, the indoor air, ambient air, and soil vapor sample Summa canisters were labeled and transferred under appropriate chain-of-custody documentation to Alpha. Laboratory analytical documentation is provided in Appendix B.

Laboratory analysis of three soil samples consisted of Chlorinated Volatile Organic Compounds (CVOCs) by EPA Method 8260.

Laboratory analysis of the two sub-slab soil vapor, the two indoor air samples, and the ambient air sample consisted of CVOCs by EPA Method TO-15.

3.8 Investigation Derived Wastes

No investigation derived waste was created during this investigation.

4.0 FINDINGS

For the purpose of providing context to the data obtained during this investigation, analytical results are compared to available regulatory screening levels. The New York State Department of Environmental Conservation (NYSDEC) has the responsibility for overseeing soil and groundwater cleanups which are managed under a variety of different regulatory programs. The soil results of this investigation were reviewed along with the applicable NYSDEC Restricted Residential Use Soil Cleanup Objective (SCO) and NYSDEC Unrestricted Use SCO. With respect to the sub-slab soil vapor samples, these data were compared to the sub-slab vapor concentrations outlined in the Matrix Tables 1 and 2 of the NYSDOH – Guidance for Evaluating Soil Vapor Intrusion in the State of New York, dated October 2006. Indoor air sample results were compared to the NYSDOH September 2013 and August 2015 Fact Sheets for PCE and TCE in indoor and outdoor air.

4.1 Geology and Hydrogeology

The recovered soil in each of the borings generally consisted of a light brown sandy silt along with weathered schist (Appendix A).

Groundwater was not encountered in the two soil borings advanced at the Site.

4.2 Soil Sample Analytical Results

The following information is a summary of the soil sample analytical test results (Appendix B). This information has also been included in Table 1.

CVOCs

- PCE was detected at 23,000 milligram per kilogram (mg/kg) in soil sample AEI-SB8 and at 23 mg/kg in soil sample AEI-SB9. The concentrations detected in AEI-SB8 and AEI-SB9 exceed the NYSDEC Restricted Residential Use SCO of 19 mg/kg and the NYSDEC Unrestricted Use SCO of 1.3 mg/kg for PCE.
- TCE was detected in soil sample AEI-SB8 at 120 mg/kg, a concentration which exceeds the NYSDEC Restricted Residential Use SCO of 21 mg/kg for TCE and the NYSDEC Unrestricted Use SCO of 0.47 mg/kg for TCE. TCE was not detected in soil sample AEI-SB9.
- cis-1,2-Dichloroethene was detected in soil sample AEI-SB8 at 46 mg/kg, a concentration which exceeds the NYSDEC Unrestricted Use SCO standard of 0.25 mg/kg for cis-1,2-dichloroethene. cis-1,2-Dichloroethene was not detected in soil sample AEI-SB9.

4.3 Sub-slab Soil Vapor and Indoor Air Sample Analytical Results

The following information is a summary of the sub-slab soil vapor and indoor air sample analytical test results (Appendix B). This information has also been included in Tables 2 and 3.

CVOCs in Sub-slab Soil Vapor

- PCE was detected in sub-slab soil vapor sample SSSV-1 at 47,300,000 micrograms per cubic meter (ug/m^3), and sub-slab soil vapor sample SSSV-2 at 2,130,000 ug/m^3. These concentrations exceed the NYSDOH Matrix 2 guidance level of 100 ug/m^3 for PCE.
- TCE was detected in sub-slab soil vapor sample SSSV-1 at 425,000 ug/m^3, and sub-slab soil vapor sample SSSV-2 at 8,810 ug/m^3. These concentrations exceed the NYSDOH Matrix 1 guidance level of 5 ug/m^3 for TCE.
- trans-1,2-Dichloroethene was detected in sub-slab soil vapor sample SSSV-1 at 2,360 ug/m^3, and sub-slab soil vapor sample SSSV-2 at 323 ug/m^3. There is currently no NYSDEC or NYSDOH standard for trans-1,2-dichloroethene.
- cis-1,2-Dichloroethene was detected in sub-slab soil vapor sample SSSV-1 at 531,000 ug/m^3, and sub-slab soil vapor sample SSSV-2 at 6,580 ug/m^3. There is currently no NYSDEC or NYSDOH standard for cis-1,2-dichloroethene.

Based on the results of SSSV-1 and SSSV-2, indoor air samples IA-1a, IA-1a and ambient air sample AA-1 were subsequently analyzed.

CVOCs in Indoor/Ambient Air

- PCE was detected in indoor sample IA-1a at 5,270 ug/m^3 and indoor air sample IA-1b at 286 ug/m^3. These concentrations exceed the NYSDOH guidance criteria of 30 ug/m^3 for PCE in indoor air.

- TCE was detected in indoor sample IA-1a at 42.3 ug/m^3 and indoor air sample IA-1b at 3.07 ug/m^3. These concentrations exceed the NYSDOH guidance criteria of 2 ug/m^3 for TCE in indoor air.
- trans-1,2-Dichloroethene was detected in indoor sample IA-1a at 0.472 ug/m^3 and indoor air sample IA-1b at 0.079 ug/m^3. There is currently no NYSDEC or NYSDOH standard for trans-1,2-dichloroethene in indoor air.
- cis-1,2-Dichloroethene was detected in indoor sample IA-1a at 62.2 ug/m^3 and indoor air sample IA-1b at 5.59 ug/m^3. There is currently no NYSDEC or NYSDOH standard for cis-1,2-dichloroethene in indoor air.

5.0 SUMMARY AND CONCLUSIONS

AEI has completed a limited Phase II investigation at the Site. The purpose of the investigation at the Site was to evaluate if the former onsite dry cleaning facility has impacted the subsurface of the Site.

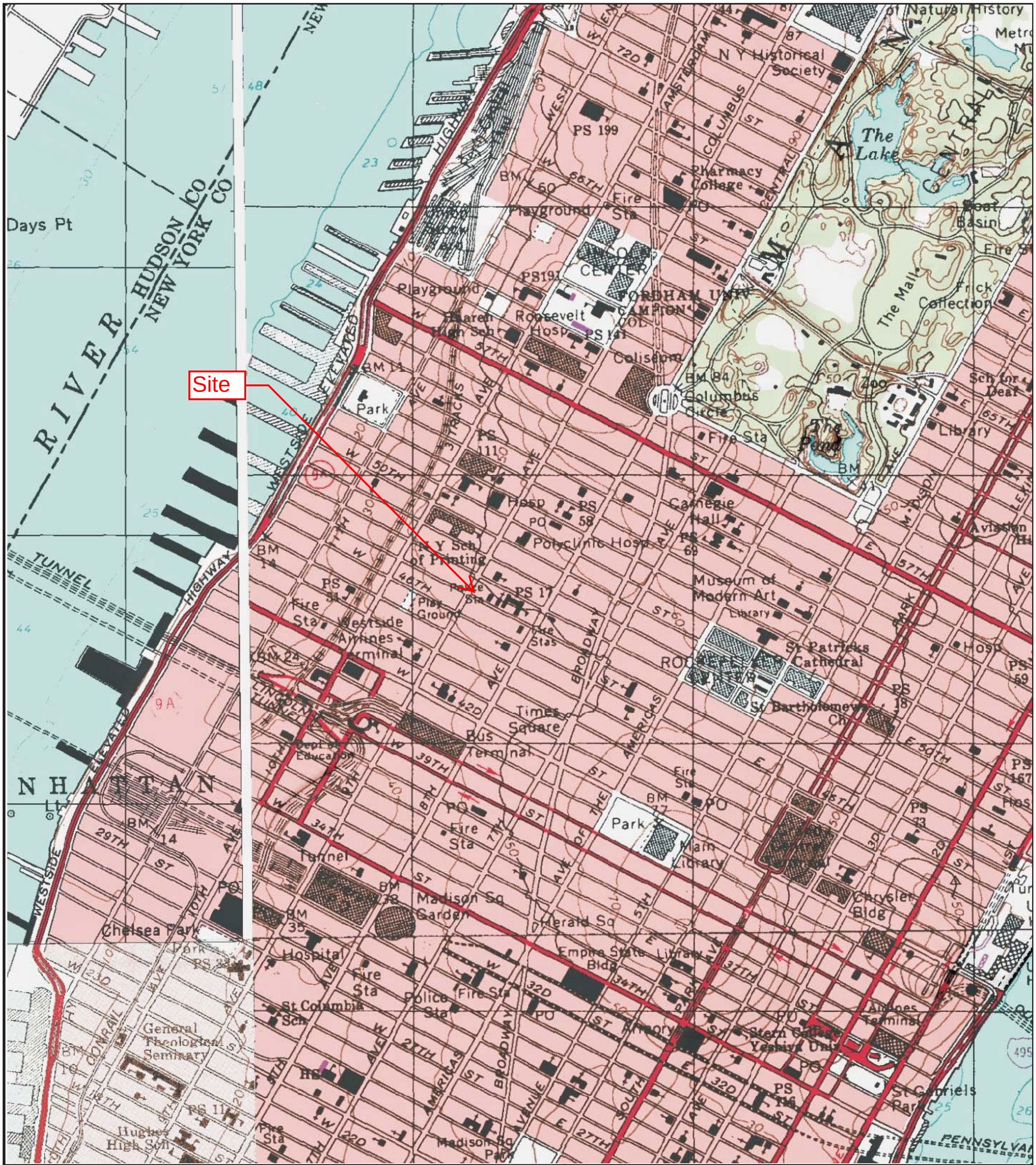
Two borings (AEI-SB8 and AEI-SB9) were advanced in the western room in the basement of the Site building. The results of the soil investigation indicated that PCE, TCE, and cis-1,2-dichloroethene were detected in soil beneath the basement slab at concentrations greater than their respective NYSDEC soil cleanup criteria.

Analysis of sub-slab soil vapor samples SSSV-1 and SSSV-2 detected PCE and TCE at concentrations greater than the applicable NYSDOH guidance levels. Based on the results of SSSV-1 and SSSV-2, indoor air samples IA-1a, IA-1a and ambient air sample AA-1 were analyzed. Analysis of indoor air samples also detected concentrations of PCE and TCE greater than the NYSDOH guidance criteria for indoor air.

The results of this investigation indicate that a release of PCE has contaminated soils beneath the slab of the Site building, there is a complete pathway between the soil contaminants and air in the building's basement, and, the contaminant levels in the indoor air exceed the applicable NYSDOH air guidelines. Based on this information, AEI recommended that the NYSDEC be notified by the Site owner of the release pursuant to 6 NYCRR 597. Subsequently, the NYSDEC was notified of the release on May 4, 2017, and NYSDEC Spill #1701031 was issued.

AEI also recommended that remedial action be implemented to remove or treat impacted soils beneath the building slab and, if warranted following removal/treatment of the soil, installation of a sub-slab depressurization system to mitigate VI of chlorinated VOCs inside the building. Although AEI understands that the Site building is currently vacant, the effectiveness of the remedial actions should be verified before the building is occupied for residential or commercial use.

FIGURES



LEGEND

N

Source: USGS

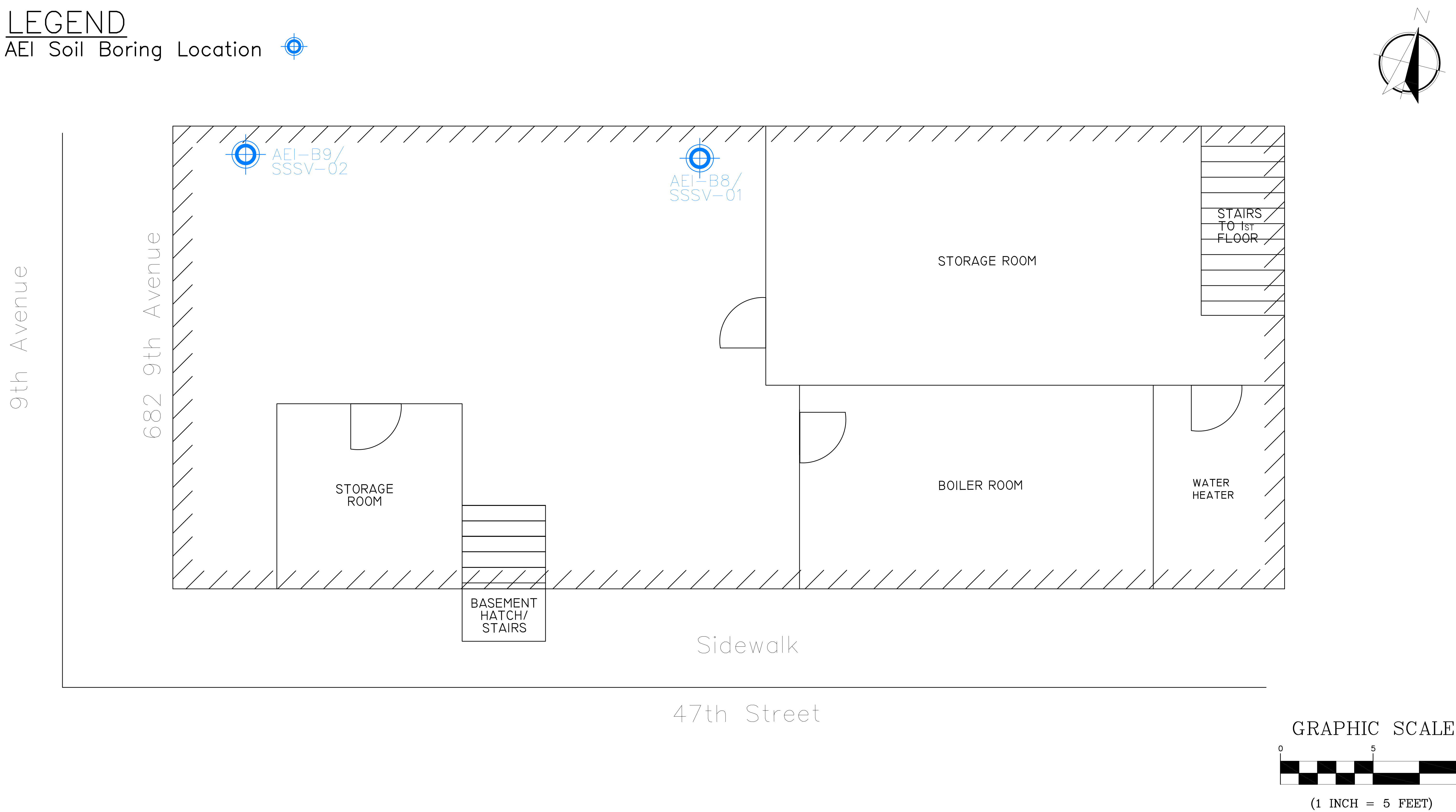
AEI Consultants

20 Gibson Place, Suite 310, Freehold, New Jersey

USGS TOPOGRAPHIC MAP

682 9th Avenue
New York, NY 10036

FIGURE 1
Project No. 368024



AEI Consultants
Environmental & Engineering Services

DRAWN BY: A Cauterucci	REVIEWED BY: D Bausmith	SITE MAP 682 9th Avenue New York, New York 10036	AEI Project #368024 NYSDEC Spill #1701031	FIGURE 2
APPROVED BY D Bausmith	Date: 5/30/2017			

TABLES

TABLE 1: SOIL SAMPLE DATA SUMMARY
682 9th Avenue, New York, NY 10036

Analysis	Units	AEI-SB8 9/9/2016 2.5-3.0 (feet bgs)	AEI-SB9 9/9/2016 2.5-3.0 (feet bgs)	NYSDEC Unrestricted SCO	NYSDEC Restricted Residential SCO
CVOCs via 8260:					
Tetrachloroethene	mg/kg	$\boxed{\mathbf{23,000}}$	$\boxed{\mathbf{23}}$	1.3	19
Trichloroethene	mg/kg	$\boxed{\mathbf{120}}$	ND	0.47	21
cis-1,2-Dichloroethene	mg/kg	**46**	ND	0.25	100
1,2-Dichloroethene, Total	mg/kg	46	ND	NS	NS
All Other CVOCs	mg/kg	ND	ND	NS	NS

Notes:

mg/kg	milligrams per kilogram
bgs	below ground surface
NS	no standard
Bold	Result exceeds applicable NYSDEC Unrestricted SCO
Boxed	Result exceeds applicable NYSDEC Restricted Residential SCO

Comparision Values:

NYSDEC Unrestricted SCO	New York State Department of Environmental Conservation - Unrestricted Soil Cleanup Objective
NYSDEC Restricted Residential SCO	New York State Department of Environmental Conservation - Restricted Residential Soil Cleanup Objective

TABLE 2: SUB-SLAB SOIL VAPOR SAMPLE DATA SUMMARY
682 9th Avenue, New York, NY 10036

Analysis	Units	SSSV-1 9/9/2016	SSSV-2 9/9/2016	NYSDOH Matrix 2 SSV Criteria	NYSDOH Matrix 1 SSV Criteria
CVOCs via TO-15:					
Tetrachloroethene	ug/m3	**47,300,000**	**2,130,000**	100	NS
Trichloroethene	ug/m3	$\boxed{425,000}$	$\boxed{8,810}$	NS	5
cis-1,2-Dichloroethene	ug/m3	531,000	6,580	NS	NS
trans-1,2-Dichloroethene	ug/m3	2,360	323	NS	NS
All Other CVOCs	ug/m3	ND	ND	NS	NS

Notes:

ug/m3	micrograms per cubic meter
NS	no standard
Bold	Result exceeds applicable NYSDOH Matrix 2 SSV Criteria
Boxed	Result exceeds applicable NYSDOH Matrix 1 SSV Criteria

Comparision Values:

NYSDOH Matrix 1 - SSV Criteria	New York State Department of Health - Matrix 1 - Sub-Slab Vapor Concentration for TCE
NYSDOH Matrix 2 - SSV Criteria	New York State Department of Health - Matrix 2 - Sub-Slab Vapor Concentration for PCE

TABLE 3: INDOOR/AMBIENT AIR SAMPLE DATA SUMMARY
682 9th Avenue, New York, NY 10036

Analysis	Units	IA-1a 9/9/2016	IA-1b 9/9/2016	AA-1 9/9/2016	NYSDOH IA Guidance Criteria
CVOCs via TO-15:					
Tetrachloroethene	ug/m3	5270	286	7.32	30
Trichloroethene	ug/m3	42.3	3.07	0.215	2
cis-1,2-Dichloroethene	ug/m3	62.2	5.59	0.147	NS
trans-1,2-Dichloroethene	ug/m3	0.472	0.079	ND	NS
All Other CVOCs	ug/m3	ND	ND	ND	NS

Notes:

ug/m3	micrograms per cubic meter
NS	no standard
Boxed	Result exceeds applicable NYSDOH IA Guidance Criteria

Comparision Values:

NYSDOH IA Guidance Criteria — New York State Department of Health - Indoor Air Guidance Criteria

APPENDIX A

BORING LOGS

BORING NUMBER AEI-SB8

AEI Consultants
Environmental & Engineering Services

CLIENT MJW 47 LLC
PROJECT NAME 682 9th Avenue
PROJECT NUMBER 368024
PROJECT LOCATION 682 9th Ave., NYC, NY
DATE STARTED 9/9/16 **COMPLETED** 9/9/16
GROUND ELEVATION **HOLE SIZE** 2 inches
DRILLING CONTRACTOR AEI
GROUND WATER LEVELS:
DRILLING METHOD Hand Auger
AT TIME OF DRILLING ---
LOGGED BY Anthony Cauterucci **CHECKED BY**
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS	PID DATA (ppm)	GRAPHIC LOG	MATERIAL DESCRIPTION	COMPLETION
0					Concrete	
0.5					Light brown sandy silt with weathered schist	
1						
2						
	AEI-SB8					
3				3.0		

Bottom of borehole at 3.0 feet.

AEI BORING - GINT STD US LAB.GDT - 10/12/16 16:59 - C:\USERS\ACAUTERUCCI\DESKTOP\360508 BORING LOGS.GPJ

BORING NUMBER AEI-SB9

AEI Consultants
Environmental & Engineering Services

CLIENT MJW 47 LLC
PROJECT NAME 682 9th Avenue
'PROJECT NUMBER 368024
PROJECT LOCATION 682 9th Ave., NYC, NY
DATE STARTED 9/9/16 **COMPLETED** 9/9/16
GROUND ELEVATION **HOLE SIZE** 2 inches
DRILLING CONTRACTOR AEI
GROUND WATER LEVELS:
DRILLING METHOD Hand Auger
AT TIME OF DRILLING ---
LOGGED BY Anthony Cauterucci **CHECKED BY**
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS	PID DATA (ppm)	GRAPHIC LOG	MATERIAL DESCRIPTION	COMPLETION
0					Concrete	
				0.5	Light brown sandy silt with weathered schist	
1						
2						
3	AEI-SB9			3.0		

Bottom of borehole at 3.0 feet.

APPENDIX B

LABORATORY ANALYTICAL REPORTS

ANALYTICAL REPORT

Lab Number:	L1628430
Client:	AEI Consultants 20 Gibson Place Suite 310 Freehold, NJ 07728
ATTN:	Anthony Cauterucci
Phone:	(732) 414-2720
Project Name:	682 9TH AVE., NYC, NY
Project Number:	360508
Report Date:	09/29/16

Certifications & Approvals: MA (M-MA086), NY (11148), CT (PH-0574), NH (2003), NJ NELAP (MA935), RI (LAO00065), ME (MA00086), PA (68-03671), VA (460195), MD (348), IL (200077), NC (666), TX (T104704476), DOD (L2217), USDA (Permit #P-330-11-00240).

320 Forbes Boulevard, Mansfield, MA 02048-1806
508-822-9300 (Fax) 508-822-3288 800-624-9220 - www.alphalab.com

Project Name: 682 9TH AVE., NYC, NY
Project Number: 360508

Lab Number: L1628430
Report Date: 09/29/16

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1628430-01	IA-1A	AIR	682 9TH AVE., NYC, NY	09/09/16 13:41	09/09/16
L1628430-02	IA-1B	AIR	682 9TH AVE., NYC, NY	09/09/16 11:28	09/09/16
L1628430-03	AA-1	AIR	682 9TH AVE., NYC, NY	09/09/16 13:36	09/09/16
L1628430-04	SSSV-1	SOIL_VAPOR	682 9TH AVE., NYC, NY	09/09/16 12:18	09/09/16
L1628430-05	SSSV-2	SOIL_VAPOR	682 9TH AVE., NYC, NY	09/09/16 12:16	09/09/16

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. All specific QC information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances the specific failure is not narrated but noted in the associated QC table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

HOLD POLICY
For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Client Service Representative and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Client Services at 800-624-9220 with any questions.

Case Narrative (continued)

Report Submission

This final report replaces the partial report issued on September 20, 2016 and includes the results of all requested analyses. The analysis of the associated indoor and ambient air samples has been cancelled by the client.

Volatile Organics in Air

Canisters were released from the laboratory on September 8, 2016. The canister certification results are provided as an addendum.

Due to the concentration present in the sample designated IA-1B (L1628430-02) the concenteration of Tetrachloroethene has been reported by TO15 full scan instead of TO15 SIM.

Samples L1628430-04 and -05: The samples have elevated detection limits due to the dilution required by the elevated concentrations of target compounds in the samples.

Samples L1628430-04 and -05: The samples were diluted and re-analyzed to quantify the results within the calibration range. The result(s) should be considered estimated, and are qualified with an E flag, for any compound(s) that exceeded the calibration range in the initial analysis. The re-analysis was performed only for the compound(s) that exceeded the calibration range.

Sample L1628430-01: The sample has elevated detection limits due to the dilution required by the elevated concentrations of target compounds in the sample.

Sample L1628430-01; the sample was diluted and re-analyzed to quantify the results within the calibration range. The result(s) should be considered estimated, and are qualified with an E flag, for any compound(s) that exceeded the calibration range in the initial analysis. The re-analysis was performed only for the compound(s) that exceeded the calibration range.

Case Narrative (continued)

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Christopher J. Anderson

Title: Technical Director/Representative

Date: 09/29/16

AIR

Project Name:	682 9TH AVE., NYC, NY	***Lab Number:***	L1628430
Project Number:	360508	***Report Date:***	09/29/16

SAMPLE RESULTS

Lab ID:	L1628430-01	Date Collected:	09/09/16 13:41
Client ID:	IA-1A	Date Received:	09/09/16
Sample Location:	682 9TH AVE., NYC, NY	Field Prep:	Not Specified
Matrix:	Air		
Anaytical Method:	48,TO-15		
Analytical Date:	09/28/16 16:29		
Analyst:	RY		

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Tetrachloroethene	378	0.200	--	2560	1.36	--	E	1

Internal Standard	**% Recovery**	**Qualifier**	**Acceptance Criteria**
1,4-Difluorobenzene	89		60-140
Bromochloromethane	71		60-140
chlorobenzene-d5	96		60-140

Project Name: 682 9TH AVE., NYC, NY **Lab Number:** L1628430
Project Number: 360508 **Report Date:** 09/29/16

SAMPLE RESULTS

Lab ID: L1628430-01
Client ID: IA-1A
Sample Location: 682 9TH AVE., NYC, NY
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 09/28/16 16:29
Analyst: RY

Date Collected: 09/09/16 13:41
Date Received: 09/09/16
Field Prep: Not Specified

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air by SIM - Mansfield Lab								
Vinyl chloride	ND	0.020	--	ND	0.051	--		1
1,1-Dichloroethene	ND	0.020	--	ND	0.079	--		1
trans-1,2-Dichloroethene	0.119	0.020	--	0.472	0.079	--		1
1,1-Dichloroethane	ND	0.020	--	ND	0.081	--		1
cis-1,2-Dichloroethene	15.7	0.020	--	62.2	0.079	--		1
1,2-Dichloroethane	ND	0.020	--	ND	0.081	--		1
1,1,1-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Trichloroethene	7.88	0.020	--	42.3	0.107	--		1

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-difluorobenzene	90		60-140
bromochloromethane	69		60-140
chlorobenzene-d5	98		60-140

Project Name:	682 9TH AVE., NYC, NY	***Lab Number:***	L1628430
Project Number:	360508	***Report Date:***	09/29/16

SAMPLE RESULTS

Lab ID:	L1628430-01 D	Date Collected:	09/09/16 13:41
Client ID:	IA-1A	Date Received:	09/09/16
Sample Location:	682 9TH AVE., NYC, NY	Field Prep:	Not Specified
Matrix:	Air		
Anaytical Method:	48,TO-15		
Analytical Date:	09/28/16 17:34		
Analyst:	RY		

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Tetrachloroethene	777	2.00	--	5270	13.6	--		10

Internal Standard	**% Recovery**	**Qualifier**	**Acceptance Criteria**
1,4-Difluorobenzene	87		60-140
Bromochloromethane	88		60-140
chlorobenzene-d5	83		60-140

ALPHA ANALYTICAL

Project Name: 682 9TH AVE., NYC, NY
Lab Number: L1628430
Project Number: 360508
Report Date: 09/29/16

SAMPLE RESULTS

Lab ID: L1628430-02
Client ID: IA-1B
Sample Location: 682 9TH AVE., NYC, NY
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 09/28/16 17:03
Analyst: RY

Date Collected: 09/09/16 11:28
Date Received: 09/09/16
Field Prep: Not Specified

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air by SIM - Mansfield Lab								
Vinyl chloride	ND	0.020	--	ND	0.051	--		1
1,1-Dichloroethene	ND	0.020	--	ND	0.079	--		1
trans-1,2-Dichloroethene	0.020	0.020	--	0.079	0.079	--		1
1,1-Dichloroethane	ND	0.020	--	ND	0.081	--		1
cis-1,2-Dichloroethene	1.41	0.020	--	5.59	0.079	--		1
1,2-Dichloroethane	ND	0.020	--	ND	0.081	--		1
1,1,1-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Trichloroethene	0.572	0.020	--	3.07	0.107	--		1
Tetrachloroethene	42.2	0.020	--	286	0.136	--		1

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-difluorobenzene	95		60-140
bromochloromethane	77		60-140
chlorobenzene-d5	91		60-140

Project Name:	682 9TH AVE., NYC, NY	***Lab Number:***	L1628430
Project Number:	360508	***Report Date:***	09/29/16

SAMPLE RESULTS

Lab ID:	L1628430-03	Date Collected:	09/09/16 13:36
Client ID:	AA-1	Date Received:	09/09/16
Sample Location:	682 9TH AVE., NYC, NY	Field Prep:	Not Specified
Matrix:	Air		
Anaytical Method:	48,TO-15-SIM		
Analytical Date:	09/28/16 15:55		
Analyst:	RY		

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air by SIM - Mansfield Lab								
Vinyl chloride	ND	0.020	--	ND	0.051	--		1
1,1-Dichloroethene	ND	0.020	--	ND	0.079	--		1
trans-1,2-Dichloroethene	ND	0.020	--	ND	0.079	--		1
1,1-Dichloroethane	ND	0.020	--	ND	0.081	--		1
cis-1,2-Dichloroethene	0.037	0.020	--	0.147	0.079	--		1
1,2-Dichloroethane	0.036	0.020	--	0.146	0.081	--		1
1,1,1-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Trichloroethene	0.040	0.020	--	0.215	0.107	--		1
Tetrachloroethene	1.08	0.020	--	7.32	0.136	--		1

Internal Standard	**% Recovery**	**Qualifier**	**Acceptance Criteria**
1,4-difluorobenzene	92		60-140
bromochloromethane	71		60-140
chlorobenzene-d5	87		60-140

Project Name:	682 9TH AVE., NYC, NY	***Lab Number:***	L1628430
Project Number:	360508	***Report Date:***	09/29/16

SAMPLE RESULTS

Lab ID:	L1628430-04 D	Date Collected:	09/09/16 12:18
Client ID:	SSSV-1	Date Received:	09/09/16
Sample Location:	682 9TH AVE., NYC, NY	Field Prep:	Not Specified
Matrix:	Soil_Vapor		
Anaytical Method:	48,TO-15		
Analytical Date:	09/17/16 07:28		
Analyst:	MB		

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Vinyl chloride	ND	318.	--	ND	813	--		1590
1,1-Dichloroethene	ND	318	--	ND	1260	--		1590
trans-1,2-Dichloroethene	595	318	--	2360	1260	--		1590
1,1-Dichloroethane	ND	318.	--	ND	1290	--		1590
cis-1,2-Dichloroethene	134000	318	--	531000	1260	--		1590
1,2-Dichloroethane	ND	318.	--	ND	1290	--		1590
1,1,1-Trichloroethane	ND	318	--	ND	1740	--		1590
Trichloroethene	79100	318	--	425000	1710	--		1590
Tetrachloroethene	1310000	318	--	8880000	2160	--	E	1590

Internal Standard	**% Recovery**	**Qualifier**	**Acceptance Criteria**
1,4-Difluorobenzene	92		60-140
Bromochloromethane	101		60-140
chlorobenzene-d5	98		60-140

Project Name:	682 9TH AVE., NYC, NY	***Lab Number:***	L1628430
Project Number:	360508	***Report Date:***	09/29/16

SAMPLE RESULTS

Lab ID:	L1628430-04 D2	Date Collected:	09/09/16 12:18
Client ID:	SSSV-1	Date Received:	09/09/16
Sample Location:	682 9TH AVE., NYC, NY	Field Prep:	Not Specified
Matrix:	Soil_Vapor		
Anaytical Method:	48,TO-15		
Analytical Date:	09/20/16 02:04		
Analyst:	MB		

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Tetrachloroethene	6980000	25000	--	47300000	170000	--		125000

Internal Standard	**% Recovery**	**Qualifier**	**Acceptance Criteria**
1,4-Difluorobenzene	87		60-140
Bromochloromethane	93		60-140
chlorobenzene-d5	91		60-140

Project Name: 682 9TH AVE., NYC, NY
Lab Number: L1628430
Project Number: 360508
Report Date: 09/29/16

SAMPLE RESULTS

Lab ID:	L1628430-05 D	Date Collected:	09/09/16 12:16
Client ID:	SSSV-2	Date Received:	09/09/16
Sample Location:	682 9TH AVE., NYC, NY	Field Prep:	Not Specified
Matrix:	Soil_Vapor		
Anaytical Method:	48,TO-15		
Analytical Date:	09/17/16 08:12		
Analyst:	MB		

	ppbV			ug/m3				
Parameter	Results	RL	MDL	Results	RL	MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Vinyl chloride	ND	81.5	--	ND	208	--		407.4
1,1-Dichloroethene	ND	81.5	--	ND	323	--		407.4
trans-1,2-Dichloroethene	81.5	81.5	--	323	323	--		407.4
1,1-Dichloroethane	ND	81.5	--	ND	330	--		407.4
cis-1,2-Dichloroethene	1660	81.5	--	6580	323	--		407.4
1,2-Dichloroethane	ND	81.5	--	ND	330	--		407.4
1,1,1-Trichloroethane	ND	81.5	--	ND	445	--		407.4
Trichloroethene	1640	81.5	--	8810	438	--		407.4
Tetrachloroethene	129000	81.5	--	875000	553	--	E	407.4

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-Difluorobenzene	90		60-140
Bromochloromethane	101		60-140
chlorobenzene-d5	100		60-140

Project Name:	682 9TH AVE., NYC, NY	***Lab Number:***	L1628430
Project Number:	360508	***Report Date:***	09/29/16

SAMPLE RESULTS

Lab ID:	L1628430-05 D2	Date Collected:	09/09/16 12:16
Client ID:	SSSV-2	Date Received:	09/09/16
Sample Location:	682 9TH AVE., NYC, NY	Field Prep:	Not Specified
Matrix:	Soil_Vapor		
Anaytical Method:	48,TO-15		
Analytical Date:	09/20/16 02:47		
Analyst:	MB		

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Tetrachloroethene	314000	652	--	2130000	4420	--		3259

Internal Standard	**% Recovery**	**Qualifier**	**Acceptance Criteria**
1,4-Difluorobenzene	86		60-140
Bromochloromethane	94		60-140
chlorobenzene-d5	92		60-140

Project Name: 682 9TH AVE., NYC, NY **Lab Number:** L1628430
Project Number: 360508 **Report Date:** 09/29/16

Method Blank Analysis
Batch Quality Control

Analytical Method: 48,TO-15
Analytical Date: 09/16/16 17:09

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab for sample(s): 04-05 Batch: WG932842-4								
Vinyl chloride	ND	0.200	--	ND	0.511	--		1
1,1-Dichloroethene	ND	0.200	--	ND	0.793	--		1
trans-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
1,1-Dichloroethane	ND	0.200	--	ND	0.809	--		1
cis-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
1,2-Dichloroethane	ND	0.200	--	ND	0.809	--		1
1,1,1-Trichloroethane	ND	0.200	--	ND	1.09	--		1
Trichloroethene	ND	0.200	--	ND	1.07	--		1
Tetrachloroethene	ND	0.200	--	ND	1.36	--		1

Project Name: 682 9TH AVE., NYC, NY **Lab Number:** L1628430
Project Number: 360508 **Report Date:** 09/29/16

Method Blank Analysis
Batch Quality Control

Analytical Method: 48,TO-15
Analytical Date: 09/19/16 14:04

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab for sample(s): 04-05 Batch: WG932842-9								
Vinyl chloride	ND	0.200	--	ND	0.511	--		1
1,1-Dichloroethene	ND	0.200	--	ND	0.793	--		1
trans-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
1,1-Dichloroethane	ND	0.200	--	ND	0.809	--		1
cis-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
1,2-Dichloroethane	ND	0.200	--	ND	0.809	--		1
1,1,1-Trichloroethane	ND	0.200	--	ND	1.09	--		1
Trichloroethene	ND	0.200	--	ND	1.07	--		1
Tetrachloroethene	ND	0.200	--	ND	1.36	--		1

Project Name: 682 9TH AVE., NYC, NY **Lab Number:** L1628430
Project Number: 360508 **Report Date:** 09/29/16

Method Blank Analysis
Batch Quality Control

Analytical Method: 48,TO-15
Analytical Date: 09/28/16 13:45

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab for sample(s): 01 Batch: WG936746-4								
Vinyl chloride	ND	0.200	--	ND	0.511	--		1
1,1-Dichloroethene	ND	0.200	--	ND	0.793	--		1
trans-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
1,1-Dichloroethane	ND	0.200	--	ND	0.809	--		1
cis-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
1,2-Dichloroethane	ND	0.200	--	ND	0.809	--		1
1,1,1-Trichloroethane	ND	0.200	--	ND	1.09	--		1
Trichloroethene	ND	0.200	--	ND	1.07	--		1
Tetrachloroethene	ND	0.200	--	ND	1.36	--		1

Project Name: 682 9TH AVE., NYC, NY **Lab Number:** L1628430
Project Number: 360508 **Report Date:** 09/29/16

Method Blank Analysis
Batch Quality Control

Analytical Method: 48,TO-15-SIM
Analytical Date: 09/28/16 14:19

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air by SIM - Mansfield Lab for sample(s): 01-03 Batch: WG936752-4								
Propylene	ND	0.500	--	ND	0.861	--		1
Dichlorodifluoromethane	ND	0.200	--	ND	0.989	--		1
Chloromethane	ND	0.200	--	ND	0.413	--		1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	0.050	--	ND	0.349	--		1
Vinyl chloride	ND	0.020	--	ND	0.051	--		1
1,3-Butadiene	ND	0.020	--	ND	0.044	--		1
Bromomethane	ND	0.020	--	ND	0.078	--		1
Chloroethane	ND	0.020	--	ND	0.053	--		1
Ethyl Alcohol	ND	5.00	--	ND	9.42	--		1
Vinyl bromide	ND	0.200	--	ND	0.874	--		1
Acetone	ND	1.00	--	ND	2.38	--		1
Trichlorofluoromethane	ND	0.050	--	ND	0.281	--		1
iso-Propyl Alcohol	ND	0.500	--	ND	1.23	--		1
Acrylonitrile	ND	0.500	--	ND	1.09	--		1
1,1-Dichloroethene	ND	0.020	--	ND	0.079	--		1
tert-Butyl Alcohol	ND	0.500	--	ND	1.52	--		1
Methylene chloride	ND	0.500	--	ND	1.74	--		1
3-Chloropropene	ND	0.200	--	ND	0.626	--		1
Carbon disulfide	ND	0.200	--	ND	0.623	--		1
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	0.050	--	ND	0.383	--		1
Halothane	ND	0.050	--	ND	0.404	--		1
trans-1,2-Dichloroethene	ND	0.020	--	ND	0.079	--		1
1,1-Dichloroethane	ND	0.020	--	ND	0.081	--		1
Methyl tert butyl ether	ND	0.200	--	ND	0.721	--		1
Vinyl acetate	ND	1.00	--	ND	3.52	--		1

Project Name: 682 9TH AVE., NYC, NY **Lab Number:** L1628430
Project Number: 360508 **Report Date:** 09/29/16

Method Blank Analysis
Batch Quality Control

Analytical Method: 48,TO-15-SIM
Analytical Date: 09/28/16 14:19

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air by SIM - Mansfield Lab for sample(s): 01-03 Batch: WG936752-4								
2-Butanone	ND	0.500	--	ND	1.47	--		1
cis-1,2-Dichloroethene	ND	0.020	--	ND	0.079	--		1
Ethyl Acetate	ND	0.500	--	ND	1.80	--		1
Chloroform	ND	0.020	--	ND	0.098	--		1
Tetrahydrofuran	ND	0.500	--	ND	1.47	--		1
1,2-Dichloroethane	ND	0.020	--	ND	0.081	--		1
n-Hexane	ND	0.200	--	ND	0.705	--		1
1,1,1-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Benzene	ND	0.100	--	ND	0.319	--		1
Carbon tetrachloride	ND	0.020	--	ND	0.126	--		1
Cyclohexane	ND	0.200	--	ND	0.688	--		1
Dibromomethane	ND	0.200	--	ND	1.42	--		1
1,2-Dichloropropane	ND	0.020	--	ND	0.092	--		1
Bromodichloromethane	ND	0.020	--	ND	0.134	--		1
1,4-Dioxane	ND	0.100	--	ND	0.360	--		1
Trichloroethene	ND	0.020	--	ND	0.107	--		1
2,2,4-Trimethylpentane	ND	0.200	--	ND	0.934	--		1
Heptane	ND	0.200	--	ND	0.820	--		1
cis-1,3-Dichloropropene	ND	0.020	--	ND	0.091	--		1
4-Methyl-2-pentanone	ND	0.500	--	ND	2.05	--		1
trans-1,3-Dichloropropene	ND	0.020	--	ND	0.091	--		1
1,1,2-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Toluene	ND	0.050	--	ND	0.188	--		1
2-Hexanone	ND	0.200	--	ND	0.820	--		1
Dibromochloromethane	ND	0.020	--	ND	0.170	--		1

Project Name: 682 9TH AVE., NYC, NY
Project Number: 360508

Lab Number: L1628430
Report Date: 09/29/16

Method Blank Analysis
Batch Quality Control

Analytical Method: 48,TO-15-SIM
Analytical Date: 09/28/16 14:19

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air by SIM - Mansfield Lab for sample(s): 01-03 Batch: WG936752-4								
1,2-Dibromoethane	ND	0.020	--	ND	0.154	--		1
Tetrachloroethene	ND	0.020	--	ND	0.136	--		1
1,1,1,2-Tetrachloroethane	ND	0.020	--	ND	0.137	--		1
Chlorobenzene	ND	0.100	--	ND	0.461	--		1
Ethylbenzene	ND	0.020	--	ND	0.087	--		1
p/m-Xylene	ND	0.040	--	ND	0.174	--		1
Bromoform	ND	0.020	--	ND	0.207	--		1
Styrene	ND	0.020	--	ND	0.085	--		1
1,1,2,2-Tetrachloroethane	ND	0.020	--	ND	0.137	--		1
o-Xylene	ND	0.020	--	ND	0.087	--		1
1,2,3-Trichloropropane	ND	0.020	--	ND	0.121	--		1
Isopropylbenzene	ND	0.200	--	ND	0.983	--		1
Bromobenzene	ND	0.200	--	ND	0.793	--		1
4-Ethyltoluene	ND	0.020	--	ND	0.098	--		1
1,3,5-Trimethylbenzene	ND	0.020	--	ND	0.098	--		1
1,2,4-Trimethylbenzene	ND	0.020	--	ND	0.098	--		1
Benzyl chloride	ND	0.200	--	ND	1.04	--		1
1,3-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
1,4-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
sec-Butylbenzene	ND	0.200	--	ND	1.10	--		1
p-Isopropyltoluene	ND	0.200	--	ND	1.10	--		1
1,2-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
n-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2,4-Trichlorobenzene	ND	0.050	--	ND	0.371	--		1
Naphthalene	ND	0.050	--	ND	0.262	--		1

Project Name: 682 9TH AVE., NYC, NY **Lab Number:** L1628430
Project Number: 360508 **Report Date:** 09/29/16

Method Blank Analysis
Batch Quality Control

Analytical Method: 48,TO-15-SIM
Analytical Date: 09/28/16 14:19

	ppbV			ug/m3				
Parameter	Results	RL	MDL	Results	RL	MDL	Qualifier	Dilution Factor
Volatile Organics in Air by SIM - Mansfield Lab for sample(s): 01-03 Batch: WG936752-4								
1,2,3-Trichlorobenzene	ND	0.050	--	ND	0.371	--		1
Hexachlorobutadiene	ND	0.050	--	ND	0.533	--		1

Lab Control Sample Analysis
Batch Quality Control

Project Name: 682 9TH AVE., NYC, NY
Project Number: 360508
Lab Number: L1628430
Report Date: 09/29/16

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics in Air - Mansfield Lab Associated sample(s): 04-05 Batch: WG932842-3								
Chlorodifluoromethane	88		-		70-130	-		
Propylene	105		-		70-130	-		
Propane	76		-		70-130	-		
Dichlorodifluoromethane	117		-		70-130	-		
Chloromethane	90		-		70-130	-		
1,2-Dichloro-1,1,2,2-tetrafluoroethane	103		-		70-130	-		
Methanol	84		-		70-130	-		
Vinyl chloride	105		-		70-130	-		
1,3-Butadiene	96		-		70-130	-		
Butane	96		-		70-130	-		
Bromomethane	108		-		70-130	-		
Chloroethane	101		-		70-130	-		
Ethyl Alcohol	93		-		70-130	-		
Dichlorofluoromethane	108		-		70-130	-		
Vinyl bromide	96		-		70-130	-		
Acrolein	86		-		70-130	-		
Acetone	109		-		70-130	-		
Acetonitrile	107		-		70-130	-		
Trichlorofluoromethane	124		-		70-130	-		
iso-Propyl Alcohol	94		-		70-130	-		
Acrylonitrile	76		-		70-130	-		

Lab Control Sample Analysis
Batch Quality Control

Project Name: 682 9TH AVE., NYC, NY

Project Number: 360508

Lab Number: L1628430

Report Date: 09/29/16

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics in Air - Mansfield Lab Associated sample(s): 04-05 Batch: WG932842-3								
Pentane	76		-		70-130	-		
Ethyl ether	74		-		70-130	-		
1,1-Dichloroethene	127		-		70-130	-		
tert-Butyl Alcohol	95		-		70-130	-		
Methylene chloride	96		-		70-130	-		
3-Chloropropene	105		-		70-130	-		
Carbon disulfide	99		-		70-130	-		
1,1,2-Trichloro-1,2,2-Trifluoroethane	105		-		70-130	-		
trans-1,2-Dichloroethene	102		-		70-130	-		
1,1-Dichloroethane	112		-		70-130	-		
Methyl tert butyl ether	95		-		70-130	-		
Vinyl acetate	116		-		70-130	-		
2-Butanone	97		-		70-130	-		
cis-1,2-Dichloroethene	124		-		70-130	-		
Ethyl Acetate	114		-		70-130	-		
Chloroform	118		-		70-130	-		
Tetrahydrofuran	92		-		70-130	-		
2,2-Dichloropropane	104		-		70-130	-		
1,2-Dichloroethane	129		-		70-130	-		
n-Hexane	104		-		70-130	-		
Isopropyl Ether	90		-		70-130	-		

Lab Control Sample Analysis
Batch Quality Control

Project Name: 682 9TH AVE., NYC, NY **Lab Number:** L1628430
Project Number: 360508 **Report Date:** 09/29/16

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics in Air - Mansfield Lab Associated sample(s): 04-05 Batch: WG932842-3								
Ethyl-Tert-Butyl-Ether	90		-		70-130	-		
1,1,1-Trichloroethane	113		-		70-130	-		
1,1-Dichloropropene	96		-		70-130	-		
Benzene	96		-		70-130	-		
Carbon tetrachloride	129		-		70-130	-		
Cyclohexane	101		-		70-130	-		
Tertiary-Amyl Methyl Ether	78		-		70-130	-		
Dibromomethane	97		-		70-130	-		
1,2-Dichloropropane	101		-		70-130	-		
Bromodichloromethane	111		-		70-130	-		
1,4-Dioxane	97		-		70-130	-		
Trichloroethene	99		-		70-130	-		
2,2,4-Trimethylpentane	116		-		70-130	-		
Methyl Methacrylate	97		-		70-130	-		
Heptane	91		-		70-130	-		
cis-1,3-Dichloropropene	88		-		70-130	-		
4-Methyl-2-pentanone	93		-		70-130	-		
trans-1,3-Dichloropropene	101		-		70-130	-		
1,1,2-Trichloroethane	100		-		70-130	-		
Toluene	91		-		70-130	-		
1,3-Dichloropropane	89		-		70-130	-		

Lab Control Sample Analysis
Batch Quality Control

Project Name: 682 9TH AVE., NYC, NY

Project Number: 360508

Lab Number: L1628430

Report Date: 09/29/16

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics in Air - Mansfield Lab Associated sample(s): 04-05 Batch: WG932842-3								
2-Hexanone	91		-		70-130	-		
Dibromochloromethane	108		-		70-130	-		
1,2-Dibromoethane	95		-		70-130	-		
Butyl Acetate	79		-		70-130	-		
Octane	88		-		70-130	-		
Tetrachloroethene	94		-		70-130	-		
1,1,1,2-Tetrachloroethane	98		-		70-130	-		
Chlorobenzene	95		-		70-130	-		
Ethylbenzene	94		-		70-130	-		
p/m-Xylene	96		-		70-130	-		
Bromoform	107		-		70-130	-		
Styrene	92		-		70-130	-		
1,1,2,2-Tetrachloroethane	100		-		70-130	-		
o-Xylene	100		-		70-130	-		
1,2,3-Trichloropropane	93		-		70-130	-		
Nonane (C9)	83		-		70-130	-		
Isopropylbenzene	92		-		70-130	-		
Bromobenzene	91		-		70-130	-		
o-Chlorotoluene	88		-		70-130	-		
n-Propylbenzene	94		-		70-130	-		
p-Chlorotoluene	91		-		70-130	-		

Lab Control Sample Analysis
Batch Quality Control

Project Name: 682 9TH AVE., NYC, NY
Project Number: 360508

Lab Number: L1628430
Report Date: 09/29/16

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics in Air - Mansfield Lab Associated sample(s): 04-05 Batch: WG932842-3								
4-Ethyltoluene	90		-		70-130	-		
1,3,5-Trimethylbenzene	95		-		70-130	-		
tert-Butylbenzene	97		-		70-130	-		
1,2,4-Trimethylbenzene	99		-		70-130	-		
Decane (C10)	94		-		70-130	-		
Benzyl chloride	98		-		70-130	-		
1,3-Dichlorobenzene	96		-		70-130	-		
1,4-Dichlorobenzene	95		-		70-130	-		
sec-Butylbenzene	88		-		70-130	-		
p-Isopropyltoluene	90		-		70-130	-		
1,2-Dichlorobenzene	93		-		70-130	-		
n-Butylbenzene	93		-		70-130	-		
1,2-Dibromo-3-chloropropane	106		-		70-130	-		
Undecane	95		-		70-130	-		
Dodecane (C12)	104		-		70-130	-		
1,2,4-Trichlorobenzene	93		-		70-130	-		
Naphthalene	89		-		70-130	-		
1,2,3-Trichlorobenzene	92		-		70-130	-		
Hexachlorobutadiene	101		-		70-130	-		

Lab Control Sample Analysis
Batch Quality Control

Project Name: 682 9TH AVE., NYC, NY

Project Number: 360508

Lab Number: L1628430

Report Date: 09/29/16

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics in Air - Mansfield Lab Associated sample(s): 04-05 Batch: WG932842-8								
Chlorodifluoromethane	92		-		70-130	-		
Propylene	118		-		70-130	-		
Propane	81		-		70-130	-		
Dichlorodifluoromethane	122		-		70-130	-		
Chloromethane	87		-		70-130	-		
1,2-Dichloro-1,1,2,2-tetrafluoroethane	100		-		70-130	-		
Methanol	85		-		70-130	-		
Vinyl chloride	107		-		70-130	-		
1,3-Butadiene	95		-		70-130	-		
Butane	110		-		70-130	-		
Bromomethane	104		-		70-130	-		
Chloroethane	102		-		70-130	-		
Ethyl Alcohol	96		-		70-130	-		
Dichlorofluoromethane	108		-		70-130	-		
Vinyl bromide	91		-		70-130	-		
Acrolein	86		-		70-130	-		
Acetone	110		-		70-130	-		
Acetonitrile	109		-		70-130	-		
Trichlorofluoromethane	121		-		70-130	-		
iso-Propyl Alcohol	92		-		70-130	-		
Acrylonitrile	74		-		70-130	-		

Lab Control Sample Analysis
Batch Quality Control

Project Name: 682 9TH AVE., NYC, NY
Project Number: 360508
Lab Number: L1628430
Report Date: 09/29/16

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics in Air - Mansfield Lab Associated sample(s): 04-05 Batch: WG932842-8								
Pentane	71		-		70-130	-		
Ethyl ether	**67**	Q	-		70-130	-		
1,1-Dichloroethene	110		-		70-130	-		
tert-Butyl Alcohol	91		-		70-130	-		
Methylene chloride	95		-		70-130	-		
3-Chloropropene	98		-		70-130	-		
Carbon disulfide	92		-		70-130	-		
1,1,2-Trichloro-1,2,2-Trifluoroethane	98		-		70-130	-		
trans-1,2-Dichloroethene	96		-		70-130	-		
1,1-Dichloroethane	104		-		70-130	-		
Methyl tert butyl ether	90		-		70-130	-		
Vinyl acetate	109		-		70-130	-		
2-Butanone	91		-		70-130	-		
cis-1,2-Dichloroethene	115		-		70-130	-		
Ethyl Acetate	104		-		70-130	-		
Chloroform	112		-		70-130	-		
Tetrahydrofuran	86		-		70-130	-		
2,2-Dichloropropane	100		-		70-130	-		
1,2-Dichloroethane	127		-		70-130	-		
n-Hexane	101		-		70-130	-		
Isopropyl Ether	87		-		70-130	-		

Lab Control Sample Analysis
Batch Quality Control

Project Name: 682 9TH AVE., NYC, NY
Project Number: 360508

Lab Number: L1628430
Report Date: 09/29/16

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics in Air - Mansfield Lab Associated sample(s): 04-05 Batch: WG932842-8								
Ethyl-Tert-Butyl-Ether	89		-		70-130	-		
1,1,1-Trichloroethane	114		-		70-130	-		
1,1-Dichloropropene	95		-		70-130	-		
Benzene	92		-		70-130	-		
Carbon tetrachloride	**133**	Q	-		70-130	-		
Cyclohexane	99		-		70-130	-		
Tertiary-Amyl Methyl Ether	78		-		70-130	-		
Dibromomethane	93		-		70-130	-		
1,2-Dichloropropane	97		-		70-130	-		
Bromodichloromethane	111		-		70-130	-		
1,4-Dioxane	93		-		70-130	-		
Trichloroethene	93		-		70-130	-		
2,2,4-Trimethylpentane	113		-		70-130	-		
Methyl Methacrylate	97		-		70-130	-		
Heptane	89		-		70-130	-		
cis-1,3-Dichloropropene	89		-		70-130	-		
4-Methyl-2-pentanone	93		-		70-130	-		
trans-1,3-Dichloropropene	100		-		70-130	-		
1,1,2-Trichloroethane	95		-		70-130	-		
Toluene	78		-		70-130	-		
1,3-Dichloropropane	81		-		70-130	-		

Lab Control Sample Analysis
Batch Quality Control

Project Name: 682 9TH AVE., NYC, NY
Project Number: 360508
Lab Number: L1628430
Report Date: 09/29/16

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics in Air - Mansfield Lab Associated sample(s): 04-05 Batch: WG932842-8								
2-Hexanone	81		-		70-130	-		
Dibromochloromethane	95		-		70-130	-		
1,2-Dibromoethane	83		-		70-130	-		
Butyl Acetate	70		-		70-130	-		
Octane	74		-		70-130	-		
Tetrachloroethene	80		-		70-130	-		
1,1,1,2-Tetrachloroethane	85		-		70-130	-		
Chlorobenzene	83		-		70-130	-		
Ethylbenzene	80		-		70-130	-		
p/m-Xylene	84		-		70-130	-		
Bromoform	93		-		70-130	-		
Styrene	79		-		70-130	-		
1,1,2,2-Tetrachloroethane	87		-		70-130	-		
o-Xylene	87		-		70-130	-		
1,2,3-Trichloropropane	84		-		70-130	-		
Nonane (C9)	75		-		70-130	-		
Isopropylbenzene	81		-		70-130	-		
Bromobenzene	82		-		70-130	-		
o-Chlorotoluene	76		-		70-130	-		
n-Propylbenzene	83		-		70-130	-		
p-Chlorotoluene	78		-		70-130	-		

Lab Control Sample Analysis
Batch Quality Control

Project Name: 682 9TH AVE., NYC, NY
Project Number: 360508

Lab Number: L1628430
Report Date: 09/29/16

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics in Air - Mansfield Lab Associated sample(s): 04-05 Batch: WG932842-8								
4-Ethyltoluene	80		-		70-130	-		
1,3,5-Trimethylbenzene	85		-		70-130	-		
tert-Butylbenzene	88		-		70-130	-		
1,2,4-Trimethylbenzene	88		-		70-130	-		
Decane (C10)	87		-		70-130	-		
Benzyl chloride	88		-		70-130	-		
1,3-Dichlorobenzene	85		-		70-130	-		
1,4-Dichlorobenzene	82		-		70-130	-		
sec-Butylbenzene	80		-		70-130	-		
p-Isopropyltoluene	82		-		70-130	-		
1,2-Dichlorobenzene	86		-		70-130	-		
n-Butylbenzene	84		-		70-130	-		
1,2-Dibromo-3-chloropropane	100		-		70-130	-		
Undecane	89		-		70-130	-		
Dodecane (C12)	97		-		70-130	-		
1,2,4-Trichlorobenzene	82		-		70-130	-		
Naphthalene	80		-		70-130	-		
1,2,3-Trichlorobenzene	81		-		70-130	-		
Hexachlorobutadiene	88		-		70-130	-		

Lab Control Sample Analysis
Batch Quality Control

Project Name: 682 9TH AVE., NYC, NY
Project Number: 360508
Lab Number: L1628430
Report Date: 09/29/16

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics in Air - Mansfield Lab Associated sample(s): 01 Batch: WG936746-3								
Chlorodifluoromethane	96		-		70-130	-		
Propylene	**58**	Q	-		70-130	-		
Propane	**65**	Q	-		70-130	-		
Chloromethane	109		-		70-130	-		
1,2-Dichloro-1,1,2,2-tetrafluoroethane	84		-		70-130	-		
Methanol	95		-		70-130	-		
Vinyl chloride	95		-		70-130	-		
1,3-Butadiene	110		-		70-130	-		
Butane	97		-		70-130	-		
Bromomethane	84		-		70-130	-		
Chloroethane	91		-		70-130	-		
Ethyl Alcohol	98		-		70-130	-		
Dichlorofluoromethane	79		-		70-130	-		
Vinyl bromide	90		-		70-130	-		
Acrolein	98		-		70-130	-		
Acetone	93		-		70-130	-		
Acetonitrile	96		-		70-130	-		
Trichlorofluoromethane	95		-		70-130	-		
iso-Propyl Alcohol	98		-		70-130	-		
Acrylonitrile	108		-		70-130	-		
Pentane	97		-		70-130	-		

Lab Control Sample Analysis
Batch Quality Control

Project Name: 682 9TH AVE., NYC, NY

Project Number: 360508

Lab Number: L1628430

Report Date: 09/29/16

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics in Air - Mansfield Lab Associated sample(s): 01 Batch: WG936746-3								
Ethyl ether	95		-		70-130	-		
1,1-Dichloroethene	99		-		70-130	-		
tert-Butyl Alcohol	92		-		70-130	-		
Methylene chloride	104		-		70-130	-		
3-Chloropropene	112		-		70-130	-		
Carbon disulfide	82		-		70-130	-		
1,1,2-Trichloro-1,2,2-Trifluoroethane	92		-		70-130	-		
trans-1,2-Dichloroethene	82		-		70-130	-		
1,1-Dichloroethane	80		-		70-130	-		
Methyl tert butyl ether	73		-		70-130	-		
Vinyl acetate	112		-		70-130	-		
2-Butanone	87		-		70-130	-		
cis-1,2-Dichloroethene	104		-		70-130	-		
Ethyl Acetate	97		-		70-130	-		
Chloroform	87		-		70-130	-		
Tetrahydrofuran	106		-		70-130	-		
2,2-Dichloropropane	78		-		70-130	-		
1,2-Dichloroethane	95		-		70-130	-		
n-Hexane	116		-		70-130	-		
Isopropyl Ether	90		-		70-130	-		
Ethyl-Tert-Butyl-Ether	109		-		70-130	-		

Lab Control Sample Analysis
Batch Quality Control

Project Name: 682 9TH AVE., NYC, NY
Project Number: 360508
Lab Number: L1628430
Report Date: 09/29/16

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics in Air - Mansfield Lab Associated sample(s): 01 Batch: WG936746-3								
1,1,1-Trichloroethane	102		-		70-130	-		
1,1-Dichloropropene	94		-		70-130	-		
Benzene	89		-		70-130	-		
Carbon tetrachloride	113		-		70-130	-		
Cyclohexane	120		-		70-130	-		
Tertiary-Amyl Methyl Ether	90		-		70-130	-		
Dibromomethane	97		-		70-130	-		
1,2-Dichloropropane	109		-		70-130	-		
Bromodichloromethane	101		-		70-130	-		
1,4-Dioxane	100		-		70-130	-		
Trichloroethene	112		-		70-130	-		
2,2,4-Trimethylpentane	128		-		70-130	-		
Methyl Methacrylate	106		-		70-130	-		
Heptane	126		-		70-130	-		
cis-1,3-Dichloropropene	105		-		70-130	-		
4-Methyl-2-pentanone	130		-		70-130	-		
trans-1,3-Dichloropropene	93		-		70-130	-		
1,1,2-Trichloroethane	107		-		70-130	-		
Toluene	82		-		70-130	-		
1,3-Dichloropropane	77		-		70-130	-		
2-Hexanone	117		-		70-130	-		

Lab Control Sample Analysis
Batch Quality Control

Project Name: 682 9TH AVE., NYC, NY
Project Number: 360508

Lab Number: L1628430
Report Date: 09/29/16

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics in Air - Mansfield Lab Associated sample(s): 01 Batch: WG936746-3								
Dibromochloromethane	102		-		70-130	-		
1,2-Dibromoethane	90		-		70-130	-		
Butyl Acetate	75		-		70-130	-		
Octane	75		-		70-130	-		
Tetrachloroethene	100		-		70-130	-		
1,1,1,2-Tetrachloroethane	95		-		70-130	-		
Chlorobenzene	90		-		70-130	-		
Ethylbenzene	87		-		70-130	-		
p/m-Xylene	86		-		70-130	-		
Bromoform	113		-		70-130	-		
Styrene	91		-		70-130	-		
1,1,2,2-Tetrachloroethane	88		-		70-130	-		
o-Xylene	90		-		70-130	-		
1,2,3-Trichloropropane	78		-		70-130	-		
Nonane (C9)	106		-		70-130	-		
Isopropylbenzene	89		-		70-130	-		
Bromobenzene	79		-		70-130	-		
o-Chlorotoluene	93		-		70-130	-		
n-Propylbenzene	90		-		70-130	-		
p-Chlorotoluene	79		-		70-130	-		
4-Ethyltoluene	88		-		70-130	-		

Lab Control Sample Analysis
Batch Quality Control

Project Name: 682 9TH AVE., NYC, NY
Project Number: 360508
Lab Number: L1628430
Report Date: 09/29/16

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics in Air - Mansfield Lab Associated sample(s): 01 Batch: WG936746-3								
1,3,5-Trimethylbenzene	92		-		70-130	-		
tert-Butylbenzene	92		-		70-130	-		
1,2,4-Trimethylbenzene	97		-		70-130	-		
Decane (C10)	103		-		70-130	-		
Benzyl chloride	95		-		70-130	-		
1,3-Dichlorobenzene	104		-		70-130	-		
1,4-Dichlorobenzene	102		-		70-130	-		
sec-Butylbenzene	88		-		70-130	-		
p-Isopropyltoluene	84		-		70-130	-		
1,2-Dichlorobenzene	101		-		70-130	-		
n-Butylbenzene	86		-		70-130	-		
1,2-Dibromo-3-chloropropane	82		-		70-130	-		
Undecane	105		-		70-130	-		
Dodecane (C12)	114		-		70-130	-		
1,2,4-Trichlorobenzene	117		-		70-130	-		
Naphthalene	96		-		70-130	-		
1,2,3-Trichlorobenzene	104		-		70-130	-		
Hexachlorobutadiene	119		-		70-130	-		

Lab Control Sample Analysis
Batch Quality Control

Project Name: 682 9TH AVE., NYC, NY
Project Number: 360508
Lab Number: L1628430
Report Date: 09/29/16

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics in Air by SIM - Mansfield Lab Associated sample(s): 01-03 Batch: WG936752-3								
Propylene	**52**	Q	-		70-130	-		25
Dichlorodifluoromethane	72		-		70-130	-		25
Chloromethane	94		-		70-130	-		25
1,2-Dichloro-1,1,2,2-tetrafluoroethane	76		-		70-130	-		25
Vinyl chloride	82		-		70-130	-		25
1,3-Butadiene	101		-		70-130	-		25
Bromomethane	74		-		70-130	-		25
Chloroethane	76		-		70-130	-		25
Ethyl Alcohol	84		-		70-130	-		25
Vinyl bromide	78		-		70-130	-		25
Acetone	78		-		70-130	-		25
Trichlorofluoromethane	82		-		70-130	-		25
iso-Propyl Alcohol	86		-		70-130	-		25
Acrylonitrile	90		-		70-130	-		25
1,1-Dichloroethene	85		-		70-130	-		25
tert-Butyl Alcohol[1]	78		-		70-130	-		25
Methylene chloride	98		-		70-130	-		25
3-Chloropropene	103		-		70-130	-		25
Carbon disulfide	**68**	Q	-		70-130	-		25
1,1,2-Trichloro-1,2,2-Trifluoroethane	80		-		70-130	-		25
Halothane	**65**	Q	-		70-130	-		25

Lab Control Sample Analysis

Batch Quality Control

Project Name: 682 9TH AVE., NYC, NY

Project Number: 360508

Lab Number: L1628430

Report Date: 09/29/16

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics in Air by SIM - Mansfield Lab Associated sample(s): 01-03 Batch: WG936752-3								
trans-1,2-Dichloroethene	73		-		70-130	-		25
1,1-Dichloroethane	74		-		70-130	-		25
Methyl tert butyl ether	**67**	Q	-		70-130	-		25
Vinyl acetate	89		-		70-130	-		25
2-Butanone	90		-		70-130	-		25
cis-1,2-Dichloroethene	90		-		70-130	-		25
Ethyl Acetate	76		-		70-130	-		25
Chloroform	73		-		70-130	-		25
Tetrahydrofuran	87		-		70-130	-		25
1,2-Dichloroethane	79		-		70-130	-		25
n-Hexane	111		-		70-130	-		25
1,1,1-Trichloroethane	94		-		70-130	-		25
Benzene	79		-		70-130	-		25
Carbon tetrachloride	102		-		70-130	-		25
Cyclohexane	108		-		70-130	-		25
Dibromomethane[1]	82		-		70-130	-		25
1,2-Dichloropropane	97		-		70-130	-		25
Bromodichloromethane	91		-		70-130	-		25
1,4-Dioxane	90		-		70-130	-		25
Trichloroethene	100		-		70-130	-		25
2,2,4-Trimethylpentane	122		-		70-130	-		25

Lab Control Sample Analysis
Batch Quality Control

Project Name: 682 9TH AVE., NYC, NY

Project Number: 360508

Lab Number: L1628430

Report Date: 09/29/16

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics in Air by SIM - Mansfield Lab Associated sample(s): 01-03 Batch: WG936752-3								
cis-1,3-Dichloropropene	94		-		70-130	-		25
4-Methyl-2-pentanone	116		-		70-130	-		25
trans-1,3-Dichloropropene	81		-		70-130	-		25
1,1,2-Trichloroethane	93		-		70-130	-		25
Toluene	72		-		70-130	-		25
2-Hexanone	104		-		70-130	-		25
Dibromochloromethane	89		-		70-130	-		25
1,2-Dibromoethane	82		-		70-130	-		25
Tetrachloroethene	90		-		70-130	-		25
1,1,1,2-Tetrachloroethane	84		-		70-130	-		25
Chlorobenzene	81		-		70-130	-		25
Ethylbenzene	78		-		70-130	-		25
p/m-Xylene	79		-		70-130	-		25
Bromoform	95		-		70-130	-		25
Styrene	82		-		70-130	-		25
1,1,2,2-Tetrachloroethane	80		-		70-130	-		25
o-Xylene	80		-		70-130	-		25
1,2,3-Trichloropropane[1]	72		-		70-130	-		25
Isopropylbenzene	77		-		70-130	-		25
Bromobenzene[1]	70		-		70-130	-		25
4-Ethyltoluene	81		-		70-130	-		25

Lab Control Sample Analysis
Batch Quality Control

Project Name: 682 9TH AVE., NYC, NY
Lab Number: L1628430
Project Number: 360508
Report Date: 09/29/16

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics in Air by SIM - Mansfield Lab Associated sample(s): 01-03 Batch: WG936752-3								
1,3,5-Trimethylbenzene	84		-		70-130	-		25
1,2,4-Trimethylbenzene	87		-		70-130	-		25
Benzyl chloride	76		-		70-130	-		25
1,3-Dichlorobenzene	93		-		70-130	-		25
1,4-Dichlorobenzene	91		-		70-130	-		25
sec-Butylbenzene	77		-		70-130	-		25
p-Isopropyltoluene	73		-		70-130	-		25
1,2-Dichlorobenzene	91		-		70-130	-		25
n-Butylbenzene	74		-		70-130	-		25
1,2,4-Trichlorobenzene	103		-		70-130	-		25
Naphthalene	90		-		70-130	-		25
1,2,3-Trichlorobenzene	96		-		70-130	-		25
Hexachlorobutadiene	104		-		70-130	-		25

Lab Duplicate Analysis
Batch Quality Control

Project Name: 682 9TH AVE., NYC, NY
Project Number: 360508
Lab Number: L1628430
Report Date: 09/29/16

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Volatile Organics in Air - Mansfield Lab Associated sample(s): 04-05 QC Batch ID: WG932842-5 QC Sample: L1628445-01 Client ID: DUP Sample						
Dichlorodifluoromethane	0.623	0.624	ppbV	0		25
Chloromethane	0.878	0.901	ppbV	3		25
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	ND	ppbV	NC		25
Vinyl chloride	0.674	0.690	ppbV	2		25
1,3-Butadiene	ND	ND	ppbV	NC		25
Bromomethane	ND	ND	ppbV	NC		25
Chloroethane	0.306	0.309	ppbV	1		25
Ethyl Alcohol	5.91	6.70	ppbV	13		25
Vinyl bromide	ND	ND	ppbV	NC		25
Acetone	33.2	33.7	ppbV	1		25
Trichlorofluoromethane	1.02	1.04	ppbV	2		25
iso-Propyl Alcohol	1.01	1.05	ppbV	4		25
1,1-Dichloroethene	ND	ND	ppbV	NC		25
tert-Butyl Alcohol	1.09	1.19	ppbV	9		25
Methylene chloride	1.36	1.37	ppbV	1		25
3-Chloropropene	ND	ND	ppbV	NC		25
Carbon disulfide	ND	ND	ppbV	NC		25
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	ND	ppbV	NC		25
trans-1,2-Dichloroethene	0.428	0.437	ppbV	2		25

Lab Duplicate Analysis
Batch Quality Control

Project Name: 682 9TH AVE., NYC, NY
Project Number: 360508
Lab Number: L1628430
Report Date: 09/29/16

Parameter	Native Sample	Duplicate Sample	Units	RPD	RPD Limits
Volatile Organics in Air - Mansfield Lab Associated sample(s): 04-05 QC Batch ID: WG932842-5 QC Sample: L1628445-01 Client ID: DUP Sample					
1,1-Dichloroethane	ND	ND	ppbV	NC	25
Methyl tert butyl ether	ND	ND	ppbV	NC	25
2-Butanone	4.55	4.68	ppbV	3	25
cis-1,2-Dichloroethene	98.8	101E	ppbV	2	25
Ethyl Acetate	ND	ND	ppbV	NC	25
Chloroform	0.276	0.275	ppbV	0	25
Tetrahydrofuran	2.13	2.22	ppbV	4	25
1,2-Dichloroethane	ND	ND	ppbV	NC	25
n-Hexane	ND	ND	ppbV	NC	25
1,1,1-Trichloroethane	ND	ND	ppbV	NC	25
Benzene	14.2	14.4	ppbV	1	25
Carbon tetrachloride	ND	ND	ppbV	NC	25
Cyclohexane	1.10	1.09	ppbV	1	25
1,2-Dichloropropane	ND	ND	ppbV	NC	25
Bromodichloromethane	ND	ND	ppbV	NC	25
1,4-Dioxane	ND	ND	ppbV	NC	25
Trichloroethene	27.7	28.1	ppbV	1	25
2,2,4-Trimethylpentane	ND	ND	ppbV	NC	25
Heptane	ND	ND	ppbV	NC	25

Lab Duplicate Analysis
Batch Quality Control

Project Name: 682 9TH AVE., NYC, NY
Project Number: 360508
Lab Number: L1628430
Report Date: 09/29/16

Parameter	Native Sample	Duplicate Sample	Units	RPD	RPD Limits
Volatile Organics in Air - Mansfield Lab Associated sample(s): 04-05 QC Batch ID: WG932842-5 QC Sample: L1628445-01 Client ID: DUP Sample					
cis-1,3-Dichloropropene	ND	ND	ppbV	NC	25
4-Methyl-2-pentanone	ND	ND	ppbV	NC	25
trans-1,3-Dichloropropene	ND	ND	ppbV	NC	25
1,1,2-Trichloroethane	ND	ND	ppbV	NC	25
Toluene	1.69	1.70	ppbV	1	25
2-Hexanone	0.298	0.305	ppbV	2	25
Dibromochloromethane	ND	ND	ppbV	NC	25
1,2-Dibromoethane	ND	ND	ppbV	NC	25
Tetrachloroethene	70.8	72.4	ppbV	2	25
Chlorobenzene	ND	ND	ppbV	NC	25
Ethylbenzene	0.229	0.236	ppbV	3	25
p/m-Xylene	1.25	1.28	ppbV	2	25
Bromoform	ND	ND	ppbV	NC	25
Styrene	ND	ND	ppbV	NC	25
1,1,2,2-Tetrachloroethane	ND	ND	ppbV	NC	25
o-Xylene	0.467	0.486	ppbV	4	25
4-Ethyltoluene	ND	ND	ppbV	NC	25
1,3,5-Trimethylbenzene	ND	ND	ppbV	NC	25
1,2,4-Trimethylbenzene	0.416	0.415	ppbV	0	25

Lab Duplicate Analysis
Batch Quality Control

Project Name: 682 9TH AVE., NYC, NY
Project Number: 360508

Lab Number: L1628430
Report Date: 09/29/16

Parameter	Native Sample	Duplicate Sample	Units	RPD	RPD Limits
Volatile Organics in Air - Mansfield Lab Associated sample(s): 04-05 QC Batch ID: WG932842-5 QC Sample: L1628445-01 Client ID: DUP Sample					
Benzyl chloride	ND	ND	ppbV	NC	25
1,3-Dichlorobenzene	ND	ND	ppbV	NC	25
1,4-Dichlorobenzene	ND	ND	ppbV	NC	25
1,2-Dichlorobenzene	ND	ND	ppbV	NC	25
1,2,4-Trichlorobenzene	ND	ND	ppbV	NC	25
Hexachlorobutadiene	ND	ND	ppbV	NC	25

Lab Duplicate Analysis
Batch Quality Control

Project Name: 682 9TH AVE., NYC, NY
Project Number: 360508

Lab Number: L1628430
Report Date: 09/29/16

Parameter	Native Sample	Duplicate Sample	Units	RPD	RPD Limits
Volatile Organics in Air - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG936746-5 QC Sample: L1630145-02 Client ID: DUP Sample					
Chloromethane	0.600	0.681	ppbV	13	25
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	ND	ppbV	NC	25
1,3-Butadiene	ND	ND	ppbV	NC	25
Bromomethane	ND	ND	ppbV	NC	25
Chloroethane	ND	ND	ppbV	NC	25
Ethyl Alcohol	30.7	31.1	ppbV	1	25
Vinyl bromide	ND	ND	ppbV	NC	25
Acetone	209	208	ppbV	0	25
Trichlorofluoromethane	0.834	0.849	ppbV	2	25
iso-Propyl Alcohol	8.29	8.31	ppbV	0	25
tert-Butyl Alcohol	ND	ND	ppbV	NC	25
Methylene chloride	ND	ND	ppbV	NC	25
3-Chloropropene	ND	ND	ppbV	NC	25
Carbon disulfide	ND	ND	ppbV	NC	25
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	ND	ppbV	NC	25
trans-1,2-Dichloroethene	ND	ND	ppbV	NC	25
1,1-Dichloroethane	ND	ND	ppbV	NC	25
Methyl tert butyl ether	ND	ND	ppbV	NC	25
2-Butanone	0.783	0.875	ppbV	11	25

Lab Duplicate Analysis
Batch Quality Control

Project Name: 682 9TH AVE., NYC, NY
Project Number: 360508

Lab Number: L1628430
Report Date: 09/29/16

Parameter	Native Sample	Duplicate Sample	Units	RPD	RPD Limits
Volatile Organics in Air - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG936746-5 QC Sample: L1630145-02 Client ID: DUP Sample					
Ethyl Acetate	ND	ND	ppbV	NC	25
Chloroform	ND	ND	ppbV	NC	25
Tetrahydrofuran	ND	ND	ppbV	NC	25
1,2-Dichloroethane	ND	ND	ppbV	NC	25
n-Hexane	0.700	0.705	ppbV	1	25
Benzene	ND	ND	ppbV	NC	25
Cyclohexane	0.953	0.960	ppbV	1	25
1,2-Dichloropropane	ND	ND	ppbV	NC	25
Bromodichloromethane	ND	ND	ppbV	NC	25
1,4-Dioxane	ND	ND	ppbV	NC	25
2,2,4-Trimethylpentane	ND	ND	ppbV	NC	25
Heptane	0.348	0.365	ppbV	5	25
cis-1,3-Dichloropropene	ND	ND	ppbV	NC	25
4-Methyl-2-pentanone	ND	ND	ppbV	NC	25
trans-1,3-Dichloropropene	ND	ND	ppbV	NC	25
1,1,2-Trichloroethane	ND	ND	ppbV	NC	25
Toluene	0.707	0.706	ppbV	0	25
2-Hexanone	ND	ND	ppbV	NC	25
Dibromochloromethane	ND	ND	ppbV	NC	25

Lab Duplicate Analysis
Batch Quality Control

Project Name: 682 9TH AVE., NYC, NY
Project Number: 360508

Lab Number: L1628430
Report Date: 09/29/16

Parameter	Native Sample	Duplicate Sample	Units	RPD	RPD Limits
Volatile Organics in Air - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG936746-5 QC Sample: L1630145-02 Client ID: DUP Sample					
1,2-Dibromoethane	ND	ND	ppbV	NC	25
Chlorobenzene	ND	ND	ppbV	NC	25
Ethylbenzene	ND	ND	ppbV	NC	25
p/m-Xylene	0.400	ND	ppbV	NC	25
Bromoform	ND	ND	ppbV	NC	25
Styrene	ND	ND	ppbV	NC	25
1,1,2,2-Tetrachloroethane	ND	ND	ppbV	NC	25
o-Xylene	ND	ND	ppbV	NC	25
4-Ethyltoluene	ND	ND	ppbV	NC	25
1,3,5-Trimethylbenzene	ND	ND	ppbV	NC	25
1,2,4-Trimethylbenzene	0.406	0.420	ppbV	3	25
Benzyl chloride	ND	ND	ppbV	NC	25
1,3-Dichlorobenzene	ND	ND	ppbV	NC	25
1,4-Dichlorobenzene	ND	ND	ppbV	NC	25
1,2-Dichlorobenzene	ND	ND	ppbV	NC	25
1,2,4-Trichlorobenzene	ND	ND	ppbV	NC	25
Hexachlorobutadiene	ND	ND	ppbV	NC	25

Lab Duplicate Analysis
Batch Quality Control

Project Name: 682 9TH AVE., NYC, NY
Project Number: 360508

Lab Number: L1628430
Report Date: 09/29/16

Parameter	Native Sample	Duplicate Sample	Units	RPD	RPD Limits
Volatile Organics in Air by SIM - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG936752-5 QC Sample: L1630145-02 Client ID: DUP Sample					
Dichlorodifluoromethane	0.317	0.342	ppbV	8	25
Vinyl chloride	ND	ND	ppbV	NC	25
1,1-Dichloroethene	ND	ND	ppbV	NC	25
cis-1,2-Dichloroethene	ND	ND	ppbV	NC	25
1,1,1-Trichloroethane	ND	ND	ppbV	NC	25
Carbon tetrachloride	0.091	0.092	ppbV	1	25
Trichloroethene	ND	ND	ppbV	NC	25
Tetrachloroethene	0.162	0.157	ppbV	3	25

Canister and Flow Controller Information

Samplenum	Client ID	Media ID	Media Type	Date Prepared	Bottle Order	Cleaning Batch ID	Can Leak Check	Initial Pressure (in. Hg)	Pressure on Receipt (in. Hg)	Flow Controler Leak Chk	Flow Out mL/min	Flow In mL/min	% RPD
L1628430-01	IA-1A	0348	#16 AMB	09/08/16	228320		-	-	-	Pass	3.1	3.1	0
L1628430-01	IA-1A	1823	6.0L Can	09/08/16	228320	L1627442-02	Pass	-29.6	-9.9	-	-	-	-
L1628430-02	IA-1B	0387	#16 AMB	09/08/16	228320		-	-	-	Pass	3.3	3.6	9
L1628430-02	IA-1B	1830	6.0L Can	09/08/16	228320	L1627442-02	Pass	-29.6	-1.3	-	-	-	-
L1628430-03	AA-1	0496	#16 AMB	09/08/16	228320		-	-	-	Pass	3.3	3.0	10
L1628430-03	AA-1	2053	6.0L Can	09/08/16	228320	L1627442-02	Pass	-29.4	-8.8	-	-	-	-
L1628430-04	SSSV-1	0356	#90 SV	09/08/16	228320		-	-	-	Pass	138	153	10
L1628430-04	SSSV-1	499	2.7L Can	09/08/16	228320	L1627639-01	Pass	-29.6	-4.1	-	-	-	-
L1628430-05	SSSV-2	0228	#30 SV	09/08/16	228320		-	-	-	Pass	140	153	9
L1628430-05	SSSV-2	356	2.7L Can	09/08/16	228320	L1627639-01	Pass	-29.6	-4.4	-	-	-	-

Project Name:

Project Number: CANISTER QC BAT

Lab Number: L1627442

Report Date: 09/29/16

Air Canister Certification Results

Lab ID:	L1627442-02	Date Collected:	08/31/16 16:00
Client ID:	CAN 955 SHELF 46	Date Received:	09/01/16
Sample Location:		Field Prep:	Not Specified
Matrix:	Air		
Anaytical Method:	48,TO-15		
Analytical Date:	09/01/16 21:31		
Analyst:	RY		

	ppbV			ug/m3				Dilution
Parameter	Results	RL	MDL	Results	RL	MDL	Qualifier	Factor
Volatile Organics in Air - Mansfield Lab								
Chlorodifluoromethane	ND	0.200	--	ND	0.707	--		1
Propylene	ND	0.500	--	ND	0.861	--		1
Propane	ND	0.500	--	ND	0.902	--		1
Dichlorodifluoromethane	ND	0.200	--	ND	0.989	--		1
Chloromethane	ND	0.200	--	ND	0.413	--		1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	0.200	--	ND	1.40	--		1
Methanol	ND	5.00	--	ND	6.55	--		1
Vinyl chloride	ND	0.200	--	ND	0.511	--		1
1,3-Butadiene	ND	0.200	--	ND	0.442	--		1
Butane	ND	0.200	--	ND	0.475	--		1
Bromomethane	ND	0.200	--	ND	0.777	--		1
Chloroethane	ND	0.200	--	ND	0.528	--		1
Ethyl Alcohol	ND	5.00	--	ND	9.42	--		1
Dichlorofluoromethane	ND	0.200	--	ND	0.842	--		1
Vinyl bromide	ND	0.200	--	ND	0.874	--		1
Acrolein	ND	0.500	--	ND	1.15	--		1
Acetone	ND	1.00	--	ND	2.38	--		1
Acetonitrile	ND	0.200	--	ND	0.336	--		1
Trichlorofluoromethane	ND	0.200	--	ND	1.12	--		1
iso-Propyl Alcohol	ND	0.500	--	ND	1.23	--		1
Acrylonitrile	ND	0.500	--	ND	1.09	--		1
Pentane	ND	0.200	--	ND	0.590	--		1
Ethyl ether	ND	0.200	--	ND	0.606	--		1
1,1-Dichloroethene	ND	0.200	--	ND	0.793	--		1
tert-Butyl Alcohol	ND	0.500	--	ND	1.52	--		1

Project Name:
Project Number: CANISTER QC BAT

Lab Number: L1627442
Report Date: 09/29/16

Air Canister Certification Results

Lab ID: L1627442-02
Client ID: CAN 955 SHELF 46
Sample Location:

Date Collected: 08/31/16 16:00
Date Received: 09/01/16
Field Prep: Not Specified

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Methylene chloride	ND	0.500	--	ND	1.74	--		1
3-Chloropropene	ND	0.200	--	ND	0.626	--		1
Carbon disulfide	ND	0.200	--	ND	0.623	--		1
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	0.200	--	ND	1.53	--		1
trans-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
1,1-Dichloroethane	ND	0.200	--	ND	0.809	--		1
Methyl tert butyl ether	ND	0.200	--	ND	0.721	--		1
Vinyl acetate	ND	1.00	--	ND	3.52	--		1
2-Butanone	ND	0.500	--	ND	1.47	--		1
cis-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
Ethyl Acetate	ND	0.500	--	ND	1.80	--		1
Chloroform	ND	0.200	--	ND	0.977	--		1
Tetrahydrofuran	ND	0.500	--	ND	1.47	--		1
2,2-Dichloropropane	ND	0.200	--	ND	0.924	--		1
1,2-Dichloroethane	ND	0.200	--	ND	0.809	--		1
n-Hexane	ND	0.200	--	ND	0.705	--		1
Isopropyl Ether	ND	0.200	--	ND	0.836	--		1
Ethyl-Tert-Butyl-Ether	ND	0.200	--	ND	0.836	--		1
1,1,1-Trichloroethane	ND	0.200	--	ND	1.09	--		1
1,1-Dichloropropene	ND	0.200	--	ND	0.908	--		1
Benzene	ND	0.200	--	ND	0.639	--		1
Carbon tetrachloride	ND	0.200	--	ND	1.26	--		1
Cyclohexane	ND	0.200	--	ND	0.688	--		1
Tertiary-Amyl Methyl Ether	ND	0.200	--	ND	0.836	--		1
Dibromomethane	ND	0.200	--	ND	1.42	--		1
1,2-Dichloropropane	ND	0.200	--	ND	0.924	--		1
Bromodichloromethane	ND	0.200	--	ND	1.34	--		1
1,4-Dioxane	ND	0.200	--	ND	0.721	--		1

Project Name:
Project Number: CANISTER QC BAT

Lab Number: L1627442
Report Date: 09/29/16

Air Canister Certification Results

Lab ID: L1627442-02
Client ID: CAN 955 SHELF 46
Sample Location:

Date Collected: 08/31/16 16:00
Date Received: 09/01/16
Field Prep: Not Specified

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Trichloroethene	ND	0.200	--	ND	1.07	--		1
2,2,4-Trimethylpentane	ND	0.200	--	ND	0.934	--		1
Methyl Methacrylate	ND	0.500	--	ND	2.05	--		1
Heptane	ND	0.200	--	ND	0.820	--		1
cis-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
4-Methyl-2-pentanone	ND	0.500	--	ND	2.05	--		1
trans-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
1,1,2-Trichloroethane	ND	0.200	--	ND	1.09	--		1
Toluene	ND	0.200	--	ND	0.754	--		1
1,3-Dichloropropane	ND	0.200	--	ND	0.924	--		1
2-Hexanone	ND	0.200	--	ND	0.820	--		1
Dibromochloromethane	ND	0.200	--	ND	1.70	--		1
1,2-Dibromoethane	ND	0.200	--	ND	1.54	--		1
Butyl Acetate	ND	0.500	--	ND	2.38	--		1
Octane	ND	0.200	--	ND	0.934	--		1
Tetrachloroethene	ND	0.200	--	ND	1.36	--		1
1,1,1,2-Tetrachloroethane	ND	0.200	--	ND	1.37	--		1
Chlorobenzene	ND	0.200	--	ND	0.921	--		1
Ethylbenzene	ND	0.200	--	ND	0.869	--		1
p/m-Xylene	ND	0.400	--	ND	1.74	--		1
Bromoform	ND	0.200	--	ND	2.07	--		1
Styrene	ND	0.200	--	ND	0.852	--		1
1,1,2,2-Tetrachloroethane	ND	0.200	--	ND	1.37	--		1
o-Xylene	ND	0.200	--	ND	0.869	--		1
1,2,3-Trichloropropane	ND	0.200	--	ND	1.21	--		1
Nonane (C9)	ND	0.200	--	ND	1.05	--		1
Isopropylbenzene	ND	0.200	--	ND	0.983	--		1
Bromobenzene	ND	0.200	--	ND	0.793	--		1

Project Name:
Project Number: CANISTER QC BAT

Lab Number: L1627442
Report Date: 09/29/16

Air Canister Certification Results

Lab ID:	L1627442-02	Date Collected:	08/31/16 16:00
Client ID:	CAN 955 SHELF 46	Date Received:	09/01/16
Sample Location:		Field Prep:	Not Specified

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
o-Chlorotoluene	ND	0.200	--	ND	1.04	--		1
n-Propylbenzene	ND	0.200	--	ND	0.983	--		1
p-Chlorotoluene	ND	0.200	--	ND	1.04	--		1
4-Ethyltoluene	ND	0.200	--	ND	0.983	--		1
1,3,5-Trimethylbenzene	ND	0.200	--	ND	0.983	--		1
tert-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2,4-Trimethylbenzene	ND	0.200	--	ND	0.983	--		1
Decane (C10)	ND	0.200	--	ND	1.16	--		1
Benzyl chloride	ND	0.200	--	ND	1.04	--		1
1,3-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
1,4-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
sec-Butylbenzene	ND	0.200	--	ND	1.10	--		1
p-Isopropyltoluene	ND	0.200	--	ND	1.10	--		1
1,2-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
n-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2-Dibromo-3-chloropropane	ND	0.200	--	ND	1.93	--		1
Undecane	ND	0.200	--	ND	1.28	--		1
Dodecane (C12)	ND	0.200	--	ND	1.39	--		1
1,2,4-Trichlorobenzene	ND	0.200	--	ND	1.48	--		1
Naphthalene	ND	0.200	--	ND	1.05	--		1
1,2,3-Trichlorobenzene	ND	0.200	--	ND	1.48	--		1
Hexachlorobutadiene	ND	0.200	--	ND	2.13	--		1

	Results	**Qualifier**	**Units**	**RDL**	**Dilution Factor**
Tentatively Identified Compounds					
No Tentatively Identified Compounds					

Project Name:		**Lab Number:**	L1627442
Project Number:	CANISTER QC BAT	**Report Date:**	09/29/16

Air Canister Certification Results

Lab ID:	L1627442-02	Date Collected:	08/31/16 16:00
Client ID:	CAN 955 SHELF 46	Date Received:	09/01/16
Sample Location:		Field Prep:	Not Specified

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								

Internal Standard	**% Recovery**	**Qualifier**	**Acceptance Criteria**
1,4-Difluorobenzene	80		60-140
Bromochloromethane	86		60-140
chlorobenzene-d5	78		60-140

Project Name:

Project Number: CANISTER QC BAT

Lab Number: L1627442

Report Date: 09/29/16

Air Canister Certification Results

Lab ID: L1627442-02
Client ID: CAN 955 SHELF 46
Sample Location:
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 09/01/16 21:31
Analyst: AR

Date Collected: 08/31/16 16:00
Date Received: 09/01/16
Field Prep: Not Specified

	ppbV			ug/m3				
Parameter	Results	RL	MDL	Results	RL	MDL	Qualifier	Dilution Factor
Volatile Organics in Air by SIM - Mansfield Lab								
Dichlorodifluoromethane	ND	0.200	--	ND	0.989	--		1
Chloromethane	ND	0.200	--	ND	0.413	--		1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	0.050	--	ND	0.349	--		1
Vinyl chloride	ND	0.020	--	ND	0.051	--		1
1,3-Butadiene	ND	0.020	--	ND	0.044	--		1
Bromomethane	ND	0.020	--	ND	0.078	--		1
Chloroethane	ND	0.020	--	ND	0.053	--		1
Acetone	ND	1.00	--	ND	2.38	--		1
Trichlorofluoromethane	ND	0.050	--	ND	0.281	--		1
Acrylonitrile	ND	0.500	--	ND	1.09	--		1
1,1-Dichloroethene	ND	0.020	--	ND	0.079	--		1
Methylene chloride	ND	0.500	--	ND	1.74	--		1
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	0.050	--	ND	0.383	--		1
Halothane	ND	0.050	--	ND	0.404	--		1
trans-1,2-Dichloroethene	ND	0.020	--	ND	0.079	--		1
1,1-Dichloroethane	ND	0.020	--	ND	0.081	--		1
Methyl tert butyl ether	ND	0.200	--	ND	0.721	--		1
2-Butanone	ND	0.500	--	ND	1.47	--		1
cis-1,2-Dichloroethene	ND	0.020	--	ND	0.079	--		1
Chloroform	ND	0.020	--	ND	0.098	--		1
1,2-Dichloroethane	ND	0.020	--	ND	0.081	--		1
1,1,1-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Benzene	ND	0.100	--	ND	0.319	--		1
Carbon tetrachloride	ND	0.020	--	ND	0.126	--		1
1,2-Dichloropropane	ND	0.020	--	ND	0.092	--		1

Project Name:

Project Number: CANISTER QC BAT

Lab Number: L1627442

Report Date: 09/29/16

Air Canister Certification Results

Lab ID: L1627442-02
Client ID: CAN 955 SHELF 46
Sample Location:

Date Collected: 08/31/16 16:00
Date Received: 09/01/16
Field Prep: Not Specified

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air by SIM - Mansfield Lab								
Bromodichloromethane	ND	0.020	--	ND	0.134	--		1
1,4-Dioxane	ND	0.100	--	ND	0.360	--		1
Trichloroethene	ND	0.020	--	ND	0.107	--		1
cis-1,3-Dichloropropene	ND	0.020	--	ND	0.091	--		1
4-Methyl-2-pentanone	ND	0.500	--	ND	2.05	--		1
trans-1,3-Dichloropropene	ND	0.020	--	ND	0.091	--		1
1,1,2-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Toluene	ND	0.050	--	ND	0.188	--		1
Dibromochloromethane	ND	0.020	--	ND	0.170	--		1
1,2-Dibromoethane	ND	0.020	--	ND	0.154	--		1
Tetrachloroethene	ND	0.020	--	ND	0.136	--		1
1,1,1,2-Tetrachloroethane	ND	0.020	--	ND	0.137	--		1
Chlorobenzene	ND	0.100	--	ND	0.461	--		1
Ethylbenzene	ND	0.020	--	ND	0.087	--		1
p/m-Xylene	ND	0.040	--	ND	0.174	--		1
Bromoform	ND	0.020	--	ND	0.207	--		1
Styrene	ND	0.020	--	ND	0.085	--		1
1,1,2,2-Tetrachloroethane	ND	0.020	--	ND	0.137	--		1
o-Xylene	ND	0.020	--	ND	0.087	--		1
Isopropylbenzene	ND	0.200	--	ND	0.983	--		1
4-Ethyltoluene	ND	0.020	--	ND	0.098	--		1
1,3,5-Trimethylbenzene	ND	0.020	--	ND	0.098	--		1
1,2,4-Trimethylbenzene	ND	0.020	--	ND	0.098	--		1
1,3-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
1,4-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
sec-Butylbenzene	ND	0.200	--	ND	1.10	--		1
p-Isopropyltoluene	ND	0.200	--	ND	1.10	--		1
1,2-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1

Project Name:

Project Number: CANISTER QC BAT

Lab Number: L1627442

Report Date: 09/29/16

Air Canister Certification Results

Lab ID:	L1627442-02	Date Collected:	08/31/16 16:00
Client ID:	CAN 955 SHELF 46	Date Received:	09/01/16
Sample Location:		Field Prep:	Not Specified

	ppbV			ug/m3				
Parameter	Results	RL	MDL	Results	RL	MDL	Qualifier	Dilution Factor
Volatile Organics in Air by SIM - Mansfield Lab								
n-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2,4-Trichlorobenzene	ND	0.050	--	ND	0.371	--		1
Naphthalene	ND	0.050	--	ND	0.262	--		1
1,2,3-Trichlorobenzene	ND	0.050	--	ND	0.371	--		1
Hexachlorobutadiene	ND	0.050	--	ND	0.533	--		1

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-difluorobenzene	82		60-140
bromochloromethane	90		60-140
chlorobenzene-d5	79		60-140

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT
Lab Number: L1627639
Report Date: 09/29/16

Air Canister Certification Results

Lab ID: L1627639-01
Client ID: CAN 193 SHELF 4
Sample Location:
Matrix: Air
Anaytical Method: 48,TO-15
Analytical Date: 09/02/16 19:16
Analyst: RY

Date Collected: 09/01/16 16:00
Date Received: 09/02/16
Field Prep: Not Specified

	ppbV			ug/m3				
Parameter	Results	RL	MDL	Results	RL	MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Chlorodifluoromethane	ND	0.200	--	ND	0.707	--		1
Propylene	ND	0.500	--	ND	0.861	--		1
Propane	ND	0.500	--	ND	0.902	--		1
Dichlorodifluoromethane	ND	0.200	--	ND	0.989	--		1
Chloromethane	ND	0.200	--	ND	0.413	--		1
Freon-114	ND	0.200	--	ND	1.40	--		1
Methanol	ND	5.00	--	ND	6.55	--		1
Vinyl chloride	ND	0.200	--	ND	0.511	--		1
1,3-Butadiene	ND	0.200	--	ND	0.442	--		1
Butane	ND	0.200	--	ND	0.475	--		1
Bromomethane	ND	0.200	--	ND	0.777	--		1
Chloroethane	ND	0.200	--	ND	0.528	--		1
Ethanol	ND	5.00	--	ND	9.42	--		1
Dichlorofluoromethane	ND	0.200	--	ND	0.842	--		1
Vinyl bromide	ND	0.200	--	ND	0.874	--		1
Acrolein	ND	0.500	--	ND	1.15	--		1
Acetone	ND	1.00	--	ND	2.38	--		1
Acetonitrile	ND	0.200	--	ND	0.336	--		1
Trichlorofluoromethane	ND	0.200	--	ND	1.12	--		1
Isopropanol	ND	0.500	--	ND	1.23	--		1
Acrylonitrile	ND	0.500	--	ND	1.09	--		1
Pentane	ND	0.200	--	ND	0.590	--		1
Ethyl ether	ND	0.200	--	ND	0.606	--		1
1,1-Dichloroethene	ND	0.200	--	ND	0.793	--		1
Tertiary butyl Alcohol	ND	0.500	--	ND	1.52	--		1

Project Name: BATCH CANISTER CERTIFICATION **Lab Number:** L1627639
Project Number: CANISTER QC BAT **Report Date:** 09/29/16

Air Canister Certification Results

Lab ID: L1627639-01 Date Collected: 09/01/16 16:00
Client ID: CAN 193 SHELF 4 Date Received: 09/02/16
Sample Location: Field Prep: Not Specified

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Methylene chloride	ND	0.500	--	ND	1.74	--		1
3-Chloropropene	ND	0.200	--	ND	0.626	--		1
Carbon disulfide	ND	0.200	--	ND	0.623	--		1
Freon-113	ND	0.200	--	ND	1.53	--		1
trans-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
1,1-Dichloroethane	ND	0.200	--	ND	0.809	--		1
Methyl tert butyl ether	ND	0.200	--	ND	0.721	--		1
Vinyl acetate	ND	1.00	--	ND	3.52	--		1
2-Butanone	ND	0.500	--	ND	1.47	--		1
cis-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
Ethyl Acetate	ND	0.500	--	ND	1.80	--		1
Chloroform	ND	0.200	--	ND	0.977	--		1
Tetrahydrofuran	ND	0.500	--	ND	1.47	--		1
2,2-Dichloropropane	ND	0.200	--	ND	0.924	--		1
1,2-Dichloroethane	ND	0.200	--	ND	0.809	--		1
n-Hexane	ND	0.200	--	ND	0.705	--		1
Diisopropyl ether	ND	0.200	--	ND	0.836	--		1
tert-Butyl Ethyl Ether	ND	0.200	--	ND	0.836	--		1
1,1,1-Trichloroethane	ND	0.200	--	ND	1.09	--		1
1,1-Dichloropropene	ND	0.200	--	ND	0.908	--		1
Benzene	ND	0.200	--	ND	0.639	--		1
Carbon tetrachloride	ND	0.200	--	ND	1.26	--		1
Cyclohexane	ND	0.200	--	ND	0.688	--		1
tert-Amyl Methyl Ether	ND	0.200	--	ND	0.836	--		1
Dibromomethane	ND	0.200	--	ND	1.42	--		1
1,2-Dichloropropane	ND	0.200	--	ND	0.924	--		1
Bromodichloromethane	ND	0.200	--	ND	1.34	--		1
1,4-Dioxane	ND	0.200	--	ND	0.721	--		1

Project Name: BATCH CANISTER CERTIFICATION **Lab Number:** L1627639
Project Number: CANISTER QC BAT **Report Date:** 09/29/16

Air Canister Certification Results

Lab ID: L1627639-01 Date Collected: 09/01/16 16:00
Client ID: CAN 193 SHELF 4 Date Received: 09/02/16
Sample Location: Field Prep: Not Specified

	ppbV			ug/m3				Dilution
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Factor**
Volatile Organics in Air - Mansfield Lab								
Trichloroethene	ND	0.200	--	ND	1.07	--		1
2,2,4-Trimethylpentane	ND	0.200	--	ND	0.934	--		1
Methyl Methacrylate	ND	0.500	--	ND	2.05	--		1
Heptane	ND	0.200	--	ND	0.820	--		1
cis-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
4-Methyl-2-pentanone	ND	0.500	--	ND	2.05	--		1
trans-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
1,1,2-Trichloroethane	ND	0.200	--	ND	1.09	--		1
Toluene	ND	0.200	--	ND	0.754	--		1
1,3-Dichloropropane	ND	0.200	--	ND	0.924	--		1
2-Hexanone	ND	0.200	--	ND	0.820	--		1
Dibromochloromethane	ND	0.200	--	ND	1.70	--		1
1,2-Dibromoethane	ND	0.200	--	ND	1.54	--		1
Butyl acetate	ND	0.500	--	ND	2.38	--		1
Octane	ND	0.200	--	ND	0.934	--		1
Tetrachloroethene	ND	0.200	--	ND	1.36	--		1
1,1,1,2-Tetrachloroethane	ND	0.200	--	ND	1.37	--		1
Chlorobenzene	ND	0.200	--	ND	0.921	--		1
Ethylbenzene	ND	0.200	--	ND	0.869	--		1
p/m-Xylene	ND	0.400	--	ND	1.74	--		1
Bromoform	ND	0.200	--	ND	2.07	--		1
Styrene	ND	0.200	--	ND	0.852	--		1
1,1,2,2-Tetrachloroethane	ND	0.200	--	ND	1.37	--		1
o-Xylene	ND	0.200	--	ND	0.869	--		1
1,2,3-Trichloropropane	ND	0.200	--	ND	1.21	--		1
Nonane	ND	0.200	--	ND	1.05	--		1
Isopropylbenzene	ND	0.200	--	ND	0.983	--		1
Bromobenzene	ND	0.200	--	ND	0.793	--		1

Project Name:	BATCH CANISTER CERTIFICATION	**Lab Number:**	L1627639
Project Number:	CANISTER QC BAT	**Report Date:**	09/29/16

Air Canister Certification Results

Lab ID:	L1627639-01	Date Collected:	09/01/16 16:00
Client ID:	CAN 193 SHELF 4	Date Received:	09/02/16
Sample Location:		Field Prep:	Not Specified

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
2-Chlorotoluene	ND	0.200	--	ND	1.04	--		1
n-Propylbenzene	ND	0.200	--	ND	0.983	--		1
4-Chlorotoluene	ND	0.200	--	ND	1.04	--		1
4-Ethyltoluene	ND	0.200	--	ND	0.983	--		1
1,3,5-Trimethylbenzene	ND	0.200	--	ND	0.983	--		1
tert-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2,4-Trimethylbenzene	ND	0.200	--	ND	0.983	--		1
Decane	ND	0.200	--	ND	1.16	--		1
Benzyl chloride	ND	0.200	--	ND	1.04	--		1
1,3-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
1,4-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
sec-Butylbenzene	ND	0.200	--	ND	1.10	--		1
p-Isopropyltoluene	ND	0.200	--	ND	1.10	--		1
1,2-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
n-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2-Dibromo-3-chloropropane	ND	0.200	--	ND	1.93	--		1
Undecane	ND	0.200	--	ND	1.28	--		1
Dodecane	ND	0.200	--	ND	1.39	--		1
1,2,4-Trichlorobenzene	ND	0.200	--	ND	1.48	--		1
Naphthalene	ND	0.200	--	ND	1.05	--		1
1,2,3-Trichlorobenzene	ND	0.200	--	ND	1.48	--		1
Hexachlorobutadiene	ND	0.200	--	ND	2.13	--		1

	Results	**Qualifier**	**Units**	**RDL**	**Dilution Factor**
Tentatively Identified Compounds					
No Tentatively Identified Compounds					

Project Name:	BATCH CANISTER CERTIFICATION	**Lab Number:**	L1627639
Project Number:	CANISTER QC BAT	**Report Date:**	09/29/16

Air Canister Certification Results

Lab ID:	L1627639-01	Date Collected:	09/01/16 16:00
Client ID:	CAN 193 SHELF 4	Date Received:	09/02/16
Sample Location:		Field Prep:	Not Specified

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-Difluorobenzene	83		60-140
Bromochloromethane	89		60-140
chlorobenzene-d5	83		60-140

Project Name: BATCH CANISTER CERTIFICATION
Lab Number: L1627639
Project Number: CANISTER QC BAT
Report Date: 09/29/16

Air Canister Certification Results

Lab ID: L1627639-01
Client ID: CAN 193 SHELF 4
Sample Location:
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 09/02/16 19:16
Analyst: RY

Date Collected: 09/01/16 16:00
Date Received: 09/02/16
Field Prep: Not Specified

	ppbV			ug/m3				Dilution
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Factor**
Volatile Organics in Air by SIM - Mansfield Lab								
Dichlorodifluoromethane	ND	0.200	--	ND	0.989	--		1
Chloromethane	ND	0.200	--	ND	0.413	--		1
Freon-114	ND	0.050	--	ND	0.349	--		1
Vinyl chloride	ND	0.020	--	ND	0.051	--		1
1,3-Butadiene	ND	0.020	--	ND	0.044	--		1
Bromomethane	ND	0.020	--	ND	0.078	--		1
Chloroethane	ND	0.020	--	ND	0.053	--		1
Acetone	ND	1.00	--	ND	2.38	--		1
Trichlorofluoromethane	ND	0.050	--	ND	0.281	--		1
Acrylonitrile	ND	0.500	--	ND	1.09	--		1
1,1-Dichloroethene	ND	0.020	--	ND	0.079	--		1
Methylene chloride	ND	0.500	--	ND	1.74	--		1
Freon-113	ND	0.050	--	ND	0.383	--		1
Halothane	ND	0.050	--	ND	0.404	--		1
trans-1,2-Dichloroethene	ND	0.020	--	ND	0.079	--		1
1,1-Dichloroethane	ND	0.020	--	ND	0.081	--		1
Methyl tert butyl ether	ND	0.200	--	ND	0.721	--		1
2-Butanone	ND	0.500	--	ND	1.47	--		1
cis-1,2-Dichloroethene	ND	0.020	--	ND	0.079	--		1
Chloroform	ND	0.020	--	ND	0.098	--		1
1,2-Dichloroethane	ND	0.020	--	ND	0.081	--		1
1,1,1-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Benzene	ND	0.100	--	ND	0.319	--		1
Carbon tetrachloride	ND	0.020	--	ND	0.126	--		1
1,2-Dichloropropane	ND	0.020	--	ND	0.092	--		1

Project Name: BATCH CANISTER CERTIFICATION | **Lab Number:** L1627639

Project Number: CANISTER QC BAT | **Report Date:** 09/29/16

Air Canister Certification Results

Lab ID: L1627639-01 | Date Collected: 09/01/16 16:00
Client ID: CAN 193 SHELF 4 | Date Received: 09/02/16
Sample Location: | Field Prep: Not Specified

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air by SIM - Mansfield Lab								
Bromodichloromethane	ND	0.020	--	ND	0.134	--		1
1,4-Dioxane	ND	0.100	--	ND	0.360	--		1
Trichloroethene	ND	0.020	--	ND	0.107	--		1
cis-1,3-Dichloropropene	ND	0.020	--	ND	0.091	--		1
4-Methyl-2-pentanone	ND	0.500	--	ND	2.05	--		1
trans-1,3-Dichloropropene	ND	0.020	--	ND	0.091	--		1
1,1,2-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Toluene	ND	0.050	--	ND	0.188	--		1
Dibromochloromethane	ND	0.020	--	ND	0.170	--		1
1,2-Dibromoethane	ND	0.020	--	ND	0.154	--		1
Tetrachloroethene	ND	0.020	--	ND	0.136	--		1
1,1,1,2-Tetrachloroethane	ND	0.020	--	ND	0.137	--		1
Chlorobenzene	ND	0.100	--	ND	0.461	--		1
Ethylbenzene	ND	0.020	--	ND	0.087	--		1
p/m-Xylene	ND	0.040	--	ND	0.174	--		1
Bromoform	ND	0.020	--	ND	0.207	--		1
Styrene	ND	0.020	--	ND	0.085	--		1
1,1,2,2-Tetrachloroethane	ND	0.020	--	ND	0.137	--		1
o-Xylene	ND	0.020	--	ND	0.087	--		1
Isopropylbenzene	ND	0.200	--	ND	0.983	--		1
4-Ethyltoluene	ND	0.020	--	ND	0.098	--		1
1,3,5-Trimethybenzene	ND	0.020	--	ND	0.098	--		1
1,2,4-Trimethylbenzene	ND	0.020	--	ND	0.098	--		1
1,3-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
1,4-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
sec-Butylbenzene	ND	0.200	--	ND	1.10	--		1
p-Isopropyltoluene	ND	0.200	--	ND	1.10	--		1
1,2-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1

Project Name: BATCH CANISTER CERTIFICATION **Lab Number:** L1627639
Project Number: CANISTER QC BAT **Report Date:** 09/29/16

Air Canister Certification Results

Lab ID:	L1627639-01	Date Collected:	09/01/16 16:00
Client ID:	CAN 193 SHELF 4	Date Received:	09/02/16
Sample Location:		Field Prep:	Not Specified

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air by SIM - Mansfield Lab								
n-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2,4-Trichlorobenzene	ND	0.050	--	ND	0.371	--		1
Naphthalene	ND	0.050	--	ND	0.262	--		1
1,2,3-Trichlorobenzene	ND	0.050	--	ND	0.371	--		1
Hexachlorobutadiene	ND	0.050	--	ND	0.533	--		1

Internal Standard	**% Recovery**	**Qualifier**	**Acceptance Criteria**
1,4-difluorobenzene	82		60-140
bromochloromethane	88		60-140
chlorobenzene-d5	82		60-140

Project Name: 682 9TH AVE., NYC, NY
Project Number: 360508

Lab Number: L1628430
Report Date: 09/29/16

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
N/A	Absent

Container Information

Container ID	Container Type	Cooler	pH	Temp deg C	Pres	Seal	Analysis(*)
L1628430-01A	Canister - 6 Liter	N/A	N/A		Y	Absent	TO15-LL(30),TO15-SIM(30)
L1628430-02A	Canister - 6 Liter	N/A	N/A		Y	Absent	TO15-SIM(30)
L1628430-03A	Canister - 6 Liter	N/A	N/A		Y	Absent	TO15-SIM(30)
L1628430-04A	Canister - 2.7 Liter	N/A	N/A		Y	Absent	-
L1628430-05A	Canister - 2.7 Liter	N/A	N/A		Y	Absent	-

*Values in parentheses indicate holding time in days

GLOSSARY

Acronyms

EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Footnotes

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Data Qualifiers

A - Spectra identified as "Aldol Condensation Product".

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the

Data Qualifiers

reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

J - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

ND - Not detected at the reporting limit (RL) for the sample.

REFERENCES

48 Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air. Second Edition. EPA/625/R-96/010b, January 1999.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624: m/p-xylene, o-xylene
EPA 8260C: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), Methyl methacrylate, 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
EPA 300: DW: Bromide
EPA 6860: NPW and SCM: Perchlorate
EPA 9010: NPW and SCM: Amenable Cyanide Distillation
EPA 9012B: NPW: Total Cyanide
EPA 9050A: NPW: Specific Conductance
SM3500: NPW: Ferrous Iron
SM4500: NPW: Amenable Cyanide, Dissolved Oxygen; SCM: Total Phosphorus, TKN, NO2, NO3.
SM5310C: DW: Dissolved Organic Carbon

Mansfield Facility
SM 2540D: TSS
EPA 3005A NPW
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Biological Tissue Matrix: ***EPA 3050B***

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **SM4500NO3-F, EPA 353.2**: Nitrate-N**, EPA 351.1, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D.**
EPA 624: Volatile Halocarbons & Aromatics,
EPA 608: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9222D-MF**.

Mansfield Facility:

Drinking Water
EPA 200.7: Ba, Be, Cd, Cr, Cu, Ni, Na, Ca. **EPA 200.8:** Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Ni, Se, TL. **EPA 245.1** Hg.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

AIR ANALYSIS

CHAIN OF CUSTODY

PAGE 1 OF 1

Date Rec'd in Lab: 9/10/16

ALPHA Job #: L1628430

ALPHA ANALYTICAL
320 Forbes Blvd, Mansfield, MA 02048
TEL: 508-822-9300 FAX: 508-822-3288

Client Information

Client: AEI
Address: 20 Gibson Place, Ste. 310, Freehold, NJ
Phone: 732-275-4719
Fax:
Email: acantemerci@aeiconsultants.com

☐ These samples have been previously analyzed by Alpha

Project Information

Project Name: 682 9th Ave, NYC
Project Location: 682 9th Ave, NYC, NY
Project #: 360508
Project Manager: A. Cantemerci
ALPHA Quote #:

Turn-Around Time

☒ Standard ☐ RUSH (only confirmed if pre-approved!)

Date Due: Time:

Report Information - Data Deliverables

☐ FAX
☐ ADEx
Criteria Checker:
(Default based on Regulatory Criteria Indicated)
Other Formats:
☒ EMAIL (standard pdf report)
☐ Additional Deliverables:

Report to: (if different than Project Manager)

Billing Information

☒ Same as Client info PO #:

Regulatory Requirements/Report Limits

State/Fed	Program	Res / Comm
NYSDEC	VI	

Other Project Specific Requirements/Comments:

Project-Specific Target Compound List: ☐ Chlorinated VOCs

All Columns Below Must Be Filled Out

ALPHA Lab ID (Lab Use Only)	Sample ID	COLLECTION End Date	Start Time	End Time	Initial Vacuum	Final Vacuum	Sample Matrix*	Sampler's Initials	Can Size	I D Can	I D - Flow Controller	ANALYSIS: TO-15 (CVOCs only)	TO-15 SIM	APH	Fixed Gases	Sulfides & Mercaptans by TO-15	Sample Comments (i.e. PID)
28430-01	IA-1a	9/9/16	13:25	13:41	-30.23	-9.58	AA	AVR	6	1823	0348	X					Hold analysis
-02	IA-1b	9/9/16	13:26	11:28	-29.72	-0.62	AA	AVR	6	1830	0387	X					Hold analysis
-03	AA-1	9/9/16	13:27	13:36	-30.69	-8.27	AA	AVR	6	2053	0496	X					Hold analysis
-04	SSSV-1	9/9/16	12:01	12:18	-29.6	-3.62	SV	AVR	2.7	356	0356	X					
-05	SSSV-2	9/9/16	12:02	12:16	-29.6	-3.87	SV	AVR	2.7	499	0228	X					

*SAMPLE MATRIX CODES
AA = Ambient Air (Indoor/Outdoor)
SV = Soil Vapor/Landfill Gas/SVE
Other = Please Specify

Container Type: CS

Relinquished By:	Date/Time	Received By:	Date/Time:
Anthony Cantemerci	9/9/16-13:46	PS	9/9/16 13:46
PS	9/9/16, 2120	Al Williams	9/9/16 2120
Al Williams	9/10/16 03:25	[illegible]	9/10/16 03:25

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

ANALYTICAL REPORT

Lab Number:	L1628392
Client:	AEI Consultants 20 Gibson Place Suite 310 Freehold, NJ 07728
ATTN:	Anthony Cauterucci
Phone:	(732) 414-2720
Project Name:	682 9TH AVE., NYC, NY
Project Number:	360508
Report Date:	09/19/16

The original project report/data package is held by Alpha Analytical. This report/data package is paginated and should be reproduced only in its entirety. Alpha Analytical holds no responsibility for results and/or data that are not consistent with the original.

Certifications & Approvals: MA (M-MA086), NY (11148), CT (PH-0574), NH (2003), NJ NELAP (MA935), RI (LAO00065), ME (MA00086), PA (68-03671), VA (460195), MD (348), IL (200077), NC (666), TX (T104704476), DOD (L2217), USDA (Permit #P-330-11-00240).

Eight Walkup Drive, Westborough, MA 01581-1019
508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com

Project Name: 682 9TH AVE., NYC, NY
Project Number: 360508

Lab Number: L1628392
Report Date: 09/19/16

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1628392-01	AEI-SB8	SOIL	682 9TH AVE., NYC, NY	09/09/16 13:30	09/09/16
L1628392-02	AEI-SB9	SOIL	682 9TH AVE., NYC, NY	09/09/16 12:50	09/09/16

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. All specific QC information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances the specific failure is not narrated but noted in the associated QC table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

HOLD POLICY
For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Client Service Representative and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Client Services at 800-624-9220 with any questions.

Case Narrative (continued)

Report Submission

All non-detect (ND) or estimated concentrations (J-qualified) have been quantitated to the limit noted in the MDL column.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Michelle M. Morris

Title: Technical Director/Representative Date: 09/19/16

ORGANICS

VOLATILES

Project Name:	682 9TH AVE., NYC, NY	**Lab Number:**	L1628392
Project Number:	360508	**Report Date:**	09/19/16

SAMPLE RESULTS

Lab ID:	L1628392-01 D2	Date Collected:	09/09/16 13:30
Client ID:	AEI-SB8	Date Received:	09/09/16
Sample Location:	682 9TH AVE., NYC, NY	Field Prep:	Not Specified
Matrix:	Soil		
Analytical Method:	1,8260C		
Analytical Date:	09/18/16 18:19		
Analyst:	JC		
Percent Solids:	92%		

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by 8260/5035 - Westborough Lab						
Tetrachloroethene	23000000		ug/kg	520000	74000	10000

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	103		70-130
Toluene-d8	103		70-130
4-Bromofluorobenzene	103		70-130
Dibromofluoromethane	92		70-130

Project Name: 682 9TH AVE., NYC, NY
Lab Number: L1628392
Project Number: 360508
Report Date: 09/19/16

SAMPLE RESULTS

Lab ID:	L1628392-01 D	Date Collected:	09/09/16 13:30
Client ID:	AEI-SB8	Date Received:	09/09/16
Sample Location:	682 9TH AVE., NYC, NY	Field Prep:	Not Specified
Matrix:	Soil		
Analytical Method:	1,8260C		
Analytical Date:	09/17/16 20:31		
Analyst:	MS		
Percent Solids:	92%		

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by 8260/5035 - Westborough Lab						
Methylene chloride	ND		ug/kg	520000	58000	1000
1,1-Dichloroethane	ND		ug/kg	79000	4500	1000
Chloroform	ND		ug/kg	79000	19000	1000
Carbon tetrachloride	ND		ug/kg	52000	11000	1000
1,2-Dichloropropane	ND		ug/kg	180000	12000	1000
Dibromochloromethane	ND		ug/kg	52000	8100	1000
1,1,2-Trichloroethane	ND		ug/kg	79000	16000	1000
Tetrachloroethene	22000000	E	ug/kg	52000	7400	1000
Chlorobenzene	ND		ug/kg	52000	18000	1000
Trichlorofluoromethane	ND		ug/kg	260000	20000	1000
1,2-Dichloroethane	ND		ug/kg	52000	6000	1000
1,1,1-Trichloroethane	ND		ug/kg	52000	5800	1000
Bromodichloromethane	ND		ug/kg	52000	9100	1000
trans-1,3-Dichloropropene	ND		ug/kg	52000	6300	1000
cis-1,3-Dichloropropene	ND		ug/kg	52000	6200	1000
1,3-Dichloropropene, Total	ND		ug/kg	52000	6200	1000
1,1-Dichloropropene	ND		ug/kg	260000	7400	1000
1,1,2,2-Tetrachloroethane	ND		ug/kg	52000	5300	1000
Chloromethane	ND		ug/kg	260000	15000	1000
Vinyl chloride	ND		ug/kg	100000	6200	1000
Chloroethane	ND		ug/kg	100000	17000	1000
1,1-Dichloroethene	ND		ug/kg	52000	14000	1000
trans-1,2-Dichloroethene	ND		ug/kg	79000	11000	1000
Trichloroethene	120000		ug/kg	52000	6600	1000
1,2-Dichlorobenzene	ND		ug/kg	260000	8000	1000
1,3-Dichlorobenzene	ND		ug/kg	260000	7100	1000
1,4-Dichlorobenzene	ND		ug/kg	260000	7300	1000
cis-1,2-Dichloroethene	46000	J	ug/kg	52000	7500	1000
1,2-Dichloroethene, Total	46000	J	ug/kg	52000	7500	1000
Dichlorodifluoromethane	ND		ug/kg	520000	10000	1000

Project Name:	682 9TH AVE., NYC, NY	**Lab Number:**	L1628392
Project Number:	360508	**Report Date:**	09/19/16

SAMPLE RESULTS

Lab ID:	L1628392-01	D	Date Collected:	09/09/16 13:30
Client ID:	AEI-SB8		Date Received:	09/09/16
Sample Location:	682 9TH AVE., NYC, NY		Field Prep:	Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by 8260/5035 - Westborough Lab						
1,2,3-Trichloropropane	ND		ug/kg	520000	8500	1000
Bromochloromethane	ND		ug/kg	260000	14000	1000
2,2-Dichloropropane	ND		ug/kg	260000	12000	1000
1,3-Dichloropropane	ND		ug/kg	260000	7600	1000
1,1,1,2-Tetrachloroethane	ND		ug/kg	52000	17000	1000
o-Chlorotoluene	ND		ug/kg	260000	8400	1000
p-Chlorotoluene	ND		ug/kg	260000	7000	1000
1,2-Dibromo-3-chloropropane	ND		ug/kg	260000	21000	1000
Hexachlorobutadiene	ND		ug/kg	260000	12000	1000
1,2,3-Trichlorobenzene	ND		ug/kg	260000	7800	1000
1,2,4-Trichlorobenzene	ND		ug/kg	260000	9600	1000
trans-1,4-Dichloro-2-butene	ND		ug/kg	260000	20000	1000

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	107		70-130
Toluene-d8	101		70-130
4-Bromofluorobenzene	97		70-130
Dibromofluoromethane	97		70-130

Project Name: 682 9TH AVE., NYC, NY **Lab Number:** L1628392
Project Number: 360508 **Report Date:** 09/19/16

SAMPLE RESULTS

Lab ID: L1628392-02 D
Client ID: AEI-SB9
Sample Location: 682 9TH AVE., NYC, NY
Matrix: Soil
Analytical Method: 1,8260C
Analytical Date: 09/17/16 20:58
Analyst: MS
Percent Solids: 91%

Date Collected: 09/09/16 12:50
Date Received: 09/09/16
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by 8260/5035 - Westborough Lab						
Methylene chloride	ND		ug/kg	2700	300	4
1,1-Dichloroethane	ND		ug/kg	410	24.	4
Chloroform	ND		ug/kg	410	100	4
Carbon tetrachloride	ND		ug/kg	270	58.	4
1,2-Dichloropropane	ND		ug/kg	960	62.	4
Dibromochloromethane	ND		ug/kg	270	42.	4
1,1,2-Trichloroethane	ND		ug/kg	410	83.	4
Tetrachloroethene	23000		ug/kg	270	38.	4
Chlorobenzene	ND		ug/kg	270	96.	4
Trichlorofluoromethane	ND		ug/kg	1400	110	4
1,2-Dichloroethane	ND		ug/kg	270	31.	4
1,1,1-Trichloroethane	ND		ug/kg	270	30.	4
Bromodichloromethane	ND		ug/kg	270	48.	4
trans-1,3-Dichloropropene	ND		ug/kg	270	33.	4
cis-1,3-Dichloropropene	ND		ug/kg	270	32.	4
1,3-Dichloropropene, Total	ND		ug/kg	270	32.	4
1,1-Dichloropropene	ND		ug/kg	1400	39.	4
1,1,2,2-Tetrachloroethane	ND		ug/kg	270	28.	4
Chloromethane	ND		ug/kg	1400	81.	4
Vinyl chloride	ND		ug/kg	550	32.	4
Chloroethane	ND		ug/kg	550	87.	4
1,1-Dichloroethene	ND		ug/kg	270	72.	4
trans-1,2-Dichloroethene	ND		ug/kg	410	58.	4
Trichloroethene	ND		ug/kg	270	34.	4
1,2-Dichlorobenzene	ND		ug/kg	1400	42.	4
1,3-Dichlorobenzene	ND		ug/kg	1400	37.	4
1,4-Dichlorobenzene	ND		ug/kg	1400	38.	4
cis-1,2-Dichloroethene	ND		ug/kg	270	39.	4
1,2-Dichloroethene, Total	ND		ug/kg	270	39.	4
Dichlorodifluoromethane	ND		ug/kg	2700	52.	4

Project Name:	682 9TH AVE., NYC, NY	Lab Number:	L1628392
Project Number:	360508	Report Date:	09/19/16

SAMPLE RESULTS

Lab ID:	L1628392-02 D		Date Collected:	09/09/16 12:50
Client ID:	AEI-SB9		Date Received:	09/09/16
Sample Location:	682 9TH AVE., NYC, NY		Field Prep:	Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by 8260/5035 - Westborough Lab						
1,2,3-Trichloropropane	ND		ug/kg	2700	45.	4
Bromochloromethane	ND		ug/kg	1400	76.	4
2,2-Dichloropropane	ND		ug/kg	1400	62.	4
1,3-Dichloropropane	ND		ug/kg	1400	40.	4
1,1,1,2-Tetrachloroethane	ND		ug/kg	270	87.	4
o-Chlorotoluene	ND		ug/kg	1400	44.	4
p-Chlorotoluene	ND		ug/kg	1400	36.	4
1,2-Dibromo-3-chloropropane	ND		ug/kg	1400	110	4
Hexachlorobutadiene	ND		ug/kg	1400	62.	4
1,2,3-Trichlorobenzene	ND		ug/kg	1400	40.	4
1,2,4-Trichlorobenzene	ND		ug/kg	1400	50.	4
trans-1,4-Dichloro-2-butene	ND		ug/kg	1400	110	4

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	107		70-130
Toluene-d8	99		70-130
4-Bromofluorobenzene	100		70-130
Dibromofluoromethane	99		70-130

Project Name: 682 9TH AVE., NYC, NY **Lab Number:** L1628392
Project Number: 360508 **Report Date:** 09/19/16

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 09/17/16 13:23
Analyst: MS

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by 8260/5035 - Westborough Lab for sample(s): 01-02 Batch: WG933193-5					
Methylene chloride	ND		ug/kg	500	55.
1,1-Dichloroethane	ND		ug/kg	75	4.3
Chloroform	ND		ug/kg	75	18.
Carbon tetrachloride	ND		ug/kg	50	10.
1,2-Dichloropropane	ND		ug/kg	180	11.
Dibromochloromethane	ND		ug/kg	50	7.7
1,1,2-Trichloroethane	ND		ug/kg	75	15.
Tetrachloroethene	ND		ug/kg	50	7.0
Chlorobenzene	ND		ug/kg	50	17.
Trichlorofluoromethane	ND		ug/kg	250	19.
1,2-Dichloroethane	ND		ug/kg	50	5.7
1,1,1-Trichloroethane	ND		ug/kg	50	5.5
Bromodichloromethane	ND		ug/kg	50	8.7
trans-1,3-Dichloropropene	ND		ug/kg	50	6.0
cis-1,3-Dichloropropene	ND		ug/kg	50	5.9
1,3-Dichloropropene, Total	ND		ug/kg	50	5.9
1,1-Dichloropropene	ND		ug/kg	250	7.1
1,1,2,2-Tetrachloroethane	ND		ug/kg	50	5.0
Chloromethane	16	J	ug/kg	250	15.
Vinyl chloride	ND		ug/kg	100	5.9
Chloroethane	ND		ug/kg	100	16.
1,1-Dichloroethene	ND		ug/kg	50	13.
trans-1,2-Dichloroethene	ND		ug/kg	75	11.
Trichloroethene	ND		ug/kg	50	6.2
1,2-Dichlorobenzene	ND		ug/kg	250	7.7
1,3-Dichlorobenzene	ND		ug/kg	250	6.8
1,4-Dichlorobenzene	ND		ug/kg	250	6.9
cis-1,2-Dichloroethene	ND		ug/kg	50	7.1
1,2-Dichloroethene, Total	ND		ug/kg	50	7.1

Project Name: 682 9TH AVE., NYC, NY **Lab Number:** L1628392
Project Number: 360508 **Report Date:** 09/19/16

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 09/17/16 13:23
Analyst: MS

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by 8260/5035 - Westborough Lab for sample(s): 01-02 Batch: WG933193-5					
Dichlorodifluoromethane	ND		ug/kg	500	9.5
1,2,3-Trichloropropane	ND		ug/kg	500	8.1
Bromochloromethane	ND		ug/kg	250	14.
2,2-Dichloropropane	ND		ug/kg	250	11.
1,3-Dichloropropane	ND		ug/kg	250	7.3
1,1,1,2-Tetrachloroethane	ND		ug/kg	50	16.
o-Chlorotoluene	ND		ug/kg	250	8.0
p-Chlorotoluene	ND		ug/kg	250	6.6
1,2-Dibromo-3-chloropropane	ND		ug/kg	250	20.
Hexachlorobutadiene	ND		ug/kg	250	11.
1,2,3-Trichlorobenzene	ND		ug/kg	250	7.4
1,2,4-Trichlorobenzene	ND		ug/kg	250	9.1
trans-1,4-Dichloro-2-butene	ND		ug/kg	250	20.

Surrogate	%Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	104		70-130
Toluene-d8	99		70-130
4-Bromofluorobenzene	99		70-130
Dibromofluoromethane	100		70-130

Project Name: 682 9TH AVE., NYC, NY **Lab Number:** L1628392

Project Number: 360508 **Report Date:** 09/19/16

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 09/18/16 09:01
Analyst: JC

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by 8260/5035 - Westborough Lab for sample(s): 01 Batch: WG933364-5					
Methylene chloride	76	J	ug/kg	500	55.
1,1-Dichloroethane	ND		ug/kg	75	4.3
Chloroform	ND		ug/kg	75	18.
Carbon tetrachloride	ND		ug/kg	50	10.
1,2-Dichloropropane	ND		ug/kg	180	11.
Dibromochloromethane	ND		ug/kg	50	7.7
1,1,2-Trichloroethane	ND		ug/kg	75	15.
Tetrachloroethene	ND		ug/kg	50	7.0
Chlorobenzene	ND		ug/kg	50	17.
Trichlorofluoromethane	ND		ug/kg	250	19.
1,2-Dichloroethane	ND		ug/kg	50	5.7
1,1,1-Trichloroethane	ND		ug/kg	50	5.5
Bromodichloromethane	ND		ug/kg	50	8.7
trans-1,3-Dichloropropene	ND		ug/kg	50	6.0
cis-1,3-Dichloropropene	ND		ug/kg	50	5.9
1,3-Dichloropropene, Total	ND		ug/kg	50	5.9
1,1-Dichloropropene	ND		ug/kg	250	7.1
1,1,2,2-Tetrachloroethane	ND		ug/kg	50	5.0
Chloromethane	ND		ug/kg	250	15.
Vinyl chloride	ND		ug/kg	100	5.9
Chloroethane	ND		ug/kg	100	16.
1,1-Dichloroethene	ND		ug/kg	50	13.
trans-1,2-Dichloroethene	ND		ug/kg	75	11.
Trichloroethene	ND		ug/kg	50	6.2
1,2-Dichlorobenzene	ND		ug/kg	250	7.7
1,3-Dichlorobenzene	ND		ug/kg	250	6.8
1,4-Dichlorobenzene	ND		ug/kg	250	6.9
cis-1,2-Dichloroethene	ND		ug/kg	50	7.1
1,2-Dichloroethene, Total	ND		ug/kg	50	7.1

Project Name:	682 9TH AVE., NYC, NY	**Lab Number:**	L1628392
Project Number:	360508	**Report Date:**	09/19/16

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 09/18/16 09:01
Analyst: JC

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by 8260/5035 - Westborough Lab for sample(s): 01 Batch: WG933364-5					
Dichlorodifluoromethane	ND		ug/kg	500	9.5
1,2,3-Trichloropropane	ND		ug/kg	500	8.1
Bromochloromethane	ND		ug/kg	250	14.
2,2-Dichloropropane	ND		ug/kg	250	11.
1,3-Dichloropropane	ND		ug/kg	250	7.3
1,1,1,2-Tetrachloroethane	ND		ug/kg	50	16.
o-Chlorotoluene	ND		ug/kg	250	8.0
p-Chlorotoluene	ND		ug/kg	250	6.6
1,2-Dibromo-3-chloropropane	ND		ug/kg	250	20.
Hexachlorobutadiene	ND		ug/kg	250	11.
1,2,3-Trichlorobenzene	ND		ug/kg	250	7.4
1,2,4-Trichlorobenzene	ND		ug/kg	250	9.1
trans-1,4-Dichloro-2-butene	ND		ug/kg	250	20.

Surrogate	%Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	104		70-130
Toluene-d8	103		70-130
4-Bromofluorobenzene	98		70-130
Dibromofluoromethane	88		70-130

Lab Control Sample Analysis
Batch Quality Control

Project Name: 682 9TH AVE., NYC, NY
Project Number: 360508
Lab Number: L1628392
Report Date: 09/19/16

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by 8260/5035 - Westborough Lab Associated sample(s): 01-02 Batch: WG933193-3 WG933193-4								
Methylene chloride	102		90		70-130	13		30
1,1-Dichloroethane	102		91		70-130	11		30
Chloroform	104		93		70-130	11		30
Carbon tetrachloride	98		86		70-130	13		30
1,2-Dichloropropane	102		91		70-130	11		30
Dibromochloromethane	100		94		70-130	6		30
2-Chloroethylvinyl ether	113		96		70-130	16		30
1,1,2-Trichloroethane	102		97		70-130	5		30
Tetrachloroethene	100		91		70-130	9		30
Chlorobenzene	101		92		70-130	9		30
Trichlorofluoromethane	92		82		70-139	11		30
1,2-Dichloroethane	105		94		70-130	11		30
1,1,1-Trichloroethane	99		89		70-130	11		30
Bromodichloromethane	102		94		70-130	8		30
trans-1,3-Dichloropropene	104		94		70-130	10		30
cis-1,3-Dichloropropene	102		92		70-130	10		30
1,1-Dichloropropene	100		87		70-130	14		30
Bromoform	106		93		70-130	13		30
1,1,2,2-Tetrachloroethane	106		95		70-130	11		30
Benzene	100		88		70-130	13		30
Toluene	99		92		70-130	7		30

Lab Control Sample Analysis
Batch Quality Control

Project Name: 682 9TH AVE., NYC, NY
Project Number: 360508
Lab Number: L1628392
Report Date: 09/19/16

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by 8260/5035 - Westborough Lab Associated sample(s): 01-02 Batch: WG933193-3 WG933193-4								
Ethylbenzene	100		91		70-130	9		30
Chloromethane	102		88		52-130	15		30
Bromomethane	105		87		57-147	19		30
Vinyl chloride	92		80		67-130	14		30
Chloroethane	96		89		50-151	8		30
1,1-Dichloroethene	98		88		65-135	11		30
trans-1,2-Dichloroethene	100		90		70-130	11		30
Trichloroethene	99		90		70-130	10		30
1,2-Dichlorobenzene	102		92		70-130	10		30
1,3-Dichlorobenzene	106		93		70-130	13		30
1,4-Dichlorobenzene	106		92		70-130	16		30
Methyl tert butyl ether	104		94		66-130	10		30
p/m-Xylene	101		92		70-130	9		30
o-Xylene	102		93		70-130	9		30
cis-1,2-Dichloroethene	102		92		70-130	10		30
Dibromomethane	103		94		70-130	9		30
Styrene	103		92		70-130	11		30
Dichlorodifluoromethane	87		79		30-146	10		30
Acetone	132		98		54-140	30		30
Carbon disulfide	129		96		59-130	29		30
2-Butanone	107		91		70-130	16		30

Lab Control Sample Analysis
Batch Quality Control

Project Name: 682 9TH AVE., NYC, NY
Project Number: 360508
Lab Number: L1628392
Report Date: 09/19/16

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by 8260/5035 - Westborough Lab Associated sample(s): 01-02 Batch: WG933193-3 WG933193-4								
Vinyl acetate	102		92		70-130	10		30
4-Methyl-2-pentanone	103		97		70-130	6		30
1,2,3-Trichloropropane	104		91		68-130	13		30
2-Hexanone	100		94		70-130	6		30
Bromochloromethane	110		96		70-130	14		30
2,2-Dichloropropane	98		90		70-130	9		30
1,2-Dibromoethane	106		98		70-130	8		30
1,3-Dichloropropane	105		93		69-130	12		30
1,1,1,2-Tetrachloroethane	100		92		70-130	8		30
Bromobenzene	106		93		70-130	13		30
n-Butylbenzene	103		91		70-130	12		30
sec-Butylbenzene	100		90		70-130	11		30
tert-Butylbenzene	101		90		70-130	12		30
o-Chlorotoluene	103		92		70-130	11		30
p-Chlorotoluene	104		94		70-130	10		30
1,2-Dibromo-3-chloropropane	103		91		68-130	12		30
Hexachlorobutadiene	102		91		67-130	11		30
Isopropylbenzene	103		92		70-130	11		30
p-Isopropyltoluene	101		91		70-130	10		30
Naphthalene	105		93		70-130	12		30
Acrylonitrile	113		96		70-130	16		30

Lab Control Sample Analysis
Batch Quality Control

Project Name: 682 9TH AVE., NYC, NY
Project Number: 360508
Lab Number: L1628392
Report Date: 09/19/16

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by 8260/5035 - Westborough Lab Associated sample(s): 01-02 Batch: WG933193-3 WG933193-4								
Isopropyl Ether	102		93		66-130	9		30
tert-Butyl Alcohol	104		95		70-130	9		30
n-Propylbenzene	103		91		70-130	12		30
1,2,3-Trichlorobenzene	108		93		70-130	15		30
1,2,4-Trichlorobenzene	107		93		70-130	14		30
1,3,5-Trimethylbenzene	102		91		70-130	11		30
1,2,4-Trimethylbenzene	102		91		70-130	11		30
Methyl Acetate	109		100		51-146	9		30
Ethyl Acetate	100		93		70-130	7		30
Acrolein	114		**131**	Q	70-130	14		30
Cyclohexane	91		82		59-142	10		30
1,4-Dioxane	110		99		65-136	11		30
1,1,2-Trichloro-1,2,2-Trifluoroethane	94		83		50-139	12		30
1,4-Diethylbenzene	104		90		70-130	14		30
4-Ethyltoluene	103		92		70-130	11		30
1,2,4,5-Tetramethylbenzene	104		92		70-130	12		30
Tetrahydrofuran	108		92		66-130	16		30
Ethyl ether	100		90		67-130	11		30
trans-1,4-Dichloro-2-butene	107		92		70-130	15		30
Methyl cyclohexane	92		81		70-130	13		30
Ethyl-Tert-Butyl-Ether	102		93		70-130	9		30

Lab Control Sample Analysis
Batch Quality Control

Project Name: 682 9TH AVE., NYC, NY
Project Number: 360508

Lab Number: L1628392
Report Date: 09/19/16

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by 8260/5035 - Westborough Lab Associated sample(s): 01-02 Batch: WG933193-3 WG933193-4								
Tertiary-Amyl Methyl Ether	104		94		70-130	10		30

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
1,2-Dichloroethane-d4	100		101		70-130
Toluene-d8	100		101		70-130
4-Bromofluorobenzene	100		101		70-130
Dibromofluoromethane	98		101		70-130

Lab Control Sample Analysis
Batch Quality Control

Project Name: 682 9TH AVE., NYC, NY
Project Number: 360508
Lab Number: L1628392
Report Date: 09/19/16

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by 8260/5035 - Westborough Lab Associated sample(s): 01 Batch: WG933364-3 WG933364-4								
Methylene chloride	102		100		70-130	2		30
1,1-Dichloroethane	107		102		70-130	5		30
Chloroform	104		103		70-130	1		30
Carbon tetrachloride	104		96		70-130	8		30
1,2-Dichloropropane	102		103		70-130	1		30
Dibromochloromethane	91		90		70-130	1		30
2-Chloroethylvinyl ether	86		89		70-130	3		30
1,1,2-Trichloroethane	106		105		70-130	1		30
Tetrachloroethene	112		103		70-130	8		30
Chlorobenzene	107		102		70-130	5		30
Trichlorofluoromethane	113		88		70-139	25		30
1,2-Dichloroethane	104		103		70-130	1		30
1,1,1-Trichloroethane	108		101		70-130	7		30
Bromodichloromethane	99		98		70-130	1		30
trans-1,3-Dichloropropene	93		90		70-130	3		30
cis-1,3-Dichloropropene	90		92		70-130	2		30
1,1-Dichloropropene	108		100		70-130	8		30
Bromoform	80		78		70-130	3		30
1,1,2,2-Tetrachloroethane	103		104		70-130	1		30
Benzene	104		100		70-130	4		30
Toluene	109		103		70-130	6		30

Lab Control Sample Analysis
Batch Quality Control

Project Name: 682 9TH AVE., NYC, NY
Lab Number: L1628392
Project Number: 360508
Report Date: 09/19/16

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by 8260/5035 - Westborough Lab Associated sample(s): 01 Batch: WG933364-3 WG933364-4								
Ethylbenzene	109		104		70-130	5		30
Chloromethane	117		102		52-130	14		30
Bromomethane	103		95		57-147	8		30
Vinyl chloride	116		98		67-130	17		30
Chloroethane	112		98		50-151	13		30
1,1-Dichloroethene	109		98		65-135	11		30
trans-1,2-Dichloroethene	108		100		70-130	8		30
Trichloroethene	105		101		70-130	4		30
1,2-Dichlorobenzene	106		106		70-130	0		30
1,3-Dichlorobenzene	110		108		70-130	2		30
1,4-Dichlorobenzene	107		108		70-130	1		30
Methyl tert butyl ether	99		97		66-130	2		30
p/m-Xylene	110		105		70-130	5		30
o-Xylene	108		105		70-130	3		30
cis-1,2-Dichloroethene	105		103		70-130	2		30
Dibromomethane	99		100		70-130	1		30
Styrene	106		103		70-130	3		30
Dichlorodifluoromethane	115		98		30-146	16		30
Acetone	124		110		54-140	12		30
Carbon disulfide	93		85		59-130	9		30
2-Butanone	88		79		70-130	11		30

Lab Control Sample Analysis
Batch Quality Control

Project Name: 682 9TH AVE., NYC, NY
Project Number: 360508

Lab Number: L1628392
Report Date: 09/19/16

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by 8260/5035 - Westborough Lab Associated sample(s): 01 Batch: WG933364-3 WG933364-4								
Vinyl acetate	91		89		70-130	2		30
4-Methyl-2-pentanone	89		90		70-130	1		30
1,2,3-Trichloropropane	102		104		68-130	2		30
2-Hexanone	90		85		70-130	6		30
Bromochloromethane	107		104		70-130	3		30
2,2-Dichloropropane	108		100		70-130	8		30
1,2-Dibromoethane	102		102		70-130	0		30
1,3-Dichloropropane	105		104		69-130	1		30
1,1,1,2-Tetrachloroethane	105		102		70-130	3		30
Bromobenzene	106		106		70-130	0		30
n-Butylbenzene	116		112		70-130	4		30
sec-Butylbenzene	114		109		70-130	4		30
tert-Butylbenzene	113		108		70-130	5		30
o-Chlorotoluene	112		109		70-130	3		30
p-Chlorotoluene	112		109		70-130	3		30
1,2-Dibromo-3-chloropropane	84		87		68-130	4		30
Hexachlorobutadiene	110		103		67-130	7		30
Isopropylbenzene	113		109		70-130	4		30
p-Isopropyltoluene	114		110		70-130	4		30
Naphthalene	100		103		70-130	3		30
Acrylonitrile	95		88		70-130	8		30

Lab Control Sample Analysis
Batch Quality Control

Project Name: 682 9TH AVE., NYC, NY
Project Number: 360508
Lab Number: L1628392
Report Date: 09/19/16

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by 8260/5035 - Westborough Lab Associated sample(s): 01 Batch: WG933364-3 WG933364-4								
Isopropyl Ether	105		103		66-130	2		30
tert-Butyl Alcohol	92		85		70-130	8		30
n-Propylbenzene	114		109		70-130	4		30
1,2,3-Trichlorobenzene	105		107		70-130	2		30
1,2,4-Trichlorobenzene	108		109		70-130	1		30
1,3,5-Trimethylbenzene	114		110		70-130	4		30
1,2,4-Trimethylbenzene	112		109		70-130	3		30
Methyl Acetate	92		85		51-146	8		30
Ethyl Acetate	89		88		70-130	1		30
Acrolein	102		85		70-130	18		30
Cyclohexane	108		98		59-142	10		30
1,4-Dioxane	90		91		65-136	1		30
1,1,2-Trichloro-1,2,2-Trifluoroethane	110		95		50-139	15		30
1,4-Diethylbenzene	115		110		70-130	4		30
4-Ethyltoluene	114		110		70-130	4		30
1,2,4,5-Tetramethylbenzene	103		103		70-130	0		30
Tetrahydrofuran	92		110		66-130	18		30
Ethyl ether	102		98		67-130	4		30
trans-1,4-Dichloro-2-butene	89		90		70-130	1		30
Methyl cyclohexane	105		96		70-130	9		30
Ethyl-Tert-Butyl-Ether	100		100		70-130	0		30

Lab Control Sample Analysis
Batch Quality Control

Project Name: 682 9TH AVE., NYC, NY
Project Number: 360508
Lab Number: L1628392
Report Date: 09/19/16

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by 8260/5035 - Westborough Lab Associated sample(s): 01 Batch: WG933364-3 WG933364-4								
Tertiary-Amyl Methyl Ether	97		98		70-130	1		30

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
1,2-Dichloroethane-d4	99		100		70-130
Toluene-d8	105		102		70-130
4-Bromofluorobenzene	101		103		70-130
Dibromofluoromethane	99		99		70-130

INORGANICS
&
MISCELLANEOUS

Project Name: 682 9TH AVE., NYC, NY
Lab Number: L1628392
Project Number: 360508
Report Date: 09/19/16

SAMPLE RESULTS

Lab ID: L1628392-01
Client ID: AEI-SB8
Sample Location: 682 9TH AVE., NYC, NY
Matrix: Soil
Date Collected: 09/09/16 13:30
Date Received: 09/09/16
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total	92.3		%	0.100	NA	1	-	09/12/16 23:13	121,2540G	VB

Project Name: 682 9TH AVE., NYC, NY
Lab Number: L1628392
Project Number: 360508
Report Date: 09/19/16

SAMPLE RESULTS

Lab ID: L1628392-02
Client ID: AEI-SB9
Sample Location: 682 9TH AVE., NYC, NY
Matrix: Soil

Date Collected: 09/09/16 12:50
Date Received: 09/09/16
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total	90.9		%	0.100	NA	1	-	09/12/16 23:13	121,2540G	VB

Lab Duplicate Analysis
Batch Quality Control

Project Name: 682 9TH AVE., NYC, NY
Project Number: 360508

Lab Number: L1628392
Report Date: 09/19/16

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG931169-1 QC Sample: L1628387-01 Client ID: DUP Sample						
Solids, Total	98.9	98.4	%	1		20

Project Name: 682 9TH AVE., NYC, NY
Project Number: 360508

Lab Number: L1628392
Report Date: 09/19/16

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Reagent H2O Preserved Vials Frozen on: 10-SEP-16 16:14

Cooler Information Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	pH	Temp deg C	Pres	Seal	Analysis(*)
L1628392-01A	5 gram Encore Sampler	A	N/A	2.1	Y	Absent	NYTCL-8260HLW(2)
L1628392-01B	5 gram Encore Sampler	A	N/A	2.1	Y	Absent	NYTCL-8260HLW(2)
L1628392-01C	5 gram Encore Sampler	A	N/A	2.1	Y	Absent	NYTCL-8260HLW(2)
L1628392-01D	Plastic 2oz unpreserved for TS	A	N/A	2.1	Y	Absent	TS(7)
L1628392-01X	Vial MeOH preserved split	A	N/A	2.1	Y	Absent	NYTCL-8260HLW(14)
L1628392-01Y	Vial Water preserved split	A	N/A	2.1	Y	Absent	NYTCL-8260HLW(14)
L1628392-01Z	Vial Water preserved split	A	N/A	2.1	Y	Absent	NYTCL-8260HLW(14)
L1628392-02A	5 gram Encore Sampler	A	N/A	2.1	Y	Absent	NYTCL-8260HLW(2)
L1628392-02B	5 gram Encore Sampler	A	N/A	2.1	Y	Absent	NYTCL-8260HLW(2)
L1628392-02C	5 gram Encore Sampler	A	N/A	2.1	Y	Absent	NYTCL-8260HLW(2)
L1628392-02D	Plastic 2oz unpreserved for TS	A	N/A	2.1	Y	Absent	TS(7)
L1628392-02X	Vial MeOH preserved split	A	N/A	2.1	Y	Absent	NYTCL-8260HLW(14)
L1628392-02Y	Vial Water preserved split	A	N/A	2.1	Y	Absent	NYTCL-8260HLW(14)
L1628392-02Z	Vial Water preserved split	A	N/A	2.1	Y	Absent	NYTCL-8260HLW(14)

*Values in parentheses indicate holding time in days

GLOSSARY

Acronyms

EDL - Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).

EPA - Environmental Protection Agency.

LCS - Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LCSD - Laboratory Control Sample Duplicate: Refer to LCS.

LFB - Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

MDL - Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

MS - Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.

MSD - Matrix Spike Sample Duplicate: Refer to MS.

NA - Not Applicable.

NC - Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.

NDPA/DPA - N-Nitrosodiphenylamine/Diphenylamine.

NI - Not Ignitable.

NP - Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.

RL - Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

RPD - Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.

SRM - Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.

STLP - Semi-dynamic Tank Leaching Procedure per EPA Method 1315.

TIC - Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Footnotes

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Data Qualifiers

A - Spectra identified as "Aldol Condensation Product".

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the

Data Qualifiers

reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

J - Estimated value. The Target analyte concentration is below the quantitation limit (RL), but above the Method Detection Limit (MDL) or Estimated Detection Limit (EDL) for SPME-related analyses. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

ND - Not detected at the method detection limit (MDL) for the sample, or estimated detection limit (EDL) for SPME-related analyses.

REFERENCES

1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IV, 2007.

121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624: m/p-xylene, o-xylene
EPA 8260C: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), Methyl methacrylate, 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
EPA 300: DW: Bromide
EPA 6860: NPW and SCM: Perchlorate
EPA 9010: NPW and SCM: Amenable Cyanide Distillation
EPA 9012B: NPW: Total Cyanide
EPA 9050A: NPW: Specific Conductance
SM3500: NPW: Ferrous Iron
SM4500: NPW: Amenable Cyanide, Dissolved Oxygen; SCM: Total Phosphorus, TKN, NO2, NO3.
SM5310C: DW: Dissolved Organic Carbon

Mansfield Facility
SM 2540D: TSS
EPA 3005A NPW
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Biological Tissue Matrix: ***EPA 3050B***

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **SM4500NO3-F, EPA 353.2**: Nitrate-N**, EPA 351.1, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D.**
EPA 624: Volatile Halocarbons & Aromatics,
EPA 608: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9222D-MF**.

Mansfield Facility:

Drinking Water
EPA 200.7: Ba, Be, Cd, Cr, Cu, Ni, Na, Ca. **EPA 200.8:** Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Ni, Se, TL. **EPA 245.1** Hg.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

ALPHA ANALYTICAL

NEW JERSEY CHAIN OF CUSTODY

Service Centers
Mahwah, NJ 07430: 35 Whitney Rd, Suite 5
Albany, NY 12205: 14 Walker Way
Tonawanda, NY 14150: 275 Cooper Ave, Suite 105

Page 1 of 1

Date Rec'd in Lab: 9/9/16

ALPHA Job #: L1628392

Westborough, MA 01581
8 Walkup Dr.
TEL: 508-898-9220
FAX: 508-898-9193

Mansfield, MA 02048
320 Forbes Blvd
TEL: 508-822-9300
FAX: 508-822-3288

Project Information
Project Name: 682 9th Ave, NYC, NY
Project Location: 682 9th Ave, NYC, NY
Project # 360508
(Use Project name as Project #) ☐
Project Manager: A. Cantenin
ALPHAQuote #:

Deliverables
☐ NJ Full / Reduced
☐ EQuIS (1 File) ☐ EQuIS (4 File)
☒ Other NYSDEC

Billing Information
☒ Same as Client Info
PO #

Client Information
Client: AEI
Address: 20 Gibson Pl., Ste 310
Freehold, NJ
Phone: 732-275-4719
Fax:
Email: acantenin@aeiconsultants.com

Turn-Around Time
Standard ☒ Due Date:
Rush (only if pre approved) ☐ # of Days:

Regulatory Requirement
☐ SRS Residential/Non Residential
☐ SRS Impact to Groundwater
☐ NJ Ground Water Quality Standards
☐ NJ IGW SPLP Leachate Criteria
☒ Other NYSDEC

Site Information
Is this site impacted by Petroleum? Yes ☐
Petroleum Product:

These samples have been previously analyzed by Alpha ☐

For EPH, selection is REQUIRED:	For VOC, selection is REQUIRED:	Other project specific requirements/comments:
☐ Category 1 ☐ Category 2	☐ 1,4-Dioxane ☐ 8011	Please specify Metals or TAL.

ANALYSIS: VOCs (CVOCs only)

Sample Filtration: ☐ Done ☐ Lab to do
Preservation: ☐ Lab to do
(Please Specify below)

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	VOCs (CVOCs only)								Sample Specific Comments	Total Bottles
28392-01	AEI-SB8	9/9/16	13:30	S	AC	✓									4
-02	AEI-SB9	9/9/16	12:50	S	AC	✓									4

Preservative Code:
A = None
B = HCl
C = HNO_3
D = H_2SO_4
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$
K/E = Zn Ac/NaOH
O = Other

Container Code
P = Plastic
A = Amber Glass
V = Vial
G = Glass
B = Bacteria Cup
C = Cube
O = Other
E = Encore
D = BOD Bottle

Westboro: Certification No: MA935
Mansfield: Certification No: MA015

Container Type	E
Preservative	A

Relinquished By:	Date/Time	Received By:	Date/Time
Anthony Cantenin	9/9/16 13:46	PS	9/9/16 13:46
PS	9/9/16 1910	Tom Tobler	9-9-16 1910
Tom Tobler	9-9-16 2330	[illegible]	9/9/16 2330

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. BY EXECUTING THIS COC, THE CLIENT HAS READ AND AGREES TO BE BOUND BY ALPHA'S TERMS & CONDITIONS. (See reverse side.)

Form No: 01-14 HC (rev. 30-Sept-2013)

APPENDIX C

HEALTH & SAFETY PLAN

AEI Consultants
Environmental & Engineering Services

HEALTH & SAFETY, INJURY & ILLNESS PREVENTION PLAN (Solvent Site)

Property Identification:
682 9th Avenue
New York, New York 10036

AEI Project No. 368024
BCP # C231106

Prepared for:
MJW 47 LLC
302 East 42nd Street, Suite 200
Manhattan, New York 10021

Prepared by:
AEI Consultants
20 Gibson Place, Suite 310
Freehold, NJ 07728
(732) 414-2720

San Francisco HQ
Atlanta
Chicago
Costa Mesa
Dallas
Denver
Los Angeles
Miami
New York
Phoenix
Portland
San Jose

TABLE OF CONTENTS

APPENDICES

1.0 GENERAL INFORMATION

Client/Site Name:	MJW 47 LLC
Site Address:	682 9th Avenue, New York, New York 10036
Job/Project #:	368024
Estimated Start Date:	11/5/18
Estimated Completion Date:	11/21/18

Have Necessary Underground Utility Notifications for Subsurface Work Been Made? ☒ Yes ☐ Not Applicable
(Specify clearance dates, USA Ticket #, and other relevant information on the "Site Inspection Log")

2.0 SCOPE OF WORK

Site Description:	Vacant commercial/residential building
Specific Tasks Performed by AEI:	Soil, soil vapor, indoor air, bedrock and groundwater sampling/ Sub-slab Communication Study
Concurrent Tasks to be Performed by AEI Subcontractors (List Subs by Name):	Installation of soil borings, groundwater monitoring wells, and well survey
Concurrent Tasks to be Performed by Others (List Others by Name):	None

3.0 ROLES AND RESPONSIBILITIES

AEI PERSONNEL

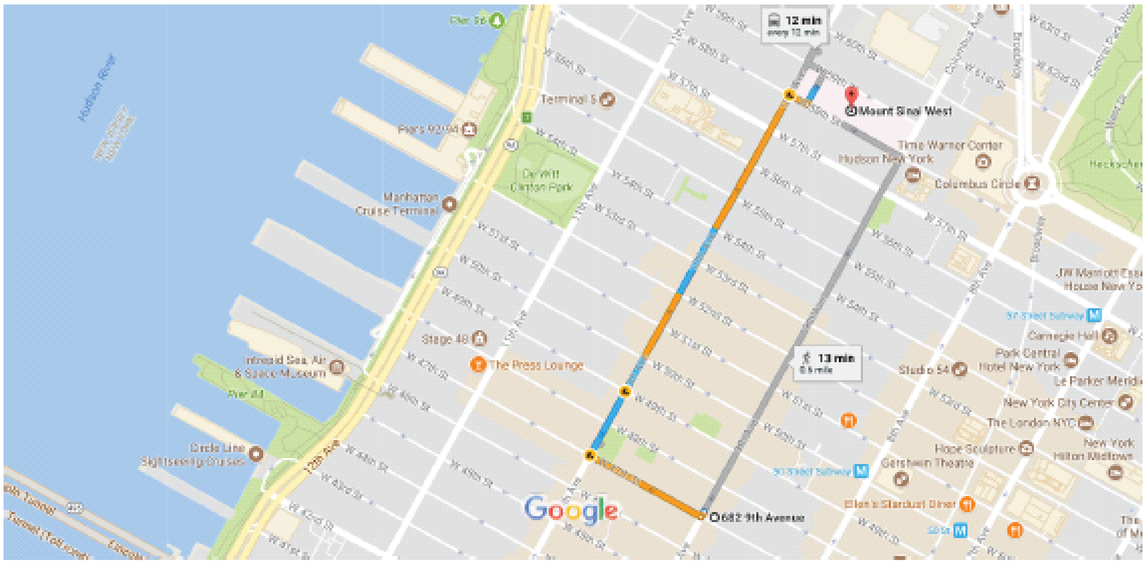
Name	Project Title/Assigned Role	Phone Numbers
Anthony Cauterucci	Project Manager / Site Safety Officer	732-414-2720
David Bausmith	Quality Leader	732-414-2720

EMERGENCY CONTACTS [CAL/OSHA 8 CCR 5192(L)]

Emergency Information	Emergency Number	Phone Numbers
New York City Police Department	911	(212) 767-8400
Mount Sinai West 1000 10th Ave, New York, NY 10019	911 (map attached)	(212) 523-4000
Anthony Cauterucci	Project Manager / Site Safety Officer	732-414-2720
Location of Nearest Phone & First Aid:	Mobile cellular telephone in the Site Safety Officer's work vehicle	

4.0 DIRECTIONS TO THE NEAREST EMERGENCY DEPARTMENT

Google Maps 682 9th Avenue, New York, NY to Mount Sinai West, 1000 10th Ave, New York, NY 10019 — Drive 0.8 mile, 6 min



Map data ©2017 Google United States 500 ft

682 9th Ave
New York, NY 10036

1.	Head southwest on 9th Ave toward W 47th St	43 ft
2.	Turn right at the 1st cross street onto W 47th St	0.2 mi
3.	Turn right at the 1st cross street onto 10th Ave	0.6 mi
4.	Turn right onto W 58th St	138 ft
5.	Turn left Destination will be on the right	131 ft

Mount Sinai West
1000 10th Ave, New York, NY 10019

5.0 EMERGENCY PROCEDURES [CAL/OSHA 8 CCR 5192(L)]

If an emergency arises, the on-site personnel should contact the EMT by dialing 911. Emergency communications at the site will be by means of a cellular radio and/or telephone. All work in the project area should stop and the work area should be secured, to the extent possible. The following general procedures will be followed in the case of a medical emergency at the site:

Skin Contact - Skin exposure should be treated by rinsing with soap and water. All contaminated clothing must be removed.

Eye Contact - Eye contact with chemicals should be treated by rinsing the eye with solution or water for at least 15 minutes. If symptoms persist, medical attention should be sought as soon as possible.

Ingestion - Seek immediate medical attention. Refer to MSDS.

Inhalation—Any warning symptoms such as headache, dizziness, nausea, shortness of breath, etc. necessitate that the victim leaves the immediate site area rapidly. If the victim stops breathing, assisting personnel should don breathing protection while removing them from the area. Persons trained in CPR should immediately begin initiated, while medical attention should be obtained as soon as possible.

In case of evacuation, all vehicles/equipment should be turned off and personnel should immediately leave the work area. Personnel should move to the specified meeting area located upwind of the affected area, such as the building exterior, site field office, property boundary, or other predestinated location, where all personnel will be accounted for.

IF AN EMERGENCY ARISES, THE DESIGNATED MEETING LOCATION FOR THIS PROJECT IS IMMEDIATELY IN FRONT OF THE BUILDING ON THE SUBJECT PROPERTY.

This location is located upwind of the drilling activities, but is subject to change if prevailing weather conditions alter typical wind direction.

Personnel should not re-enter the work area following evacuation until all of the following conditions have been met:

1) The condition causing the emergency has been corrected.

2) All hazards have been assessed.

3) The HASP has been reviewed.

4) Personnel have been oriented on any changes in the HASP.

All emergencies should be promptly reported to the SSO.

- **Site Supervisors and Project Managers (SS/PM)**: Responsibility for compliance with AEI Health and Safety programs, policies, procedures and applicable laws and regulations is shared by all AEI management and supervisory personnel. This includes the need for effective oversight and supervision of project staff necessary to control the Health and Safety aspects of AEI on-site activities.

- **Site Safety Officers and Competent Persons (SSO):** The Site Safety Officer (SSO), as defined by OSHA 1926.20(b), is the individual "who is capable of identifying existing and predictable hazards in surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them." The SSO is designated on a site-by-site basis based on the site conditions, scope-of-work, and the individual's ability to recognize site-specific hazards and take appropriate corrective actions. This individual is responsible to both project management and the designated Office Health and Safety Officer (HSO) with regard to the completion of these assigned duties.

- **Staff:** Ultimate control of Health Safety is in the hands of each individual employee. Therefore, each employee must become familiar with and comply with all Health and Safety requirements associated with their position and daily operations. Employees also have the responsibility to notify the appropriate management, SSO, and/or HSO of unsafe conditions and accidents/injuries immediately. When employees are issued respirators or any other personal protective equipment (PPE), they are responsible for ensuring that said items are used properly, cleaned as required and maintained in good working order.

- **(Sub) contractors:** (Sub) contractors should develop their own site safety plan related to their specific on-site activities. Subcontractors may use AEI's plan as an informational model. However, each Subcontractor is responsible for determining the plan's adequacy and applicability to its own activities on site. Subcontractors wishing to do so must deliver their plan in clear written form to AEI prior to the initiation of on-site activities.

6.0 PLAN ACKNOWLEDGEMENT AND APPROVALS

Approval or Acknowledgement	SSO SS/PM	HSO
Probable hazards identified on form.	X	X
Project scope accurately reflected on form.	X	
Appropriate emergency response info identified on form.	X	X
Appropriate control measures identified on form.	X	X
Hazards and control measures to be implemented on site acknowledged.	X	
Overall project scope and health and safety requirements acknowledged.	X	

7.0 SITE CONTROL MEASURES

Anthony Cauterucci has been designated to coordinate access control and security on site. All work will strictly follow OSHA guidelines and HAWOPER regulations. There will be a 10-foot boundary surrounding the work area. The boundaries are identified by orange safety cones and/or "yellow" caution or red "danger" tape. The area within this boundary is considered an exclusion zone and only qualified personnel will be allowed to enter. All personnel arriving or departing the site should log in before entering the exclusion zone. All activities on site must be cleared through the Site Manager. Additional hazards on site include heavy equipment and overhead equipment. Only 40-hour HAZWOPER trained personnel will operate equipment or perform any duties associated with this project. A hard hat and steel toed boots are mandatory for all personnel associated with the drilling operation. Nitrile gloves will be worn at all times and changed periodically (as required) during boring logging, soil and groundwater sample collection and decontamination to reduce the risk of dermal exposure.

A GENERAL PURPOSE FIRST AID KIT WILL BE AVAILABLE ONSITE. EMERGENCY SERVICES ARE AVAILABLE BY DIALING **911** ON THE TELEPHONE LOCATED IN THE SITE MANAGER'S VEHICLE, WHICH WILL BE ONSITE AT ALL TIMES.

8.0 DOCUMENTATION TO BE COMPLETED ON SITE

- A **Site Inspection Log** must be completed at the initiation of on-site activities and at least once per week thereafter until the completion of AEI on-site activities.
- A **Site Health and Safety Briefing** or "Tailgate Safety Meeting" must be completed at the initiation of on-site activities and at the beginning of site activities each day thereafter until the completion of AEI on-site activities. (Note: The actual briefing may be conducted off-site, in the office for example, if conditions preclude or render impractical its completion on site.) The corresponding **Site Orientation Record** should be completed at the initiation of on-site activities and once per week thereafter.
- The AEI Incident Investigation Form (OSHA Form 301) and the Subcontractor's Statement of Understanding Regarding Health and Safety Responsibilities Form are to be completed on an as needed basis.

9.0 PPE AND SITE CONTROLS [CAL/OSHA 8 CCR 5192(D) AND (G)(5)]

Based on an evaluation of the suspected and known hazards at the site, Level D personal protective equipment (PPE) will be required for all personnel and visitors entering the controlled portion of the site. Protective equipment for each level of protection is summarized below. Both Level C and D PPE should be available on-site at all times during all phases of the project, as conditions may change and require additional PPE. Work should be conducted in Level D as long as breathing zone vapor concentrations remain at background or below 10 ppm, no breathing protection will be required. Engineering controls, such as forced air ventilation, will be used when feasible to reduce respiratory hazards. If on-site personnel find that breathing zone concentrations exceed 10 ppm, then the SSO or PM will make a determination if work shall continue in Level C PPE.

At this time, all work in the affected area should be suspended until a decision is made. Implementation of Level C PPE will be required if work continues during elevated breathing zone concentrations. Donning and use of respirators shall be performed in accordance with manufacturer specifications. Replacement of respirator cartridges shall be performed in accordance with manufacturer specifications. All respirators and cartridges shall be stored in air tight bags while not in use.

Personal Protective Equipment - Level D	**Personal Protective Equipment - Level C**
☒ Hearing Protection (as needed near loud equipment) ☒ Hardhat ☒ Outer Gloves Type: Kevlar or Leather (as needed) ☒ Inner Gloves Type: Nitrile ☒ Steel Toe Boots: ☐ Coveralls Type: ☐ Outer Boots Type: ☒ Eye Protection: Safety Glasses ☐ Others:	☒ Respirator Type: Full-Face Air Purifying Respirator ☒ Cartridge Type: Organic Vapor w/ P100 ☐ Assigned Protection Factor: 50 ☐ Others:
Monitoring Equipment[1] ☒ PID Type: RAE Systems ppbRAE 3000 or MiniRAE Lite ☐ PID Lamp Energy: 10.6 eV ☐ Calibration Gas: Isobutylene 10 ppmv / 100 ppmv ☐ FID Type: ☐ LEL/O_2 Meter ☐ Others:	**Other Equipment & Gear[2]** ☒ 10-lb ABC Fire Extinguisher ☒ "Caution" and "Danger" Tape ☒ Traffic Cones or Delineators ☒ Warning Signs or Placards ☒ Decontamination Equipment ☒ First Aid Kit ☐ Others:

Notes:

1. All direct reading instruments should be calibrated onsite once per day using the appropriate calibration gas standards and in accordance with the manufacturer's instructions.

2. A 10-foot work zone / exclusion zone is required wherever available to control access to heavy equipment and/or hazardous exposure situations. Only authorized persons will be allowed to enter work zone / exclusion zone.

10.0 COMMUNITY AIR MONITORING PLAN (CAMP)

Real-time air monitoring for volatile organic compounds (VOCs) and particulate levels at the perimeter of the exclusion zone or work area will be performed. Continuous monitoring will be performed for all ground intrusive activities and during the handling of contaminated or potentially contaminated media. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pit excavation or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be performed during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. Periodic monitoring during sample collection, for instance, will consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. Depending upon the proximity of potentially exposed individuals, continuous monitoring may be performed during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

VOCs will be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis during invasive work. Upwind concentrations will be measured at the start of each workday and periodically thereafter to establish background conditions. The monitoring work will be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment will be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. Upwind/downwind monitoring locations will be adjusted, as needed, during the course of work to account for changes in the prevailing wind direction throughout the day. The equipment readings will be compared to the levels specified below.

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities will be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities will resume with continued monitoring.
- If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities will resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.
- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities will be shutdown.

CAMP data will be reported to the NYSDEC and NYSDOH Project Managers on a daily or weekly basis; if exceedances of action levels are detected, information regarding CAMP action level exceedances and Corrective Actions taken will be provided to the NYSDEC and the NYSDOH project managers the same business day of occurrence. CAMP reports will include a figure depicting daily work zones, wind direction, and other appropriate site information including specific work activities.

Particulate Monitoring and Response Actions

Due to the nature of the proposed work (subsurface drilling), the potential for fugitive dust emissions at the work location and property boundaries is anticipated to be very low. However, potential particulate/dust emissions will be monitored continuously at the work area, and upwind and downwind perimeters of the work exclusion zone (i.e., site boundaries). Fugitive dust migration will be visually assessed during all work activities. If visible dust in the active work area is detected, work will be suspended and/or dust suppression techniques (i.e., application of water) will be utilized. Work will not resume until dust/particulates that have the potential to migrate from the on-site work area has been mitigated. Dust monitoring records will be reported to the NYSDEC and NYSDOH Project Managers on a daily or weekly basis. If exceedances of action levels are detected, information regarding CAMP action level exceedances and Corrective Actions taken will be provided to the NYSDEC and the NYSDOH project managers the same business day of occurrence.

11.0 PERMISSIBLE EXPOSURE LIMITS FOR CHEMICAL CONTAMINANTS

Chemical Name (CAS #)	Molecular Weight[1]	Vapor Pressure (mm-Hg)[1]	Ionization Potential (eV)[1]	OSHA PEL (ppmv)[1]	Cal-OSHA PEL (ppmv)	NIOSH REL (ppmv)[1]	ACGIH TLV (ppmv)
Tetrachloroethene (127-18-4)	165.8	14	9.32	25 C 200 300 (5-min)	25 TWA C 300 100 STEL	*Ca 150 IDLH	25 100 STEL
	131.4	58	9.45	100	25 TWA	*Ca	50

Trichloroethene (79-01-6)				C 200 300 (5-min)	C 200 100 STEL	1,000 IDLH	
1,1-Dichloroethene (75-35-4)	96.9	500	10	1.0	1.0 100 STEL	*Ca	5.0
1,1-Dichloroethane (75-34-3)	99.0	182	11.06	100	100	3,000 IDLH	100 TWA 250 STEL
1,2-Dichloroethene (540-59-0)	97.0	180-265	9.65	200	200	200 1,000 IDLH	200
1,2-Dichloroethane (107-06-2)	98.9	64	11.05	50 C 100 (5-min) 200 (peak)	1.0 C 200 2 STEL	*Ca 50 IDLH	10 C 75
Vinyl chloride (75-01-4)	62..5	3.3atm	9.9	1.0 C 5.0 (15-min)	1.0	*Ca	1.0

1) Source: National Institute for Occupational Safety and Health (NIOSH), 2004. "NIOSH Pocket Guide to Chemical Hazards", February 2004.

PEL = permissible exposure limit REL = recommended exposure limit TLV = threshold limit value

C = ceiling concentration TWA = time-weighted average STEL = short-term exposure limit

IDLH = immediately dangerous to life or health

^NIOSH recommendation is to "minimize workplace exposure concentrations" (see Appendix A of the NIOSH Pocket Guide to Chemical Hazards).

*** Asterisk indicates that the chemical is known to the State of California to cause cancer per the Proposition 65 list of chemicals and the Safe Drinking Water and Toxic Enforcement Act of 1986 (*revised December 2, 2005*)**

Atmospheric vapor concentrations will be monitored via a photo-ionization detector (PID) with lamp energy appropriate for the contaminants of interest or equivalent to determine appropriate action levels. The PID will be calibrated daily by AEI personnel prior to use. Calibration will be performed in accordance with the manufacturer specifications and recorded in a log book kept with the instrument. Ambient breathing space measurements should be collected every 5 to 15 minutes (minimum) during drilling and other field activities.

12.0 Decontamination Procedures [Cal/OSHA 8 CCR 5192(k)]

All down-hole soil, soil vapor, and groundwater sampling equipment (e.g., split spoons, hand augers, probe rods, discrete samplers, etc.), hand tools, purge pumps, water level indicators, etc. will be decontaminated before, between, and after use with Alconox or an equivalent phosphate-free detergent solution to reduce the risk of cross-contamination.

Decontamination of all sampling equipment will consist of submerging the equipment in a detergent solution bath and scrubbing it with dedicated brushes. The equipment will then be placed in a rinse bath and agitated. A second rinse bath will be used as needed.

13.0 Employee Training [Cal/OSHA 8 CCR 5192(e)]

All personnel working onsite must have had at a minimum the required 24 or 40-hour OSHA training for HAZWOPER with current annual 8-hour refresher, which includes the use of respirators and PPE. Annual individualized respirator fit testing is required for all applicable AEI employees working at the site.

During the daily Site Health and Safety Briefing or "Tailgate Safety Meeting", at a minimum the following should be discussed:

1) Scope of work, including personnel project responsibilities.

2) A description of the levels of personal protection at the site and the steps taken to select each level.

3) Emergency procedures. Identify Emergency gathering location.

4) Nature of the known or anticipated hazards, including the location of the Material Safety Data Sheets (MSDS) for the chemicals at the site.

5) Review safe work practices and identify any prohibited or forbidden practices.

6) Permissible smoking location. (aware of city/local ordinances for smoking)

Attendance at the Site Health and Safety Briefing or "Tailgate Safety Meeting" will be mandatory and all personnel coming on-site following the initial daily meeting will be subject to their own Site Health and Safety Briefing prior to entering the site. All personnel will be required to sign the Health and Safety Briefing/Site Orientation Record to signify understanding and adherence to AEI's HASP.

14.0 SITE HAZARD ASSESSMENT

(☒ = Applies, or required item(s) available. ☐ = Not Applicable.)

HAZARD ASSESSMENT: PHYSICAL HAZARDS AND RELATED CONCERNS [CAL/OSHA 8 CCR 5192]

☐ **Confined Space Entry (CSE)**. Confined space entry means the *potentially hazardous* entry into any space which, by design, has limited openings for entry and exit, unfavorable natural ventilation which could contain or produce dangerous air contaminants, and which is not intended for continuous employee occupancy. Confined spaces include but are not limited to storage tanks, compartments of ships, process vessels, pits, silos, vats, degreasers, reaction vessels, boilers, ventilation and exhaust ducts, sewers, tunnels, underground utility vaults, and pipelines. Other environments which must be treated as confined spaces include *test pits, and basements, garages, warehouses and other indoor areas where mechanical (i.e., diesel, propane, gasoline or similarly powered) equipment must be operated for drilling or test pitting purposes*. Confined space entry should be allowed only when absolutely necessary, and then only when all requirements of AEI's Confined Space Entry Control Program, and/or CSE Program Supplement for Indoor Drilling (and Similar Operations) and/or Trench and Excavation Safety and Health Guide (and CSE Program Supplement), contained in the Health and Safety Program Manual, have been satisfied.

☒ **Construction Hazards, Drill Rigs, Backhoes, etc.** The use of drill rigs, backhoes and other heavy equipment represent potentially serious construction hazards. Whenever such equipment is used, personnel in the vicinity should be limited to those who must be there to complete their assigned duties. All personnel must avoid standing within the turning radius of the equipment or below any suspended load. Job sites must be kept as clean, orderly and sanitary as possible. When water is used, care must be taken to avoid creating muddy or slippery conditions.

Never turn your back to operating machinery. Never wear loose clothing jewelry, hair or other personal items around rotating equipment or other equipment that could may catch or ensnare loose clothing, jewelry, hair or other personal items. Always stand far enough away from operating machinery to prevent accident contact which may result from mechanical or human error.

Additionally, the following basic personal protective measures must be observed: **Hardhats** must be worn to protect against bumps or falling objects. **Safety glasses** must be worn when necessary to protect against chemicals or other hazards. **Steel-toed safety shoes or boots** are also required. The shoes must be chemically resistant or protected with appropriately selected boots/coverings where necessary. Unless otherwise specified, normal **work clothes** must be worn. Gloves are also required whenever necessary to protect against hazardous contact, cuts, abrasions or other possible skin hazards.

☒ **Drums and Buried Drums**. As a precautionary measure, personnel must assume that *labeled* and *unlabeled drums* encountered during field activities contain hazardous materials until their contents can be confirmed and characterized. Personnel should recognize that drums are frequently mislabeled, particularly drums that are reused.

Only trained and authorized personnel should be allowed to perform drum handling. Prior to any handling, drums must be visually inspected to gain as much information as possible about their contents. Trained field personnel must look for signs of deterioration such as corrosion, rust or leaks, and for signs that the drum is under pressure such as swelling or bulging. Drum-type and drumhead configuration may provide the observer with information about the type of material inside, (i.e., a removable lid is designed to contain solids, while the presence of a bung indicates liquid storage).

Although not usually anticipated, buried drums can be encountered when digging test pits. Therefore, the following provisions must be observed if drums are encountered. Machine excavation (i.e., backhoe) should cease immediately anytime a drum is encountered. The appropriate management personnel should be notified immediately. All AEI personnel should be instructed to immediately leave the work area.

☒ **Fire and Explosion**. The possibility of flammable materials being encountered during field activities must be recognized and the appropriate steps necessary to minimize fire and explosion must be observed. This includes situations where *excessive organic vapors or free product* are encountered. When this occurs, monitoring with a combustible gas indicator (CGI), is required.

Excessive organic vapors, for the purposes of initiating the use of a CGI, are defined as sustained readings (i.e., continuous for at least five minutes) at or above 250 units or as an instantaneous reading at or above 1,000 units on the PID or FID, in close proximity (within 1 foot or less) of the borehole, test pit, sampling location or other area of potential exposure.

In situations where hexane, methanol are needed for field activities, the following precautions must be observed: keep flammable and combustible materials away from heat, sparks and open flames; do not smoke around flammable or combustible materials; and keep all flammable and combustible liquids in approved and properly labeled safety containers.

☐ **Landfill/Methane Hazards**. Fire and explosion should be regarded as one of, if not the, most significant potential hazards associated with drilling operations and other intrusive work conducted at a landfill. Accordingly, all sources of ignition must be fully controlled. Failure to control ignition sources could result in fire, explosion and pose a serious threat to life and health. Control methods may include forced ventilation and/or filling the borehole with enough water to inhibit the release of methane and other gases which would otherwise escape through the top of the borehole.

If forced (mechanical) ventilation is to be used, all such equipment must be approved for Class I, Division I hazardous atmospheres. The blower must be positioned to blow across the top of the borehole so that gases and vapors may be diluted as they exit the borehole. Do not attempt to suck out the gases or vapors. Blowers, all other mechanical equipment, and tools which could release sparks or static electricity must be bonded and grounded.

Regardless of the gas/vapor control method used, the atmosphere surrounding the borehole must be frequently monitored using direct reading instruments approved for Class I, Division I hazardous atmospheres. Monitoring should be conducted within 1 to 2 feet of the top of the borehole. Do not insert sampling devices into the borehole. Never approach the auger or drill shaft while it is in operation.

Regardless of actual instrument readings, if all sources of ignition can not be controlled, operations should be immediately shut down if readings equal or exceed 10% of LEL and the area evacuated until ignition sources have been eliminated. Ignition sources include, but are not limited to: smoking, static electricity, lighting, open flames, spontaneously ignitable substances, frictional heat or sparks, hot surfaces, radiant heat, electrical sparks, stray currents, cutting and welding, and ovens, furnaces and heating equipment.

☒ **Heat and Cold Stress**. Overexposure to temperature extremes can represent significant risks to personnel if simple precautions are not observed. Typical control measures designed to prevent **heat stress** include dressing properly, drinking plenty of the right fluids, and establishing an appropriate work/break regimen. Typical control measures designed to prevent **cold stress** also include dressing properly, and establishing an appropriate work/break regimen.

☒ **Moving Vehicles, Traffic Safety**. All vehicular traffic routes which could impact worker safety must be identified and communicated. Whenever necessary, barriers or other methods must be established to prevent injury from moving vehicles. This is particularly important when field activities are conducted in parking lots, driveways, ramps or roadways

☒ **Noise**. Noise exposure can be affected by many factors including the number and types of noise sources (continuous vs. intermittent or impact), and the proximity to noise intensifying structures such walls or building which cause noise to bounce back or echo. The single most important factor effecting total noise exposure is distance from the source. The closer one is to the source the louder the noise. The operation of a drill rig, backhoe or other mechanical equipment can be sources of significant noise exposure. In order to reduce the exposure to this noise, personnel working in areas of excessive noise must use hearing protectors (ear plugs or ear muffs).

Rule-of-Thumb: Wherever actual data from sound level meters or noise dosimeters is unavailable and it is necessary to raise one's voice above a normal conversational level to communicate with others within 3 to 5 feet away, hearing protection should be worn.

☒ **Overhead Utilities and Hazards**. Overhead hazards can include low hanging structures which can cause injury due to bumping into them. Other overhead hazards include *falling objects, suspended loads, swinging loads and rotating equipment*. Hardhats must be worn by personnel in areas were these types of physical hazards may be encountered. Barriers or other methods must also be used to exclude personnel from these areas were appropriate. Electrical wires are another significant overhead hazard. According to OSHA (29 CFR 1926.550), *the minimum clearance which must be maintained from overhead electrical wires is 10 feet* from an electrical source rated $\leq$ 50 kV. Sources rated > 50 kV require a minimum clearance of 10 feet plus 0.4 inch per kV above 50 kV.

☒ **Pedestrian Traffic**. The uncontrolled presence of pedestrians on a drilling or excavation site can be hazardous to both pedestrians and site workers. The site should be surveyed to determine if, when and where pedestrian may gain access. This includes walkways, parking lots, gates and doorways. Barriers or caution tape should be used to exclude all pedestrian traffic. *Exclusion of pedestrian traffic is intended to prevent injury to the pedestrians and eliminate distractions which could cause injury to AEI personnel or other site workers*.

☒ **Test Pit and/or other Excavations**. All provisions of the OSHA trenching and excavation standard (29 CFR 1926.650-652) must be followed during excavation activities. This includes *all test pit excavation and sampling activities*. The estimated location of utility installations, such as sewer, telephone, electric, water lines and other underground installations that may reasonably be expected to be encountered during excavation work, must be determined prior to opening an excavation.

A ladder or similar means of egress must be located in excavations greater than 4 feet in depth so as to require no more than 25 feet of lateral travel for employees. *No person should be allowed to enter an excavation greater than 5 feet in depth unless the walls of the excavation have been protected using an approved shield (trench box), an approved shoring system, or the walls have been sloped back to an angle of 34 degrees, and the excavation is free of accumulated water*. If personnel enter an excavation, the spoils pile and all materials must be placed at least 2 feet from the edge of the excavation to prevent the materials from rolling into the excavation. *Personnel must remain at least 2 feet away from the edge of the excavation at all times*. Upon completion of a test pit exploration, the excavation should be backfilled and graded. Excavation should never be left open unless absolutely necessary, and then only with proper barricading and controls to prevent accidental injury.

☒ **Underground Utilities and Hazards**. The identification of underground storage tanks (USTs), pipes, utilities and other underground hazards is critically important prior to all drilling, excavating and other intrusive activities. In accordance with OSHA 29 CFR 1926.650, *the estimated location of utility installations, such as sewer, telephone, electric, water lines and other underground installations that may reasonably be expected to be encountered* during excavation work, *must be determined* prior to opening an excavation. The same requirements apply to drilling operations and the use of soil-gas probes. Where public utilities may exist, the utility agencies or operators must be contacted directly or through a utility-sponsored service such as *Dig-Safe*. Where other underground hazards may exist, reasonable attempts must be made to identify their locations as well. *Failure to identify underground hazards can lead to fire, explosion, flooding, electrocution or other life threatening accidents.*

☐ **Water Hazards and Boat Sampling**. The collection of water or sediment samples on or immediately adjacent to a body of water can pose significant hazards. In addition to the slip, trip and fall hazards associated with wet surfaces, the potential for drowning accidents must be recognized. These hazards can be intensified by the use of some PPE, particularly if respiratory protection is worn.

HAZARD ASSESSMENT: CHEMICAL HAZARDS AND RELATED CONCERNS [CAL/OSHA 8 CCR 5192]

☒ **Chemicals Subject to OSHA Hazard Communication**. All chemicals used in field activities such as solvents, reagents, decontamination solutions, or any other hazardous chemical must be accompanied by the required labels, Material Safety Data Sheets (MSDS), and employee training documentation (OSHA 1910.1200). For additional information refer to **AEI's Hazard Communication Program** contained in the Health and Safety Program manual.

☒ **Asbestos**. Disturbance of building materials in buildings built prior to 1980 must be evaluated for the presence of asbestos-containing materials by an accredited AEI inspector. The inspection and/or removal of asbestos-based or asbestos-containing building materials are regulated by some major cities and several states. Regulations require individuals who conduct building inspections for the presence of asbestos or collect samples of asbestos containing materials to be licensed or certified. AEI employees must determine the applicability of these regulations prior to any activities involving asbestos. The primary health effects of asbestos exposure include asbestosis (a scarring of the lungs), lung cancer, mesothelioma and other forms of cancer. Exposure to asbestos is regulated by a comprehensive OSHA standard (29 CFR 1910.1001).

☐ **BTEX Compounds**. Exposure to the vapors of **benzene, ethyl benzene, toluene** and **xylenes** above their respective permissible exposure limits (PELs), as defined by the Occupational Safety and Health Administration (OSHA), may produce irritation of the mucous membranes of the upper respiratory tract, nose and mouth. Overexposure may also result in the depression of the central nervous system. Symptoms of such exposure include drowsiness, headache, fatigue and drunken-like behavior. Benzene has been determined to be carcinogenic, targeting blood-forming organs and bone marrow. The odor threshold for benzene is higher than the PEL and employees may be overexposed to benzene without sensing its presence, therefore, detector tubes must be utilized to evaluate airborne concentrations.

The vapor pressures of these compounds are high enough to generate significant quantities of airborne vapor. On sites where high concentrations of these compounds are present, a potential inhalation hazard to the field team during subsurface investigations can result. However, if the site is open and the anticipated quantities of BTEX contamination are small (i.e., part per million concentrations in the soil or groundwater), overexposure potential will also be small.

☐ **Carbon Monoxide**. Carbon monoxide (CO) is a gas usually formed by the incomplete combustion of various fuels. Welding, cutting and the operation internal combustion engines can produce significant quantities of CO. Amounts of CO can quickly rise to hazardous levels in poorly ventilated areas. CO is odorless and colorless. It cannot be detected without appropriate monitoring equipment. LEL/O_2 meters and H-Nu/PIDs are not appropriate for the detection of CO. A direct reading instrument, calibrated for CO, should be used. Common symptoms of overexposure include pounding of the heart, a dull headache, flashes before the eyes, dizziness, ringing in the ears and nausea. These symptoms must not be relied upon in place of an appropriately calibrated monitoring instrument. Exposures should not exceed 15 ppm. Exposures above 15 ppm require the use of supplied air respirators. Air purifying respirators are not approved for protection against CO.

☒ **Chlorinated Organic Compounds**. Exposure to the vapors of many chlorinated organic compounds such as vinyl chloride, tetrachloroethene, 1,1,1-trichloroethane, trichloroethene and 1,2-dichloroethene above their respective permissible exposure limits (PELs) will result in similar symptoms. The actual PELs as set by the Occupational Safety and Health Administration (OSHA) vary depending on the specific compound.

Overexposure to the vapor of these compounds can cause irritation of the eyes, nose and throat. The liquid, if splashed in the eyes, may cause burning irritation and damage. Repeated or prolonged skin contact with the liquid may cause dermatitis. Acute overexposure to chlorinated hydrocarbons depresses the central nervous system exhibiting such symptoms as drowsiness, dizziness, headache, blurred vision, in-coordination, mental confusion, flushed skin, tremors, nausea, vomiting, fatigue and cardiac arrhythmia. Alcohol may make symptoms of overexposure worse. If alcohol has been consumed, the overexposed worker may become flushed. Some of these compounds are considered to be potential human carcinogens. Exposure to *vinyl chloride* is regulated by a comprehensive OSHA standard (29 CFR 1910.1017).

☐ **Chromium Compounds**. Hexavalent chromium compounds, upon contact with the skin can cause ulceration and possibly an allergic reaction. Inhalation of hexavalent chromium dusts is irritating and corrosive to the mucous membranes of the upper respiratory tract. Chrome ulcers and chrome dermatitis are common occupational health effects from prolonged and repeated exposure to hexavalent chromium compounds. Acute exposures to hexavalent chromium dusts may cause coughing or wheezing, pain on deep inspiration, tearing, inflammation of the conjunctiva, nasal itch and soreness or ulceration of the nasal septum. Certain forms of hexavalent chromium have been found to cause increased respiratory cancer among workers.

Trivalent chromium compounds (chromic oxide) are generally considered to be of lower toxicity, although dermatitis may occur as a result of direct handling.

☐ **Cutting Oils**. Cutting oils may produce a condition known as "cutting oil acne," a specific dermatosis associated with prolonged and repeated direct contact. Other problems associated with continued occupational exposure to cutting fluids include allergic skin sensitization, folliculitis and squamous cell carcinoma, due to the presence of nitrosamines.

☐ **Fuel Oil**. See Petroleum Hydrocarbons (PHC)

☐ **Gasoline**. See BTEX Compounds, and Tetraethyl and Tetramethyl Lead.

☐ **Herbicides**. Some of the commonly used herbicides present a low toxicity to man. However, other herbicides pose more serious problems. Organophosphorus and carbamate herbicides, if inhaled or ingested can interfere with the functioning of the central nervous system. Many herbicides can be readily absorbed through the skin to cause systemic effects. In addition to being absorbed through the skin, many herbicides, upon contact with the skin, may cause discoloring, skin irritation or dermatitis. Contaminants of commercial preparations of chlorinated phenoxy herbicides such as 2,4,5-T include 2,3,7,8-tetrachlorodibenzo-p-dioxin (dioxin). Dioxin is a known mutagen and a suspect carcinogen.

☐ **Hydrogen Sulfide (H_2S)**. Hydrogen sulfide, characterized by its "rotten egg" odor, is produced by the decomposition of sulfur-containing organic matter. It is found in many of the same areas where methane is found such as landfills, swamps, sewers and sewer treatment facilities. An important characteristic of H_2S is its ability to cause a decrease in ones ability to detect its presence by smell. So although one may no longer be able to smell it, it could still be present in harmful concentrations.

The symptoms of over exposure include headache, dizziness, staggering and nausea. Severe over exposure can cause respiratory failure, coma, and death. The current OSHA PEL is 10 ppm as an 8-hour TWA. The ACGIH TLV is the same.

☐ **Lead Paint**. The inspection and/or removal, sanding, grinding, etc. of lead-based or lead-containing paints is now strictly regulated by OSHA. States may require individuals who conduct lead paint inspections or collect samples of lead paint to be licensed or certified. AEI employees must determine the applicability of these regulations prior to any activities involving lead paint. For additional health information, see Metal Compounds.

☐ **Metal Compounds**. Overexposure to metal compounds has been associated with a variety of local and systemic health hazards, both acute and chronic in nature, with chronic effects being most significant. Direct contact with the dusts of some metal compounds can result in contact or allergic dermatitis. Repeated contact with arsenic compounds may result in hyperpigmentation. Cases of skin cancer due to the trivalent inorganic arsenic compounds have been documented. The moist mucous membranes, particularly the conjunctivae, are most sensitive to the irritating effects of arsenic. Copper particles embedded in the eye result in a pronounced foreign body reaction with a characteristic discoloration of eye tissue.

Inhalation of copper and zinc dusts and fumes above their established PELs may result in flu-like symptoms known as "metal fume fever." Prolonged and repeated inhalation of the dusts of inorganic arsenic compounds above the established PEL may result in weakness, loss of appetite, a sense of heaviness in the stomach and vomiting. Respiratory problems such as cough, hoarseness and chest pain usually precede the gastrointestinal problems. Chronic overexposure to the dusts of inorganic arsenic may result in lung cancer.

The early symptoms of lead poisoning are usually nonspecific. Symptoms include sleep disturbances, decreased physical fitness, headache, decreased appetite and abdominal pains. Chronic overexposure may result in severe colic and severe abdominal cramping. The central nervous system (CNS) may also be adversely effected when lead is either inhaled or ingested in large quantities for extended periods of time. The peripheral nerve is usually affected. "Wrist drop" is peculiar to such CNS damage. Lead has also been characterized as a male and female reproductive toxin as well as a fetotoxin. Exposure to lead (Pb) is regulated by a comprehensive OSHA standard (29 CFR 1910.1025).

☐ **Methane**. Methane is an odorless, colorless, tasteless, gas that cannot be detected by an H-Nu or similar PID. When present in high concentrations in air, methane acts primarily as a simple asphyxiant without other significant physiologic effects. Simple asphyxiants dilute or displace oxygen below that required to maintain blood levels sufficient for normal tissue respiration.

Methane has a lower explosive limit (LEL) of 5 percent and an upper explosive limit (UEL) of 15 percent. The LEL of a substance is the minimum concentration of gas or vapor in air below which the substance will not burn when exposed to a source of ignition. This concentration is expressed in percent by volume. Below this concentration, the mixture is "too lean" to burn or explode. The UEL of a substance is the maximum concentration of gas or vapor in air above which the substance will not burn when exposed to a source of ignition. Above this concentration, the mixture is "too rich" to burn or explode. The explosive range is the range of concentrations between the LEL and UEL where the gas-air mixture will support combustion. For methane this range is 5 to 15 percent.

☐ **MTBE**. Methyl tertiary butyl ether (MTBE) is a volatile, flammable and colorless liquid that is relatively soluble in water. MTBE has a typical odor reminiscent of diethyl ether, leading to unpleasant taste and odor in water. MTBE is almost exclusively used as a fuel component in motor gasoline. The EPA has concluded that available data are not adequate to estimate potential health risks of MTBE at low exposure levels in drinking water, but that the data support the conclusion that MTBE is a potential human carcinogen at high doses. The ACGIH has recommended an exposure limit of 40 parts of MTBE per million parts of air (40 ppm) for an 8-hour workday, 40-hour workweek.

☐ **Pesticides**. Pesticides can be grouped into three major categories: organophosphates, carbonate and chlorinated hydrocarbons. The actual PELs as set by the OSHA, vary depending on the specific compound. Organophosphates, including Diazinon, Malathion and Parathion, are quickly absorbed into the body by inhalation, ingestion and direct skin contact. The symptoms of exposure include headache, fatigue, dizziness, blurred vision, sweating, cramps, nausea and vomiting. More severe symptoms can include tightness of the chest, muscle spasms, seizures and unconsciousness. It should also be noted that the Malathion and Parathion PELs both carry the *Skin* notation, indicating that these compounds adversely effect or penetrate the skin. OSHA specifies that skin exposure to substances carrying this designation be prevent or reduced through the use of the appropriate PPE.

Chlorinated Hydrocarbons such as Chlordane, DDT and Heptachlor can cause dizziness, nausea, abdominal pain and vomiting. The more severe symptoms include epileptic like seizures, rapid heart beat, coma and death. These compounds also carry the OSHA *Skin* notation. The symptoms of exposure to carbamate such Carbaryl (also known as Sevin) are similar to those described for the organophosphates. However, the OSHA exposure limit for Carbaryl *does not* carry the Skin notation.

☐ **Petroleum Hydrocarbons (PHCs)**. Petroleum Hydrocarbons such as fuel oil are generally considered to be of low toxicity. Recommended airborne exposure limits have not been established for these vapors. However, inhalation of low concentrations of the vapor may cause mucous membrane irritation. Inhalation of high concentrations of the vapor may cause pulmonary edema. Repeated or prolonged direct skin contact with the oil may produce skin irritation as a result of defatting. Protective measures, such as the wearing of chemically resistant gloves, to minimize contact are addressed elsewhere in this plan. Because of the relatively low vapor pressures associated with PHCs, an inhalation hazard in the outdoor environment is not likely.

☐ **Polychlorinated Biphenyls (PCBs)**. Prolonged skin contact with PCBs may cause the formation of comedones, sebaceous cysts, and/or pustules (a condition known as chloracne). PCBs are considered to be suspect carcinogens and may also cause reproductive damage.

The OSHA permissible exposure limits (PELs) for PCBs are as follows:

Compound	*PEL (8-hour time-weighted average)*
Chlorodiphenyl (42% Chlorine)	1 mg/m^3 - Skin
Chlorodiphenyl (54% Chlorine)	0.5 mg/m^3 - Skin

It should be noted that PCBs have extremely low vapor pressures (0.001 mm Hg @ 42% Chlorine and 0.00008 mm Hg @ 54% Chlorine). This makes it unlikely that any significant vapor concentration (i.e., exposures above the OSHA PEL) will be created in the ambient environment. This minimizes the potential for any health hazards to arise due to inhalation unless the source is heated or generates an airborne mist. If generated, vapor or mists above the PEL may cause irritation of the eyes, nose, and throat. The exposure limits noted above are considered low enough to prevent systemic effects but it is not known if these levels will prevent local effects. It should also be noted that both PELs carry the *Skin* notation, indicating that these compounds adversely effect or penetrate the skin. OSHA specifies that skin exposure to substances carrying this designation be prevented or reduced through the use of the appropriate personal protective equipment (PPE).

☐ **Polycyclic Aromatic Hydrocarbons (PAHs)**. Due to the relatively low vapor pressure of PAH compounds, vapor hazards at ambient temperatures are not expected to occur. However, if site conditions are dry, the generation of contaminated dusts may pose a potential inhalation hazard. Therefore, dust levels should be controlled with wetting if necessary. Repeated contact with certain PAH compounds has been associated with the development of skin cancer. Contact of PAH compounds with the skin may cause photosensitization of the skin, producing skin burns after subsequent exposure to ultraviolet radiation. Protective measures, such as the wearing of chemically resistant gloves, are appropriate when handling PAH contaminated materials.

☐ **Tetraethyl and Tetramethyl Lead**. Both compounds are used as anti-knock ingredients in gasoline. The inhalation of tetraethyl lead dusts may result in irritation of the respiratory tract. This dust, when in contact with moist skin or eye membranes, may cause itching, burning and transient redness.

The direct absorption of a sufficient quantity of tetraethyl lead, whether briefly at a high rate, or for prolonged periods at a low rate, may cause acute intoxication of the central nervous system. Mild degrees of intoxication may cause headache, anxiety, insomnia, nervous excitation and minor gastrointestinal disturbances.

☒ **Volatile Organic Compounds (VOCs)**. See BTEX compounds and Chlorinated Organic Compounds.

☐ **Waste Oil**. See Petroleum Hydrocarbons (PHCs) and Cutting Oil.

HAZARD ASSESSMENT: BIOLOGICAL HAZARDS AND RELATED CONCERNS [CAL/OSHA 8 CCR 5192]

☒ **Insects**. Insects represent significant sources (vectors) of disease transmission. Therefore, precautions to avoid or minimize potential contact should be considered prior to all field activities. Disease or harmful effects can be transmitted through bites, stings or through direct contact with insects or through ingestion of foods contaminated by certain insects. Examples of disease transmitted by insect bites include encephalitis and malaria from contaminated mosquitoes, lyme disease and spotted fever from contaminated ticks. Stinging insects, such as bees and wasps, are prevalent throughout the country, particularly during the warmer months. The stings of these insects can be painful, and cause serious allergic reactions to some individuals.

☐ **Lyme Disease**. Lyme disease is an infection caused by the bite of certain ticks, primarily deer, dog and wood ticks. The symptoms of Lyme disease usually start out as a skin rash then progress to more serious symptoms. The more serious symptoms can include lesions, headaches, arthritis and permanent damage to the neurological system. If detected early the disease can be treated successfully with antibiotics. The following steps are recommended for prevention of lyme disease and other diseases transmitted by ticks: a) Beware of tall grass, bushes, woods and other areas where ticks may live; b) Wear good shoes, long pants tucked into socks, a shirt with a snug collar, good cuffs around the wrists and tails tucked into the pants. Insect/tick repellents may also be useful; c) Carefully monitor for the presence of ticks. Carefully inspect clothes and skin when undressing. If a tick is attached to the skin, it should be removed with fine tipped tweezers. You should be alert for early symptoms over the next month or so. If you suspect that you have been bitten by a tick, you should contact a physician for medical advice.

☐ **Medical Wastes and Bloodborne Diseases**. Any field activity where exposure to medical wastes or other sources of bloodborne pathogens can be reasonably anticipated must be conducted in accordance with the OSHA (29 CFR 1910.1030) *Bloodborne Pathogens* standard. According to the OSHA definition, Bloodborne Pathogens means pathogenic microorganisms that are present in human blood and can cause disease in humans. These pathogens include but are not limited to *hepatitis B virus (HBV) and human immunodeficiency virus (HIV)*. Wherever there is a potential for employee skin, eye, mucous membrane, or parenteral (skin or membrane piercing) contact with blood or other potentially infectious sources, *employers must develop a Written Exposure Control Plan*.

☐ **Poisonous Plants**. The possible presence of poisonous plants should be anticipated for field activities in wooded or heavily vegetated areas. *Poison ivy* is a climbing plant with alternate green to red leaves (arranged in threes) and white berries. *Poison oak* is similar to poison ivy and *sumac* but its leaves are oak-like in form. The leaves of these poisonous plants produce an irritating oil which causes an intensely itching skin rash and characteristic blister-like lesions. Contact with these plants should be avoided.

☒ **Rats, Snakes and Other Vermin**. Certain animals, particularly those that feed on garbage and other wastes, can represent significant sources (vectors) of disease transmission. Therefore, precautions to avoid or minimize potential contact with (biting) animals (such as rats) or animal waste (such as pigeon droppings) should be considered prior to all field activities. Rats, snakes and other wild animals can inflict painful bites. The bites can poisonous (as in the case of some snakes), or disease causing (as in the case of rabid animals). Avoidance of these animals is the best protection.

☐ **Waste Water and Sewage**. Sewage and waste water contaminated with raw, untreated sewage can represent significant sources of bacterial, viral or fungal contamination. Adverse effects, due to contact, can range from mild skin reactions or rashes to life threatening diseases. Diseases are easily transmitted by accidental ingestion or through skin contact, particularly if the skin is broken. Avoidance of direct contact and good personal hygiene are the best protection from these hazards.

Cal/OSHA Forms
Injury and Illness Incident Report

This *Injury and Illness Incident Report* (Form 301) is one of the first forms you must fill out when a recordable work related injury 929 CFR 1904.7(b)(1) - death, days away from work, restricted work or transfer to another job, medical treatment beyond first aid, loss of conscious, injury or illness diagnosed by a physician or other licensed health professional0 has occurred. Together with accompanying *Annual Summary* (Form 300 and 300A) these forms help the employer and Cal/OSHA develop a picture of the extent and severity of work-related incidents.

Within 7 calendar days after you receive information that a recordable work-related injury or illness has occurred, you must fill out this form or an equivalent. Some state workers' compensation, insurance, or other reports may be acceptable substitutes. To be considered an equivalent form, any substitute must contain all the instructions and information asked for on this form.

According to CCR Title 8 Section 14300.33 Cal/OSHA's recordkeeping rule, you must keep this form on file for 5 years following the year to which it pertains.

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes. See CCR Title 8 14300.29(b)(6) to (10).

Appendix A: CAL/OSHA Form 301

Information about the employee		
Full name:		
Address:		
Date of birth:		
Date hired:		
	Male: ☐	Female: ☐

Information about the physician or other health care professional		
Name of physician or other health care professional		
If treatment was given away from the worksite, where was it given?		
Facility:		
Address:		
Was employee treated in an emergency room?	Yes: ☐	No: ☐
Was employee hospitalized overnight as an in-patient?	Yes: ☐	No: ☐

Information about the case		
Case number from the log *(Transfer the case number from the Log after you record the case.)*		
Date of injury or illness:		
Time employee began work:	AM:	PM:
Time of event:	AM:	PM:
Check if time cannot be determined:		

What was the employee doing just before the incident occurred?

Describe the activity, as well as the tools, equipment, or material the employee was using. Be specific.

Examples: "climbing a ladder while carrying roofing materials"; "spraying chlorine from hand sprayer"; "daily computer key-entry."

What happened? **Tell us how the injury occurred.** *Examples:* "When ladder slipped on wet floor, worker fell 20 feet"; "Worker was sprayed with chlorine when gasket broke during replacement"; "Worker developed soreness in wrist over time."
What was the injury or illness? **Tell us the part of the body that was affected and how it was affected; be more specific than "hurt," "pain," or sore."** *Examples:* "strained back"; "chemical burn, hand"; "carpal tunnel syndrome."
What object or substance directly harmed the employee? *Examples:* "concrete floor"; "chlorine"; "radial arm saw."
If the employee died, when did death occur? Date of death:

Completed By (Full Name):	
Title:	
Phone:	
Date:	

Appendix B: AEI Incident Evaluation Form

Discuss the cause of the incident and future preventative measures	
Why did the accident occur (Root cause)?	
How can we avoid this from happening again (Solution)?	
Date of Implementation:	
Approved By: (Name and Title)	

Appendix C: Site Inspection Log

PROJECT NAME:	LOCATION:
PROJECT NUMBER:	DATE:
PROJECT MANAGER:	COMPLETED BY:
SITE DESCRIPTION AND NATURE OF WORK:	

HAZARD COMMUNICATION
[ ] Chemical hazards identified
[ ] All containers properly labeled
[ ] MSDS/workplace notebook on site
[ ] Site safety briefing completed and documented

ACCIDENTS/EMERGENCY INFO
[ ] First aid personnel identified
[ ] Hospital location identified-
[ ] Police/Fire/Ambulance phone numbers available
[ ] Incident investigation forms available
[ ] Fire extinguisher present

SANITATION
[ ] Washing facilities available
[ ] Toilet facilities available
[ ] Approved trash receptacle available
[ ] Water/refreshments available

STORAGE
[ ] Tools/Drill tooling/supplies safely stacked to prevent rolling or collapse
[ ] Work areas and passage ways kept clear

HOUSEKEEPING
[ ] Work areas clean and orderly
[ ] Storage areas clean and orderly
[ ] Combustible scrap/debris removed regularly
[ ] Waste containers of flammable or toxic materials covered

OVERHEAD HAZARDS
[ ] 15^{ft} minimum clearance maintained
[ ] All sources of falling objects/swinging loads/ rotating equipment identified
[ ] Barriers or other methods in place to prevent injury due to overhead hazards

POSTING
[ ] Emergency phone/contact info posted
[ ] OSHA poster displayed

UNDERGROUND HAZARDS
[ ] All underground hazards identified and communicated to workers on site
[ ] Utility/USA clearance confirmed
[ ] Clearance dates: ________________
[ ] Clearance ID#: ________________

EXCAVATIONS and TRENCHES
[ ] All personnel and storage at least 2^{ft} from top edge of excavation
[ ] Ladder in place
[ ] Guarding/barriers in place

VEHICULAR TRAFFIC
[ ] All vehicular traffic routes which could impact worker safety identified and communicated
[ ] Barriers or other methods established to prevent injury from moving vehicles

PEDESTRIAN TRAFFIC/SITE CONTROL
[ ] All walkways which could be impacted by site activities identified and communicated
[ ] Barriers or other methods established to prevent pedestrian injury from site activities

ENVIRONMENTAL HAZARDS
[ ] Poisonous plants, stinging or biting insects, vermin, sewage, etc. identified and communicated

COMMENTS/OTHER HAZARDS________________________________
____
____
____
____
____
____
____

√ = OK *NA = Not Applicable*

Appendix D: Health and Safety Briefing / Site Orientation Record

This is to verify that I, the undersigned, have been provided with a site (orientation) briefing regarding the safety and health considerations at 682 9^{th} Avenue, New York, New York 10036. I agree to abide by my employer's site-specific safety and health plan and other safety or health requirements applicable to the site.

NAME (PRINT)	SIGNATURE	COMPANY	DATE

Site (orientation) Briefing Conducted By: ______________________________ Date: __________________

Appendix E: Subcontractor's Statement of Understanding Regarding Health and Safety Responsibilities

Project Name: MJW 47 LLC Project Number: 368024

In accordance with generally accepted practices, each Subcontractor engaged by AEI is responsible for all matters relating to the health and safety of its personnel and equipment in performance of the work. This includes recognition of the potential health and safety hazards associated with the work. AEI will establish a health and safety plan or program (HASP) applicable to its own employees and its own activities on site. AEI will make its HASP available to each subcontractor for informational purposes only. Each subcontractor must establish a HASP applicable to its own employees and its own activities on site.

Subcontractors who use AEI's HASP as a model for their own HASP are responsible for determining its adequacy and applicability to its own employees and its own activities on site. Subcontractors must establish their own HASP applicable to subcontractor employees and/or activities, even if modeled after AEI's HASP and deliver this HASP in clear written form to AEI prior to the initiation of on-site activities. Submittal of the subcontractor's HASP to AEI will be for informational purposes only. Review of the subcontractor's HASP by AEI shall in no way constitute approval or endorsement by AEI of the subcontractor's HASP. It is understood that protective measures specified in the Subcontractor's HASP are minimum requirements for the work.

Subcontractor warrants that all its employees that are permitted to engage in operations that could expose them to hazardous wastes, hazardous substances, or safety or health hazards have obtained the necessary health and safety training and medical surveillance as specified in the applicable provisions of OSHA

1926.59 Hazard Communication;
1926.52 Occupational Noise Exposure;
1926.103 Respiratory Protection;
1926.65 Hazardous Waste Operations and Emergency Response;

as well as any other applicable portion of the OSHA General Industry (29 CFR 1910) and Construction Industry (29 CFR 1926) Standards. Subcontractor shall provide AEI with evidence of the necessary certification before beginning hazardous waste work subject to OSHA 1926.65 on the project site.

Should AEI become aware of subcontractor activities on site which appear to violate OSHA or other applicable safety regulations or otherwise pose an immediate and serious threat to the safety of AEI employees, subcontractor employees, other individuals on site, or members of the public, AEI may notify the subcontractor verbally and/or in writing regarding the need for corrective action. Failure to comply with either general safety practices or health and safety practices as described above may be grounds for breach and prompt contract termination. The safety requirements of the work as described above apply without regard to time, place, or presence of an AEI representative.

THE PRESENCE OF AEI PERSONNEL ON THE SITE CARRYING OUT PROFESSIONAL ACTIVITIES DOES NOT MEAN THAT AEI UNDERTAKES TO OVERSEE THE SUBCONTRACTOR'S COMPLIANCE RESPONSIBILITIES.

The undersigned agrees that he is authorized to execute this statement of understanding on behalf of their firm:

Firm: ____

Name (Print): ______________________________ Title: ____________________

Signature: ______________________________ Date: ____________________

MISCELLANEOUS SITE CONTROL PROCEDURES

PLAN SIGN-OFF

(Please sign and date. See page 5 for Plan Acknowledgement and Approvals scope.)

SSO/CP:______________________________ SS/PM:______________________________

H&S Representative:__________________________

Attach additional information as required

APPENDIX D

QUALITY ASSURANCE PROJECT PLAN

AEI Consultants
Environmental & Engineering Services

QUALITY ASSURANCE PROJECT PLAN

Property Identification:
682 9th Avenue
New York, New York 10036

AEI Project No. 368024
BCP # C231106

October 2018

Prepared for:
MJW 47 LLC
302 East 42nd Street, Suite 200
Manhattan, New York 10021

Prepared by:
AEI Consultants
20 Gibson Place, Suite 310
Freehold, New Jersey 07728
(732) 414-2720

Environmental & Engineering Due Diligence

Site Investigation & Remediation

Energy Performance & Benchmarking

Industrial Hygiene

Construction Consulting

Construction, Site Stabilization & Stormwater Services

Zoning Analysis Reports & ALTA Surveys

National Presence
Regional Focus
Local Solutions

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Attachments

Introduction

The revised Quality Assurance Project Plan (QAPP) was prepared by All Environmental Inc (AEI) for MJW 47 LLC, who is conducting remedial investigation (RI) at the property located at 682 9th Avenue New York, New York 10036, the "Site".

The purpose of this QAPP is to ensure that scientific data are acquired according to established methods and procedures designed to obtain results that are objective, true, repeatable, and of known accuracy. Specifically, this QAPP provides guidance and specifications to ensure that RI activities are planned and executed in a manner consistent with the Quality Assurance Objectives (QAO's) stated below:

- Field determinations and analytical results are valid through adherence to New York State Department of Environmental Conservation (NYSDEC) field procedures, NYSDEC-approved analytical protocols, and calibration and preventive maintenance of equipment;
- Samples are identified and controlled through sample tracking systems and chain of custody procedures;
- Records are retained as documentary evidence of field activities and observations;
- Samples are collected and analytical data are validated in accordance with the NYSDEC requirements; and
- Evaluations of the data are accurate, appropriate, and consistent throughout the project

The contents of this QAPP are based on the NYSDEC requirements as stated in the EPA Requirements for Quality Assurance Project Plans (QA/R-5) (May 2006). This QAPP includes the following components:

- Problem Definition/Background;
- Project/Task Description;
- Project/Task Organization;
- Data Quality Objectives and Criteria for Measurement Data;
- Historical and Secondary Information/Data;
- Investigative Process Design;
- Field Instrumentation/Equipment Calibration and Frequency;
- Inspection/Acceptance of Supplies and Consumables;
- Sample Handling and Custody Requirements;
- Field Storage and Transport Procedures;
- Sample Containers, Preservation, and Holding Times;
- Analytical Methods Summary Table;
- Project Compounds and Analytical Summary;
- Analytical Quality Control;
- Laboratory Deliverables;
- Data and Records Management;
- Data Verification and Usability; and
- Corrective Action Processes.

As specific conditions and additional information warrant, this QAPP will be amended or revised to include site-specific quality assurance/quality control procedures.

1. Project Definition / Background

A commercial dry cleaning facility formerly operated at 682 9th Avenue, New York, New York (the Site). The Site is defined on the New York City Department of Finance records as Block 1038, Lot 1.

On September 8th and 9th, 2016, a limited soil and soil vapor investigation was conducted at the Site. Two (2) soil borings were completed in the basement of the Site, where former dry cleaning-operations were apparently present. The locations of the soil borings are presented on Figure 1. Laboratory analysis of the soil samples indicated that tetrachloroethylene (PCE), trichloroethylene (TCE), and cis-1,2-dichloroethene were detected in soil beneath the basement slab at concentrations greater than their respective NYSDEC soil cleanup objectives.

In addition to soil sampling, sub-slab vapor samples, indoor air, and outdoor/ambient air samples were collected at the Site. The investigation methodology was consistent with the New York State Department of Health (NYSDOH) Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006). Two indoor air samples (IA-1a and IA-1b) and an exterior background (i.e., ambient) air sample were collected over a 24-hour period. The indoor air samples were collected from the basement (sample IA-1a) and the first floor in the former commercial tenant space (sample IA-1b). Two sub-slab soil vapor samples (SSSV-1 and SSSV-2) were also collected in the western room of the basement at locations proximal to the soil boring locations.

Analysis of sub-slab soil vapor samples SSSV-1 and SSSV-2 detected PCE and TCE at concentrations greater than the applicable NYSDOH guidance levels. Based on the results of SSSV-1 and SSSV-2, indoor air samples IA-1a, IA-1b and ambient air sample AA-1 were analyzed. Analysis of indoor air samples also detected concentrations of PCE and TCE greater than the NYSDOH guidance criteria for indoor air.

As per Soil Vapor/Indoor Air Matrix Table A, TCE levels in both sub-slab vapor samples SSSV-1 and SSSV-2 exceed the 250 micrograms per cubic meter (ug/m^3) threshold for sub-slab vapor concentrations. When compared with the TCE concentration detected in indoor air sample IA-1a, which exceeds the 5 ug/m^3 threshold for indoor air concentrations in Matrix A, the matrix requires that mitigation is conducted. Additionally, per Soil Vapor/Indoor Air Matrix Table B, PCE levels in both sub-slab vapor samples SSSV-1 and SSSV-2 exceed the 1,000 ug/m^3 threshold for sub-slab vapor concentrations and require mitigation. When compared with the PCE concentration detected in indoor air sample IA-1a, which exceeds the 100 ug/m^3 threshold for indoor air concentrations in Matrix B, the matrix requires that mitigation is conducted.

The results of this investigation indicate that a release of PCE has contaminated soils in soils located between the base of the building slab and the top of the apparent bedrock surface, located between approximately two (2) feet and four (4) feet beneath the slab surface. The vapor results also suggest the associated soil vapor is impacted, that there is a complete pathway between the soil vapor and air in the building 682's basement, and that the contaminant levels in the basement air exceed the applicable NYSDOH air guidelines.

Based on these findings, the NYSDEC was notified of the release on May 4th, 2017, and NYSDEC Spill #1701031 was issued.

Limited excavation of soil was conducted in the basement of the Site between May 15 and May 23, 2017, as an interim measure to permanently remove the most-contaminated soils in the basement area. The excavation work was discontinued on May 23, 2017, pursuant to a request from the NYSDEC, until a complete Remedial Investigation Work Plan (RIWP) could be completed for the Site.

The overall project goal and objective of the current RI is to delineate the extent of the onsite soil and sub-slab soil vapor contamination, determine if impacts detected in soil have resulted in offsite soil or soil vapor contamination, and to investigate whether groundwater beneath the Site has been impacted.

The data shall be used to determine if further soil, soil vapor, groundwater, bedrock core, or indoor air investigation is required. These decisions shall be made following receipt of all analytical data associated with the investigation. Data users for the project include the person responsible for conducting the remediation, the environmental consultant, the Professional Engineer (PE), and ultimately the NYSDEC.

2. Project Summary

The work that is planned to be conducted includes a Remedial Investigation of soil, soil vapor, bedrock core, and groundwater. Personnel required to conduct the remedial investigation activities include a PE.

All of the data shall be collected through soil, soil vapor, bedrock core, and groundwater sampling and laboratory analysis. No data shall be collected from other sources.

The sample results shall be compared to the applicable NYSDEC Restricted Commercial Use Soil Cleanup Objectives (RCUSCOs) for soil and bedrock cores, the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York Matrix Tables for soil vapor, and the NYSDEC Ambient Water Quality Standards (AWQSs) for groundwater, and a conclusion shall be made, based on the comparison, as to whether contamination exists that requires further investigation/delineation or if no further investigation is required, and remedial action can be commenced.

The anticipated project schedule from initiation to final report is included as Section 9 of the RIWP. The applicable regulatory quality standards are: RCUSCOs for soil and bedrock cores, the NYSDOH Matrix Tables for soil vapor, and the NYSDEC AWQSs for groundwater

3. Project / Task Organization

Project Team

All remedial phases of work for this project are under the direction of Mr. John A. Rhodes, P.E., License #84423.

The Health and Safety Coordinator, Quality Assurance Coordinator, and Project Manager for this project is Mr. Anthony Cauterucci of AEI Consultants, Inc. (AEI). He is responsible for implementing the Quality Assurance Project Plan and the Remedial Investigation in accordance with NYSDEC regulations, and also serves as the central point of communication with all other individuals and organizations associated with this project. AEI can be reached at (732) 414-2720.

The Quality Assurance Officer for this project is Mr. John A. Rhodes, P.E. While Mr. Rhodes will not be directly involved in the collection and analysis of samples from the Site, he has worked in conjunction with Mr. Cauterucci in the development of the sampling and analytical portion of this QAPP. He is responsible for reviewing sampling procedures and certifying that the data was collected and analyzed using the appropriate procedures. Mr. Rhodes is familiar with analytical methods, data interpretation and validation, the development of sampling plans, quality control procedures and auditing requirements and techniques. During the course of the sampling and analytical portion of the project Mr. Rhodes may conduct periodic field and sampling audits, interface with the analytical laboratory to resolve problems, and interface with the data validator and/or the preparer of the Data Usability Summary Report (DUSR) to resolve problems.

Laboratory Analysis: Alpha Analytical Laboratory (NY Certification #11148): 35 Whitney Rd # 5, Mahwah, NJ 07430 (Contact: Ben Rao) (201) 847-9100. Special training is required to operate laboratory equipment and conduct laboratory analyses.

Special Training Needs/Certification
Training needs and certifications of field oversight include requirements to have completed the OSHA 40- Hour training with annual 8-hour refresher training in accordance with 29 CFR 1910.120 (Hazardous waste operations and emergency response).

4. Data Quality Objectives and Criteria for Measurement Data

Data quality objectives ("DQOs") are qualitative and quantitative statements that are developed in the first six (6) steps of the DQO process. DQOs define the purpose of the data collection effort, clarify what the data should represent to satisfy this purpose, and specify the performance requirements for the quality of information to be obtained from the data.

The development of the data quality criteria can be developed through the formal DQO process described in the EPA document titled "Guidance for the Data Quality Objectives Process", EPA/600/R-96/055. For most projects, however, a less iterative process is normally used to develop the project-specific DQOs.

Data of Known Quality Protocols ("DKQP") describe specific laboratory quality assurance and quality control procedures which, if followed, will provide data of known and documented quality (i.e. scientific reproducible and reliable data). When data of known quality ("DKQ") is obtained, an evaluation of the data with respect to its intended purpose can be made. To this end, a NY-certified laboratory must be used to analyze samples whenever possible.

Typical DQOs are often expressed in terms of data quality indicators ("DQIs") including precision, accuracy, representativeness, comparability, completeness and sensitivity (also known as the "PARCCS" parameters). These measures of performance are discussed in detail below.

Precision

Precision is the measure of agreement among repeated measurements of the same property under identical or substantially similar testing conditions. The investigator will determine the precision of the data by:

- Using the same analytical methods to perform repeated analyses on the same sample (laboratory or matrix duplicates);
- Collection of a field duplicate and submittal of both to evaluate the precision from sample collection, for sample handling, preservation and storage and analytical measurements

Precision for laboratory and field measurements can be expressed as the relative percent difference ("RPD") between two duplicate determinations or percent relative standard deviation ("%RSD") between multiple determinations.

Acceptance criteria for field precision shall be assessed through the splitting of a sample in the field and submitting both to the laboratory. Field duplicates will be collected at a frequency of one (1) per twenty (20) investigative samples per matrix per analytical parameter. Precision will be measured through the calculation of RPD. The resulting information will be used to assess sample homogeneity, spatial variability at the site, sample collection reproducibility, and analytical variability.

Accuracy

Accuracy is the degree of agreement of a measured value and an accepted reference or true value. The difference between the measured value and the reference or true value includes components of both systematic error (bias) and random error (precision). It should be noted that precise data may not be accurate data. Accuracy can be expressed as a percent recovery or percent deviation of the measurement with respect to its known or true value.

The accuracy will be determined through establishing acceptance criteria for spike recoveries (e g , surrogate recoveries, laboratory control sample recoveries, matrix spike recoveries, reference material recoveries etc.) or allowable deviations for calibration (e.g., % RPD for calibration verification). Acceptance criteria for matrix spike measurements are expressed as a percent recovery and are usually specified in the analytical method (or laboratory SOP, as applicable). Various blank samples (laboratory or field) may also be used to assess contamination of samples that may bias results high. Accuracy in the field shall be assessed through the adherence to sample collection, handling, preservation, and holding time requirements.

Representativeness

Representativeness is a qualitative measurement that describes the extent to which analytical data represent the site conditions. In almost every project, the investigator will not be able to measure the whole system, process, or situation of interest. Instead, the investigator will choose sample locations, quantities, and analyses in order to capture a sufficiently broad and/or weighted view of the situation.

Representativeness in the laboratory is ensured by using the proper analytical procedures, appropriate methods, and meeting sample holding times. Following the detailed requirements outlined in the EPA methods and the laboratory SOPs will maximize the representativeness of the laboratory data.

Comparability

Comparability is a qualitative term that 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. Comparability is defined as the extent to which data from one data set can be compared directly to similar or related data sets and/or decision-making standards.

Historical data should be evaluated to determine whether they may be combined with data being collected in present time. Comparability should discuss comparisons of sample collection and handling methods, sample preparation, and analytical procedures, holding times, stability issues and QA protocol.

Comparability in the laboratory is dependent on the use of recognized methods and approved laboratory SOPs. Comparability in the field is dependent upon adherence to the sampling methodology and that the proper preservation techniques are used.

Completeness

Completeness is a measure of the amount of usable data collected compared to the amount of data expected to be obtained. Three measures of completeness are defined as:

- 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.

Sensitivity

Sensitivity refers to the ability of an analytical procedure to quantify an analyte at a given concentration. The sensitivity requirements should be established such that the laboratory method Reporting Limits ("RLs") are at or below the relevant and applicable regulatory limits for each Contaminant of Concern ("COC") for the project. For the purpose of SRP projects:

- The RL for a specific substance when determining the extent and degree of polluted soil vapor from a release. For the purpose of this document, the RL is defined as:
  - Organics, the lowest initial calibration standard as adjusted for the dilution factor, sample weight/volume, and moisture content;
  - Inorganics, the concentration of that analyte in the lowest level check standard (which could be the lowest calibration standard in a multi-point calibration curve).

Methods for analysis have been chosen to meet the sensitivity requirements for a project (e.g., compound- specific and matrix-specific). If however, the laboratory RLs exceed the project sensitivity requirements (i.e., the RL is above the relevant and applicable regulatory standard), the analytical methods may need to be adjusted (e.g., analysis conducted using a more sensitive method or sample preparation and analysis features adjusted to gain sensitivity) and/or the project objectives may need to be adjusted (i.e., certain COCs may not be able to be screened out during this phase of the evaluation).

Due to the low regulatory limits, it will be ensured that laboratory reporting limits for PFAS in groundwater will be 2 nanograms per liter (ng/L).
The method detection limit for 1,4-dioxane will not exceed 0.35 micrograms per liter (ug/L).

5. Historical and Secondary Information / Data

The potential sources of data for any project include both historical data (i.e., data not collected by the current investigator) and secondary data (i.e., data that were collected for a different purpose than that for which they are now being used). Historical data should be evaluated for applicability to current project objectives. Secondary data should be assessed to determine if the quality of the data is sufficient for the current project objectives and meets comparability criteria (it is not sufficient that the secondary data were produced by a reliable source or a known environmental monitoring project with an approved QAPP).

Historical data and secondary data are not known to exist in association with the media being investigated at the current building.

6. Investigation Process Design

A description and justification of the investigation design should include, for each area of interest:

- The COCs or other parameters of interest
- The number of anticipated investigation points and how and why they will be selected including a site map depicting proposed sample locations
- Method of obtaining/determining locational information (such as the use of GPS instrumentation)
- Factors which could affect the variability of the data such as physical obstructions, seasonal variations, tidal influences, soil profile changes, weather-

related variation, and process variation within the source

- Design basis (i.e., probability based or judgment based)
- Results comparison (i.e., versus previous data, regulatory standards, reference population, etc.) Matrices to be monitored including any special sampling requirements
- Monitoring frequency (if applicable)
- Heterogeneity or homogeneity of the matrix
- Appropriateness of composite samples
- Required quality control samples

The investigative process design is based generally on the following:

- NYSDEC DER-10 / Technical Guidance for Site Investigation and Remediation
- NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) including May 2017 updates

7. Field Quality Control

Field quality control activities, along with their frequency, acceptance criteria, and corrective actions to be taken are provided for each DQI in the following tables.

Analyte(s)	DQI	Data Quality Element	Frequency of Collection	Acceptance Criteria	Corrective Action(s)
-VOCs+TICs per Method 8260C -SVOCs+TICs by Method 8270D -TAL Metals by EPA 200.7 / 200.8/ 245.2 / 6010C / 6020A / 7470A / 7471B -TCL PCBs and Pesticides by Method 8082A/8081B -Herbicides by Method 8151A -1,4-Dioxane by EPA Method 8270D-SIM -PFAS by modified EPA Method 537	Sensitivity	Samples reported to RL	For each target analyte	Analyte specific	Qualify sample data

AEI Consultants

-VOCs+TICs per Method 8260C -SVOCs+TICs by Method 8270D -TAL Metals by EPA 200.7 / 200.8/ 245.2 / 6010C / 6020A / 7470A / 7471B -TCL PCBs and Pesticides by Method 8082A/8081B -Herbicides by Method 8151A -1,4-Dioxane by EPA Method 8270D-SIM - PFAS by modified EPA Method 537	Accuracy	Laboratory Control Samples (LCS)	One (1) per preparatory batch of 20 samples	Analyte specific	Reanalyze all samples in the batch
-VOCs+TICs per Method 8260C -SVOCs+TICs by Method 8270D -TAL Metals by EPA 200.7 / 200.8/ 245.2 / 6010C / 6020A / 7470A / 7471B -TCL PCBs and Pesticides by Method 8082A/8081B -Herbicides by Method 8151A -1,4-Dioxane by EPA Method 8270D-SIM - PFAS by modified EPA Method 537	Precision	Laboratory Duplicates	One (1) per preparatory batch of 20 samples	RPD≤ 25%	Qualify sample data
-VOCs+TICs per Method 8260C -SVOCs+TICs by Method 8270D -TAL Metals by EPA 200.7 / 200.8/ 245.2 / 6010C / 6020A / 7470A / 7471B -TCL PCBs and Pesticides by Method 8082A/8081B -Herbicides by Method 8151A -1,4-Dioxane by EPA Method 8270D-SIM - PFAS by modified EPA Method 537	Accuracy	Method Blanks	One (1) per preparatory batch of 20 samples	No target analytes concentrations ≥ RL	Investigate the source of contamination and document and reanalyze all samples processed
-VOCs per Method TO-15	Accuracy and precision	Leak Check	Every soil vapor sample	<10% helium in sample probe	Purge tubing and reseal annular space at surface

* Target Compound List (TCL) VOCs, including Tentatively Identified Compounds (TICs); Semi-volatile organic compounds; Target Analyte List (TAL) Metals; Polychlorinated Biphenyls (PCBs); Per- and Polyfluoroalkyl substances (PFAS).

Equipment to be decontaminated during the project may include tools, monitoring equipment, and sample collection equipment.

Contaminated tools and sampling equipment will be dropped into a plastic pail, tub or other container. The tools will be brushed off, rinsed, and transferred into a second pail to be carried to further decontamination stations where they will be washed with a Liquinox ®, or equivalent soap and water solution, rinsed with clean potable water, and finally rinsed with deionized water.

Any direct or obvious contamination on monitoring equipment will be brushed or wiped with a disposable paper wipe. The units will then be wiped off with damp disposable wipes and dried. The units will be checked, standardized, and recharged, as necessary, for the next day's operation. They will then be prepared with new protective coverings.

Sample containers will be wiped clean at the sample site, taken to the decontamination area to be further cleaned, as necessary, and transferred to a clean carrier. The samples will be checked off against the COC record. The samples will then be stored on ice in a secure area prior to shipment. Sample handling areas will be cleaned/wiped down daily using disposable wipes. Disposable wipes will not be used on any equipment that comes in contact with samples. For final cleanup, all equipment will be disassembled and decontaminated. Any equipment which cannot be satisfactorily decontaminated will be disposed (e.g., glassware, covers for surfaces).

Analysis of an equipment/field blank sample shall be conducted for the COCs being investigated that day with that equipment.

8. Sampling Methods and Techniques

Floor Drain Sediment Sampling

An evaluation of floor drains inside the basement of the Site building and in the basement of the adjacent building to the north at 684 9th Avenue will be conducted. One (1) sediment sample will be collected from the floor drain in the basement of the Site building. The sediment sample will be a direct grab sample and will be transferred into laboratory supplied glassware and placed into a cooler with ice immediately following sample collection. Additional sediment samples may be taken as a result of the interior inspection if contaminants are indicated by field instrumentation.

Pneumatic Sub-slab Communication Study

In order to evaluate site-specific conditions relative to sub-slab soil vapor flow, and the type of equipment necessary to design and install an effective sub-slab depressurization system (SSDS) at the Site, pneumatic sub-slab communication testing will be conducted inside the basement of the Site building and the adjacent building to the north at 684 9th Avenue. This study will be conducted to evaluate the following: (1) separate foundation areas within the overall building footprints; (2) sub-slab obstructions that may impede pressure field extension; and, (3) pressure field extension throughout the building footprints.

In order to conduct the pneumatic sub-slab communication study, three (3) ¾-inch probes will be drilled into the building slab and a 1.5-inch diameter hose with an adapter connected to a portable vacuum that will create negative pressure beneath the building slab. The vacuum will be equipped with bleed valves and pressure gauges to control the pressure and flow rate applied. Exhaust from the vacuum will be filtered before being discharged outdoors. The distribution of the pressure beneath the slab will be monitored at four (4) temporary monitoring probes, vapor sampling probes, and unused vacuum probes installed though the basement slabs of the two buildings. The flow rate/pressure will be modified, as needed, to evaluate correlations between pressure/flow at the air application point and the gauging probes as the sub-slab pressure field stabilizes. Preliminary intrinsic permeability and zone of influence will be evaluated. Once readings are collected and recorded, the communication gauging probes and pressurized probe will be sealed using a temporary silicone plug to enable future use.

Soil Borings and Samples

Soil borings will be completed in eight (8) locations in the subsurface. Six (6) borings will be completed inside the basement of the Site building and two (2) will be completed in the basement of the adjacent building to the north (684 9th Avenue) in the locations shown on Figure 3. At each location, the soil borings will be completed using manual equipment (i.e., concrete corer and hand auger).

Soils will be sampled to a maximum depth of approximately 4 feet bgs or to refusal, whichever is shallower. Continuous soil samples will be inspected, logged and field screened from grade surface to the final depth of each boring using a PID by an AEI scientist.

One soil sample from each boring will be collected at the depth interval that represents the highest likelihood of contamination based on field screening results; and one soil sample will be collected from the terminus of each boring. Each soil sample will be a direct grab sample from a 6-inch interval and will be transferred into laboratory supplied glassware and placed into a cooler with ice.

Appropriate QA/QC samples will be collected for the soil sampling events including two trip blanks, two field duplicate samples, two matrix spike samples, and two matrix spike duplicate samples.

Sub-slab Soil Vapor Sampling

Five sub-slab vapor samples will be obtained from building interiors: comprised of two (2) sub-slab vapor probes in the basement of the Site, two (2) sub-slab soil vapor probes in the basement of the adjacent building to the north at 684 9th Avenue, and one (1) sub-slab vapor probe in the basement of the adjacent building to the east at 361 West 47th Street.

Two (2) exterior soil vapor probes will be completed from underneath the sidewalks located to the south (along 47th Street) and west of the Site (along 9th Avenue).

The sub-slab soil vapor probes will be installed to a depth of 2 inches beneath the existing building slab. Exterior soil vapor samples will be installed using manual coring equipment to a maximum depth of 10 feet bgs, or refusal of drilling equipment.

Temporary sub-slab soil vapor ports will be constructed with inert tubing of 0.25-inch diameter. The tubing will not extend more than 2 inches beneath the floor slab. The port will be sealed to the surface with non-VOC-containing and non-shrinking products for temporary installations. After sub-slab port installation and prior to sampling, a helium leak test will be performed and a one to three volume purge will occur in order to ensure vapors are not leaking from the port and a representative sample will be collected.

The exterior soil vapor points will be advanced by drilling up to 10 feet bgs, inserting tubing into the base of the borehole, filling the bottom three feet of the annular space around the sample port with sand, and sealing the remainder of the borehole with bentonite clay. Like the sub-slab probes, the annular space will be leak-checked using an inert tracer gas (i.e., helium) to verify that the soil vapor probes are not drawing ambient air during sample collection.

The soil vapor samples will be collected in a stainless steel Summa® canister (e.g. 1-Liter etc.) The canister will be individually cleaned, tested, and certified by a NYSDOH-certified laboratory for air tightness and proper vacuum prior to sampling. Prior to sampling, a vacuum gauge will be attached to the flow controller to measure and record the initial Summa® canister vacuum pressure. The Summa® canister will collect a sample for approximately 24 hours at a flow rate not to exceed 200 ml/min. Once sampling is complete, each Summa® canister valve will be closed tightly while maintaining a slight vacuum prior to sealing [approximately -5 inches of mercury (Hg)]. The following will be recorded for each sample:

- Sample identification (ID)
- Start and stop time
- Initial and final vacuum pressure
- Summa® canister and flow controller IDs
- Sample location
- Identity of the sampler

- Helium leak test results
- Soil vapor purge volume

The soil vapor samples will represent a 24-hr average, and will be analyzed for VOCs using EPA method TO-15.

Indoor and Outdoor Air Sampling

The indoor air (IA) and outdoor/background air sampling will be conducted in accordance with the Guidance for Evaluating Soil Vapor Intrusion in the State of New York by the NYSDOH.

The indoor air samples will be co-located with the interior sub-slab soil vapor samples collected in each building. The IA samples will be collected from within the breathing zone; approximately three (3) to five (5) feet above the ground surface. The air sampling equipment will be provided by a NYSDEC-certified laboratory. The IA and background air samples will be collected using 6-L capacity SUMMA canisters equipped with a regulator-flow controller. Each canister will be individually cleaned, tested, and certified by the laboratory for air tightness and proper vacuum. The regulator flow controller will be calibrated by the laboratory to allow for air samples to be collected over a 24-hour period.

Five (5) indoor air samples will be collected: two (2) samples from the basement of the Site building co-located with the sub-slab vapor probes in the basement of the Site, two (2) samples from the basement of the adjacent building to the north at 684 9th Avenue co-located with the sub-slab vapor probes in the north adjacent building, and one (1) indoor air sample in the basement of the adjacent building to the east at 361 47th Street, co-located with the sub-slab vapor probe in the east adjacent building. One (1) outdoor/background air sample will be collected from an outdoor area between 361 47th Avenue and 682 9th Avenue. The proposed locations are illustrated on Figure 4 of the RIWP. The samples will be collected into 6-Liter stainless steel SUMMA canisters. Prior to sampling, a vacuum gauge will be attached to the flow controller to measure and record the initial SUMMA canister vacuum pressure. Once sampling is complete, each SUMMA canister valve will be closed tightly while maintaining a slight vacuum prior to sealing (approximately -5 inch Hg). The following will be recorded for each sample:

- Sample identification (ID);
- Start and stop time;
- Initial and final vacuum pressure;
- SUMMA canister and flow controller IDs;
- Sample location;
- Identity of the sampler;

The indoor and ambient air samples will represent a 24-hr average, and will be analyzed for

VOCs per EPA method TO-15. Per NYSDOH requirements, laboratory detection/reporting limits for TCE, cis-1, 2-dichloroethene, 1, 1-dichloroethene, carbon tetrachloride, vinyl chloride in indoor air will be 0.20 ug/m3 and all laboratory data will be reported in units of ug/m3.

A Building Questionnaire and Product Inventory will also be completed for each sampled structure. This inventory will be compared to indoor air results.

Bedrock Coring and Monitoring Well Installation

The Sampling Plan calls for five (5) bedrock cores finished as double cased, groundwater monitoring wells; however, this plan may be modified by the Triad approach as explained in Section 5.1 of the RIWP. Modifications would be done only after consultation with and approval by the NYSDEC and DOH. The intent is to provide flexibility in the sampling plan to take advantage of the initial information developed by the program.

The rock cores will be completed using a tri-pod mounted rock coring equipment. The rock cores will be advanced to 20 feet below the basement floor, or to a depth of approximately 30 feet bgs, in accordance with the double casing procedure described above. Continuous cores will be collected and continuously screened using a PID and visual methods for evidence of contamination, presence of non-aqueous phase liquid (NAPL), and observed for inflow of water from leaking pipes in the building. Bedrock cores will also be observed for fractures and the interior of the cores will be screened using a PID and visual methods for evidence of contamination. One (1) bedrock core sample will be selected from each core location for laboratory analysis at the depth interval that represents the highest likelihood of contamination based on field screening results.

Cores and, in turn, finished monitoring wells will be double cased. A drilled hole will extend a minimum of five (5) feet into competent bedrock. Casing will be placed in the drilled hole and tremmie grouted. Drilling will then continue within the grouted casing to isolate the deeper ccoring interval and monitoring well from shallow contamination.

The newly installed monitoring wells will be developed by purging and/or pumping the water in the well to loosen and remove suspended fines. Measurements of the water volume removed and water quality parameters including temperature, pH, conductivity, and turbidity will be recorded at regular intervals throughout the development process. Development will continue until the water is visibly free of sediment.

The top of the PVC casing for each well will be surveyed by a NY-licensed surveyed and depth to groundwater measurements will be recorded in each well to determine groundwater flow direction in the area of the Site.

Groundwater Sampling and Testing

If groundwater is present in the well, groundwater sampling will be conducted as per the groundwater guidance in DER-10 Section 3.7.2. Prior to collecting the each groundwater sample, the well will be gauged for groundwater depth/NAPL using a decontaminated oil-water interface probe. The groundwater samples will be collected from each well with low-flow sampling techniques using dedicated non-teflon lined high density polyethylene (HDPE) and silicon tubing and a peristaltic pump to purge and collect samples for laboratory analysis. When sampling for PFAS, the special precautions and guidelines outlined below will be employed to avoid contamination of environmental samples or site media with PFAS. During purging, groundwater field parameters including pH, specific conductivity, temperature, turbidity, and dissolved oxygen will be measured using a calibrated water quality meter equipped with a flow-through cell. Depending on the yield of the well, a minimum of three well volumes will be removed prior to sample collection. Analytical samples will be collected when water quality parameter measurements have stabilized. Each well will be sampled for analysis listed in the table above.

The following guidelines and procedures will be followed to avoid contamination of environmental samples or site media with PFAS:

- No clothing or clothing treated with stain- or water-resistant coatings will be allowed. Clothing must be washed three to six times before use.
- No Tyvek® clothing will be allowed.
- No Post-It-Notes® will be used during sampling.
- Personnel must not handle pre-wrapped food or snacks before sampling or while working at the property.
- No materials or equipment will be used that contains Teflon® (e.g. Teflon® tubing, sample container cap liners, tape, etc.).
- No materials or equipment will be used that contains polytetrafluoroethylene (PTFE) (e.g. PTFE-coated aluminum foil, Gore-Sorbers™) or any other material known or suspected to contain a fluoropolymer.
- For samples that may be analyzed for PFASs, only sampling containers and caps/tops that have been supplied by the laboratory will be used.
- Sample containers and caps/tops will not be stored for more than 30 days before use.
- Field personnel must wash their hands with soap and potable water prior to sampling activities, especially after contact with any materials potentially containing PFASs.
- Chemical ice packs ("blue ice") will not be used

A full list of sampling considerations when analyzing for PFAS is attached to this QAPP.

The following NYSDEC special precautions for trace contaminant sampling will also be utilized based on review of Section 5.2.9 of the NYSDEC's Sampling Guidelines and Protocols (NYSDEC, 1992):

- A clean pair of new, disposable nitrile gloves will be worn each time a different point or location is sampled
- Sample containers shall be placed into separate re-sealable polyethylene plastic bags immediately after collection and labeling.

All groundwater samples will be collected in laboratory supplied sample bottles in accordance with protocols for analysis shown in the table above. Appropriate QA/QC samples will be collected for the groundwater sampling event including the following: duplicate, MS/MSD samples will be collected with a frequency of 1 in every 20 samples, trip blanks will be collected for VOCs at a frequency of 1 per cooler and equipment blanks for PFAS will be collected at a frequency of 1 per day. Subsequent to sample collection, the groundwater samples will be placed in an ice-filled shipping cooler, and transported under chain-of-custody to a NY-certified analytical laboratory.

9. Field Instrumentation / Equipment Calibration and Frequency

Field instrumentation/equipment that will require calibration includes a photo ionization detector (PID), a helium detector, and flow regulators for Summa canisters. Calibration of PID will be conducted using isobutylene gas at the beginning at each day of field work. Alpha Laboratory will provide all calibration records on the flow regulators and the helium detector calibration record will be provided by Pine Environmental Services, Inc. upon request.

10. Inspection / Acceptance of Supplies and Consumables

Critical supplies or consumables are planned for use in soil, soil vapor, and groundwater sampling events. All consumables must be unused and dedicated specifically to this project. The soil, bedrock, and groundwater samples will be collected into laboratory-supplied bottleware. The sub-slab vapor samples will be collected into laboratory-supplied Summa canisters. Summa canisters shall be certified as clean from the laboratory. Summa canisters shall be certified as clean from the laboratory.

11. Sample Handling and Custody Requirements

Sample containers will be wiped clean at the sample site, taken to the decontamination area to be further cleaned, as necessary, and transferred to a clean carrier. The samples will be checked off against the chain of custody (COC) record. The samples will then be stored on ice in a secure area prior to shipment. At the time samples are obtained, the following must be recorded by the sampler in the field logbook and/or on sample data sheets:

- Sample location
- Sample type
- Date and time of sampling
- Project and sample designations
- Sample identification
- Analyses requested

Sample handling areas will be cleaned/wiped down daily using disposable wipes. Disposable wipes will not be used on any equipment that comes in contact with samples. For final cleanup, all equipment will be disassembled and decontaminated. Any equipment which cannot be satisfactorily decontaminated will be disposed (e.g., glassware, covers for surfaces). Samples shall be maintained on-site for no more than two (2) consecutive days, and shall be delivered to the laboratory within one (1) day of shipment from the field.

The following COC protocol will be followed by the sampling crews:
• Documenting procedures and reagents added to the sample during sample preservation
• Recording sampling locations, sample bottle identification, and specific sample collection procedures on the appropriate forms
• Using sample labels that contain all information necessary for effective sample tracking
• Completing standard field data records to establish analytical sample custody in the field before sample shipment.

Prepared labels are normally developed for each sample to be collected. Each label is numbered to correspond with the appropriate sample(s) to be collected.

The COC record is used to document sample-handling information (i.e., sample location, sample identification, and number of containers corresponding to each sample number). The following information is recorded on the COC record:
• Project reference
• The site location code, sample identification number, date of collection, time of collection, sample bottle number, preservation, and sample type, number of containers, sample matrix
• The names of the sampler(s) and the person shipping the samples
• Serial number of custody seals and shipping cases (if applicable)
• The date and time that the samples were delivered for shipping
• Analyses required
• The names of those responsible for receiving the samples at the laboratory.

COC Forms may be obtained from the subcontractor laboratory or from AEI. A copy of the COC is sent with the analytical samples to the laboratory; another is kept by the sample crew leader and maintained in the project file. When this shipment is received by the laboratory, the COC is signed by the laboratory and returned with the test results as part of the data package submittal.

12. Field Storage and Transport Procedures

Samples shall remain in direct site and in the custody of field personnel at all times until transfer to the laboratory.

13. Sample Containers, Preservation, and Holding Times

Sample containers, preservation, and holding times are specified on Table 1.

14. Analytical Methods Summary Table

Analytical methods are summarized on Table 1.

15. Project Compounds and Analytical Summary

Volatile organic compounds (VOCs), specifically PCE, TCE, 1,2-dichloroethene (DCE) and vinyl chloride (VC) are the COCs for the soil, bedrock, soil vapor, and groundwater at the Site. The project action limits are the NYSDEC RCUSCOs for soil and bedrock cores, the NYSDOH Matrix Tables for soil vapor, and the NYSDEC AWQSs for groundwater. The analytical methods chosen can meet the DQOs of the project.

Analytical sensitivity requirements include the use of instruments or methods to detect the contaminants of concern at or below the action limits. The RLs are expected to be below the applicable regulatory standards. NYSDEC and EPA methods were selected to achieve the action limits. Laboratories may need to adjust RLs based on dilutions, sample sizes, extract/digestate volumes, percent solids and cleanup procedures. Sensitivity will be maximized by following the NYSDEC and EPA methods or laboratory SOPs utilizing experienced, trained laboratory personnel and by conducting laboratory audits.

16. Analytical Quality Control

Quality assurance and quality control ("QA/QC") requirements for analysis are specified in the most recent version of the document titled "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", prepared by EPA. The laboratory may also have QA/QC procedures in addition to those specified by the test method.

17. Laboratory Deliverables

The laboratory deliverable format to be used for this project shall be the Analytical Services Protocols (ASP) Category B full laboratory data deliverable. The laboratory shall also generate spreadsheets of the analytical results.

18. Data and Records Management

The recording media for the project will be both paper and electronic. The project will implement proper document control procedures for both. For instance, hand-recorded data records will be taken with indelible ink, and changes to such data records will be made by drawing a single line through the error with an initial by the responsible person. The Project Manager will have ultimate responsibility for any and all changes to records and documents. Similar controls will be put in place for electronic records.

The Quality Assurance Coordinator shall retain all updated versions of the QAPP and be responsible for distribution of the current version of the QAPP. The Quality Assurance Coordinator/Project Manager will approve periodic updates. The Project Manager shall retain copies of all management reports, memoranda, and all correspondence between the parties identified in Section 3.

Project data shall be stored in the Project Manager's office.

19. Data Verification and Usability

The procedure for review (verification and usability procedures) including data assessment versus stated data quality objectives of the investigation is specified in the NYSDEC's DER-10.

The data validator for this project will be Ms. Veronica Champagne. Ms. Champagne’s resume is included as an attachment to this QAPP.

20. Corrective Action Processes

Corrective action in the field may be needed when the work plan is modified (i.e., number or locations of samples) or when sampling procedures and/or field analytical procedures require modification due to unexpected conditions. The corrective action may be implemented at the time the determination is made in the field or may be implemented later, depending on the circumstances. Any corrective actions taken shall be documented in the field logbook and in the technical report.

Corrective actions in the laboratory may be needed when Non-Conformances occur. The laboratory shall implement and document corrective actions in accordance with the laboratory SOP.

TABLE 1

Analytical Methods/Quality Assurance Summary Table

682 9^{th} Avenue, New York, New York 10036

Matrix Type	Number of Samples	Analytical Parameters	Analytical Methods	Sample Preservation	Sample Container & Volume	Permissible Holding Time
Soil	28[1]	TCL VOCs+TICs TCL SVOCs+TICs TAL Metals Total PCBs TCL Pesticides Herbicides	8260C 8270D 6010C / 7471B 8082A 8081B 8151A	0-6 °C 0-6 °C None 0-6 °C 0-6 °C 0-6 °C	(3) Encore samplers 4 oz amber glass 4 oz amber glass 4 oz amber glass 4 oz amber glass 4 oz amber glass	48 Hours 14 Days[3] 180 Days (28 days for Hg) 14 Days 14 Days[3] 14 Days[3]
Sediment	1	TCL VOCs+TICs TCL SVOCs+TICs TAL Metals Total PCBs TCL Pesticides Herbicides	8260C 8270D 6010C / 7471B 8082A 8081B 8151A	0-6 °C 0-6 °C None 0-6 °C 0-6 °C 0-6 °C	(3) Encore samplers 4 oz amber glass 4 oz amber glass 4 oz amber glass 4 oz amber glass 4 oz amber glass	48 Hours 14 Days[3] 180 Days (28 days for Hg) 14 Days 14 Days[3] 14 Days[3]
Bedrock Core	5	TCL VOCs	8260C	0-6 °C	(3) Encore samplers	48 Hours
Soil Vapor	7	VOCs	EPA TO-15	Ambient temperature	Summa Canister; 1-liter	30 days
Indoor/ Ambient Air	6	VOCs	EPA TO-15	Ambient temperature	Summa Canister; 6-liter	30 days
Groundwater	5[2]	TCL VOCs+TICs TCL SVOCs+TICs TAL Metals Total PCBs TCL Pesticides Herbicides 1,4-Dioxane PFAS[6]	8260C 8270D 200.7/200.8/ 245.2/6010C/ 6020A/7470A 8082A 8081B 8151A 8270D-SIM Modified 537	HCL 0-6 °C HNO_3 0-6 °C 0-6 °C 0-6 °C 0-6 °C 0-6 °C Trizma/0-6 °C	(3) 40 ml VOA (2) 1000 ml (1) 500 ml (2) 1000 ml (2) 500 ml (2) 1000 ml (2) 1000 ml (2) 250 ml	14 days 7 Days[4] 180 Days (28 days for Hg) 7 Days 7 Days[4] 7 Days[4] 7 Days[4] 14 Days[5]

1. Includes 28 field samples, 2 duplicates, 2 MS/MSD, 2 field blanks, and 2 trip blanks (duplicate, MS/MSD samples will be collected with a frequency of 1 in every 20 samples, trip blanks will be collected for VOCs at a frequency of 1 per cooler)
2. Includes 5 field samples, 1 duplicate, 1 MS/MSD, 1 field blank, and 1 trip blank (duplicate, MS/MSD samples will be collected with a frequency of 1 in every 20 samples, trip blanks will be collected for VOCs at a frequency of 1 per cooler and equipment blanks for PFAS will be collected at a frequency of 1 per day)
3. Permissible holding time for SVOCs+TICs, Pesticides, and Herbicides in soil is 14 days to extract and 40 days to analyze.
4. Permissible holding time for SVOCs+TICs, Pesticides, and Herbicides in groundwater is 7 days to extract and 40 days to analyze.
5. Permissible holding time for PFAS in groundwater is 14 days to extract and 28 days to analyze.
6. Full list of 21 PFAS will be analyzed

SAMPLING CONSIDERATIONS WHEN ANALYZING FOR PFAS

SAMPLING CONSIDERATIONS WHEN ANALYZING FOR PFAS	
Prohibited Materials	**Acceptable Materials**
Field Equipment	
Fluoropolymer tubing, valves and other parts in pumps (Teflon®)	High density polyethylene (HDPE) and silicon materials
Fluoropolymer bailers or pump bladders	Disposable Equipment / Dedicated Equiment (no PTFE parts)
Aluminum foil	Thin HDPE sheeting
Blue (chemical) ice	Ice contained in plastic (polyethlene) bags (double bagged), secured to avoid meltwater from contacting sample containers, overnight shipping
Post-it notes, sharpies, waterproof fieldbook	Ball point pens, Loose paper on aluminum clipboard, non weatherproof fieldbook, pre-printed labels
Glass containers (due to potential loss of analytle through adsorption)	Polypropylene or HDPE sample bottles fitted with an unlined (no PTFE), polypropylene or HDPE screw cap
Decon 90	Alconox and Liquinox soap for decontamination, if needed
Decontamination water from the site	Water used for the decontamination of sampling equipment will be laboratory certified "PFAS-free" water
Field Clothing and Personal Protective Equipment (PPE)	
New clothing or water resistant, waterproof, or stain-treated clothing, clothing containing Gore-Tex	Well-laundered clothing, defined as clothing that has been washed 6 times or more after purchase, made of synthetic or natural fibers.
Clothing laundered using fabric softener	No fabric softener
Boots containg Gore-Tex	Boots made with polyurethane and polyvinyl chloride
Cosmetics, moisturizers, hand cream or other related products as part of personal cleaning/showering routine on the morning of sampling	Sunscreens - Alba Organics Natural Sunscreen, Yes to Cucumbers, Aubrey Organics, Jason Natural Sun Block, Kiss my face, Baby sunscreens that are "free" or "natural"
	Inspect Repellents: Jason Natural Quit Bugging Me, Repel Lemon Eucalyptus Inspect repellent, Herbal Armor, BabyGanics
Handling or prepackaged food products	Do not have at sampling location, wash hands well after handing wear powderless nitrile gloves

DATA VALIDATOR RESUME - VERONICA CHAMPAGNE

Veronica J. Champagne

957 Broadway, Haverhill, MA 01832, (650) 515-8860, ronni89@earthlink.net

Job Description

Environmental Project Manager/Data Quality Specialist

Summary of Professional Experience:

Ms. Champagne has worked in the environmental consulting field for 28 years and specializes in performing laboratory data validation and usability assessments for hazardous waste sites, as well as authoring technical reports based on Massachusetts Contingency Plan (MCP) and CERCLA federal guidelines. Although her residence and primary knowledge base is Massachusetts, she has experience in data validation under state and federal guidelines in all of New England, as well as New York, New Jersey and other locations. Ms. Champagne is well versed in the U.S. EPA National Functional Guidelines and Region I Data Validation Protocol, Massachusetts Compendium of Analytical Methods (CAM), and Representativeness Evaluation and Data Usability Assessment (REDUA) guidelines.

She has worked on many projects, providing support and guidance in the investigation and remediation of environmentally impacted sites. She has played a lead role in the discovery, clean-up, and closure of many sites. She has extensive experience with sites contaminated with chlorinated and gasoline contaminants, monitored natural attenuation (MNA) programs, and remediation of subsurface contamination through excavation, chemical injection (ISCO) and numerous other technologies.

Professional Experience

Environmental Chemical Corporation (ECC), Hudson, Massachusetts
Associate Environmental Scientist October 2012-Current

- Performed task management for several multi-million dollar U.S. Air Force and U.S. Army Environmental Projects under Performance-Based Remediation contracts. Work performed under CERCLA and multiple state environmental programs.
- Authored numerous documents under the CERCLA program, including many Quality Assurance Project Plans written according to the current federal guidance.
- Performed Tier II and Tier III laboratory data validation, QC Program Evaluation, and authored Data Usability Assessments for numerous projects. Validation performed both manually and using EDMS (Electronic Data Management System) database.
- Managed field and office junior staff for project support tasks, including teaching data validation methodology.

Self-Employed
Data Validation Specialist February 2010-Current

- Performed Tier II and Tier III laboratory data validation, QC Program Evaluation, and authored Data Usability Assessments for numerous New England, New York and New Jersey sites.
- Authored several MCP report submittals and Air Force OES Plans.

Environmental Compliance Services, Inc. (ECS), Woburn, Massachusetts
(previously d.b.a. Marin Environmental)
Project Manager/Environmental Scientist 2001 – February 2010

- Prepared CERCLA-guidance QAPPs for private industry clients.
- Experienced in performing Tier II and Tier III laboratory data validation, under both MCP and USEPA RCRA programs.
- Prepared numerous REDUA text sections for Phase II and Response Action Outcome (RAO) Statements.
- Managed environmental investigation and remediation projects for industrial, commercial, and residential sites in Massachusetts.
- Authored or reviewed numerous compliance and all types of MCP reports for projects.
- Performed Imminent Hazard Evaluations (IHEs) for both petroleum-impacted and chlorinated VOC sites.
- Remediation General Permit (RGP) application, management, and reporting for wastewater disposal.
- Performed OSHA internal health and safety management and refresher training.
- Responsible for local office safety audits and general safety program.

IT Corporation, Andover, Massachusetts
(previously d.b.a. EMCON and Wehran Engineering)
Task Manager, Environmental Scientist 1990-2001

- Performed over 200 ASTM Phase I Investigations and prepared reports.
- Field sampling activities, all environmental media.
- Task management for environmental sampling programs.
- Performed data validation for a 3-year groundwater sampling program, with EPA Contract Laboratory Program Tier III review of laboratory data packages.

Select project experience for Ms. Champagne includes:

- Aided in the performance of full CLP-level Data Validation for a private consultant client and the U.S. Air Force in relation to data collected at the Ravenna Army Ammunition Plant in Ravenna, Ohio. Project included extensive analytical testing, including methods related to explosives, PCBs, herbicides, pesticides, et. al.
- Performed extensive Tier II data validation for a private consultant client on a project located in Raynham, MA. The project analytical centered primarily on PCB contaminants.

- Performed Modified Tier II data validations for a private clients, for a project located in Bridgeport, Connecticut. The validation and evaluation was performed according to Connecticut DEEP guidelines. Produced Data Quality Assessment (DQA) spreadsheets and Data Usability Evaluation (DUE) Memos for a private consultant client.

Education

B.A., Biology, Boston University; 1989

OSHA Training:	40-Hour OSHA Health and Safety Training, US; (24-hour in 1990; 16-hour in 1994)
	8-Hour OSHA Health and Safety Training Refresher; annually, 1990-2018
Courses:	Technical Writing Course: Strategies and Styles, October 2009
	Technical Course: Groundwater Monitoring Well Design, Construction and Development, The Nielsen Environmental Field School, Inc. 2005
	Government Institutes, Inc. Course, Environmental Site Assessments From A to Z; 1998
	Professional Analytical and Consulting Services, Inc. (PACS) Course, Environmental Data Validation; 1997
Seminar:	The Revised CAM, What you Need to Know, December 2009

August, 2018

Veronica J. Champagne, 957 Broadway, Haverhill, MA 01832
(650) 515-8860
Ronni89@earthlink.net

ALPHA ANALYTICAL

ELAP CERTIFICATIONS AND QUALITY SYSTEMS MANUAL

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2019
Issued April 01, 2018

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MR. JOHN TRIMBLE
ALPHA ANALYTICAL
320 FORBES BOULEVARD
MANSFIELD, MA 02048

NY Lab Id No: 11627

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2003) for the category ENVIRONMENTAL ANALYSES POTABLE WATER
All approved analytes are listed below:

Metals I

Arsenic, Total	EPA 200.8 Rev. 5.4
Barium, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
Cadmium, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
Chromium, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
Copper, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
Iron, Total	EPA 200.7 Rev. 4.4
Lead, Total	EPA 200.8 Rev. 5.4
Manganese, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
Mercury, Total	EPA 245.1 Rev. 3.0
Selenium, Total	EPA 200.8 Rev. 5.4
Silver, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
Zinc, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4

Metals II

Aluminum, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
Antimony, Total	EPA 200.8 Rev. 5.4
Beryllium, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4

Metals II

Nickel, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
Thallium, Total	EPA 200.8 Rev. 5.4
Vanadium, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4

Metals III

Boron, Total	EPA 200.7 Rev. 4.4
Calcium, Total	EPA 200.7 Rev. 4.4
Magnesium, Total	EPA 200.7 Rev. 4.4
Potassium, Total	EPA 200.7 Rev. 4.4
Sodium, Total	EPA 200.7 Rev. 4.4

Miscellaneous

1,4-Dioxane	EPA 522

Non-Metals

Calcium Hardness	EPA 200.7 Rev. 4.4

Perfluorinated Alkyl Acids

Perfluorooctanesulfonic acid (PFOS)	EPA 537
Perfluorooctanoic acid (PFOA)	EPA 537

Serial No.: 57869

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All approved analytes are listed below:

Amines

1,2-Diphenylhydrazine	EPA 8270D
2-Nitroaniline	EPA 8270D
3-Nitroaniline	EPA 8270D
4-Chloroaniline	EPA 8270D
4-Nitroaniline	EPA 8270D
Aniline	EPA 8270D
Carbazole	EPA 8270D
Pyridine	EPA 8270D

Benzidines

3,3'-Dichlorobenzidine	EPA 8270D
Benzidine	EPA 8270D

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
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

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

1,2,4,5-Tetrachlorobenzene	EPA 8270D
1,2,4-Trichlorobenzene	EPA 8270D
2-Chloronaphthalene	EPA 8270D
Hexachlorobenzene	EPA 8081B
	EPA 8270D
Hexachlorobutadiene	EPA 8270D
Hexachlorocyclopentadiene	EPA 8270D
Hexachloroethane	EPA 8270D

Dissolved Gases

Ethane	RSK-175
Ethene (Ethylene)	RSK-175
Methane	RSK-175
Propane	RSK-175

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All approved analytes are listed below:

Fuel Oxygenates	
Ethanol	EPA 8015D
tert-amyl alcohol	EPA 8015D
tert-butyl alcohol	EPA 8015D
Haloethers	
2,2'-Oxybis(1-chloropropane)	EPA 8270D
4-Bromophenylphenyl ether	EPA 8270D
4-Chlorophenylphenyl ether	EPA 8270D
Bis(2-chloroethoxy)methane	EPA 8270D
Bis(2-chloroethyl)ether	EPA 8270D
Low Level Polynuclear Aromatics	
Acenaphthene Low Level	EPA 8270D SIM
Acenaphthylene Low Level	EPA 8270D SIM
Anthracene Low Level	EPA 8270D SIM
Benzo(a)anthracene Low Level	EPA 8270D SIM
Benzo(a)pyrene Low Level	EPA 8270D SIM
Benzo(b)fluoranthene Low Level	EPA 8270D SIM
Benzo(g,h,i)perylene Low Level	EPA 8270D SIM
Benzo(k)fluoranthene Low Level	EPA 8270D SIM
Chrysene Low Level	EPA 8270D SIM
Dibenzo(a,h)anthracene Low Level	EPA 8270D SIM
Fluoranthene Low Level	EPA 8270D SIM
Fluorene Low Level	EPA 8270D SIM
Indeno(1,2,3-cd)pyrene Low Level	EPA 8270D SIM
Naphthalene Low Level	EPA 8270D SIM
Phenanthrene Low Level	EPA 8270D SIM

Low Level Polynuclear Aromatics	
Pyrene Low Level	EPA 8270D SIM
Metals I	
Barium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6020A
	EPA 200.8, Rev. 5.4 (1994)
Cadmium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6020A
	EPA 200.8, Rev. 5.4 (1994)
Calcium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6020A
Chromium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6020A
	EPA 200.8, Rev. 5.4 (1994)
Copper, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6020A
	EPA 200.8, Rev. 5.4 (1994)
Iron, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6020A
Lead, Total	EPA 200.7, Rev. 4.4 (1994)

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Metals I

Lead, Total	EPA 6010C
	EPA 6020A
	EPA 200.8, Rev. 5.4 (1994)
Magnesium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6020A
Manganese, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6020A
	EPA 200.8, Rev. 5.4 (1994)
Nickel, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6020A
	EPA 200.8, Rev. 5.4 (1994)
Potassium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6020A
Silver, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6020A
	EPA 200.8, Rev. 5.4 (1994)
Sodium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6020A
Strontium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C

Metals I

Strontium, Total	EPA 6020A

Metals II

Aluminum, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6020A
	EPA 200.8, Rev. 5.4 (1994)
Antimony, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6020A
	EPA 200.8, Rev. 5.4 (1994)
Arsenic, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6020A
	EPA 200.8, Rev. 5.4 (1994)
Beryllium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6020A
	EPA 200.8, Rev. 5.4 (1994)
Mercury, Low Level	EPA 1631E
Mercury, Total	EPA 245.1, Rev. 3.0 (1994)
	EPA 7470A
Selenium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6020A
	EPA 200.8, Rev. 5.4 (1994)

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Metals II

Vanadium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6020A
	EPA 200.8, Rev. 5.4 (1994)
Zinc, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6020A
	EPA 200.8, Rev. 5.4 (1994)

Metals III

Cobalt, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6020A
	EPA 200.8, Rev. 5.4 (1994)
Molybdenum, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6020A
	EPA 200.8, Rev. 5.4 (1994)
Thallium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6020A
	EPA 200.8, Rev. 5.4 (1994)
Tin, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6020A
Titanium, Total	EPA 200.7, Rev. 4.4 (1994)

Metals III

Titanium, Total	EPA 6010C
	EPA 6020A

Mineral

Hardness, Total	EPA 200.7, Rev. 4.4 (1994)
	SM 2340B-2011

Miscellaneous

Boron, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6020A
Silica, Dissolved	EPA 200.7, Rev. 4.4 (1994)

Nitroaromatics and Isophorone

2,4-Dinitrotoluene	EPA 8270D
2,6-Dinitrotoluene	EPA 8270D
Isophorone	EPA 8270D
Nitrobenzene	EPA 8270D

Nitrosoamines

N-Nitrosodimethylamine	EPA 8270D
N-Nitrosodi-n-propylamine	EPA 8270D
N-Nitrosodiphenylamine	EPA 8270D

Organophosphate Pesticides

Atrazine	EPA 8270D

Petroleum Hydrocarbons

Diesel Range Organics	EPA 8015D

Serial No.: 57870

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.

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All approved analytes are listed below:

Phthalate Esters

Benzyl butyl phthalate	EPA 8270D
Bis(2-ethylhexyl) phthalate	EPA 8270D
Diethyl phthalate	EPA 8270D
Dimethyl phthalate	EPA 8270D
Di-n-butyl phthalate	EPA 8270D
Di-n-octyl phthalate	EPA 8270D

Polychlorinated Biphenyls

PCB 118	EPA 8082A
PCB 128	EPA 8082A
PCB 138	EPA 8082A
PCB 170	EPA 8082A
PCB 18	EPA 8082A
PCB 206	EPA 8082A
PCB 44	EPA 8082A
PCB 52	EPA 8082A
PCB 66	EPA 8082A
PCB-1016	EPA 8082A
PCB-1221	EPA 8082A
PCB-1232	EPA 8082A
PCB-1242	EPA 8082A
PCB-1248	EPA 8082A
PCB-1254	EPA 8082A
PCB-1260	EPA 8082A
PCB-1262	EPA 8082A
PCB-1268	EPA 8082A

Polynuclear Aromatics

Acenaphthene	EPA 8270D
Acenaphthylene	EPA 8270D
Anthracene	EPA 8270D
Benzo(a)anthracene	EPA 8270D
Benzo(a)pyrene	EPA 8270D
Benzo(b)fluoranthene	EPA 8270D
Benzo(ghi)perylene	EPA 8270D
Benzo(k)fluoranthene	EPA 8270D
Chrysene	EPA 8270D
Dibenzo(a,h)anthracene	EPA 8270D
Fluoranthene	EPA 8270D
Fluorene	EPA 8270D
Indeno(1,2,3-cd)pyrene	EPA 8270D
Naphthalene	EPA 8270D
Phenanthrene	EPA 8270D
Pyrene	EPA 8270D

Priority Pollutant Phenols

2,3,4,6 Tetrachlorophenol	EPA 8270D
2,4,5-Trichlorophenol	EPA 8270D
2,4,6-Trichlorophenol	EPA 8270D
2,4-Dichlorophenol	EPA 8270D
2,4-Dimethylphenol	EPA 8270D
2,4-Dinitrophenol	EPA 8270D
2-Chlorophenol	EPA 8270D
2-Methyl-4,6-dinitrophenol	EPA 8270D

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All approved analytes are listed below:

Priority Pollutant Phenols

2-Methylphenol	EPA 8270D
2-Nitrophenol	EPA 8270D
3-Methylphenol	EPA 8270D
4-Chloro-3-methylphenol	EPA 8270D
4-Methylphenol	EPA 8270D
4-Nitrophenol	EPA 8270D
Pentachlorophenol	EPA 8270D
Phenol	EPA 8270D

Semi-Volatile Organics

1,1'-Biphenyl	EPA 8270D
1,2-Dichlorobenzene, Semi-volatile	EPA 8270D
1,3-Dichlorobenzene, Semi-volatile	EPA 8270D
1,4-Dichlorobenzene, Semi-volatile	EPA 8270D
2-Methylnaphthalene	EPA 8270D
Acetophenone	EPA 8270D
Benzaldehyde	EPA 8270D
Benzoic Acid	EPA 8270D
Benzyl alcohol	EPA 8270D
Caprolactam	EPA 8270D
Dibenzofuran	EPA 8270D

Volatiles Organics

1,4-Dioxane	EPA 8270D SIM
Ethylene Glycol	EPA 8015D
Isobutyl alcohol	EPA 8015D
Methanol	EPA 8015D

Sample Preparation Methods

EPA 3015A
EPA 3005A
EPA 3510C
EPA 3020A

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All approved analytes are listed below:

Amines

1,2-Diphenylhydrazine	EPA 8270D
2-Nitroaniline	EPA 8270D
3-Nitroaniline	EPA 8270D
4-Chloroaniline	EPA 8270D
4-Nitroaniline	EPA 8270D
Aniline	EPA 8270D
Carbazole	EPA 8270D

Benzidines

3,3'-Dichlorobenzidine	EPA 8270D
Benzidine	EPA 8270D

Characteristic Testing

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
beta-BHC	EPA 8081B
Chlordane Total	EPA 8081B
delta-BHC	EPA 8081B
Dieldrin	EPA 8081B
Endosulfan I	EPA 8081B

Chlorinated Hydrocarbon Pesticides

Endosulfan II	EPA 8081B
Endosulfan sulfate	EPA 8081B
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
Pentachloronitrobenzene	EPA 8270D
Toxaphene	EPA 8081B

Chlorinated Hydrocarbons

1,2,4,5-Tetrachlorobenzene	EPA 8270D
1,2,4-Trichlorobenzene	EPA 8270D
2-Chloronaphthalene	EPA 8270D
Hexachlorobenzene	EPA 8270D
Hexachlorobutadiene	EPA 8270D
Hexachlorocyclopentadiene	EPA 8270D
Hexachloroethane	EPA 8270D

Haloethers

2,2'-Oxybis(1-chloropropane)	EPA 8270D
4-Bromophenylphenyl ether	EPA 8270D
4-Chlorophenylphenyl ether	EPA 8270D

Serial No.: 57871

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All approved analytes are listed below:

Haloethers

Bis(2-chloroethoxy)methane	EPA 8270D
Bis(2-chloroethyl)ether	EPA 8270D

Low Level Polynuclear Aromatic Hydrocarbons

Acenaphthene Low Level	EPA 8270D SIM
Acenaphthylene Low Level	EPA 8270D SIM
Anthracene Low Level	EPA 8270D SIM
Benzo(a)anthracene Low Level	EPA 8270D SIM
Benzo(a)pyrene Low Level	EPA 8270D SIM
Benzo(b)fluoranthene Low Level	EPA 8270D SIM
Benzo(g,h,i)perylene Low Level	EPA 8270D SIM
Benzo(k)fluoranthene Low Level	EPA 8270D SIM
Chrysene Low Level	EPA 8270D SIM
Dibenzo(a,h)anthracene Low Level	EPA 8270D SIM
Fluoranthene Low Level	EPA 8270D SIM
Fluorene Low Level	EPA 8270D SIM
Indeno(1,2,3-cd)pyrene Low Level	EPA 8270D SIM
Naphthalene Low Level	EPA 8270D SIM
Phenanthrene Low Level	EPA 8270D SIM
Pyrene Low Level	EPA 8270D SIM

Metals I

Barium, Total	EPA 6010C
	EPA 6020A
Cadmium, Total	EPA 6010C
	EPA 6020A
Calcium, Total	EPA 6010C
	EPA 6020A
Chromium, Total	EPA 6010C
	EPA 6020A
Copper, Total	EPA 6010C
	EPA 6020A
Iron, Total	EPA 6010C
	EPA 6020A
Lead, Total	EPA 6010C
	EPA 6020A
Magnesium, Total	EPA 6010C
	EPA 6020A
Manganese, Total	EPA 6010C
	EPA 6020A
Nickel, Total	EPA 6010C
	EPA 6020A
Potassium, Total	EPA 6010C
	EPA 6020A
Silver, Total	EPA 6010C
	EPA 6020A
Sodium, Total	EPA 6010C
	EPA 6020A
Strontium, Total	EPA 6010C
	EPA 6020A

Metals II

Aluminum, Total	EPA 6010C

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320 FORBES BOULEVARD
MANSFIELD, MA 02048

NY Lab Id No: 11627

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2003) for the category ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved analytes are listed below:

Metals II	
Aluminum, Total	EPA 6020A
Antimony, Total	EPA 6010C
	EPA 6020A
Arsenic, Total	EPA 6010C
	EPA 6020A
Beryllium, Total	EPA 6010C
	EPA 6020A
Mercury, Total	EPA 7471B
	EPA 7474
Selenium, Total	EPA 6010C
	EPA 6020A
Vanadium, Total	EPA 6010C
	EPA 6020A
Zinc, Total	EPA 6010C
	EPA 6020A
Metals III	
Cobalt, Total	EPA 6010C
	EPA 6020A
Molybdenum, Total	EPA 6010C
	EPA 6020A
Thallium, Total	EPA 6010C
	EPA 6020A
Tin, Total	EPA 6010C
	EPA 6020A
Titanium, Total	EPA 6010C
Metals III	
Titanium, Total	EPA 6020A
Miscellaneous	
Boron, Total	EPA 6010C
	EPA 6020A
Organic Carbon, Total	Lloyd Kahn Method
	EPA 9060A
Nitroaromatics and Isophorone	
2,4-Dinitrotoluene	EPA 8270D
2,6-Dinitrotoluene	EPA 8270D
Isophorone	EPA 8270D
Nitrobenzene	EPA 8270D
Pyridine	EPA 8270D
Nitrosoamines	
N-Nitrosodimethylamine	EPA 8270D
N-Nitrosodi-n-propylamine	EPA 8270D
N-Nitrosodiphenylamine	EPA 8270D
Petroleum Hydrocarbons	
Diesel Range Organics	EPA 8015D
Phthalate Esters	
Benzyl butyl phthalate	EPA 8270D
Bis(2-ethylhexyl) phthalate	EPA 8270D
Diethyl phthalate	EPA 8270D
Dimethyl phthalate	EPA 8270D

Serial No.: 57871

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2019
Issued April 01, 2018

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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Phthalate Esters

Di-n-butyl phthalate	EPA 8270D
Di-n-octyl phthalate	EPA 8270D

Polychlorinated Biphenyls

PCB 1	EPA 8082A
PCB 101	EPA 8082A
PCB 110	EPA 8082A
PCB 118	EPA 8082A
PCB 128	EPA 8082A
PCB 138	EPA 8082A
PCB 141	EPA 8082A
PCB 151	EPA 8082A
PCB 153	EPA 8082A
PCB 170	EPA 8082A
PCB 18	EPA 8082A
PCB 180	EPA 8082A
PCB 183	EPA 8082A
PCB 187	EPA 8082A
PCB 206	EPA 8082A
PCB 31	EPA 8082A
PCB 44	EPA 8082A
PCB 5	EPA 8082A
PCB 52	EPA 8082A
PCB 66	EPA 8082A
PCB 87	EPA 8082A
PCB-1016	EPA 8082A

Polychlorinated Biphenyls

PCB-1221	EPA 8082A
PCB-1232	EPA 8082A
PCB-1242	EPA 8082A
PCB-1248	EPA 8082A
PCB-1254	EPA 8082A
PCB-1260	EPA 8082A
PCB-1262	EPA 8082A
PCB-1268	EPA 8082A

Polynuclear Aromatic Hydrocarbons

Acenaphthene	EPA 8270D
Acenaphthylene	EPA 8270D
Anthracene	EPA 8270D
Benzo(a)anthracene	EPA 8270D
Benzo(a)pyrene	EPA 8270D
Benzo(b)fluoranthene	EPA 8270D
Benzo(ghi)perylene	EPA 8270D
Benzo(k)fluoranthene	EPA 8270D
Chrysene	EPA 8270D
Dibenzo(a,h)anthracene	EPA 8270D
Fluoranthene	EPA 8270D
Fluorene	EPA 8270D
Indeno(1,2,3-cd)pyrene	EPA 8270D
Naphthalene	EPA 8270D
Phenanthrene	EPA 8270D
Pyrene	EPA 8270D

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Priority Pollutant Phenols

2,3,4,6 Tetrachlorophenol	EPA 8270D
2,4,5-Trichlorophenol	EPA 8270D
2,4,6-Trichlorophenol	EPA 8270D
2,4-Dichlorophenol	EPA 8270D
2,4-Dimethylphenol	EPA 8270D
2,4-Dinitrophenol	EPA 8270D
2-Chlorophenol	EPA 8270D
2-Methyl-4,6-dinitrophenol	EPA 8270D
2-Methylphenol	EPA 8270D
2-Nitrophenol	EPA 8270D
3-Methylphenol	EPA 8270D
4-Chloro-3-methylphenol	EPA 8270D
4-Methylphenol	EPA 8270D
4-Nitrophenol	EPA 8270D
Pentachlorophenol	EPA 8270D
Phenol	EPA 8270D

Semi-Volatile Organics

1,1'-Biphenyl	EPA 8270D
1,2-Dichlorobenzene, Semi-volatile	EPA 8270D
1,3-Dichlorobenzene, Semi-volatile	EPA 8270D
1,4-Dichlorobenzene, Semi-volatile	EPA 8270D
2-Methylnaphthalene	EPA 8270D
Acetophenone	EPA 8270D
Benzaldehyde	EPA 8270D
Benzoic Acid	EPA 8270D

Semi-Volatile Organics

Benzyl alcohol	EPA 8270D
Caprolactam	EPA 8270D
Dibenzofuran	EPA 8270D

Volatile Organics

Ethylene Glycol	EPA 8015D
Isobutyl alcohol	EPA 8015D
tert-butyl alcohol	EPA 8015D

Sample Preparation Methods

EPA 3570
EPA 3580A
EPA 3050B
EPA 3540C
EPA 3051A

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Acrylates	
Acetonitrile	EPA TO-15
Acrylonitrile	EPA TO-15
Methyl methacrylate	EPA TO-15
Chlorinated Hydrocarbons	
1,2,4-Trichlorobenzene	EPA TO-15
Hexachlorobutadiene	EPA TO-15
Metals I	
Lead, Total	40 CFR PART 50 2013 APP G
Miscellaneous	
Formaldehyde	EPA TO-11A
Polychlorinated Biphenyls	
PCBs and Aroclors	EPA TO-10A
Polynuclear Aromatics	
Acenaphthene	EPA TO-13A
Acenaphthylene	EPA TO-13A
Anthracene	EPA TO-13A
Benzo(a)anthracene	EPA TO-13A
Benzo(a)pyrene	EPA TO-13A
Benzo(b)fluoranthene	EPA TO-13A
Benzo(ghi)perylene	EPA TO-13A
Benzo(k)fluoranthene	EPA TO-13A
Chrysene	EPA TO-13A
Dibenzo(a,h)anthracene	EPA TO-13A
Polynuclear Aromatics	
Fluoranthene	EPA TO-13A
Fluorene	EPA TO-13A
Indeno(1,2,3-cd)pyrene	EPA TO-13A
Naphthalene	EPA TO-13A
	EPA TO-15
Phenanthrene	EPA TO-13A
Pyrene	EPA TO-13A
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
2-Chlorotoluene	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

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Purgeable Halocarbons

1,1,2,2-Tetrachloroethane	EPA TO-15
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-Dibromo-3-chloropropane	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

Purgeable Halocarbons

Trichlorofluoromethane	EPA TO-15
Vinyl bromide	EPA TO-15
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
2,2,4-Trimethylpentane	EPA TO-15
2,5-Dimethylbenzaldehyde	EPA TO-11A
2-Butanone (Methylethyl ketone)	EPA TO-15
4-Methyl-2-Pentanone	EPA TO-15
Acetaldehyde	EPA TO-11A EPA TO-15
Acetone	EPA TO-11A EPA TO-15
Acrolein (Propenal)	EPA TO-15
Benzaldehyde	EPA TO-11A
Butyraldehyde	EPA TO-11A
Carbon Disulfide	EPA TO-15
Crotonaldehyde	EPA TO-11A
Cyclohexane	EPA TO-15
Hexanaldehyde	EPA TO-11A
Hexane	EPA TO-15

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Volatile Organics

Isopropanol	EPA TO-15
Isovaleraldehyde	EPA TO-11A
Methanol	EPA TO-15
Methyl tert-butyl ether	EPA TO-15
m-Tolualdehyde	EPA TO-11A
n-Heptane	EPA TO-15
o-Tolualdehyde	EPA TO-11A
Propionaldehyde	EPA TO-11A
p-Tolualdehyde	EPA TO-11A
tert-butyl alcohol	EPA TO-15
Valeraldehyde	EPA TO-11A
Vinyl acetate	EPA TO-15

Serial No.: 57872

Quality Systems Manual

Alpha Analytical, Inc.

D/B/A

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President: Mark Woelfel, 508-439-5115
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Laboratory Technical Manager (Director) Westboro: Joseph Watkins 508-439-5125
Laboratory Technical Manager (Director) Mansfield: John Trimble, 508-844-4134
Laboratory Technical Manager (Director) Air-Mansfield: Andy Rezendes, 508-844-4181

1 Mission Statement

The mission of Alpha Analytical is quite simply to provide our customers with the greatest value in analytical service available. For the 'greatest value' is not only found in the data that is delivered, it is also found in the services provided.

- Data must be of the highest integrity, accuracy and precision.
- Consultation and educational services must be provided to support the customer in establishing data quality objectives and interpretation of the final data package.
- Support services such as sample containers, courier service and electronic data deliverables must be available to the customer.

Alpha's mission continues with an established commitment to our community and environment. We must ensure that we do not produce any additional contamination to our environment or harm our neighbors and community in any way.

The value of Alpha's product is in the honesty and integrity with which each chemist, courier, login staff member, or office staff member performs their tasks. The customer or employee must always feel satisfied that they received the greatest value in their lab experience at Alpha.

Alpha Analytical will vigorously pursue its mission into the next millennium.

Mark Woelfel

President

2 Table of Contents

3 Introduction

The Quality Systems Manual, referred to as Corporate Quality Systems Manual (CQSM) of Alpha Analytical describes the quality program in use at the laboratory for both Westboro and Mansfield facilities. This Quality Systems Manual provides employees, customers and accrediting agencies with the necessary information to become familiar with how the quality system operates within Alpha Analytical. The quality program includes quality assurance, quality control, and the laboratory systems including feedback mechanisms for the automated continuous improvement of the laboratory operations to meet customer needs.

Implementation of the laboratory operations is by documenting procedures, training personnel and reviewing operations for improvement. Written procedures are maintained as Standard Operating Procedures (SOPs). The SOPs are available to the staff as a controlled, electronic, secure copy. The provisions of the QSM are binding on all temporary and permanent personnel assigned responsibilities. All laboratory personnel must adhere strictly to the QSM and SOPs.

All policies and procedures have been structured in accordance with the NELAC Institute (TNI) Standards), DOD QSM 5.1 and applicable EPA requirements and standards.

Twenty-five (25) sections comprise the QSM. Related quality documentation including the listing of SOPs, forms, floor plan, equipment, personnel and laboratory qualifications are available. The QSM sections provide overview descriptions of objectives, policies, services and operations.

3.1 Scope

The QSM describes the requirements of the Laboratory to demonstrate competency in the operations for performing environmental tests for inorganic, organic, air and microbiological testing. The basis for the environmental tests is the methods found in documents published by the United States Environmental Protection Agency (EPA), ASTM, AOAC, APHA/AWWA/WEF, Standard Methods, and other procedures and techniques supplied by customers.

The QSM includes requirements and information for assessing competence and determining compliance by the laboratory to the quality system. When more stringent standards or requirements are included in a mandated test method, by regulation, or specified in a project plan the laboratory demonstrates achievement of the customer specified requirements through its documented processes.

The QSM is for use by Alpha Analytical for developing and implementing the quality system. Accrediting authorities and customers use the QSM for assessing the competence of Alpha Analytical. Alpha Analytical is committed to continually improving the quality system. Meeting customer needs, operating within regulatory requirements and adhering to Alpha's Data Integrity and Ethics policy are several of the mechanism used to continually improve the quality system.

3.2 Policy Statement

This Quality Systems Manual summarizes the policies, responsibilities and operational procedures associated with Alpha Analytical. This manual applies to all associates of the laboratory and is intended for use in the on-going operations at Alpha Analytical. Specific protocols for sample handling and storage, chain-of-custody, laboratory analyses, data reduction, corrective action, and reporting are described. All policies and procedures have been structured in accordance with the NELAC Institute (TNI) Standards, DOD QSM(which includes 17025 standards), applicable EPA requirements, regulations, guidance, and technical standards. This Quality Systems Manual, laboratory Standard Operating Procedures (SOPs), and related documentation describe the quality systems, policies and procedures for Alpha Analytical.

Alpha Analytical performs chemical analyses for inorganic and organic constituents in water, seawater, soil, sediment, oil, tissue and air matrices. Alpha Analytical's goal is to produce data that is scientifically valid, technically defensible, and of known and documented quality in accordance with standards developed by The NELAC Institute (TNI) Standards and any applicable state or EPA regulations or requirements. It is the commitment of the President, Operations Director, Laboratory Technical Manager and Quality Assurance Officer to work towards continuous improvement of the operation, and towards meeting our customer's needs, requirements, and intended data usage. This continued commitment is built into every activity of the laboratory. It is the responsibility of Senior Management and the Department Managers to ensure that all associates familiarize themselves with, and comply at all times with, the quality systems, procedures and policies set forth in this manual, laboratory SOPs, and related documentation.

Alpha Analytical analyzes Proficiency Test (PT) samples, in accordance with the NELAC Institute (TNI) Standards and other regulatory programs, from a National Institute of Standards and Technology (NIST)-approved PT provider for the analytes established by EPA for water samples, and for other analytes and matrices. The specific analytes and matrices analyzed are based on the current scope of the laboratory services as documented in the laboratory SOPs and state certifications.

The technical and service requirements of all requests to provide analyses are thoroughly evaluated before commitments are made to accept the work. This includes a review of facilities and instrumentation, staffing, and any special QC or reporting requirements to ensure that analyses can be performed correctly and within the expected schedule. All measurements are made using published reference methods or methods developed by Alpha Analytical. Competence with all methods is demonstrated according to the procedure described in SOP/ 1739 prior to use.

Alpha Analytical has developed a proactive program for prevention and detection of improper, unethical or illegal actions. Components of this program include: internal proficiency testing, electronic data audits and post-analysis data review by the QA Officer; a program to improve employee vigilance and co-monitoring; and Ethics Training program identifying appropriate and inappropriate laboratory practices, instrument manipulation practices and consequences. Additionally, all associates are required to sign the Alpha Analytical *Ethics Agreement* form upon commencement of employment and each year following. This form clearly outlines the possible consequences of unethical or improper behavior, or data misrepresentation. All staff are required to report any suspected unethical conduct to management. Management will then investigate and determine if the situation was considered unethical and will take appropriate action as described in the Alpha Ethics policy.

It is the policy of the laboratory to discourage and reject all influence or inducements (whether commercial, financial or personal) offered either by customers or suppliers, which might adversely affect results or otherwise compromise the judgment or impartiality of the staff. It is the responsibility of the Operations Director and Laboratory Technical Manager to inform customers and suppliers of this policy when necessary.

In the event that any such influences or inducements are encountered, the staff is instructed to inform management immediately. It is the responsibility of the Operations Director and the Laboratory Technical Manager to take appropriate action to prevent recurrence.

3.3 References

External reference documents are available electronically in the Qualtrax system for staff to access the latest edition or version of the reference methods, regulations or national standards. The Quality Assurance Department maintains the electronic files in the Qualtrax system. Management purchases automated update services, where available, to provide the laboratory with the latest hardcopy edition, where electronic means is not available.

3.4 Definitions

Appendix A lists the definitions as adopted by the laboratory. The definitions are from the 2009 TNI standards.

4 Organization and Management

4.1 Legal Definition of Laboratory

Alpha Analytical is a full service analytical laboratory. Testing services include Drinking Water, Waste Water, Ground Water, Waste material and Air. Alpha Analytical is a privately held corporation incorporated in the state of Massachusetts. Alpha Analytical, Inc. does business as (D/B/A) Alpha Analytical.

Alpha Analytical has been in business since 1985. The types of businesses served include:

Consulting firms,
Engineering firms,
Waste Management Companies,
Industrial sites,
Municipal agencies
Department of Defense projects.

4.2 Organization

The laboratory operates a quality system approach to management in order to produce data of known quality. The laboratory organization provides effective communication and lines of authority to produce analytical data meeting customer specifications. The organizational design provides open communication while ensuring that pressures and day to day operating circumstances do not compromise the integrity of the reporting of the final data. See Appendix B for Organizational Chart.

The President is responsible for directing all areas of the company. The following job functions report to the President:

Operations Manager
Quality Assurance Officer
Marketing / Business Development / Sales
Financial Services
Human Resources

The Operations Manager is responsible for directing all laboratory operational areas of the company. The following job functions report to the Operations Manager:

Laboratory Technical Manager(s)
Customer Services Manager
Department Managers

The Laboratory Technical Manager(s) is(are) responsible for the laboratory data generated by the organics testing, inorganics testing and metals testing areas and the Air Technical Director is responsible for laboratory data generated by air analyses.

The Departmental Managers (Supervisors) have the following responsibilities:

The organics managers direct personnel in the organics extraction and instrumental laboratories.

The wet chemistry manager directs personnel and team leaders in the wet chemistry and/or microbiological testing areas.

The metals manager directs personnel and team leaders in the metals sample preparation and instrumental laboratories.

The Quality Assurance Officer is a member of the staff and reports directly to the President and has defined responsibility and authority for ensuring that the quality system is implemented and adhered to at all times. The Quality Assurance (QA) Officer is responsible for interacting and communicating certification requirements, implementing the Quality Systems Manual and reporting to the Laboratory Technical Manager and Senior Management the status of the quality program. The QAO oversees the Quality Systems Specialists and is responsible for oversight and/or review of quality control data and function independently from laboratory operations.

The Customer Services Manager is responsible for customer interactions, project coordination and laboratory personnel notification of project requirements.

The Marketing, Business Development and Sales personnel are responsible for increasing the volume of work from current customers and adding new customers to the base business of Alpha Analytical. The Marketing and Business Development personnel review all new work with the Laboratory Technical Manager, Operations Manager, President and/or Quality Assurance Officer before contractual commitment.

The CFO is responsible for maintaining and reporting on the financial status of the company. The CFO directs financial personnel on proper accounting procedures and maintaining the list of approved suppliers and subcontractors. The CFO reports directly to the President.

The Human Resource Director is responsible for personnel recruitment, hiring, performance reviews.

Personnel job descriptions define the operational function duties and responsibilities. Administration and Laboratory personnel assignments may include cross-functional training and work performance in multiple areas of the operations. Multiple function training ensures laboratory back up personnel during peak workloads.

During the absence of any staff member, assignment of alternative personnel occurs by memo or e-mail. The Manager or Supervisor authorizes the assignment. The naming of alternative personnel assures the continuing performance of critical tasks during the primary person’s absence and ensures that lines of communication remain open for continued decision making. The deputy for the Laboratory Technical Manager is the Quality Assurance (QA) Officer. The deputies for the Quality Assurance (QA) Officer are the Quality Systems Specialists.

For the purposes of the NELAC Institute (TNI) Standards the Lead Laboratory Technical Manager is the Laboratory Technical Manager. The deputies for the Lead Technical Manager are the Quality Assurance (QA) Officer, and the Departmental Managers. The Laboratory Technical Manager meets the requirements specified in the Section 4.1.7.2 Volume 1, Module 2 of the 2009 TNI standards. If the Laboratory Technical Manager is absent for a period of time exceeding 15 consecutive calendar days, a full-time staff member meeting the qualifications of Laboratory Technical Manager will be designated to temporarily perform this function. The primary Accrediting Body shall be notified in writing if the Technical Manager’s absence exceeds 35 consecutive calendar days.

4.3 Business Practices

Alpha maintains certification for the programs and analytes required by regulatory programs. The listing of qualifications from the various certifications, registrations and accreditation programs are available upon request. Alpha Analytical operates Monday to Friday from 7:30 a.m. to 5:30 p.m. Management prepares and posts the holiday schedule for the year indicating closed operations. Sample delivery occurs during normal operating hours unless arranged in advance.

Alpha's reputation depends upon timely reporting and quality data. The standard turnaround time for engineering and consulting firms is five business days from time of sample receipt. Standard turnaround for all other customers is ten business days from time of sample receipt. The time of sample receipt is when the verification of the chain of custody and samples meets the laboratory sample acceptance policy. Laboratory management must approve any special arrangements for rush or expedited turnaround time. The basis for data quality depends on customer, regulation and method performance criteria. Accuracy, precision, sensitivity and comparability are expressions of method performance criteria.

All work is performed in the strictest confidence. New and contract employees must review corporate policy and practice requirements for protecting customer confidentiality and proprietary rights. The review occurs during orientation and ethics training. It is the policy of the laboratory to release data to the customer authorized contact. Personnel assigned the duties of interacting with customers review project files and discuss data related only to the project. Personnel whose duties do not include routine customer contact must check with the customer service manager before discussing data with regulators or third parties

5 Quality System

Establishment, Audits, Essential Quality Controls and Data Verification

5.1 Establishment

The Mission Statement presents the policy and objectives for Alpha Analytical. The Quality Systems Manual provides the framework for the processes and operations to implement the Mission. The Quality Systems Manual and documentation controlled by the laboratory system detail the management authorized operations for achieving the objectives of the company.

The laboratory operates a quality system approach to management in order to produce data of known quality. Alpha Analytical is a full service laboratory designed to provide its customers with accurate, precise and reliable data within the best turn-around time and at the most reasonable prices. Alpha employs chemists of the highest training, ethics and caliber in the field of analytical chemistry. This and state-of-the-art instrumentation and automation combine to insure data of known and documented quality.

5.2 Quality Systems Manual

The QA Officer is responsible for the publication and distribution of the Quality Systems Manual and annual review. Management reviews and authorizes the manual. Implementation of major changes in the quality system occurs after revision of the appropriate Quality Systems Manual section and authorization by management.

The authorization of the Quality Systems Manual is documented electronically in Qualtrax. Updates of this manual occur at any time throughout the year. Document control procedures (SOP1729) apply to the distribution of the Quality Systems Manual. Controlled copies of the manual are maintained electronically within Qualtrax. Persons or organizations outside of Alpha Analytical may receive uncontrolled copies. Copies are distinctly indicated “Uncontrolled Documents” within the footer of each page.

5.3 Audits

Laboratory audits, both internal and external, review and examine the operations performed in the laboratory. Internal audits are conducted by qualified QA Specialists and external audits are reviews by external organizations to evaluate the ability of the laboratory to meet regulatory or project requirements. Internal audits are conducted on a frequency of bi-annually, method required and annually for DoD certified methods.

A QA designee schedules internal process audits to ensure the completion of the annual audit of each operational area. The process audits are a more detailed review of the operations. Personnel from areas other than the one audited perform process audits.

The internal system audit is a review of the implementation of the documented quality system. The system audit includes sample tracking from receipt to disposal, a data audit of a completed report, and all operations not audited during the process audit.

The purpose of the internal system audit is:

- Verification that adequate written instructions are available for use;
- Analytical practices performed in the laboratory are consistent with SOPs;
- The quality control practices are applied during production;
- Corrective actions are applied as necessary;

Deviations from approved protocols are occurring only with proper authorization and documentation;

Reported data is correct and acceptable for reporting;

SOPs, quality records, analytical records, electronic data files are maintained properly; and

Personnel training files and records are satisfactory and current.

Before a scheduled internal audit, the assigned auditor reviews checklists, if used, and/or the SOP specific to the area. The checklist may be from an external source or prepared by the auditor. . After the audit, the auditor submits a summary or notes from the audit to the Laboratory Technical Manager or QAO as part of the audit report. The summary identifies discrepancies found during the audit. Technical personnel are responsible for the inspection and monitoring of in-process and final data. Personnel independent of those having direct responsibility for the work performed audit the quality system and processes.

Representatives sent by customers and government or accrediting agencies often perform external audits. These audits are most often announced inspections, but sometimes are not announced. The Quality Assurance Officer, Laboratory Technical Manager or assigned deputy, and/or appropriate Department Manager accompany the external audit team through the laboratory. The auditors receive a brief overview of company objectives, activities, and facilities. Interviews with essential supervisory staff and technical staff are arranged, along with retrieval of any documentation pertinent to the audit. Auditors usually provide a report on their findings shortly after the audit. The QA Officer receives the audit report and copies are provided to laboratory personnel for review. Corrective actions are identified and distributed to responsible parties for implementation in response to any cited deficiencies.

5.4 Audit Review

Management reviews internal and external audit reports to evaluate system effectiveness at the annual management review meeting. Tracking of the audit findings occurs through the nonconformance action process. The management and staff work together to establish a time line for resolving the audit findings. The Quality Assurance team tracks the time line and reports to the Laboratory Technical Manager on any outstanding audit findings. Approved corrective actions for DoD that are not implemented or avoided may result in loss of DoD ELAP accreditation and may result in work being discontinued until implementation is verified by DOD ELAP AB.

5.5 Performance Audits

Alpha Analytical participates in inter-laboratory comparisons and proficiency test programs required by customers and certifying agencies. The performance audits provide information on the data comparability of results generated by the laboratory. Test samples received by the laboratory are handled following routine laboratory procedures. Proficiency test samples are unpacked, checked against the packing slip and examined for damage. Reporting requirements and deviations to routine practices are noted as would be required for any project.

Analysts demonstrate proficiency by analyzing either an external proficiency test sample, an internally prepared blind test sample or Initial Demonstration of Capability (IDC) before independent operation of a test method. The results of performance audits serve several purposes. The QA Officer may use performance audits for evaluating analyst proficiency, laboratory performance in a specified area to facilitate laboratory improvement efforts, and/or to provide information to an accrediting agency on correction of past performance of an external performance audit.

5.6 Corrective Actions/Preventative Actions (CAPA)

The corrective action process at Alpha Analytical is detailed in SOP 1736. The corrective action program at Alpha Analytical uses the Nonconformance workflow in Qualtrax to document and follow through the corrective action/preventative action process for three main areas: nonconformance's within the laboratory, customer complaints and failed PT studies. The process ensures continuous improvement of company performance by preventing the recurrence of quality problems.

Nonconformance reports are tracked for closure date and the type. Reports to management include the listing of open nonconformance reports and the frequency of the type of nonconformance occurring. A QA designee monitors the completeness of the forms, as well as verifies the actions are complete and acceptable.

Customers will be notified within 5 days of any question(s) regarding validity of results.

5.7 Managerial Review

The management review occurs at least once per year as part of the strategic planning process. Documentation of the management review meeting is by recording the meeting minutes and listing the attendees. The focus of the quality management review is the frequency of the type of nonconformance, closure status, audit progress and other quality assurance actions. Meetings include discussion and progress on quality system initiatives since the last meeting.

Prior to the meeting, an agenda is distributed to all personnel expected to be in attendance. The meeting is chaired by the President. Minutes are taken and distributed at the conclusion of the meeting by a QA designee. If action is necessary on any issue, a Summary Report is generated and distributed to responsible parties for implementation. Actions are monitored by the QAO or designee until completion.

5.8 Essential Quality Control Procedures

The following general quality control principles apply to all tests. The manner implemented is dependent on the type of test performed. The laboratory SOP presents the specific quality control checks undertaken to ensure precision, accuracy and sensitivity of each test method. Deviations from the existing SOP are allowed only upon approval of the deviation by the department manager and Quality Assurance Officer. This documentation must be either in form of written notice or email.

Alpha Analytical uses quality control samples to evaluate the following:

1. Adequate positive and negative controls to monitor blanks, spikes, reference toxicants, zero blanks;
2. Adequate tests to define the variability and/or reproducibility of laboratory results;
3. Measures to ensure the accuracy of the test data including sufficient calibration and/or continuing calibrations, use of certified reference materials, proficiency test samples;
4. Measures to evaluate test performance, such as detection limits and quantitation limits or range of applicability such as linearity;
5. Selection of appropriate formulae to reduce raw data to final results such as linear regression, internal standards, or statistical packages;
6. Selection and use of reagents and standards of appropriate quality;

7. Measures to assure the selectivity of the test for its intended purpose;
8. Measures to assure constant and consistent test conditions for the method such as temperature, humidity, light, or specific instrument conditions.

   Note: All quality control samples are treated in the same manner as field samples.

All quality control measures are assessed and evaluated on an on-going basis, and quality control acceptance limits are used to determine the usability of the data. Control charts and/or calculated control limits monitor the long-term method performance by analyte, by instrument for water matrices. Routine evaluation and reporting of the control chart performance provides supervisors and management with additional performance measures to ensure data comparability. Control limits are recalculated when trends are observed.

Where no reference method or regulatory criteria exist, the laboratory specifies the acceptance/rejection criteria in the SOP. The test SOP specifies the QC samples performed per batch of samples. The quality control samples are categorized into the following, as appropriate to the method

- Method Blank
- Laboratory Duplicate
- Laboratory Control Sample (LCS)
- Laboratory Control Sample Duplicate (LCSD)
- Matrix Spike (MS)
- Matrix Spike Duplicate (MSD)

Selection of samples for Duplicate, Matrix Spike (MS) & Matrix Spike Duplicate (MSD)

2. Duplicate samples
   a. Samples will be selected if identified and requested by customer
   b. If no samples are identified by the customer then random samples will be analyzed within the batch as defined by the method, program or at a minimum batch of 20 samples.

3. Matrix Spike (MS) / Matrix Spike Duplicate (MSD) samples
   a. Samples will be selected if identified and requested by customer
   b. If no samples are identified by the customer then random samples will be selected and analyzed within the batch as defined by the method, program or at a minimum batch of 20 samples.
   c. If MS/MSD is not required, LCS/LCSD may be substituted for

precision and accuracy evaluation.
All DOD projects require MS/MSD.

The frequency is dependent on the reference method and test protocol. The following is the default requirement for quality control checks in lieu of any other guidance. The frequency for each quality control sample is generally one (1) per every 20 samples.

5.9 Data Reduction

After completion of the test procedure, the data reduction process begins.

Chromatography data may require the manual integration of peak areas or heights before reporting of results. The analyst must perform manual integration when software does not properly integrate or identify the peak. Manual integration must not occur for the purpose of achieving acceptable quality control or calibration. The analyst and reviewer sign and date the hardcopy of all manual integration. The analyst notes the rationale for performing the manual integration on the hardcopy printout and ensures the "TIC" marks from the software represent the integration area used for reporting the results. The analyst must minimize and avoid manual integration. The establishment of the proper integration parameters in the software reduces the number of manual integration occurrences.

The SOP for each test presents the formulas used for the specific test method. The formulas for the data calculations used throughout the laboratory are the following:

% Recovery (LCS)

$$\frac{MV}{TV} * 100 = \%R_{LCS}$$

where: *MV* = Measured Value
TV = True Value

% Recovery (MS or MSD)

$$\frac{MV - SV}{TV} * 100 = \%R_{MS}$$

where: *MV* = Measured Value
TV = True Value
SV = Amount found in sample

Average ($\overline{X}$)

$$\sum_{i-1}^{n} X_i \Big/ n = \overline{X}$$

where: $\overline{X}$ = Average of all values
X = Result of each measurement
n = Number of values

Relative Percent Difference (% RPD)

$$\frac{R_1 - R_2}{(R_1 + R_2)/2} * 100 = \%RPD$$

where: R_1 = Larger of two observed values
R_2 = Smaller of two observed values

% Difference (%D)

$$\frac{X-\overline{X}}{\overline{X}}*100=\%D$$

where: $\overline{X}$ = Average of all values
X = Result of measurement

Standard Deviation of the sample (S_x)

$$\sqrt{\frac{\sum\left(X-\overline{X}\right)^2}{n-1}}=S_x$$

where: $\overline{X}$ = Average of all values
X = Result of each measurement
n = Number of values

Relative Standard Deviation (%RSD)

$$\frac{S_x}{\overline{X}}*100=\%RSD$$

where: $\overline{X}$ = Average of all values
Sx = Standard Deviation (n - 1)

Range of Logs (for microbiological enumeration analysis)

10% of routine samples are analyzed in duplicate and the range of logs is determined.

MDL (See 40CFR Part 136 for details)

$$\left[\sqrt{\frac{\sum_{i=1}^{n} x_i^2 - \left(\sum_{i=1}^{n} x_i\right)^2 \Big/ n}{n-1}}\right] * t_{0.99} = MDL$$

where: *MDL* = The method detection limit
X = Result of each measurement
n = Number of values
t(n-1,1 = .99) = The students' T value appropriate for a 99% confidence level and a standard deviation estimate with n-1 degrees of freedom. (See Students t Test Table)

Reporting Limit (RL)

Lowest calibration standard or greater

Control Limits

Upper Control Limit: $\overline{X} + 3 * S_x = UCL$
Lower Control Limit: $\overline{X} - 3 * S_x = LCL$

Warning Limits

Upper Warning Limit: $\overline{X} + 2 * S_x = UWL$
Lower Warning Limit: $\overline{X} - 2 * S_x = UWL$

Method of Standard Additions (MSA): (See EPA 7000A for details)

The simplest version of this technique is the single-addition method, in which two identical aliquots of the sample solution, each of volume Vx, are taken. To the first (labeled A) is added a known volume Vs of a standard analyte solution of concentration Cs. To the second aliquot (labeled B) is added the same volume Vs of the solvent. The analytical signals of A and B are measured and corrected for non-analyte signals. The unknown sample concentration Cx is calculated:

$$C_x = \frac{SB\ V_S\ C_s}{(SA - SB)\ V_X}$$

where SA and SB are the analytical signals (corrected for the blank) of solutions A and B, respectively. V_S and C_s should be chosen so that SA is roughly twice SB on the average, avoiding excess dilution of the sample. If a separation or concentration step is used, the additions are best made first and carried through the entire procedure.

Improved results can be obtained by employing a series of standard additions. To equal volumes of the sample are added a series of standard solutions containing different known quantities of the analyte, and all solutions are diluted to the same final volume.

For example, addition 1 should be prepared so that the resulting concentration is approximately 50 percent of the expected absorbance from the endogenous analyte in the sample. Additions 2 and 3 should be prepared so that the concentrations are approximately 100 and 150 percent of the expected endogenous sample absorbance.

The absorbance of each solution is determined and then plotted on the vertical axis of a graph, with the concentrations of the known standards plotted on the horizontal axis. When the resulting line is extrapolated to zero absorbance, the point of interception of the abscissa is the endogenous concentration of the analyte in the sample. The abscissa on the left of the ordinate is scaled the same as on the right side, but in the opposite direction from the ordinate. A linear regression program may be used to obtain the intercept concentration.

5.10 Document Control

The Document Control Procedure (SOP/1729) describes the process for controlled and uncontrolled documents. The use of the revision number allows for the retention of a previous document for historical information purposes.

Every document is assigned a unique identification number, which is present on each page of the document. A master list of documents includes the unique identification. Each controlled copy includes the revision number, published date and page number.

Full document control includes the status of each document: active, inactive or superseded/archived. Inactive documents are procedures not currently requested, but may be in the future. Archived documents are procedures replaced with a later revision. Authorized personnel must review and approve each document and any subsequent revisions before use in the laboratory. Personnel authorized to review and approve a document have access to all necessary information on which to base their review and approval. The history section of the document in Qualtrax includes a description of the nature of the document change.

Standard Operating Procedures (SOPs) are instructions for repetitive or standard operations performed by the laboratory. The SOP author is the person familiar with the topic. The standard format for writing SOPs is set-up as a template for administration and technical SOPs. Each SOP is peer reviewed, authorized by management, and QA before final publication and implementation. Authorized signatories for controlled documentation include one or more of the following personnel: Company President, Quality Assurance Officer, Laboratory Technical Manager, Department Manager, Department Team Leader. Personnel acknowledge approved documents as read, understood and agreed to through electronic attestation forms associated with each document as SOP Attestation Tests which reside in Qualtrax.

SOPs must receive evaluation and input by laboratory supervisors and key technical personnel. The content of each SOP must conform to applicable requirements of analytical methods and certification agencies. Within these constraints, the content of a SOP meets the needs of a particular area of the laboratory. A new or revised SOP is needed when regulatory programs update or add methods, the scope of the existing method is extended, or when activities are being performed without adequate documentation.

Updating, modifying and changing SOPs, forms and the contents of this QSM are prompt and part of the routine practices. The prompt modification of these documents ensures the documents reflect the current practices and operations of the laboratory. During annual review of a document, (including but not limited to: SOPs, Ethics Policy, Quality Systems Manual), requested changes are reviewed and the document reissued using the information and a new revision number is assigned and published in Qualtrax.

The laboratory maintains control over the possession and distribution of all documents that directly affect the quality of data. This includes, but is not limited to, documents such as the Quality Systems Manual, Standard Operating Procedures, customer instructions, Laboratory Work Instructions, data sheets, check lists and forms.

5.11 Detection Limits

Detection Limits (DLs), previously referred to as Method Detection Limits (MDLs), are determined for all analytes as specified in the Institute (TNI) Standards. DLs are determined for all new instrumentation, whenever there is a change in the test method or instrumentation that affects performance or sensitivity of the analysis. From these, detection limits, Reporting Limits (RLs), are established. The RL is the minimum concentration of an analyte that can be identified and quantified within specified limits of precision and bias during routine and analytical operating conditions.

Laboratory reporting limits lie within the calibration range, at or above the RL. For methods that require only one standard, the reporting limit is no lower than the low-level check standard, which is designed to verify the integrity of the curve at lower levels. If reporting limits are required below the lower level of the calibration curve, RL, or low-level check standard, method modifications are required. Refer to DL/LOD/LOQ SOP/1732. Note: "J" Estimated value: Upon customer request, the Target analyte concentration can be reported below the quantitation limit (RL), but above the Detection Limit (DL) with a "J" qualifier as long as there is a LOD study on file.

5.12 LOD/LOQ Studies

A. LOD (Limit of Detection) Verification

1. LOD (Limit of Detection) verification is required annually for each target analyte in which test results are to be reported below the lowest calibration standard ("J" values) for each instrument, matrix and prep procedure. LOD is required quarterly for all DOD projects.

2. All sample-processing steps of the analytical method shall be included in the determination of the LOD.

3. The validity of the LOD shall be confirmed by ***qualitative*** identification of the analyte(s) in a QC sample in each quality system matrix containing the analyte at no more than 2-3X the LOD for single analyte tests, and 2X up to 4X the LOD for multiple analyte tests. This verification must be performed on every instrument that is to be used for analysis of samples and reporting of data.

4. An LOD study is not required for any component for which spiking solutions or quality control samples are not available such as temperature. Where an LOD study is not performed, the laboratory may not report a value below the limit of quantitation.

B. LOQ (Limit of Quantitation) Verification

1. LOQ (Limit of Quantitation) verification is required annually for each target analyte that is not reported below the lowest calibration standard for each matrix and prep procedure. LOQ is not required if an annual LOD verification is performed.
2. The validity of the LOQ shall be confirmed by successful analysis of a QC sample containing the analytes of concern in each quality system matrix 1-2 times the claimed LOQ. A successful analysis is one where the recovery of each analyte is within the established test method acceptance criteria for accuracy. LOQ are required quarterly for all DOD projects.

The LOQ study is not required for any component or property for which spiking solutions or quality control samples are not commercially available or otherwise inappropriate (e.g., pH).

The LOQ acceptance criteria are based on the established acceptance criteria for Laboratory Control Samples.

Refer to DL/LOD/LOQ SOP/1732

5.13 Range of Logs – Precision of Quantitative Methods - Microbiology

A. Precision of duplicate analyses is calculated for samples examined by enumerative microbiological methods according to the following procedure:

   a. Perform duplicate analyses on first 15 positive samples.

   b. Record duplicate analyses as D1 and D2 and calculate the logarithm of each result.

   c. If either of a set of duplicate results is <1, add 1 to both values before calculating the logarithms.

   d. Calculate the range (R) for each pair of transformed duplicates as the mean of these ranges.

6 Personnel

6.1 Laboratory Management Responsibilities

Management is responsible for communicating the requirements of the quality system, customer specifications and regulatory needs to all personnel. Management job descriptions detail the responsibilities of each position.

The H.R. Director has job descriptions for all positions in the laboratory defining the level of qualifications, training, and experience and laboratory skills. During initial training, management provides access to documented operations procedures, observes personnel performance, and evaluates personnel proficiency. Management documents technical laboratory staff's proficiency initially and on a continuing basis through use of laboratory control samples and purchased proficiency evaluation standards.

Management is responsible for verification of proper sample management and all aspects of data reporting. The communication of the operating practices of the laboratory is through the document control and attestation process.

Either the Quality Assurance Officer, Operations Director and/or Technical Managers have the authority to stop work due to non-conformances and have the authority to resume work after it has been stopped.

6.2 Laboratory Staff Requirements

Recruitment is the responsibility of the Operations Manager and HR Department, with input from other personnel as required. The Training Program procedure SOP/1565 details the process for completing requirements and training to ensure personnel have adequate skills and competence for the job function. Initial training includes ethics training, Qualtrax Training, QA Basics, IT/LIMs including computer security.

A job description details the necessary requirements for each job and includes position title, minimum educational requirements, skills, responsibilities and reporting relationships and any supervisory responsibility.

Initial training of new employees and contract staff includes laboratory ethics and quality policies, signing the Employee Signature Log, as well as execution of an Ethics Agreement. Any employee found to knowingly violate the Ethics Policy Agreement, report data values, that are not actual values obtained or improperly manipulated, or intentionally report dates and times of data analyses that are not the actual dates and times of analysis, will lead to disciplinary action, including termination, as outlined in Section V.K of the Employee Handbook. Each employee must report personally or anonymously to the Laboratory Technical Manager, QA Officer and/or Ethics Team Member any accidental or suspected intentional reporting of non-authentic data by others for follow up action. The review of the laboratory ethics and ethics training occurs annually with all personnel.

(DOD) All inappropriate and prohibited laboratory practices, as detailed in the DOD WSM 5.2.7, will be reported to the appropriate accrediting body within 15 business days of discovery. Records of corrective actions or proposed will be submitted within 30 business days. Failure to notify the AB within 15 business days will result in suspension of the DOD ELAP accreditation.

The Ethics program consists of the following key components:

- Ethics Policy /Agreement (Appendix F)
- Initial and annual ethics training

- Internal audits conducted annually
- Adherence to Manual Integration SOP/1731
- Ethical or Data Integrity issues reported to Lab Managers, QAO or HR Director
- Anonymous reporting to HR Director - This is accomplished by writing a detailed description of the suspected ethics breach and submitting the information, anonymously, to the Human Resource Director.
- "No-fault" policy encouraging reporting of incidences without fear of retribution
- Electronic tracking and audit trails through LIMs and instruments enabled where available.

6.3 Training

The Quality Systems Manual and related documentation is available to all employees. Cross training, supervisory training and other related training takes place on a scheduled and as-needed basis. Training ensures the communication and understanding of all personnel in the laboratory-documented procedures and practices.

All personnel undertake orientation-training sessions upon initial employment. Orientation training includes laboratory business practices, employment specifications, Ethics Policy, Quality Systems Manual, Chemical Hygiene Plan, and all SOPs required for the job function.

Managers ensure the training for new employees and review the continuing training for current employees. Training includes on-site and off-site programs presented by staff members, contractors, equipment manufacturers, and institutions of higher learning.

Training of new personnel to any job assignment takes place on-site according to the Training Program procedure. Laboratory personnel may perform their assigned methods/protocols without supervision only after documentation of acceptable proficiency. Training records lists the current training status.

On-the-job training includes demonstration of skills during job performance, initial demonstration of proficiency, and review of SOPs. Health and Safety training takes place on an annual basis with careful introduction to new principles. Personnel have access to the Chemical Hygiene Plan and Material Safety Data Sheets. On-site training includes side-by-side hands-on training, formal classroom type instruction on the SOP or a meeting to discuss procedural changes or to address questions related to the laboratory operation. All training is documented via the Training Attestation Form, which is signed by all in attendance that they understood and will implement what was presented to them.

Training is an on-going opportunity to evaluate the laboratory operations. The updating of SOPs, Quality Systems Manual and other related information documents all changes to the quality system. Training is documented via the Training Attestation Form or in Qualtrax with training test records.

Off-site training takes place on an as-needed basis. Recommendations and suggestions regarding educational programs come from all levels of staff. It is the employee's responsibility to present a copy of any certificates or attendance information to the HR Director. The information is added to the individual's training record.

6.4 Records

The QA Department is responsible for maintaining training records. Certificates, demonstration of capability forms and other records of training are placed in the individual's training file.

Appropriate personnel are notified through email and/or Qualtrax or by the QA department when a revision is complete for the controlled version of a document. The manager of the area determines when a change is significant to require training.

Job descriptions are included in the training record files. The Human Resources Department reviews the job descriptions, Resumes and/or biosketches are kept on file with the Human Resources Department and the QA Department.

7 Physical Facilities – Accommodation and Environment

This laboratory facility has a total area of 25,000 square feet for each of the Westboro and Mansfield Facilities

The laboratory functional areas include:

- Administration and offices
- Sample receiving
- Sample management
- Air analysis (Mansfield Facility only)
- Microbiological (Westboro Facility only)
- General analytical chemistry
- Metals sample preparation (Mansfield Facility only)
- Organic sample preparation
- Metals analysis (Mansfield Facility only)
- Volatiles gas chromatography (GC)
- Volatiles gas chromatography/mass spectrometry (GC/MS)
- Volatiles air analysis (Mansfield Facility only)
- Semivolatiles gas chromatography/mass spectrometry (GC/MS)
- Semivolatiles gas chromatography (GC)
- Miscellaneous facility mechanical and storage areas.

All chemicals are stored in appropriate cabinets and properly disposed of as required. All flammable solvents are stored in OSHA and NFPA approved cabinets. Acids are stored in OSHA acid cabinets. Separate waste areas houses the sample and chemical waste before pickup by a licensed waste hauler.

7.1 Environment

Lighting, noise, humidity, heating, ventilation and air conditioning satisfy the needs of the testing performed on the premises. The laboratory building design ensures regulated temperature control for analytical equipment. Air-handling systems minimize airborne contaminants that may jeopardize sample integrity or analytical performance.

The analytical instrumentation is in separate rooms from laboratory activities that involve the use of large quantities of organic solvents or inorganic acids. A separate room, in the Westboro facility, provides the facilities for the microbiological testing.

Standards and other materials requiring below 0°C storage temperatures are placed in freezers and separated from samples or potential contaminating materials. Refrigerators provide cooling needs for samples and materials with temperature requirements of below room temperature and greater than freezing. Sample and standard storage areas are monitored and controlled for temperature and recorded in the data logger system. Sample storage areas for volatiles are separated from other samples and monitored for any effects due to cross contamination.

Bulk hazardous waste containers are located away from the testing activities. Waste disposal uses lab pack procedures and those designated by the regulatory authorities. The Chemical Hygiene Plan and the Waste Management and Disposal SOPs (Westboro: SOP/1728 and Mansfield SOP/1797)) include the procedures for handling and disposing of chemicals used in the laboratory.

The working and storage environments are maintained in a safe and appropriate manner. A Chemical Hygiene Plan details the requirements for safety and chemical handling. Safety measures that protect property and personnel from injury or illness include: fume hoods, fire extinguishers, fire blankets, alarm systems, safety training, protective clothing, emergency showers, eyewashes, and spill control kits.

7.2 Work Areas

Good housekeeping is the responsibility of all personnel. Each person is responsible for assuring clean and uncluttered work areas. The job descriptions list specific housekeeping duties. Records, samples and waste materials are the common cause for clutter in the laboratory.

. Removal of administration and laboratory records to the record storage area occurs to reduce clutter and ensure traceability. The individual filling the laboratory record box, labels the box with a number, the contents, date and laboratory area. Authorized personnel assign and record into a permanent record the box number, discard date and box contents. Authorized personnel review the box label for number, discard date and contents. Boxes are stored onsite and off-site for the record retention period identified in the NELAC Institute (TNI) Standards and EPA regulations, whichever is more stringent.

Sample management personnel remove samples to the sample storage area after all data is correct and complete. Sample coolers are removed to a designated storage area for recycling. Samples are stored in the designated process storage areas until testing is complete. Sample removal from the process storage occurs after mailing of the final report. The sample management staff places the samples in the archive storage area for thirty days after report release. The archive sample storage area is not controlled or monitored. Based on customer specifications, samples are properly disposed or returned to the customer.

Waste materials, expired reagents, expired standards and materials are disposed of and not stored in the laboratory. Hazardous waste labeled accumulation containers in the laboratory collect designated waste streams for later bulk disposal. Laboratory personnel remove the less than five-gallon accumulation containers when full from the laboratory and place the containers in the bulk hazardous waste area. Refer to the Waste Management and Disposal SOPS for Westboro: SOP/1728 and Mansfield SOP/1797. Personnel identifying out of date reagents and standards remove the materials to the proper disposal area.

7.3 Security

Alpha Analytical provides a secure environment for our employees, guests, customers, samples and analytical data. Security procedures require that all exterior doors remain locked unless manned. Access to the laboratory is limited to employees and contractors. Visitors not under signed contract are required to sign the Visitors Log and must be accompanied by a laboratory employee at all times within the testing areas.

The defined high security area is the sample management area. Identification card locks on the internal doors control entry into the laboratory area.

All doors are locked after hours and require a key for entry. The security alarm continuously monitors for smoke and fire related heat. When the alarm is activated, the appropriate emergency response officers are notified. The local emergency offices have the emergency contact list for the laboratory.

8 Equipment and Reference Materials

8.1 Maintenance

The laboratory has a proactive equipment maintenance program. The laboratory maintains service contracts for most major equipment, which include routine preventative maintenance visits by the service provider. Technical personnel perform manufacturer's specified maintenance on a routine basis to ensure equipment operates at peak performance.

A brief summary of some common preventive maintenance procedures is provided in Appendix D. All instrument preventative and corrective maintenance is recorded in the maintenance logbook assigned to the equipment. After maintenance or repair, the instrument must successfully calibrate following the method SOP. Laboratory personnel must demonstrate quality control performance before sample analysis.

The laboratory maintains a stock of spare parts and consumables for analytical equipment. Backup instrumentation for some analytical equipment is available on site for use in case of major equipment failure. The person discovering or suspecting an equipment maintenance problem or failure tags the equipment with 'out of service' tag. If routine maintenance measures do not eliminate the problem, the Laboratory Technical Manager or Operations Director is notified and the appropriate equipment service provider is contacted.

All major laboratory equipment has individual and traceable maintenance logbooks in which to document manufacturer's recommended maintenance procedures, specific cleaning procedures, comments on calibration, replacement of small worn or damaged parts, and any work by outside contractors. The person performing routine or non-routine maintenance signs and dates the maintenance logbook. If an instrument is down for maintenance, a complete record of all steps taken to put it back into service is recorded including reference to the new calibration and quality control checks. Any equipment service providers working on the equipment are recorded in the logbook.

Record repetitive or on-going equipment problems other than normal maintenance requirements on nonconformance action forms. The nonconformance action form notifies management and the Quality Assurance Officer of a problem affecting the performance and data quality.

The laboratory groups some equipment into a single laboratory equipment maintenance logbook. Examples include: autopipets, thermometer calibration. The identity of each item is by serial number or a laboratory-designated item number. The same data recorded for major equipment applies to this documentation.

The maintenance records shall include:

- Equipment name;
- Manufacturer's name, type identification, serial number or other unique identification;
- Date received, date put into service, condition when received;
- Current location;
- Details of past maintenance and future schedule;
- A history of any damage, malfunction, modification or repair;
- Dates and results of calibration or verification.

The maintenance logbook may include the reference to the location of the equipment operational and maintenance manuals. The logbook may include the reference to laboratory run logbook or data files for the calibration and quality checks of daily or frequent calibrations.

The Courier Supervisor ensures that maintenance and records for transportation vehicles are complete. The purchasing process is used for ordering garage maintenance, the garage work order is reviewed, and the vehicle checked for condition. The Controller receives all paperwork for completion of the maintenance process.

8.1.1 Microbiology General Equipment Maintenance

Optics of the Quebec colony counter and microscope are cleaned prior to each use. The stage of the microscope is also cleaned and the microscope is kept covered when not in use.

Glassware is checked for residual alkaline or acid residue utilizing bromothymol blue (BTB) on each day of media preparation.

8.2 Equipment Listing

A listing of the major equipment used for testing is available upon request. The equipment list details the unique identification number, equipment location, serial number, model number, and purchase date. The unique identification number is attached to the piece of equipment.

The laboratory performs analyses using state of the art equipment. In addition to the major equipment, the most common equipment used in the laboratory are: thermometers, balances, autopipets, water baths, hot plates, autoclaves, pH meters, conductivity meters and a variety of labware. The SOPs list the calibration and verification requirements for all laboratory equipment used in measurements.

8.3 Laboratory Water

Laboratory water is purified from central DI and RO water systems and piped to all laboratory areas. The QA Department samples the laboratory grade water and submits the samples for analysis by the lab to document the water meets the drinking water certification criteria. The Laboratory Water Logbook lists the daily conductivity checks and acceptance criteria for the laboratory water. The laboratory documents the daily, monthly and annual water quality checks. Please refer to Table 8-1 for tested parameters, monitoring frequency and control limits for each parameter (SOP/1738). Additional parameters may be tested for at the laboratory's discretion.

When additional treatment occurs in the test area, that test area records the water quality checks from the most frequently used tap. At a minimum the quality of the laboratory grade water is monitored daily by conductivity measurements. Records of the daily checks are found in the Laboratory Water Logbook. If out of specification results occur, a nonconformance action form is submitted.

TABLE 8-1

Parameter	Monitoring Frequency	Control Limits
Conductivity	Daily	<2 µmhos/cm @ 25°C
pH	Daily	5.5 - 7.5
Total Organic Carbon (Westboro only)	Monthly	< 1.0 mg/L
Total Residual Chlorine	Monthly	< detection limit
Ammonia Nitrogen (Westboro only)	Monthly	< 0.1 mg/L
Metals: Cd, Cr, Cu, Pb, Ni and Zn (Mansfield only)	Monthly (Required Annually)	< 0.05 mg/L
Total Metals (Mansfield only)	Monthly (Required Annually)	< 0.1 mg/L

Heterotrophic Plate Count (Westboro only)	Monthly	< 500 CFU/mL
Water Quality Test (Biosuitability) (Westboro only)	Annually	0.8 – 3.0 ratio

8.4 Reference Materials

Reference materials include: Class 1 weights, NIST thermometers and reference standards. Logbooks record the reference materials used for calibration and verification. The Department Manager or QA Department maintains any certificates received with the reference materials. Laboratory personnel record in the standards logbook the reference standards date received, unique identification number, expiration date and number of containers. Each laboratory area records the unique identifier on the reference standard certificate and the Department Manager maintains the certificate. The identifier allows traceability from the certificate to the analytical data.

9 Measurement Traceability and Calibration

9.1 General Requirements

All measuring operations and testing equipment having an effect on the accuracy or validity of tests are calibrated and/or verified before put into service and on a continuing basis. The results are recorded in the instrument specific logbook. The laboratory has a program for the calibration and verification of its measuring and test equipment. The program includes all major equipment and minor equipment such as balances, thermometers and control standards. The Quality Systems Manual and method SOP describe the calibration records, frequency and personnel responsibilities.

9.2 Traceability of Calibration

The program of calibration and/or verification and validation of equipment is such that measurements are traceable to national standards, where available. Calibration certificates indicate the traceability to national standards, provide the results, and associated uncertainty of measurement and/or a statement of compliance with identified metrological specifications. A body that provides traceability to a national standard calibrates reference standards. The laboratory maintains a permanent file of all such certifications.

9.3 Reference Standards and Materials

Alpha Analytical has a program for calibration and verification of reference standards. The results and program are recorded in the appropriate instrument logbook. Required in-service checks between calibrations and verifications are described in method SOPs and are recorded in the appropriate instrument logbook.

Calibration standards are maintained within the area of consumption. A logbook of use is maintained and use is limited strictly to method required calibrations. Each calibration standard is identified as to test method used, date received, date opened, and expiration date. Calibrations are verified by using a second source or lot number of the calibration standard. Calibration check procedures are stated in applicable test method SOPs.

Preparation of standards must be performed using Class A glassware. Class A glassware must be used for all processes involving quantitative analyses.

Reference standards of measurement in the laboratory's possession (such as calibration weights or traceable thermometers) are used for calibration only and for no other purpose.

Standards and reagents are uniquely identified as outlined in Westboro SOP 1745 and Mansfield SOP 1816.

9.4 Calibration General Requirements

Each calibration record is dated and labeled with method, instrument, analysis date, analyst(s) and each analyte name, concentration and response. For electronic processing systems that compute the calibration curve, the equation for the curve and the correlation coefficient are recorded in the appropriate instrument logbook. This is also true for manually prepared curves. Calibrations are tagged to the specific instrument through use of the instrument logbook and or sequence file documentation.

Initial calibration requires a standard curve that brackets the expected sample concentration. Initial calibration generally uses three to five standards depending on the equipment and reference method specifications. Before the start of each analytical sequence, initial calibration is verified by using a continuing calibration standard. Calibration verification or continuing calibration uses the same standard as the ICAL unless method specifies otherwise. The ICV is from a second source or lot number than that used for initial calibration. The acceptance criteria for the continuing calibration standard must meet acceptance criteria before analysis of any samples. When the acceptance criteria is not within limits, review maintenance protocols and perform any necessary maintenance before starting the initial calibration sequence.

9.5 Equipment Calibration

The SOP used for the analysis defines the instrument and equipment calibration required. The following defines the general practices for equipment calibration of selected equipment.

9.5.1 Gas Chromatography/Mass Spectrometry (GC/MS)

The GC/MS is hardware tuned before performing the initial and continuing calibrations. Results must meet the peak ratio specifications of the analytical methods. For volatiles analyses, bromofluorobenzene (BFB) is used, and for semivolatiles analyses, decafluorotriphenylphosphine (DFTPP) is used for instrument tuning.

The mass spectrometer response is calibrated by analyzing a set of five or more initial calibration solutions, as appropriate, for each GC/MS method. Each solution is analyzed once, unless the method or the customer requires multiple analyses. The relative response factor for each analyte is calculated for internal standard calibration. The calibration factor for external standard calibration is calculated using the expressions found in the laboratory method SOP. Calibration is acceptable when all acceptance criteria are within method criteria.

The initial calibration is verified through the analysis of a continuing calibration standard every 12 hours. The concentration of the continuing calibration standard is dependent on the requirements of the specific method. The relative response factors for all analytes of interest are calculated and verified against the initial calibration mean relative response factors. The percent difference (%D) for each analyte is calculated and must be less than the acceptance criteria stated in the method.

An acceptable continuing calibration run must have measured percent differences for the analytes within method specified ranges. If any criteria for an acceptable calibration are not met, either instrument maintenance must be performed until the continuing calibration analysis meets all criteria or a new initial calibration is established before any samples are analyzed. No samples may be analyzed unless the acceptance criteria are met for the initial and continuing calibration.

Additional quality control samples are part of the GC/MS analysis. These include internal standards, surrogates, method blanks, instrument blanks, laboratory control samples, matrix spikes and matrix spike duplicates. The frequency and control criteria are defined in the laboratory SOP.

9.5.2 Gas Chromatography (GC)

Internal standard calibration or external standard calibration is utilized for analysis by GC. The method-specified number of calibration standards is used. Each solution is analyzed once and the analyte relative response factors or calibration factors are calculated. The mean relative response factor for each analyte is then obtained by using the expression in the formula listed in the SOP. Integrated areas are utilized for these expressions.

For multiple response pesticides, PCBs or hydrocarbons the quantitation consists of the average of selected peaks or the integration of the area defined by a reference standard. The SOP details the integration criteria for each compound.

The initial calibration is verified through the analysis of a continuing calibration standard every 12 hours or 20 samples. The concentration of the continuing calibration standard is dependent on the requirements of the specific method. The relative response factors for all analytes of interest are calculated and verified against the initial calibration mean relative response factors. The percent difference (%D) for each analyte is calculated. The percent drift (%d) may be calculated when calibration factors are used for quantitation.

An acceptable continuing calibration must have measured percent differences or percent drift for the analytes within method specified ranges. Should any criteria for an acceptable calibration not be met, either instrument maintenance is performed until the continuing calibration analysis meets all criteria, or a new calibration is established before any samples are analyzed. No samples may be analyzed unless the acceptance criteria are met for the initial and continuing calibration.

Other standard checks may be required for a specified reference method. Instrument performance checks specified in the reference method must be performed and be within the acceptance limits stated in the reference method. Additional quality control samples are part of the GC analysis. These include internal standards, surrogates, method blanks, instrument blanks, laboratory control samples, matrix spikes and matrix spike duplicates. The frequency and control criteria are defined in the laboratory SOP.

9.5.3 Cold Vapor Atomic Absorption Spectrophotometry (CVAA)

An initial calibration is performed daily with freshly prepared working standards that bracket the expected concentration range of the sample. A minimum of a three-point calibration curve is acquired which must have a correlation coefficient of 0.995 or better. The initial calibration is verified every 10 samples. The continuing calibration is required to be within method-defined criteria, depending on the analytical method employed. Continuing calibration blanks are run at the same frequency. Analysis of samples cannot begin until an initial calibration verification has been performed and is found to be within ± 10% of the true value.

9.5.4 Inductively Coupled Plasma Emission Spectrophotometry-Mass Spectrometry (ICP-MS)

Initial calibration and instrument tune is performed daily, not to exceed 24 hours, and continuing calibrations are performed every 10 samples. Initial calibration consists of a minimum of three standards and a Blank that bracket the expected concentration range of the samples. Analysis of samples cannot begin until an initial calibration verification has been performed and is found to be within method-defined criteria. The continuing calibration is required to be within method-defined criteria. Interference check standards are performed at the beginning of the sequence. Acceptance criteria are stated in the SOP.

9.5.5 Inductively Coupled Plasma Emission Spectrophotometry (ICP)

Initial calibration is performed daily, not to exceed 24 hours, and continuing calibrations are performed every 10 samples. Initial calibration consists of one standard and a Blank that bracket the expected concentration range of the samples. Analysis of samples cannot begin until an initial calibration verification has been performed and is found to be within 5% of the true value for EPA Method 200.7 and 10% for SW846 6010 methods. The continuing calibration is required to be within 10% of the true value. Interference check standards are performed at the beginning and end of the sequence. Acceptance criteria are stated in the SOP.

9.5.6 Thermometers

Laboratory thermometers are checked annually for accuracy against certified, NIST traceable thermometers. Correction factors derived from the annual calibrations are applied to temperature readings where applicable. The analyst records the corrected temperature for all observations.

NIST traceable thermometers are calibrated professionally and re-certified every year. Records of thermometer calibrations are retained by the QA Department. All thermometers are tagged with the ID number, correction factor to be applied and the expiration of the calibration check.

NOTE: Electronic-based thermometers are calibrated on an annual basis. Thermometers are tagged with calibration information by the vendor, including the ID number, correction factor to be applied and the expiration of the calibration check. Certificates are kept on file in the QA Department.

Thermometers are not used past the calibration expiration date or if the thermometer is not reading properly. Replacement thermometers are calibrated and the maintenance logbook is updated when a change in the thermometer is required due to breakage, damage or expired calibration.

9.5.7 Balances

Calibration checks are performed for each day of use, for each balance. The calibration consists of a minimum of two weights, which bracket the weight to be measured. Additional calibration check procedures are performed on balances utilized in Microbiology laboratory. This additional procedure consists of a deflection test, which is performed to ensure that 100mg is detectable at a weight of 150 grams.

The balance logbook lists the acceptance criteria and performance criteria for the various balances used in the laboratory. Calibration weight measurements must meet the acceptance criteria listed on the record form.

Each balance is serviced and calibrated by a professional semi-annually. Balances are labeled with the balance number, date of service and the expiration date for the annual service check. The balance number used for any measurements requiring traceability is recorded with measurement data. Balances are not used past the expiration date or when the weight check is not within acceptable criteria. The accuracy of the calibration weights used by Alpha Analytical is verified annually by an accredited calibration service.

9.5.8 Mechanical volumetric pipettes

Delivery volumes for the mechanical volumetric pipettes (i.e. Eppendorf) are checked and recorded gravimetrically before use and on a quarterly basis. The verification is performed at the volume of use or bracketing the volume range of use. The check must be within the criteria stated in the laboratory logbook. Pipettes failing acceptance criteria are tagged and removed from service until repaired and the criteria are met, or discarded and replaced. Automatic pipettes are labeled with a unique ID number, volumes verified and expiration date.

9.5.9 Ion Chromatography

The ion chromatograph calibration is by analyzing a set of five or more initial calibration solutions, with concentrations of analytes appropriate to the analytical methods. The concentrations must bracket the expected concentration range of the samples analyzed. Procedures for verifying the calibration curve are method specific. The initial calibration is performed at the start of each day. The calibration curve is verified at least after every 20 samples.

9.5.10 pH Meters

pH meters are calibrated prior to use for each day of use. The meter is calibrated following the procedure for pH analysis. The records of the calibration are recorded in an instrument logbook or in the raw data for the analysis being performed. At least two buffer solutions that bracket the measurement range for the analysis are used for calibration. A second source check standard is used at the end of a run to verify meter stability. Buffer solutions used for calibration are NIST certified. Standard buffer solutions are not retained or re-used. The lot number of the buffer solutions is recorded in the data record to ensure traceability of the measurement to NIST.

9.5.11 Conductivity Meters

Three calibration standards of potassium chloride (KCL) solutions are analyzed annually on each instrument range. The calibration standards are used to verify instrument performance. The acceptance criteria are defined in the test SOP. If unacceptable performance is found, the cell is cleaned and rechecked. The cell is not used until satisfactory performance is achieved.

A single KCL standard solution is used to calibrate each range of the instrument. A second standard is used to check the calibration each day the meter is used. The check standard is near the measurement range for the samples to be analyzed. The acceptance criterion is ± 20% of the true value. The meter is labeled with expiration date for the annual calibration. A check standard that is NIST traceable is used to allow traceability. The check standard is performed at the end of the analysis run or at least after every 20 samples.

9.5.12 Autoclave

The date, contents, sterilization time and temperature, total cycle time and analyst's initials are recorded each time the autoclave is used. Autoclave cycles must be completed within 45 minutes when a 15 minute sterilization time is used. Autoclave timing mechanisms are checked quarterly with a stopwatch to verify timing controls. A maximum temperature thermometer is used with each cycle to ensure the sterilization temperature is reached.

Spore strips or ampoules are used weekly to confirm sterilization. BTSure ampoules are utilized as follows: An indicator ampoule is placed in most challenging area of sterilizer. Load is processed according to standard operating instructions. Remove from sterilizer and allow to cool for a minimum of 10 minutes. (Chemical indicator on label changes from green to black when processed.) Place the autoclaved indicator and un-autoclaved control indicator in an upright position in the plastic crusher provided. Gently squeeze crusher to break glass ampoules. Incubate both indicators at 55-60^{o}C for 24 hours. Examine appearance for color change. Yellow color indicates bacterial growth. No color change indicates adequate sterilization.

Calibration is conducted and certified annually by an outside service provider and recorded. Certificates are kept on file. Routine maintenance includes cleaning the autoclave seal to ensure freedom of caramelized media and cleaning drain screens to remove any debris buildup. For the efficient operation of the unit, overcrowding is avoided.

10 Test Methods and Standard Operating Procedures

10.1 Methods Documentation

Analysis consists of setting up proper instrument operating conditions, executing acceptable calibrations, monitoring instrument performance tests, analyzing prepared samples, and collecting data from the analyses. The test method SOP describes the instrumental analysis procedures, quality control frequencies and acceptance criteria. EPA accepted methods, national recognized methods or customer-specified methods are the basis for performance criteria, instrument conditions and the steps of the procedure. The method performance requirements of the published methods are followed unless otherwise specified by the customer.

The reference methods define the instrument operating conditions. In many of the reference methods, a range or general guidance on the operating conditions is defined. Documented modifications to the operating conditions clarify the reference methods or improve the quality of the results. In all cases where the method modifications are adopted, the performance criteria from the reference method must be met. Modifications to the operating conditions are stated in the SOP. Changes in the operating conditions made at the time of the analysis are documented in the appropriate laboratory or sequence log. A revision to the SOP takes place, when a day to day change in the operating condition improves performance for all matrices.

The laboratory SOPs include the operation of measurement equipment. The SOPs contain the - following information, as applicable:

- The equipment used in the procedure, including equipment type
- Equipment calibration and process for obtaining the measurement from the calibration
- The step by step instructions to perform the measurement
- Acceptance criteria for the calibrations
- Corrective action for failed acceptance criteria, including assessment of previous calibration results
- The basis used for the calibration standards such as traceability to NIST or EPA or demonstration of comparability
- Frequency at which the equipment will be calibrated, adjusted and checked
- The records maintained to document the calibration and use of measurement equipment
- The calibration status for the equipment
- The environmental conditions necessary before measurement equipment may be calibrated or used for measurement
- Allowed adjustments to measurement equipment, including software, which will not invalidate the laboratory analysis
- Maintenance of the equipment and record keeping to track performance before and after maintenance is completed
- Define the standards, reagents and sample handling, interferences, preservation, and storage in order to assure measurement performance

10.2 Standard Operating Procedures (SOPs)

Alpha Analytical maintains SOPs that accurately reflect all phases of current laboratory activities such as assessing data integrity, nonconformance actions, handling customer complaints, sample receipt and storage, purchasing of all materials, and all test methods. These documents include equipment manuals provided by the manufacturer, internally written documents, and published methods with documented changes or modifications.

Copies of all SOPs are accessible to all personnel in electronic form through Qualtrax. Each SOP clearly indicates the published date of the document and the revision number.

10.3 Laboratory Method Manual (s)

All SOPs are posted as secure documents in the Alpha Qualtrax system. Directories are available for each laboratory area and administrative area in appropriate subfolders. Each SOP includes or references where applicable:

1) identification of the test method and where applicable;
2) applicable matrix or matrices;
3) method detection limit;
4) scope and application;
5) summary of method;
6) definitions;
7) interferences;
8) safety;
9) equipment and supplies
10) reagents and standards
11) sample collection, preservation, shipment and storage;
12) quality control;
13) calibration and standardization;
14) procedure;
15) calculations;
16) method performance;
17) pollution prevention;
18) data assessment and acceptance criteria for quality control measurements;
19) corrective actions for out-of-control data;
20) contingencies for handling out-of-control or unacceptable data;
21) waste management;
22) references; and
23) any tables, diagrams, flowcharts and validation data.

In cases where modifications to the published method have been made by the laboratory or where the referenced method is ambiguous or provides insufficient detail, these changes or clarifications are clearly described in the SOP.

10.4 Test Methods

The laboratory uses appropriate methods and procedures for all tests and related activities within its responsibility (including sampling, handling, transport and storage, preparation of items, estimation of uncertainty of measurement and analysis of test data). The method and procedures are consistent with the accuracy required, and with any standard specification relevant to the calibrations or tests concerned. When the use of mandated methods for a sample matrix is required, only those methods are used. Where methods are employed that are not required, the methods are fully documented and validated and are available to the customer and other recipients of the relevant reports.

The customer requests the reference method for sample analysis usually based on the regulatory program. The customer services staff may assist the customer with method selection when the customer specifies the regulatory program, but is unsure of the correct method required. The Laboratory Technical Manager or Quality Assurance Officer recommends methods for non-regulatory programs. In all cases, recommendation of methods is based on customer-defined method performance criteria. Customer services may recommend a procedure that meets the customer method performance criteria.

10.5 Method Validation/Initial Demonstration of Method Performance

Before acceptance and use of any method, satisfactory initial demonstration of method performance is required. In all cases, appropriate forms are completed and retained by the laboratory and made available upon request. All associated supporting data necessary to reproduce the analytical results is retained. Initial demonstration of method performance is completed each time there is a significant change in instrument type, personnel or method.

10.6 Sample Aliquots

The aliquot sampling process from a submitted sample is part of a test method. The laboratory uses documented and appropriate procedures and techniques to obtain representative sub-samples. Sample aliquots removed for analysis are homogenized and representative portions removed from the sample container. Personnel record observations made during aliquot sampling in the test method logbooks.

10.7 Data Verification

Calculations and data transfers are subject to appropriate checks which is a 3 tier approach. The initial analyst verifies all of his work, a secondary review of 100% of the initial is conducted by a an independent qualified analyst. A Customer Services representative reviews data for project and method performance requirements where applicable. A QA representative reviews data for project and method performance requirements when requested by a Customer. Final report review is performed by an authorized company signatory.

For drinking water suppliers, every effort is made to notify the Customer within 24-hours of obtaining valid data of any results that exceed any established maximum contaminant level or reportable concentration. Analyst or Department Supervisor notifies the Customer Services Department of the sample number(s), Customer name, analysis and sample results (preliminary or confirmed). The Customer Services Department notifies the customer.

The laboratory Report Generation and Approval SOP describes the practices to ensure that the reported data is free of transcription errors and calculation errors. Manually entered data into the LIMS is dual entered and checked by the LIMS to minimize transcription errors. The laboratory test method SOP describes the quality control measures used to assure method performance before reporting data.

10.8 Labeling of Standards and Reagents

The purchase, receipt and storage of consumable materials used for the technical operations of the laboratory include the following:

a) The laboratory retains records of manufacturer's statement of purity, of the origin, purity and traceability of all chemical and physical standards.
b) Original reagent containers are labeled with the date opened and the expiration date.
c) Detailed records are maintained on reagent and standards preparation. These records indicate traceability to purchased stocks or neat compounds and include the date of preparation and preparer's initials.

d) Where calibrations do not include the generation of a calibration curve, records show the calibration date and type of calibration standard used.

e) All prepared reagents and standards are uniquely identified and the contents are clearly identified with preparation date, concentration and preparer's initials. These procedures are outlined in Westboro SOP/1745 and Mansfield SOP/1816.

10.9 Computers and Electronic Data Related Requirements

Computers or automated equipment are used for the capture, processing, manipulation, recording, reporting, storage or retrieval of test data. The laboratory ensures that computer software is documented and adequate. The goals of the software development methodology, existing system validations and the change control system are to ensure that:

the software systems perform the required functions accurately,

the users understand how to use the system, and

auditors can assure themselves of the validity of the analytical data.

The computer systems used at Alpha Analytical are purchased. A coordinated effort is made with the supplier to assure the computer operations meet the laboratory requirements for data integrity. Alpha Analytical has a formal validation program of its computer systems. The validation program is a comprehensive program to ensure data transmitted, reported or manipulated by electronic means is correct and free of errors. The validation and verification approach is separated into three areas.

1. New software is developed and validated using test data. Records of validation include the test data report, date and initials. Where formulas are part of the program, documentation includes manual verification of the final calculated values. New software includes the development of macros for spreadsheets and other tools using commercial software packages.

2. Reasons for changes to software are identified through flaws in existing documentation or the need to improve system processes and are documented on the Nonconformance Report. Final implementation of the change is documented on the nonconformance action form. The tracking and timelines of making the change is readily available. This process also provides the complete documentation of all software and electronic data reporting problems. All nonconformance identified with electronic data process result in corrective action that are reported to management before or at the bi-weekly executive meeting. Customers will be notified prior to any changes to software or hardware that will adversely affect customer electronic data. This information is provided by IT department to QA and Project Managers to be communicated to appropriate customers.

Verification of system integrity is through routine maintenance, protection from unauthorized access and electronic verification programs. Routine maintenance including system backups are performed on a scheduled basis. The backup process and password and access protections are defined in the Computer System Backup Control SOP/1562 and Computer Security SOP/1563. Electronic verification may be used to assure the commercially purchased software is performing at its original specifications. This includes virus checking of all network operation at least once per week. Documentation of all verification and maintenance operations is retained.

11 Sample Handling, Sample Acceptance Policy and Sample Receipt

The Sample Login and Custody procedures define the process for sample management from sample receipt through analysis and to disposal. These procedures detail the process for sample receipt, records and storage pending analysis.

Customers or Alpha's Couriers deliver samples to the laboratory during normal business hours. Sample receiving occurs in the sample management area.

Customer service personnel place bottle orders. The orders are filled following the bottle order instruction form. Blanks are prepared as needed with minimal storage. All glass containers are packed to minimize or prevent breakage. The containers are placed in plastic coolers or shipping packages and Chain-of Custody forms, seals (if requested) and labels enclosed. The bottle order is shipped by third party, picked up by the customer or customer representative or delivered by Alpha courier to the customer.

11.1 Sampling Supplies

11.1.1 Sample Containers

Sample containers provided by Alpha Analytical include labels, preservatives and a blank chain of custody form. Preservatives and containers are lot controlled and verified as appropriate for the indicated type of analysis.

Each lot of containers used for the collection of samples for microbiological analysis is checked for sterility prior to distribution. Sterility checks are performed by Microbiology staff and results recorded in Microbiology Sample Container Sterility Log.

Sample Containers for collecting Air samples (TO-15) are cleaned and prepared according to SOP 2190 "Cleaning and Preparation Procedures for Equipment used to collect Air sample for analytis of Volatile Organic Compounds".

11.1.2 Chain of Custody

Chain of custody forms must accompany all samples received by Alpha personnel. The chain of custody form indicates the sample origin and arrival at the laboratory and identifies the analyses requested.

11.1.3 Reagent Water

Alpha Analytical supplies laboratory pure water for field QC blanks. Water used for volatile organics must be free of volatile compounds below the method detection limit. The quality of the laboratory water is monitored for conductivity once per day. Additional water quality criteria may be monitored based on customer specific requests. The water quality in the laboratory is monitored for chemical parameters as required by the EPA certification manual for drinking water (Water Quality Monitoring SOP/1738).

11.2 Sample Tracking

Alpha Analytical uses an internal chain-of-custody in LIMs for sample tracking control purposes. When requested or required by regulation a legal custody program is used in addition to the routine laboratory practices. Legal custody practices must be arranged at the time of contractual commitment.

For legal custody the process must include complete and continuous records of the physical possession, storage, and disposal of sample containers, collected samples, sample aliquots, and sample extracts or digestates. For legal custody a sample is in someone's custody if:

1. It is in one's actual physical possession;
2. It is in one's view, after being in one's physical possession;
3. It is in one's physical possession and then locked up so that no one can tamper with it;
4. It is kept in a secured area, restricted to authorized personnel only.

The routine sample handling and tracking process includes unique identification of all sample containers, initials of the person removing the sample from the sample management area and documentation of the date of sample removal for disposal.

Samples are assigned a unique identification number from the LIMS program. Each sample container label includes a unique identifier for the container. The person handling the sample is recorded along with the unique identifier in the container tracking records in LIMS.

ALPHA ANALYTICAL utilizes a custom designed Laboratory Information Management System (LIMS) to uniquely identify and track samples and analytical data throughout the facility. The LIMS log-in, is initiated by the Sample Custodian when the following information is entered into the computer:

- Quote number (unique to the project if requested)
- Project name or description
- Analyses requested (per matrices received)
- Sample number (unique to this sample)
- Sample descriptions (customer ID, including number of received containers)
- Date received
- Date(s) and time(s) collected
- Date analytical results are due

11.2.1 Chain of Custody

Chain of custody forms must accompany all samples received by Alpha personnel. The chain of custody form indicates the sample origin and arrival at the laboratory and identifies the analyses requested.

- Customer's name and address
- Notation of special handling instructions
- Additional comments or instruction for the laboratory
- Purchase order number(s), if applicable

Alpha Job Numbers (Process for assigning numbers)

Alpha Job Numbers are unique #'s automatically designated by our LIMS computer system for every individual customer project.

There are 3 parts to this number:

- All numbers start with the letter "L"
- The next two numbers are the last two numbers of the current year.
- The last five numbers are pulled sequentially by the LIMS as each Login personnel requests a new number for a job.

  For example…. L0904165 ---- Year 2009 and 4,165th job to be logged in this year.

  The Alpha Job Number then may contain as many extensions as there are individual samples in a job. L0904165-01 is the first sample, L0904165-02 is the second and so on. Each sample may contain as many as 26 containers as the containers are designated with the letters of the Alphabet, and each container receives its own bar-coded label. For example, L0904165-09A is the first container of the 9th sample listed on a customer's Chain of Custody.

Each container is labeled with a unique identifier, a label with a unique identifier number is placed on each sample container. Once labeled, the sample containers are placed in the appropriate storage area.

11.3 Sample Acceptance Policy

The sample management personnel check for proper sample labeling, preservation and handling at the time of arrival at the laboratory. The customer and customer services manager specifies the proper sample preservation, containers, cooling and other criteria on the project review form and in the LIMS. Sample management staff record all observations and immediate notify customer services of any discrepancies or questions arising during sample receipt.

It is possible for samples or sample containers to be lost, damaged, or determined to be unsuitable, for whatever reason, after initial receipt at Alpha Analytical. The problem is brought to the attention of a customer services manager who reports it to the customer. Plans for disposition of the affected samples or container are agreed upon with the customer, carried out, and recorded in the project records. Sample hold times and preservations are listed on the Alpha website (www.alphalab.com) under Support Services "Sampling Reference Guide".

11.4 Sample Receipt Protocols

The sample management staff receives all samples. A unique job number is assigned to each shipment of samples received from a customer. The in-house records for the incoming job, including the internal Chain-of -Custody, are initiated with a Sample Delivery Group (SDG) form. The customer, and Alpha courier and/or the sample management personnel sign the sample custody form at the time of receipt at the laboratory. Samples received via overnight courier are signed on the bill of lading. The bill of lading, SDG form and the sample custody form are completed for external courier delivered samples.

The sample management staff examines the shipping containers, their contents, and accompanying customer documentation. Information about the sample identification, the location, date and time of collection, collector's name, preservation type, sample type, presence and condition of custody seals, the state of preservation of the samples and other required information is noted on the SDG form. Any discrepancies in documentation or problems with sample condition such as appropriate sample containers, thermal preservation variation, holding times and adequate sample volumes are noted and brought to the attention of the customer via the nonconformance action form, The login staff or project manager contacts the client via email or or by phone. The Customer Services Manager provides clarification or further instruction to the sample management staff on the processing of the samples that are incomplete or missing required information.

The sample management staff logs the samples in the LIMs and a durable label for each container is printed. The custodian attaches each label to the appropriate sample container. The following information is recorded for tracking internal custody: laboratory sample ID, customer sample ID, sample matrix and storage location. Sample receipt and log-in specifically requires: date and time of laboratory receipt of sample(s); sample collection date; unique laboratory ID code; field ID code supplied by sample submitter; requested analyses; signature or initials of data logger; comments from inspection for sample acceptance or rejection and in some cases, sample bottle codes.

11.5 Storage Conditions

Alpha Analytical stores samples under proper environmental conditions to ensure their integrity and security. Samples are stored at temperatures that meet specifications of the methodology, regulatory agencies and customer directives. Refrigerators are monitored and controlled to be within 4 ± 2°C. Chemical, temperature, holding times and container storage requirements are listed in the LIMS project database.

Customer Quality Assurance Project Plans may list preservation requirements differing from the laboratory. The sample management staff reviews project information for projects specific handling. Addition of chemical preservative to sample containers normally is done in the field at the time of sampling. Chemical preservation and temperature preservation checks at the time of receipt are recorded except for volatile organic compounds, bacteria, sulfite, and dissolved oxygen preservation. Any differences from laboratory or customer specific requirements are recorded on nonconformance action forms and contact made with the customer by the Customer Services Manager or designee.

Sample storage facilities are located within the sample management area, walk-in custody refrigerator or in designated sample storage areas within the analytical departments. Internal chain-of-custody procedures and documentation pertaining to sample possession, removal from storage, and transfer are outlined in the sample custody procedure. Samples are returned to the sample storage area after the sample portion is removed for analysis. Extracts and digestates are tracked and follow the same internal custody operation. Extracts and digestates are removed to the waste disposal area after analysis for proper disposal.

Sample storage precautions are used to ensure that cross contamination does not occur during sample storage. Refrigerator storage blanks are monitored bi-weekly for volatile compounds.. The storage blank information allows the assessment of potential cross contamination in the sample storage refrigerator.

Temperatures of cold storage areas are recorded continuously in the data logger system. Corrective action is done as necessary when temperatures are not within the control criteria. In both the Westboro and Mansfield facilities, Automated Data loggers are linked to thermocouples in custody refrigerators and freezers in the Sample Storage areas as well as department standards/storage refrigerators and freezers. The Data logger is calibrated and certified by an outside vendor annually and on a quarterly basis for DOD standards/storage refrigerators and freezers. If there is a catastrophic failure of custody refrigerators, a record of all samples affected and customers associated with such samples are notified of any samples affected by the failure. Refrigerators and/or freezers not connected to the Data Logger system have temperatures measured with NIST traceable thermometers. Temperature records indicate the thermometer or sensor (Data logger) used for obtaining the measurement.

11.6 Sample Disposal

Samples are held for 21 calendar days after the report is released to the customer. Upon written customer request samples may be held longer in an uncontrolled area. Requests for controlled sample storage must be arranged at the time of contractual commitment. Air canister samples are held for 3 days after the report is released to the customer.

An authorized waste carrier is contracted to pick up waste as needed and dispose of it, in accordance with all regulatory requirements. Post-analysis disposition of samples is dependent upon project specific requests. Remaining sample material may be returned to the customer, safely discarded, or archived for a specific time prior to disposal. The waste disposal SOP 1797 defines the specific requirements for sample disposal and other waste disposal operations.

The sample management staff are responsible for the archival and disposal of raw samples, extracts and digestates. Raw and prepared samples may not be archived or disposed until all of the designated analyses are complete and resultant analytical data is sent to customers. Samples in storage are retained a minimum of 21 calendar days after reporting the results to the customer. Any samples requiring more than 21 calendar days are archived. Air canister samples requiring storage more than 3 business days require prior approval.

When a customer has requested the return of samples, the sample management staff prepares and ships the samples according to the same custody procedures in which the samples were received and following any customer specified requirements. Protection of the samples during delivery is ensured by the implementation of special packaging procedures. Packages are delivered by a commercial carrier whose procedures for protecting the samples are not within the control of this laboratory. Customers are informed that a commercial carrier will deliver their samples if required.

12 Records

Alpha Analytical has a record system that produces accurate records, which document all laboratory activities. The laboratory retains records of all original observations, calculations and derived data, calibration records and a copy of the test for ten years minimum. The system retains records longer than the minimum upon the request of authorized customers, agencies or another regulator. Note: Ohio VAP requires notification before disposal of any VAP records.

12.1 Record Keeping System and Design

The record keeping system allows reconstruction of laboratory processes that produced the analytical data of the sample.

a) The records include the names of personnel involved in sampling, preparation, calibration or testing.

b) Information relating to laboratory facilities equipment, analytical methods, and activities such as sample receipt, preparation, or data verification are documented.

c) The record keeping system provides retrieval of working files and archived records for inspection and verification purposes.

d) Documentation entries are signed or initialed by responsible staff.

e) Generated data requiring operator logging on appropriate logsheets or logbooks are recorded directly and legibly in permanent ink

f) Entries in records are not obliterated by any method. Corrections to errors are made by one line marked through the error. The person making the correction signs and dates the correction.

g) Data entry is minimized by electronic data transfer and ensuring the number of manual data transcriptions is reduced.

12.2 Records Management and Storage

1. Records including calibration and test equipment, certificates and reports are safely stored, held secure and in confidence to the customer.
2. The laboratory maintains hardware and software necessary for reconstruction of data.
3. Records that are stored or generated by computers have hard copy or write-protected backup copies.
4. Alpha Analytical has established a record management system, for control of hard copy laboratory notebooks.

5. Access to archived information is carefully controlled and is limited to authorized personnel. These records are protected against fire, theft, loss, environmental deterioration, vermin, and in the case of electronic records, electronic or magnetic sources.
6. In the event that Alpha Analytical transfers ownership or goes out of business, there is a plan to ensure that the records are maintained or transferred according to the customer's instructions. A plan will be developed to maintain continuity of our record keeping systems as requested and/or required by both state and federal laws.

Alpha Analytical retains all original hard copy or electronic raw data for calibrations, samples, and quality control measures for ten years, including:

1. Analysts work sheets and data output records,
2. Reference to the specific method,
3. Calculation steps including definition of symbols to reduce observations to a reportable value,
4. Copies of all final reports
5. Archived SOPs,
6. Correspondence relating to laboratory activities for a specific project,
7. All nonconformance action reports, audits and audit responses,
8. Proficiency test results and raw data,
9. Data review and cross checking.

The basic information to tie together analysis and peripherals such as strip charts, printouts, computer files, analytical notebooks and run logs for Alpha Analytical includes:

1. Unique ID code for each Laboratory sample or QC sample;
2. Date of analysis;
3. Instrument identification and operating conditions;
4. SOP reference and version;
5. Calculations;
6. Analyst or operator's initials/signature.

In addition, Alpha Analytical maintains records of:

1. Personnel qualifications, experience and training
2. Initial and continuing demonstration of proficiency for each analyst
3. A log of names, initials and signatures for all individuals who are responsible for signing or initialing any laboratory records. Use of electronic signatures has been approved by regulatory agencies.

12.3 Laboratory Sample Tracking

A record of all procedures to which a sample is subjected while in the possession of the laboratory is maintained. These include but are not limited to records pertaining to:

a) Sample preservation including appropriate sample container and compliance with holding time requirement; If the time of the sample collection is not provided, the laboratory must assume the most conservative time of day (i.e., earliest).

b) Sample identification, receipt, acceptance or rejection and log-in;

c) Sample storage and tracking including shipping receipts, transmittal forms, and internal routing and assignment records; this includes inter-laboratory transfers of samples, extracts and digestates.

d) Sample preparation including cleanup and separation protocols, ID codes, volumes, weights, instrument printouts, meter readings, calculations, reagents;

e) Sample analysis;

f) Standard and reagent origin, receipt, preparation, and use;

g) Equipment receipt, use, specification, operating conditions and preventative maintenance;

h) Calibration criteria, frequency and acceptance criteria;

i) Data and statistical calculations, review, confirmation, interpretation, assessment and reporting conventions;

j) Method performance criteria including expected quality control requirements;

k) Quality control protocols and assessment;

l) Electronic data security, software documentation and verification, software and hardware audits, backups, and records of any changes to automated data entries;

m) Automated sample handling systems;

n) Records storage and retention; and

o) Disposal of hazardous samples including the date of sample or sub-sample disposal and the name of the responsible person.

p) The COC records account for all time periods associated with the samples.

q) The COC records include signatures of all individuals who had access to individual samples. Signatures (written or electronic) of all personnel who physically handle the samples. Time of day and calendar date of each transfer or handling procedure.

r) Common carrier documents.

13 Laboratory Report Format and Contents

The Process Planning and Control Procedure details the recording and reporting of data as required by the customer and in accordance with relevant environmental regulations.

Customers specify the report delivery and deliverables required for the work submitted. Report delivery includes standard turnaround and rush turnaround. Customers specify the delivery address or multiple addresses and method of delivery such as U.S. Mail, facsimile or electronic at the start of the project. Alpha Analytical provides data deliverables in hardcopy or electronic format. At the start of any project, the electronic deliverable formats required must be received before sample arrival. Affidavits are required with each report or series of reports generated for a particular project for Ohio VAP reports.

Reporting packages are available for routine regulatory reporting requirements. Regulatory reporting packages include only the information requested by the regulatory agency. In addition to regulatory report packages, Alpha Analytical prepares a standard report format. The standard report format includes:

1. Title: “Certification of Analysis”
2. Name and address of the laboratory
3. Laboratory Job Number, page number and total number of pages included in the report.
4. Name and address of the customer
5. Alpha sample number, Customer identification, Sample location
6. Samples identified that do not meet the sample acceptance requirements for project.
7. Date of sample receipt, sample collection, preparation or extraction date and time (if applicable), analysis date and time, report date and analyst
8. Identification of data reported by subcontractors
9. Test name and reference method number
10. Delivery method and sampling procedures when collected by lab personnel
11. Deviations or modifications that affect data quality and/or data integrity. These deviations or modifications are included in narrative statements and/or data merger files.
12. Statement that results relate only to the sample tested
13. Statement that report must be copied in full unless the laboratory provides written permission for partial copies
14. Glossary, References and limits of liability
15. Units of measure and reporting detection limit
16. Quality control data for: % Recovery surrogates, % Recovery of LCS, % RPD of LCSD, Blank analysis, % Recovery Matrix Spike, %RPD of Laboratory Duplicates, as applicable
17. Signature, title and date of report

18. A “Certificate/Approval Program Summary” page is included at the end of the report that identifies analytes for which Alpha Analytical holds certification and for those analytes reported that it does not. This summary also includes the certification numbers for either NELAP certified states, State certifications (e.g. Massachusetts laboratory certification identification number)..
19. Alpha Analytical does not accept samples from private residents for drinking water analysis and therefore maximum contaminant levels are not necessary. If Alpha were to change its policy and report drinking water samples, MCLs would be included with the report.

Results transmitted by facsimile or other electronic means include a statement of confidentiality and return of the materials at the laboratory’s expense.

The laboratory notifies the customer in writing of any circumstance that causes doubt on the validity of the results. The amended or modified report lists the change, reason for the change, affected page numbers, date of the amendment and authorized signature. The customer will be notified prior to changes in LIMs software or hardware configurations that will adversely affect customer electronic data.

13.1 Data Qualifiers

The following data qualifiers are used in conjunction with analytical results depending on the definition, state or regulatory program and report type.

Note: ”J” Estimated value: Upon customer request, the Target analyte concentration can be reported below the quantitation limit (RL), but above the Method Detection Limit (DL) with a “J” qualifier as long as there is a LOD study on file. (See section 5.11)

Data Qualifier	Qualifier Information	Regulatory Requirement
A	Spectra identified as "Aldol Condensation Product".	CT RCP, NC
B	The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at <5x the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than 10x the concentration found in the blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone) For DOD related projects, flag applies to detectable concentration of target analyte in the blank that exceeds ½ the LOG or is greater than 1/10 the concentration in the field sample	EPA Functional Guidelines 'MassDEP MCP, CT RCP, NJ-TO15/LL-TO15; NJ Tech Guidance 2014, DOD QSM 5.1
C	Co-elution: target analyte co-elutes with a known lab standard (i.e. surrogates, internal standards, etc.) for co-extracted analyses.	
D	Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.	NJ-TO15/LL-TO15 - Air only EPA Functional Guidelines; EPA Region 2,5
DL	Same was re-analyzed at a dilution. Qualifier applied to sample number.	

E		Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.	EPA Region 2,5 CT RCP, NJ-TO15/LL-TO15
G		The concentration may be biased high due to matrix interferences (i.e. co-elution) with non-target compound(s). The result should be considered estimated.	In-house/Forensics.
H		The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.	THE NELAC INSTITUTE (TNI) STANDARDS
I		The lower value for the two columns has been reported due to obvious interference.	In-house.
J		Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).	CT RCP (for TICs),
JN (NJ)		Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.	EPA Functional Guidelines 'NJ-TO15-LL
ND	DU-J	Not detected at the method detection limit (MDL) for the sample, or estimated detection limit (EDL) for same-related analysis	In-house
P	All DU	The RPD between the results for the two columns exceeds the method-specified criteria.	MassDEP MCP, CT RCP
Q	All DU	The quality control sample exceeds the associated acceptance criteria. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)	
R	All DU	Analytical results are from sample re-analysis	Customer-specific

RE	All DU	Analytical results are from sample re-extraction.	Customer-specific
S		Analytical results are from modified screening analysis	

13.2 Compound Summation for Organic Analyses

In order to be compliant with regulations from certain states, Alpha Analytical has created the following Summation Rules to cover reporting "Total Analytes". The following are an example of several compounds that can be reported as "Totals":

Volatiles:	
1,3-Dichloropropene, Total	cis + trans isomers
Xylenes, Total	m/p + o isomers
1,2-Dichloroethene, Total	cis + trans isomers
Trihalomethanes, Total	Chloroform + Bromoform +
	Dibromochloromethane +
	Dichlorobromomethane
PCBs:	
PCBs, Total	Sum of reportable Aroclors
	(all Aroclors reported for the project)

The following are the summation rules that the LIMs uses to calculate the Total values:

Summation Rules:		
H + H = H		Key:
H + J = J		H = Hit (above RL)
J + J = J		J = J-flagged value
H + ND = H		ND = U-flagged value
J + ND = J		
ND + ND = ND		

The ND values are considered "0" during the calculations.
The "E" flagged values (over the calibration) are ignored and not utilized during the calculations.
Any "N" flagged values (do not report) are ignored and not utilized during the calculations.
For dual-column analysis, the Total is reported as part of column "A" data, unless all individuals are reported from "B" column.

For analytical group summations, the Total is reported based on the associated “Reporting List”. For example, if only 7 Aroclors are requested, then the Total is based on 7 Aroclors, not 9.

The RL and MDL for Totals will always be the lowest of the individual compounds used in the summation.

For each Total summation, two values are calculated: TOTALH (calculated from all associated hits above the R L– used in DU reporting formats) and TOTALJ (calculated from all associated hits and J flagged values – used in DJQL reporting formats). Total concentrations are calculated for all samples and QC samples (however, recoveries are not calculated since they are only calculated for the compounds spiked)

If a Total summation is requested, the individual compounds must also be reported.

14 Outside Support Services and Supplies

When Alpha Analytical purchases outside services and supplies in support of tests, the laboratory uses only those outside services and supplies that are of adequate quality to maintain confidence in the tests. Differences between Request/Tender and Contracts must be resolved before work commences.

The Purchasing SOP/1726 describes approval and monitoring of all suppliers and subcontractors used by the laboratory. Where no independent assurance of the quality of outside support services or supplies is available, the laboratory ensures that purchased equipment, materials, and services comply with specifications by evaluating method performance before routine use.

The laboratory checks shipments upon receipt as complying with purchase specifications. The use of purchased equipment and consumables is only after the evaluation and compliance to the specifications is complete. The Purchasing SOP/1726 describes the details for receipt and inspection of purchased product.

The Purchasing SOP describes the process for raising, review and placement of purchase orders. It is company policy to purchase from third party certified suppliers and subcontractors wherever possible. Purchases must be from suppliers approved by the Laboratory. Laboratory or sampling subcontractors specified by the customer are noted as “Trial” on the purchase order. This identifies the subcontractor as a non-approved subcontractor. All DoD work that is subcontracted must comply with Alpha’s management system and must comply with the QSM standard and is subject to DoD customer approval.

The laboratory maintains list of approved vendors (Form 18302) and subcontractors from whom it obtains support services or supplies required for tests.

14.1 Subcontracting Analytical Samples

Customers are advised, verbally and/or in writing, if any analyses will be subcontracted to another laboratory. Any testing covered under the NELAC Institute (TNI) Standards that requires subcontracting, will be subcontracted to another THE NELAC Institute (TNI) Standard accredited laboratory for the tests to be performed. The laboratory approves testing and sampling subcontractors by review of current state, national or other external parties’ certifications or approvals. This document must indicate current approval for the subcontracted work. Any sample(s) needing special reports (*i.e.*, MCL exceedance) will be identified on the chain of custody when the laboratory subcontracts with another laboratory. Subcontractor Laboratory Certifications are located in Qualtrax under Customer Services folder

The Sample Receipt and Login Procedure describes the process for sample handling when subcontracting samples. The quotation form lists the subcontractor in order to notify the customer of any subcontracted work. Customer notification of subcontracted work is in writing before releasing samples to the subcontractor.

The review of subcontractor documents for completeness and meeting the specifications defined for the project follows the laboratory process for reporting and verification of process data. The person responsible for receiving the order reviews the information supplied by the subcontractor instead of the Department Supervisor.

15 Customer Relations

15.1 Customer Service

The majority of the customer services occur from personnel in the administration, sample receiving and sampling areas. Customer service involves inquiries into services offered, technical consulting, placing orders, and receiving orders, providing updates on the status of orders and completing orders. Personnel interacting with customers must document and review customer specific project requirements. Call Tracker is used to document communications with customers (SOP/1723). Personnel must document customer interactions following the appropriate laboratory procedures. Each person must communicate deviations, modifications and customer requests following the laboratory defined procedures.

15.2 Project Management

During staff meetings the laboratory management reviews requests for new work. The Operations Director and/or Laboratory Technical Manager address all capacity and capability issues. Where conflicts in workload arise, customer notification is immediate. The Project Communication Form (PCF) contains the documentation of all project information. Cooperation between laboratory and customer services staff allows direct communication and scheduling. Management arranges complex scheduling and coordination between departmental areas. Documentation of approval for waivers from the DoD QSM requirements must be documented on a project specific waiver. This documentation needs to be in writing and readily available for review.

15.3 Complaint Processing

The laboratory staff documents all customers or other parties' complaints or concerns regarding the data quality or laboratory operations. The Nonconformance Report records complaints, correcting the concern, and resolving the concern with the customer or other party. The process uses the same form and process as the nonconformance action process. Where repetitive corrective actions indicate a problem, an audit of the area, Customer Inquiry and Complaint SOP/1722 is immediate to ensure the corrective action has effectively solved the concern.

16 Appendix A – Definitions/References

The following definitions are from Section 3.0 of the 2009 TNI Standard. The laboratory adopts these definitions for all work performed in the laboratory.

Acceptance Criteria: specified limits placed on characteristics of an item, process, or service defined in requirement documents. (ASQC)

Accreditation: the process by which an agency or organization evaluates and recognizes a laboratory as meeting certain predetermined qualifications or standards, thereby accrediting the laboratory. (TNI)

Accuracy: the degree of agreement between an observed value and an accepted reference value. Accuracy includes a combination of random error (precision) and systematic error (bias) components which are due to sampling and analytical operations; a data quality indicator. (TNI)

Aliquot: A discrete, measured, representative portion of a sample taken for analysis. (EPA QAD glossary)

Analyst: The designated individual who performs the “hands-on” analytical methods and associated techniques and who is the one responsible for applying required laboratory practices and other pertinent quality controls to meet the required level of quality. (TNI)

Analyte: The specific chemicals or components for which a sample is analyzed; it may be a group of chemicals that belong to the same chemical family, and which are analyzed together. (EPA Risk Assessment Guide for Superfund; OSHA Glossary)

Analytical Uncertainty: A subset of Measurement Uncertainty that includes all laboratory activities performed as part of the analysis. (TNI)

Assessment: The evaluation process used to measure or establish the performance, effectiveness, and conformance of an organization and/or its systems to defined criteria (to the standards and requirements of laboratory accreditation. (TNI)

Assessment (Clarification): The evaluation process used to measure the performance or effectiveness of a system and its elements against specific criteria.

Assessment Criteria: the measures established by The NELAC Institute (TNI) Standards and applied in establishing the extent to which an applicant is in conformance with the NELAC Institute (TNI) Standards requirements.

Audit: A systematic and independent examination of facilities, equipment, personnel, training, procedures, record-keeping, data validation, data management, and reporting aspects of a system to determine whether QA/QC and technical activities are being conducted as planned and whether these activities will effectively achieve quality objectives. (TNI).

Batch: Environmental samples, which are prepared and/or analyzed together with the same process and personnel, using the same lot(s) of reagents. A

preparation batch is composed of one (1) to twenty (20) environmental samples of the same quality systems matrix, meeting the above mentioned criteria and with a maximum time between the start of processing of the first and last sample in the batch to be 24 hours. An **analytical batch** is composed of prepared environmental samples (extracts, digestates or concentrates), which are analyzed together as a group. An analytical batch can include prepared samples originating from various quality system matrices and can exceed 20 samples. (TNI)

Bias: The systematic or persistent distortion of a measurement process, which causes errors in one direction (i.e., the expected sample measurement is different from the sample's true value). (TNI)

Blank: a sample that has not been exposed to the analyzed sample stream in order to monitor contamination during sampling, transport, storage or analysis. The blank is subjected to the usual analytical and measurement process to establish a zero baseline or background value and is sometimes used to adjust or correct routine analytical results. (TNI)

<u>Blanks include:</u>

Equipment Blank: a sample of analyte-free media, which has been used to rinse common sampling equipment to check effectiveness of decontamination procedures.

Field Blank: blank prepared in the field by filling a clean container with pure de-ionized water and appropriate preservative, if any, for the specific sampling activity being undertaken. (EPA OSWER)

Instrument Blank: a clean sample (e.g. distilled water) processed through the instrumental steps of the measurement process; used to determine instrument contamination. (EPA-QAD)

Method Blank: A sample of a matrix similar to the batch of associated samples (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences are present at concentrations that impact the analytical results for sample analyses, (TNI)

Reagent Blank: (method reagent blank): a sample consisting of reagent(s), without the target analyte or sample matrix, introduced into the analytical procedure at the appropriate point and carried through all subsequent steps to determine the contribution of the reagents and of the involved analytical steps. (QAMS)

Blind Sample: a sub-sample for analysis with a composition known to the submitter. The analyst/laboratory may know the identity of the sample but not its composition. It is used to test the analyst or laboratory's proficiency in the execution of the measurement process.

Calibration: set of operations which establish, under specified conditions, the relationship between values of quantities indicated by a measuring instrument or measuring system, or values represented by a material measure or a reference material, and the corresponding values realized by standards. (TNI)

1) In calibration of support equipment the values realized by standards are established through the use of Reference Standards that are traceable to the International System of Units (SI).

2) In calibration according to test methods, the values realized by standards are typically established through the use of Reference Materials that are either purchased by the Laboratory with a certificate of analysis or purity, or prepared by the Laboratory using support equipment that has been calibrated verified to meet specifications.

Calibration Range: The range of values (concentrations) between the lowest and highest calibration standards of a multi-level calibration curve. For metals analysis with a single-point calibration, the low-level calibration check standard and the high standard establish the linear calibration range, which lies within the linear dynamic range.

Calibration Curve: the graphical relationship between the known values, such as concentrations, of a series of calibration standards and their instrument response. (TNI)

Calibration Method: A defined technical procedure for performing a calibration.

Calibration Standard: A substance or reference material used to calibrate an instrument. (TNI)

Certified Reference Material (CRM): Reference material, accompanied by a certificate, having a value, measurement uncertainty, and stated metrological traceability chain to a national metrology institute. (TNI)

Chain of Custody Form: Record that documents the possession of the samples from the time of collection to receipt in the laboratory. This record generally includes: the number and types of containers; the mode of collection; collector; time of collection; preservation; and requested analyses. See also Legal Chain of Custody Protocols (TNI)

Clean Air Act: the enabling legislation in 42 U.S.C. 7401 *et seq*., Public Law 91-604, 84 Stat. 1676 Pub.L. 95-95, 91 Stat., 685 and Pub. L. 95-190, 91 Stat., 1399, as amended, empowering EPA to promulgate air quality standards, monitor and to enforce them.

Confirmation: Verification of the identity of a component through the use of an approach with a different scientific principle from the original method. These may include, but are not limited to: Second column confirmation, Alternate wavelength, Derivatization, Mass spectral interpretation, Alternative detectors, or Additional cleanup procedures (TNI)

Customer: Any individual or organization for which items or services are furnished or work performed in response to defined requirements and expectations. (ANSI/ASQ E4-2004)

Congener: A member of a class of related chemical compounds (e.g., PCBs, PCDDs)

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA/Superfund): the enabling legislation in 42 U.S.C. 9601-9675 et seq., as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), 42 U.S.C. 9601 et seq., to eliminate the health and environmental threats posed by hazardous waste sites.

Conformance: an affirmative indication or judgment that a product or service has met the requirements of the relevant specifications, contract, or regulation; also the state of meeting the requirements. (ANSI/ASQC E4-1994)

Consensus Standard: A standard established by a group representing a cross-section of a particular industry or trade, or a part thereof. (ANSI/ASQ ANSI/ASQ E4-2004)

Continuing calibration verification: The verification of the initial calibration that is required during the course of analysis at periodic intervals. Continuing calibration verification applies to both external standard and internal standard calibration techniques, as well as to linear and non-linear calibration models. (IDQTF)

Corrective Action: the action taken to eliminate the causes of an existing nonconformity, defect or other undesirable situation in order to prevent recurrence. (ISO 8402)

Completeness: the percentage of measurements judged to be valid compared to the total number of measurements made for a specific sample matrix and analysis.

Data Quality Objectives (DQO):

Data Reduction: the process of transforming raw data by arithmetic or statistical calculations, standard curves, concentration factors, etc., and collation into a more useable form. (TNI)

Definitive Data: Analytical data of known quality, concentration, and level of uncertainty. The levels of quality and uncertainty of the analytical data are consistent with the requirements for the decision to be made. Suitable for final decision-making. (UFP-QAPP)

Demonstration of Capability: a procedure to establish the ability of the analyst to generate analytical results of acceptable accuracy and precision. (TNI)

Detection Limit: (previously referred to as Method Detection Limit –MDL) the lowest concentration or amount of the target analyte that can be identified, measured, and reported with confidence that the analyte concentration is not a false positive value. See Method Detection Limit.

Detection Limit (DL) (Clarification): The smallest analyte concentration that can be demonstrated to be different from zero or a blank concentration at the 99% level of confidence. At the DL, the false positive rate (Type I error) is 1%.

Document Control: the act of ensuring that documents (and revisions thereto) are proposed, reviewed for accuracy, approved for release by authorized personnel, distributed properly and controlled to ensure use of the correct version at the location where the prescribed activity is performed. (ASQC)

Environmental Data: Any measurements or information that describe environmental processes, locations, or conditions; ecological or health effects and consequences; or the performance of environmental technology. (ANSI/ASQ E4-2004)

False Negative: An analyte incorrectly reported as absent from the sample, resulting in potential risks from their presence.

False Positive: An item incorrectly identified as present in the sample, resulting in a high reporting value for the analyte of concern.

Federal Insecticide, Fungicide and Rodenticide Act (FIFRA): the enabling legislation under 7 U.S.C. 135 *et seq.*, as amended, that empowers the EPA to register insecticides, fungicides, and rodenticides.

Federal Water Pollution Control Act (Clean Water Act, CWA): the enabling legislation under 33 U.S.C 1251 et seq., Public Law 92-50086 Stat. 8.16, that empowers EPA to set discharge limitations, write discharge permits, monitor, and bring enforcement action for non-compliance.

Field Measurement: The determination of physical, biological, or radiological properties, or chemical constituents; that are measured on-site, close in time and space to the matrices being sampled/measured, following accepted test methods. This testing is performed in the field outside of a fixed-laboratory or outside of an enclosed structure that meets the requirements of a mobile laboratory.

Field of Accreditation: Those matrix, technology/method, and analyte combinations for which the accreditation body offers accreditation. (TNI)

Finding: an assessment conclusion, referenced to a laboratory accreditation standard and supported by objective evidence that identifies a deviation from a laboratory accreditation standard requirement. (TNI)

Finding (Clarification): An assessment conclusion that identifies a condition having a significant effect on an item or activity. An assessment finding may be positive or negative and is normally accompanied by specific examples of the observed condition (ANSI/ASQ E4-2004).

Holding Times: The maximum time that can elapse between two (2) specified activities. (TNI)

The maximum times that samples may be held prior to analysis and still be considered valid or not compromised. (40 CFR part 136)

Inspection: An activity such as measuring, examining, testing, or gauging one or more characteristics of an entity and comparing the results with specified requirements in order to establish whether conformance is achieved for each characteristic. (ANSI/ASQC E4-1994)

Internal Standard: A known amount of standard added to a test portion of a sample as a reference for evaluating and controlling the precision and bias of the applied analytical method. (TNI)

Isomer: One of two or more compounds, radicals, or ions that contain the same number of atoms of the same elements but differ in structural arrangement and properties. For example, hexane (C_6H_{14}) could be n-hexane, 2-methylpentane, 3-methylpentane, 2,3-dimethylbutane, 2,2-dimethylbutane.

Laboratory: Body that calibrates and/or tests. (ISO 25)

Laboratory Control Sample (however named, such as laboratory fortified blank, spiked blank or QC check sample): a sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes. It is generally used to establish intra-laboratory or analyst specific precision and bias or to assess the performance of all or a portion of the measurement system. (TNI).

Laboratory Duplicate: aliquots of a sample taken from the same container under laboratory conditions and processed and analyzed independently.

Legal Chain of Custody Protocols: procedures employed to record the possession of samples from the time of sampling until analysis and are performed at the special request of the customer. These protocols include the use of a Chain of Custody Form that documents the collection, transport, and receipt of compliance samples by the laboratory. In addition, these protocols document all handling of the samples within the laboratory. (TNI)

Limit of Detection (LOD): A laboratory's estimate of the minimum amount of an analyte in a given matrix that an analytical process can reliably detect in their facility. (TNI)

Limit of Detection (Clarification): The smallest amount or concentration of a substance that must be present in a sample in order to be detected at a high level of confidence (99%). At the LOD, the false negative rate (Type II error) is 1%.

Limits of Quantitation (LOQ): The minimum levels, concentrations, or quantities of a target variable (e.g. target analyte) that can be reported with a specified degree of confidence. (TNI) For DOD projects, the LOQ shall be set at or above the concentration of the lowest initial calibration standard and within the calibration range.

Limit of Quantitation (Clarification): The lowest concentration that produces a quantitative result within specified limits of precision and bias.

Management: Those individuals directly responsible and accountable for planning, implementing, and assessing work. (ANSI/ASQ E4-2004)

Management System: System to establish policy and objectives and to achieve those objectives (ISO 9000).

Matrix: The substrate of a test sample. (TNI)

Matrix Spike (spiked sample, fortified sample): A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of Target analyte concentration is available. Matrix spikes are used, for example, to determine the effect of the matrix on a method's recovery efficiency. (TNI).

Matrix Spike Duplicate (spiked sample or fortified sample duplicate): a second replicate matrix spike prepared in the laboratory and analyzed to obtain a measure of the precision of the recovery for each analyte. (TNI).

Measurement System: A test method, as implemented at a particular laboratory, and which includes the equipment used to perform the test and the operator(s). (TNI)

Method: A body of procedures and techniques for performing an activity (e.g., sampling, chemical analysis, quantification), systematically presented in the order in which they are to be executed. (TNI)

Method Detection Limit: (now referred to as Detection Limit) one way to establish a Detection Limit, defined as the minimum concentration of a substance (an analyte) that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte.

Method Detection Limit (MDL) (Clarification): The MDL is one way to establish a Detection Limit, not a Limit of Detection.

Method of Standard Additions: A set of procedures adding one or more increments of a standard solution to sample aliquots of the same size in order to overcome inherent matrix effects. The procedures encompass the extrapolation back to obtain the sample concentration. (This process is often called spiking the sample.) (Modified Skoog, Holler, and Nieman. Principles of Instrumental Analysis. 1998)

Mobile Laboratory: A portable enclosed structure with necessary and appropriate accommodation and environmental conditions for a laboratory, within which testing is performed by analysts. Examples include but are not limited to trailers, vans and skid-mounted structures configured to house testing equipment and personnel. (TNI)

National Institute of Standards and Technology (NIST): A federal agency of the US Department of Commerce's Technology Administration that is designed as the United States national metrology institute. (NMI). (TNI)

National Environmental Laboratory Accreditation Program (NELAP): The overall National Environmental Laboratory Accreditation Program of which TNI is a part.

Negative Control: Measures taken to ensure that a test, its components, or the environment do not cause undesired effects, or produce incorrect test results.

Positive Control: Measures taken to ensure that a test and/or its components are working properly and producing correct or expected results from positive test subjects.

Precision: The degree to which a set of observations or measurements of the same property, obtained under similar conditions, conform to themselves; a data quality indicator. Precision is usually expressed as standard deviation, variance or range, in either absolute or relative terms. (TNI).

Preservation: Any conditions under which a sample must be kept in order to maintain chemical and/or biological integrity prior to analysis. (TNI)

Procedure: A specified way to carry out an activity or a process. Procedures can be documented or not. (TNI)

Proficiency Testing: A means of evaluating a laboratory's performance under controlled conditions relative to a given set of criteria through analysis of unknown samples provided by an external source. (TNI)

Proficiency Testing Program: The aggregate of providing rigorously controlled and standardized environmental samples to a laboratory for analysis, reporting of results, statistical evaluation of the results and the collective demographics and results summary of all participating laboratories. (TNI)

Proficiency Test Sample (PT): A sample, the composition of which is unknown to the analyst and is provided to test whether the analyst/laboratory can produce analytical results within specified acceptance criteria. (TNI).

Protocol: A detailed written procedure for field and/or laboratory operation (e.g., sampling, analysis) which must be strictly followed. (TNI)

Quality Assurance: An integrated system of management activities involving planning, implementation, assessment, reporting and quality improvement to ensure that a process, item, or service is the type and quality needed and expected by the customer. (TNI)

Quality Assurance [Project] Plan (QAPP): A formal document describing the detailed quality control procedures by which the quality requirements defined for the data and decisions pertaining to a specific project are to be achieved. (EPA-QAD)

Quality Control: The overall system of technical activities that measures the attributes and performance of a process, item, or service against defined standards to verify that they meet the stated requirements established by the customer; operational techniques and activities that are used to fulfill requirements or quality; also the system of activities and checks used to ensure that measurement systems are maintained within prescribed limits, providing protection against "out of control" conditions and ensuring that the results are of acceptable quality. (TNI)

Quality Control Sample: A sample used to assess the performance of all or a portion of the measurement system. One of any number of samples, such as Certified Reference Materials, a quality system matrix fortified by spiking, or actual samples fortified by spiking intended to demonstrate that a measurement system or activity is in control. (TNI)

Quality Manual: A document stating the management policies, objectives, principles, organizational structure and authority, responsibilities, accountability, and implementation of an agency, organization, or laboratory, the ensure the quality of its product and the utility of its product to the users. (TNI)

Quality Manual Clarification: Alpha Analytical refers to Quality Manual as Corporate Quality Systems Manual (CQSM). (Alpha)

Quality System: A structured and documented management system describing the policies, objectives, principles, organizational authority, responsibilities, accountability, and implementation plan of an organization for ensuring quality in its work processes, products (items), and services. The quality system provides the framework for planning, implementing, and assessing work performed by the organization and for carrying out required quality assurance (QA) and quality control (QC) activities. (TNI)

Quality System Matrix: These matrix definitions are to be used for purposes of batch and quality control requirements: (TNI)

Air and Emissions: Whole gas or vapor samples including those contained in flexible or rigid wall containers and the extracted concentrated analytes of interest from a gas or vapor that are collected with a sorbent tube, impinger solution, filter, or other device.

Aqueous: Any aqueous sample excluded from the definition of Drinking Water or Saline/Estuarine. Includes surface water, ground water effluents, and TCLP or other extracts.

Biological Tissue: Any sample of a biological origin such as fish tissue, shellfish, or plant material. Such samples shall be grouped according to origin.

Chemical Waste: A product or by-product of an industrial process that results in a matrix not previously defined.

Drinking Water: Any aqueous sample that has been designated a potable or potential potable water source.

Non-Aqueous Liquid: Any organic liquid with <15% settleable solids.

Saline/Estuarine: Any aqueous sample from an ocean or estuary, or other salt water source such as the Great Salt Lake.

Solids: Includes soils, sediments, sludges and other matrices with >15% settleable solids.

Raw Data: The documentation generated during sampling and analysis. This documentation includes, but is not limited to, field notes, electronic data, magnetic tapes, untabulated sample results, QC sample results, print outs of chromatograms, instrument outputs, and handwritten records. (TNI)

Reference Material: Material or substance one or more properties of which are sufficiently well established to be used for the calibration of an apparatus, the assessment of a measurement method, or for assigning values to materials. (TNI)

Reference Standard: Standard used for the calibration of working measurement standards in a given organization or at a given location. (TNI)

Representativeness: the degree to which the sample represents the properties of the particular sample being analyzed.

Resource Conservation and Recovery Act (RCRA): the enabling legislation under 42 USC 321 *et seq.* (1976), that gives EPA the authority to control hazardous waste from the "cradle-to-grave", including its generation, transportation, treatment, storage and disposal.

Safe Drinking Water Act (SDWA): the enabling legislation, 42 USC 300f *et seq.* (1974), (Public Law 93-523), that requires the EPA to protect the quality of drinking water in the U.S. by setting maximum allowable contaminant levels, monitoring, and enforcing violations.

Sample Tracking: procedures employed to record the possession of the samples from the time of sampling until analysis, reporting and archiving. These procedures include the use of a Chain of Custody Form that documents the collection, transport, and receipt of compliance samples to the laboratory. In addition, access to the laboratory is limited and controlled to protect the integrity of the samples.

Sampling: Activity related to obtaining a representative sample of the object of conformity assessment, according to a procedure. (TNI)**Second source calibration verification (ICV):** A standard obtained or prepared from a source independent of the source of standards for the initial calibration. Its concentration should be at or near the middle of the calibration range. It is done after the initial calibration.

Selectivity: The ability to analyze, distinguish, and determine a specific analyte or parameter from another component that may be a potential interferent. (TNI)

Sensitivity: The capability of a test method or instrument to discriminate between measurement responses representing different levels (e.g., concentrations) of a variable of interest. (TNI)

Signal to Noise Ratio: The signal carries information about the analyte, while noise is made up of extraneous information that is unwanted because it degrades the accuracy and precision of an analysis and also places a lower limit on the amount of analyte that can be detected. In most measurements, the average strength of the noise is constant and independent of the magnitude of the signal. Thus, the effect of noise on the relative error of a measurement becomes greater and greater as the quantity being measured (producing the signal) decreases in magnitude. (Skoog, Holler, and Nieman. Principles of Instrumental Analysis. 1998)

Signatures, Electronic: A technology that allows a person to electronically affix a signature or its equivalent to an electronic document. The electronic signature links the signature to the signer's identity and to the time the document was signed. Alpha approves the use of electronic signatures for signing and initializing any laboratory record including, by not limited to: analytical reports, controlled documents, workflows and purchasing requests.

Standard: The document describing the elements of laboratory accreditation that has been developed and established within the consensus principles of standard setting and meets the approval requirements of standard adoption organizations procedures and policies. (TNI)

Standard Operating Procedures (SOPs): A written document which details the method of an operation, analysis or action whose techniques and procedures are thoroughly prescribed and which is accepted as the method for performing certain routine or repetitive tasks. (TNI)

Standard Method: a test method issued by an organization generally recognized as competent to do so.

Standardized Reference Material (SRM): a certified reference material produced by the U.S. National Institute of Standards and Technology or other equivalent organization and characterized for absolute content, independent of analytical method.

Surrogate: a substance with properties that mimic the analyte of interest. It is unlikely to be found in environment samples and is added to them for quality control purposes.

Technology: a specific arrangement of analytical instruments, detection systems, and/or preparation techniques. (TNI)

Test: A technical operation that consists of the determination of one or more characteristics or performance of a given product, material, equipment, organism, physical phenomenon, process or service according to a specified procedure. The result of a test is normally recorded in a document sometimes called a test report or a test certificate. (ISO/IEC Guide 2 - 12.1, amended)

Tentatively Identified Compound (TIC): A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations. Tentatively Identified Compounds, if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported.

Test Method: An adoption of a scientific technique for performing a specific measurement, as documented in a laboratory SOP or as published by a recognized authority.

Toxic Substances Control Act (TSCA): the enabling legislation in 15 USC 2601 et seq. (1976), the provides for testing, regulating, and screening all chemicals produced or imported into the United States for possible toxic effects prior to commercial manufacture.

Traceability: The ability to trace the history, application, or location of an entity by means of recorded identifications. In a calibration sense, traceability relates measuring equipment to national or international standards, primary standards, basic physical constants or properties, or reference materials. In a data collection sense, it relates calculations and data generated throughout the project back to the requirements for the quality of the project. (TNI)

Tuning: A check and/or adjustment of instrument performance for mass spectrometry as required by the method.

United States Environmental Protection Agency (EPA): the federal governmental agency with responsibility for protecting public health and safeguarding and improving the natural environment (i.e. the air, water and land) upon which human life depends. (US-EPA)

Validation: the confirmation by examination and provision of objective evidence that the particular requirements for a specific intended use are fulfilled.

Verification: confirmation by examination and provision of evidence that specified requirements have been met. (TNI)

NOTE - In connection with the management of measuring equipment, verification provides a means for checking that the deviations between values indicated by a measuring instrument and corresponding known values of a measured quantity are consistently smaller than the maximum allowable error defined in a standard, regulation or specification peculiar to the management of the measuring equipment.

The result of verification leads to a decision either to restore in service, to perform adjustments, or to repair, or to downgrade, or to declare obsolete. In all cases, it is required that a written trace of the verification performed shall be kept on the measuring

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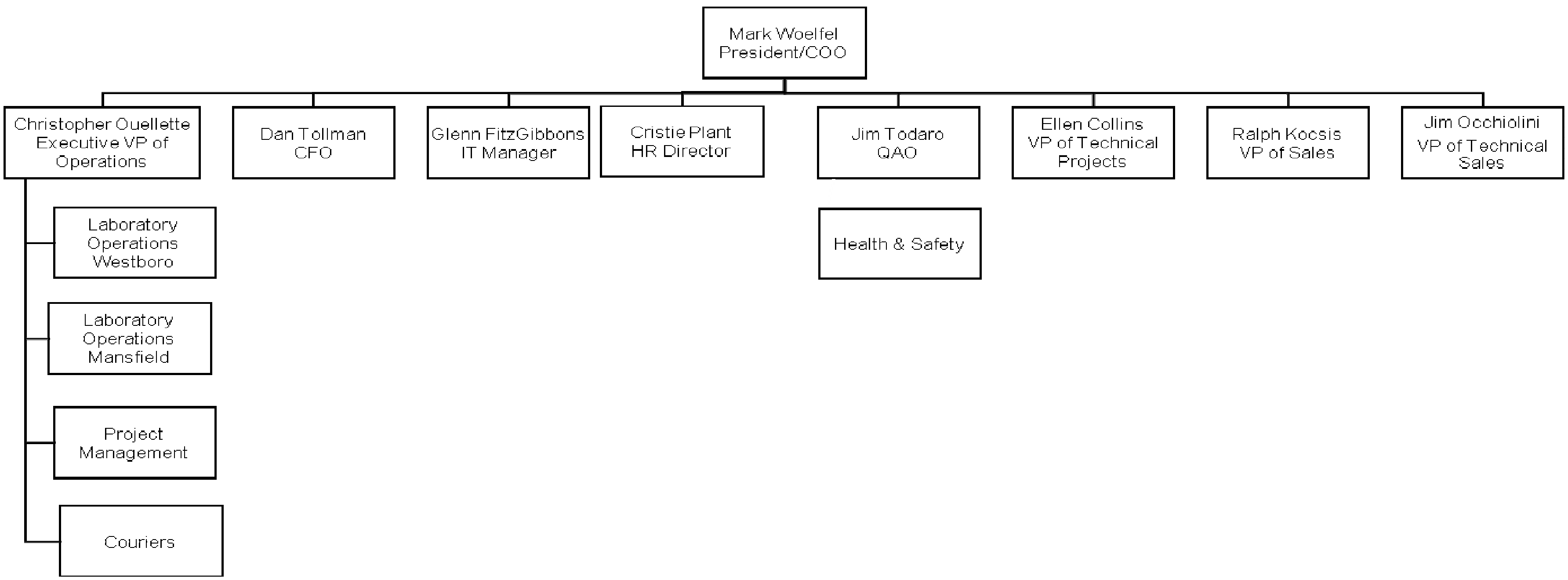
17 Appendix B – Organization Charts

The following charts provide an overview of the organizational structure of Alpha Analytical. The chart also identifies the key personnel responsible for the listed positions. For the various laboratory areas, the individual departmental supervisors are noted. For a listing of all current key personnel, please refer to Section 18, Appendix C.

Updated 09/28/2017

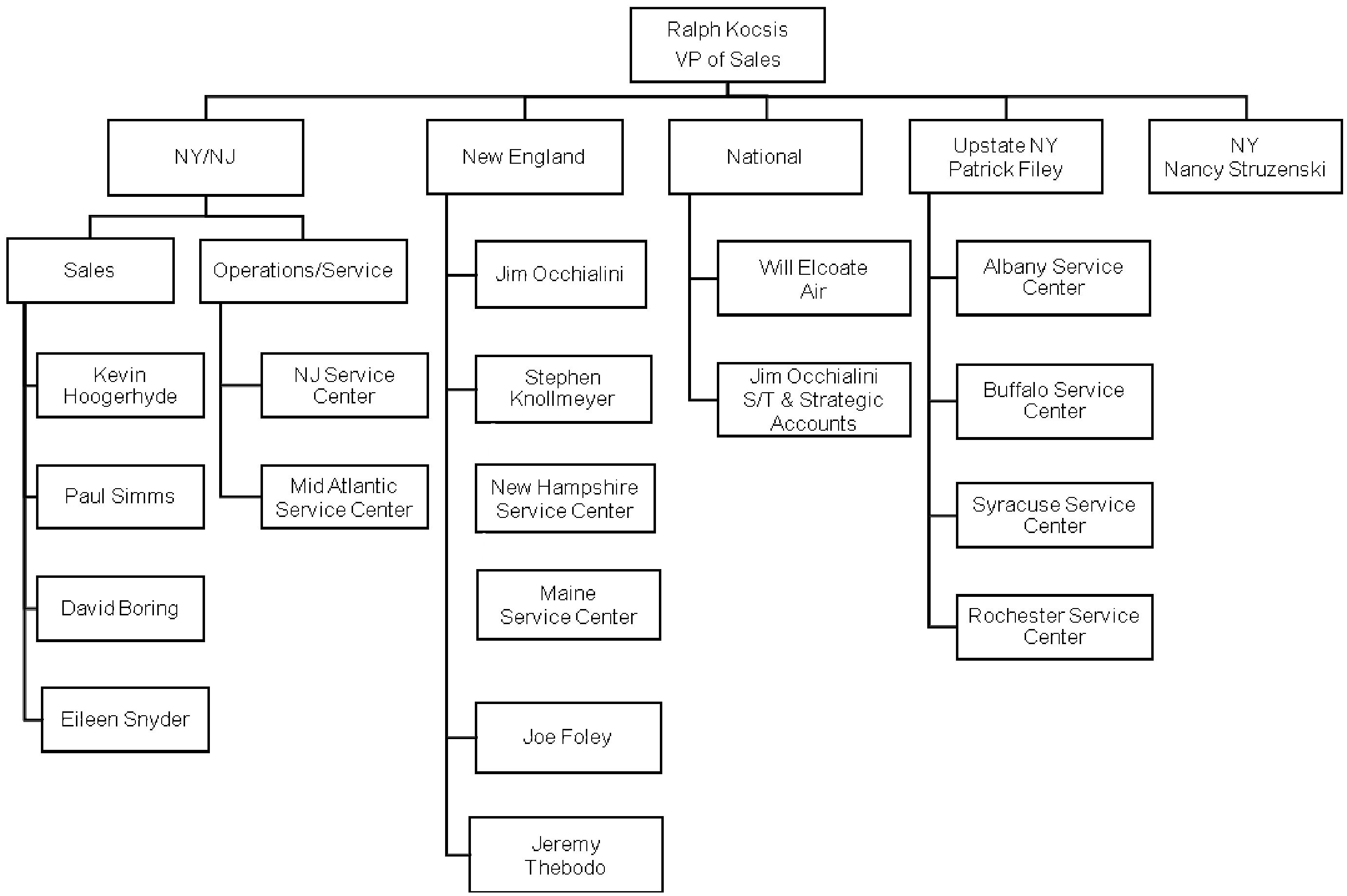
Alpha Analytical
Company Organizational Chart



Updated 09/28/2017

Alpha Analytical

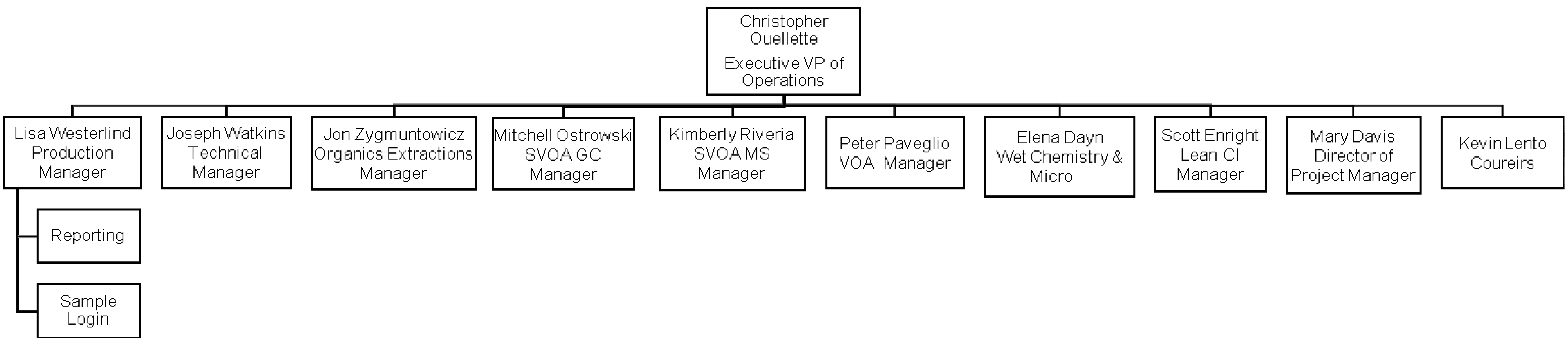
Sales Organizational Chart



Updated 09/28/2017

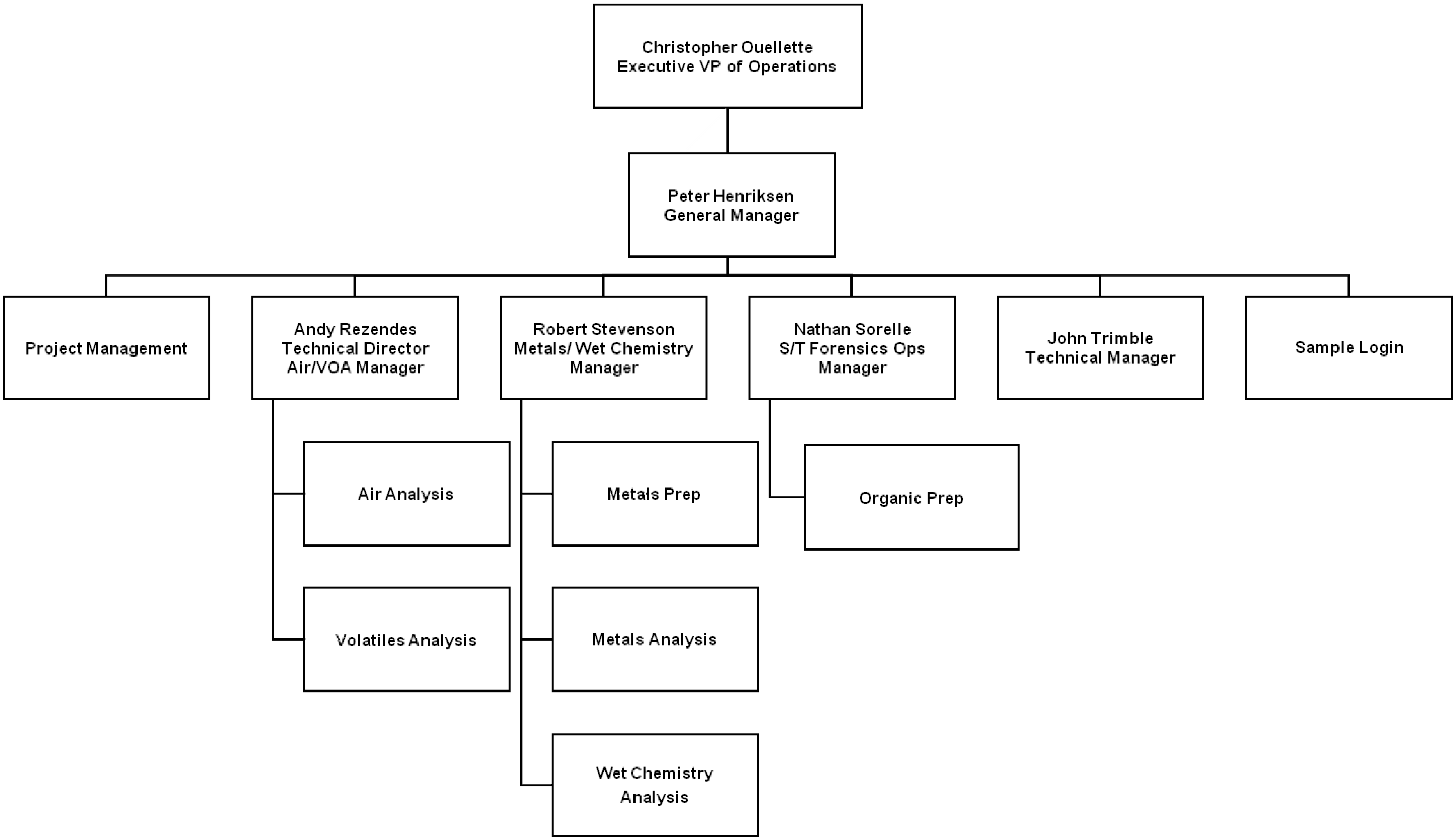
Westboro Facility

Organizational Chart



Updated 09/28/2017

Mansfield Facility Organizational Chart



18 Appendix C – List of Key Personnel

The following is a listing of all current key personnel. If role is specific to a facility it is denoted by either Westboro or Mansfield following the position title. **Updated 09/2017.**

President / COO: Mark Woelfel

Executive VP of Operations: Christopher Ouellette

CFO: Dan Tollman

Laboratory Technical Manager - Westboro: Joseph Watkins

Laboratory Technical Manager - Mansfield: John Trimble

Laboratory Technical Manager- Air, Volatiles Manager - Mansfield: Andy Rezendes

Quality Assurance Officer/Health & Safety Manager: James C. Todaro

VP, Technical Projects: Ellen Collins

VP of Sales: Ralph Kocsis

VP, Technical Sales: James Occhialini, Pat Filey, Kevin Hoogerhyde, Steven Knollmeyer, Nancy Struzenski

Technical Sales Reps: Paul Simms, David Boring, Joe Foley, Jeremy Thebodo

General Manager, Mansfield: Peter Henriksen

Director of Project Management: Mary Davis

National Air Account Manager: Will Elcoate

Information Technology Manager: Glenn Fitzgibbons

Human Resources Director: Cristie Plant

Health & Safety Officer: James Todaro

Forensic & S/T Operations Manager, Mansfield: Nathan Sorelle

SVOA GC Manager, Westboro: Mitchell Ostrowski

SVOA GC/MS Manager, Westboro: Kimberly Rivera

Extractions Manager, Westboro: John Zygmuntowicz

VOA Department Manager, Westboro: Peter Paveglio

Wet Chemistry Department Manager, Westboro: Elena Dayn

Metals Department Manager, Mansfield: Robert Stevenson

Login Manager/ Reporting Manager, Westboro Lisa Westerlind

Quality Systems Specialists: Amy Rice, Rene Bennett, Jason Hebert, Blake Buckalew

Purchasing: David Peak

Logistics Manager: Kevin Lento

Equipment Specialist: Syzmon Sus

19 Appendix D – Preventive Maintenance Procedures

Optimized Service-Calibration Intervals		
Equipment	**Frequency**	**Type of Calibration or Maintenance**
Balances	semiannually daily	cleaning & operations check by service technician (external) calibration verification using Class S-1 certified weights
COD Reactor	annually annually	complete operations check by service technician (external) reaction temperature verification
Conductivity Bridge	annually each use	verification of cell constant complete operations check by service technician (external) calibration verification
DI Water System	as needed monthly annually daily	complete operations check by service technician (external) Residual Chlorine check Biosuitability testing (external) pH and Conductivity check
DO Meter	annually each use	complete operations check by service technician (external) calibration against air as specified by manufacturer
Emergency/Safety Equipment	annually monthly	fire extinguishers and emergency exit lighting check eye washes, showers, fire blanket and first aid kits checked
Freezers	daily	temperature verification
Gas Chromatographs	as needed as needed beginning and end of batch and 10 to 20 samples as per method	injection port preparation; cleaning of detectors initial multi-point calibration continuing calibration verification (CCV) against initial calibration
ICP	Every other day Daily Annually Annually As needed	Change pump tubing Calibration, profile Complete operations check by service technician (external), Linear Dynamic Range determination Clean torch, clean nebulizer, clean spray chamber
Lachat analyzer	Daily As needed	Calibration, clean lines Change tubing, change O-rings
Mass Spectrometers (GC & ICP)	bi-annually as needed 12 hour or daily	change of mechanical pump oil by service technician (external) cleaning of source BFB, DFTPP or ICP-MS tune analysis followed by ICAL or CCV
Mercury Analyzer	monthly each use	clean cell and change pump windings calibration using multi-point curve
Auto-pipettes	Monthly Annually	verification of accuracy verification of precision
Microwave	Quarterly Annually	power and temperature verification RPM verification
Ovens	annually daily	complete operations check by service technician (external) temperature verification
pH Meters	annually each use	complete operations check by service technician (external) calibration using certified buffers
Refrigerators (General Use)	daily	temperature verification
Refrigerators (Sample Management)	daily	temperature verification
Spectrophotometer	Semi-annually Semi-annually daily	cleaning & operations check by service technician (external) wavelength verification (external) continuing calibration verification (CCV) against initial calibration
TCLP Rotator	annually	RPM verification
Thermometers (Mercury/Alcohol)	annually	calibration against NIST traceable thermometer (internal)
Thermometers (digital)	Quarterly	calibration against NIST traceable thermometer (external)
Thermometer (NIST Traceable)	annually	calibration and certification of conformance (external)
Turbidity meter	annually each use	cleaning & operations check by service technician (external) calibration using formazin
Weights (Class S-1)	annually	service/calibration and certification of conformance (external)

20 Appendix E – Alpha Code of Ethics Agreement

Alpha Analytical, Inc.
Ethical Conduct and Data Integrity Agreement

A. ***Personal Pledge:*** I understand that I am charged with meeting the highest degree of ethical standards in performing all of my duties and responsibilities and pledge to only report data, test results and conclusions that are accurate, precise and of the highest quality.

B. ***Protocol Pledges:*** I agree to adhere to the following protocols and principles of ethical conduct in fulfilling my work assignments at Alpha:

1. All work assigned to me will be performed using Standard Operating Procedures (SOPs) that are based on EPA approved methods or Alpha methods.

2. I will only report results or data that match the actual results observed or measured.

3. I will not intentionally nor improperly manipulate or falsify data in any manner, including both sample and QC data. Furthermore, I will not modify data values unless the modification can be technically justified through a measurable analytical process or method acceptable to Alpha. All such modifications will be clearly and thoroughly documented in the appropriate laboratory notebooks and raw data and include my initials or signature and date.

4. I will not intentionally report dates and times of analyses that are not the actual dates and times the analyses were conducted.

5. I will not intentionally represent another individual's work as my own or represent my work as someone else's.

6. I will not make false statements to, or seek to otherwise deceive Alpha staff, leaders or customers. I will not, through acts of commission, omission, erasure or destruction, improperly report measurements, standards results, data, test results or conclusions.

C. ***Guardian Pledge:***

1. I will not condone any accidental or intentional reporting of unauthentic data by other Alpha staff and will immediately report such occurrences to my supervisor, the QA Officer, the Laboratory Technical Manager or corporate leadership. I understand that failure to report such occurrences may subject me to immediate discipline, including termination.

2. If a supervisor or other member of the Alpha leadership group requests me to engage in, or perform an activity that I feel is compromising data validity or quality, I have the right to not comply with the request and appeal this action through Alpha's QA Officer, senior leadership or corporate officers, including the President of the company.

3. I understand that, if my job includes supervisory responsibilities, then I will not instruct, request or direct any subordinate to perform any laboratory practice that is unethical or improper. Also, I will not discourage, intimidate or inhibit a staff member who may

choose to appropriately appeal my supervisory instruction, request or directive that may be perceived to be improper, nor retaliate against those who do so.

D. ***Agreement Signature:*** I have read and fully understand all provisions of the *Alpha Analytical Ethical Conduct and Data Integrity Agreement*. I further realize and acknowledge my responsibility as an Alpha staff member to follow these standards. I clearly understand that adherence to these standards is a requirement of continued employment at Alpha.

____
Employee Signature

____
Printed Name

____
Date

Review Requirements
The *Ethical Conduct and Data Integrity Agreement* must be signed at the time of hire (or within 2 weeks of a staff member's receipt of this policy). Furthermore, each staff member will be required to review and sign this agreement every year. Such signature is a condition of continued employment at Alpha. Failure to comply with these requirements will result in immediate discharge from Alpha employment. This agreement is not an employment contract and does not modify in any manner the company's *Employment-at-Will* Agreement.

21 Appendix F – Floor Plan Westboro Facility

Fire Alarm Zones & Coverage

Zone 1	Manual Pull Stations, Heat & Smoke Detectors
Zone 2	Sprinklers, Tamper & Flow Switches
Zone 3	Duct Smoke Detectors
Zone 4	Smoke, Manual Pull Station, Fire suppression systems

22 Appendix G– Floor Plan Mansfield Facility

23 Appendix H – Job Titles and Requirements

TITLE*	REQUIRED EDUCATION**	MINIMUM REQUIRED ENVIRONMENTAL LAB EXPERIENCE	MINIMUM REQUIRED SKILLS***
Technical Manager (Director) Organic Laboratory	BS or BA in Chemical, Environmental, or Biological Science; including minimum 24 credit hours in Chemistry. Masters or Doctoral degree in one of above disciplines may be substituted for 1 year of experience.	Two (2) years with the analysis of organic analytes in an environmental laboratory	1. Advanced technical knowledge of all analytical methods performed by the lab 2. Advanced technical instrumentation/lab systems knowledge 3. Knowledge of safe laboratory practices, OSHA regs and emergency protocols 4. Experience with and understanding of LIMS 5. Experience with method development and implementation 6. Experience monitoring standards of performance in Quality Control and Quality Assurance
Technical Manager (Director) Inorganic Laboratory	BS or BA in Chemical, Environmental, or Biological Science; including minimum 16 credit hours in Chemistry. Masters or Doctoral degree in one of above disciplines may be substituted for 1 year of experience.	Two (2) years with the analysis of inorganic analytes in an environmental laboratory	1. Advanced technical knowledge of all analytical methods performed by the lab 2. Advanced technical instrumentation/lab systems knowledge 3. Knowledge of safe laboratory practices, OSHA regs and emergency protocols 4. Experience with and understanding of LIMS 5. Experience with method development and implementation 6. Experience monitoring standards of performance in Quality Control and Quality Assurance
Technical Manager (Director) Microbiology Laboratory	BS or BA in Chemical, Environmental, or Biological Science; including minimum 16 credit hours in the Biological Sciences, including at least one course having microbiology as a major component. Masters or Doctoral degree in one of above disciplines may be substituted for 1 year of experience.	Two (2) years with the analysis of microbiological analytes in an environmental laboratory	1. Advanced technical knowledge of all analytical methods performed by the lab 2. Advanced technical instrumentation/lab systems knowledge 3. Knowledge of safe laboratory practices, OSHA regs and emergency protocols 4. Experience with and understanding of LIMS 5. Experience with method development and implementation 6. Experience monitoring standards of performance in Quality Control and Quality Assurance
Quality Assurance Officer	BS/BA in Chemistry, Biology, Environmental or related Science	Two (2) years Environmental Laboratory Experience	1. Advanced technical knowledge of all analytical methods performed by the lab 2. Knowledgeable in Federal, State Programs (THE NELAC INSTITUTE (TNI) STANDARDS, etc.) 3. Able to develop QA/QC policies and certification requirements 4. Able to develop training programs for quality procedures 5. Documented training and/or experience in QA and QA procedures 6. Knowledge of safe laboratory practices and emergency protocols

TITLE*	REQUIRED EDUCATION**	MINIMUM REQUIRED ENVIRONMENTAL LAB EXPERIENCE	MINIMUM REQUIRED SKILLS***
Laboratory Coordinator	High School Diploma; Associates or BS/BA in Chemistry, Biology or Environmental or related Science preferred	1 year +	1. Knowledge of safe laboratory practices and emergency protocols 2. Proficient in all methods and SOP's within their department 3. Experience with and understanding of LIMS 4. Proven ability to meet TAT (turnaround times)
Quality Systems Specialist	BS/BA Chemistry	2 years +	1. General knowledge of laboratory methods 2. Experience with and understanding of LIMS 3. Strong attention to detail 4. Strong oral/written communication and organizational skills 5. Knowledge of QA/QC policies and certification requirements
EH&S Coordinator	High School or Equivalent	2 years +	1. General knowledge of lab operations 2. Detailed knowledge of safe lab practices and emergency protocols 3. Hazardous Waste Management and RCRA Regulation Training 4. DOT Hazardous Materials Regulations Training 5. OSHA Compliance Training 6. Able to develop and deliver new hire and ongoing safety training programs
Lab Technician I	HS or Equivalent	0-1 years. 1+ years preferred.	1. Knowledge of safe laboratory practices 2. Able to follow direction and Standard Operating Procedures (SOP's) 3. Familiarity with standard and reagent preparation 4. Knowledgeable in using volumetric pipettes and glassware 5. Strong oral/written communication and organizational skills
Lab Technician II	HS or Equivalent	2-4 years	1. All skills of Lab Technician I 2. Trained in majority of technician skills relative to department
Lab Technician III	HS or Equivalent	5 years +	1. All skills of Lab Technician II 2. Experienced in training staff
Lab Technician/Chemist I	BS/BA in Chemistry, Biology, Environmental or related Science	0-1 years	1. Knowledge of safe laboratory practices 2. Able to follow direction and Standard Operating Procedures (SOP's) 3. Familiarity with standard and reagent preparation 4. Knowledgeable in using volumetric pipettes and glassware 5. Strong oral/written communication and organizational skills
Lab Technician/Chemist II	BS/BA in Chemistry, Biology, Environmental or related Science	2-4 years	1. All skills of Chemist I 2. Trained in majority of department methods

TITLE*	REQUIRED EDUCATION**	MINIMUM REQUIRED ENVIRONMENTAL LAB EXPERIENCE	MINIMUM REQUIRED SKILLS***
Lab Technician/Chemist III	BS/BA in Chemistry, Biology, Environmental or related Science	5 years +	1. All skills of Chemist II 2. Experienced in training staff
Analyst I	HS or Equivalent	0-1 years	1. Knowledge of safe laboratory practices 2. Able to follow direction and Standard Operating Procedures (SOP's) 3. Experienced with sample handling, preparation and/or extraction
Analyst II	HS or Equivalent	2-4 years	1. All skills of Analyst I 2. Experienced in machine operation, maintenance and troubleshooting
Analyst III	HS or Equivalent	5 years +	1. All skills of Analyst II 2. Experienced in data review and reporting 3. Experienced in training staff
Analytical Chemist I	BS/BA in Chemistry, Biology, Environmental or related Science	6 mos-1 year	1. Knowledge of safe laboratory practices 2. Able to follow direction and Standard Operating Procedures (SOP's) 3. Experienced with sample handling, preparation and/or extraction
Analytical Chemist II	BS/BA in Chemistry, Biology, Environmental or related Science	2-4 years	1. All skills of Analytical Chemist I 2. Experienced in machine operation, maintenance and troubleshooting
Analytical Chemist III	BS/BA in Chemistry, Biology, or Environmental or related Science	5 years +	1. All skills of Analytical Chemist II 2. Experienced in data review and reporting 3. Experienced in training staff
Data Deliverable Specialist I	HS Diploma, BS/BA or Associates preferred	0-1 years	1. Introductory knowledge of laboratory methods 2.Able to follow direction and Standard Operating Procedures (SOP's) 3. Working knowledge of Adobe Acrobat, Microsoft Word, Excel 4. Good writing and typing skills
Data Deliverable Specialist II	HS Diploma, BS/BA or Associates preferred	2-4 years	1. All skills of Data Deliverable Specialist I 2. General knowledge of laboratory methods 3. Understanding of data review/ data reporting process 4. Experience with and understanding of LIMS and electronic data deliverables

TITLE*	REQUIRED EDUCATION**	MINIMUM REQUIRED ENVIRONMENTAL LAB EXPERIENCE	MINIMUM REQUIRED SKILLS***
Data Deliverable Specialist III	HS Diploma, BS/BA or Associates preferred	5 years +	1. All skills of Data Deliverable Specialist II 2. Intermediate/advanced knowledge of laboratory methods 3. Able to perform report review 4. Experience with and understanding of LIMS and electronic data deliverables 5. Able to initiate re-work where necessary
Laboratory Intern	2 Semesters of Chemistry, Biology or Environmental Science	None; Lab work study experience preferred	1. Knowledge of safe laboratory practices 2. Able to follow direction and Standard Operating Procedures

KEY

* Internal terms only. Full title would have "Environmental Laboratory" and specific department preceding it.

** Substitutions: Equivalent knowledge may be substituted for a degree in some instances.

*** Not meant to be an exhaustive list of skill requirements. For full list of skills consult the "Laboratory Skills" list. Actual Job Duties and Responsibilities can be found within job descriptions for each position.

24 Appendix I – Standard Operating Procedures

WESTBORO SOP #	Title
1728	Waste Management and Disposal
1730	Balance Calibration Check
1733	Thermometer Calibration
1735	Analytical Guidelines for Method Validation
1737	Inorganics Glassware Cleaning and Handling
1738	Water Quality Monitoring
1745	Reagent, Solvent and Standard Control
1948	Separatory Funnel Liquid-Liquid Extraction – EPA 3510C
1953	Organic Extraction Glassware Cleaning & Handling
1954	Soxhlet Extraction – EPA 3540C
1955	Sulfur Cleanup – EPA 3660A
1956	Oil and Waste Dilution – EPA 3580A
1959	Microwave Extraction – EPA 3546
1960	Sulfuric Acid Cleanup – EPA 3665A
1962	Florisil Cleanup
1963	Fractionation Cleanup
1964	Preparation of Samples for Chlorinated Herbicides
2022	Volatile Organic Compounds – EPA 624
2107	Volatile Organic Compounds – EPA 524.2
2108	Volatile Organic Compounds – EPA 8260C
2109	Polynuclear Aromatic Hydrocarbons (PAHs) by SIM – EPA 8270D (modified)
2110	Semivolatile Organics by GC/MS – EPA 625
2111	Semivolatile Organics by GC/MS – EPA 8270D
2112	TCLP/SPLP Extraction - Volatile Organics SW-846 Method 1311/1312
2113	EDB & DBCP in Water by Microextraction & Gas Chromatography – EPA 504.1, 8011
2116	Organochlorine Pesticides by Capillary Column GC – EPA 8081B
2119	Extractable Petroleum Hydrocarbons – MADEP
2120	Volatile Petroleum Hydrocarbons – MADEP
2122	Organochlorine Pesticides & PCBs by Capillary Column GC – EPA 608
2123	Polychlorinated Biphenyls in Oil – EPA 600/4-81-045
2125	TPH-Diesel Range Organics, Maine 4.1.25, EPA 8015C (Modified)
2126	TPH- Gasoline Range Organics, Maine 4.2.17, EPA 8015C (Modified)
2127	CT-ETPH
2128	Herbicides by 8151A

WESTBORO SOP #	Title
2129	PCBs by Capillary Column Gas Chromatography - EPA 8082A
2131	New Jersey EPH Method
2133	TCLP Extraction Metals and Semi-Volatile Organics – SW-846 Method 1311
2135	SPLP Extraction Inorganics and Semivolatile Organics, EPA 1312
2161	Fecal Coliform by Membrane Filtration – SM 9222D
2163	Fecal Coliform by Multiple Tube Fermentation – SM 9221E
2191	Heterotrophic Plate Count – SM 9215B
2192	Total Coliform/E.Coli – Presence/Absence (Colilert) – SM 9223B
2193	Total Coliform by Membrane Filtration – SM 9222B
2194	Total Coliform by Multiple Tube Fermentation – SM 9221B
2195	Chlorophyll A – SM 10200H
2196	E. Coli – Membrane Filtration
2197	Chlorophyll A – EPA 446
2198	Air Density Monitoring
2199	Inhibitory Residue Test
2200	Enterococcus – MF
2201	Total Coliform, E.Coli & Enterococcus by Quantification Methods (Quanti Tray)
2202	pH, Liquid Samples
2203	pH, Soil & Waste Samples
2204	Hexavalent Chromium
2205	Biological Oxygen Demand
2206	Ammonia Nitrogen
2207	Total Kjeldahl Nitrogen
2208	Chemical Oxygen Demand
2209	Oil & Grease by n-Hexane Extraction Method & Gravimetry
2210	Cyanide, Total
2211	Phenol, Total
2212	Sulfate, Turbidimetric Method
2213	Alkalinity, Titration Method –SM 2320B
2214	Determination of Inorganic Anions by Ion Chromatography – EPA 300.0
2215	Total Organic Carbon/Dissolved Organic Carbon
2216	Chloride – SM 4500Cl-E, EPA 9251
2217	Nitrate, Nitrite and Nitrate/Nitrite Nitrogen – EPA 353.2, SM 4500NO_3-F
2218	Total Solids (Dried @ 103-105^o) and TVS – SM 2540B, SM 2540E
2219	Total Dissolved Solids – SM 2540C
2220	Total Suspended Solids – SM 2540D
2221	Total Sulfide – SM 4500S2-AD, EPA 9030B
2222	MBAS, Anionic Surfactants – SM 5540C

WESTBORO SOP #	Title
2223	Fluoride, Electrode Method – SM 4500F-BC
2224	Turbidity, Nephelometric Method – EPA 180.1, SM 2130B
2225	Orthophosphate, Colorimetric Single Reagent Method – SM 4500P-E
2226	Total Phosphorous, Colorimetric Combined Reagent Method – SM 4500P-E
2227	Flashpoint – EPA 1010
2228	Reactivity – EPA Chapter 7.3
2229	Total Solids (Dried @ 103-105^o) – SM 2540G
2230	Specific Conductance and Salinity
2231	True and Apparent Color, Visual Comparison Method
2232	Acidity, Titration Method
2233	Determination of Formaldehyde by HPLC, EPA 8315A
2234	Sulfite, Iodometric
2235	Ferrous Iron
2236	Residual Chlorine
2237	ORP
2238	Ignitability of Solids EPA 1030
2239	Physiologically Available Cyanide (PAC)
2240	Total Settleable Solids SM 2540 F
2241	Fixed and Volatile Solids in Solid and Semisolid Samples – SM 2540G
2242	Tannin & Lignin
2243	Nitrite - Manual Colorimetric Method
2244	Paint Filter Liquids Test
2245	Odor, Threshold Odor Test
2249	Dissolved Oxygen
2251	Perchlorate by IC/MS/MS
3743	Free Cyanide
9177	Total Phenol - SEAL Method
9733	Oil & Grease and TPH in Soil
10807	Percent Organic Matter in Soil
12838	Buchi Concentration
17972	Extractable Organic Halides (EOX)
18236	Chloropicrin and Carbon Tetrachloride by EPA 8011
19332	DI Water Extraction ASTM D3987

MANSFIELD SOP #	**Title**
1753	Glassware Cleaning
1754	Balance Calibration
1755	Pipette Checks
1796	Sample Management - Forensics
1797	Haz Waste
1816	Reagent Solvent Standard Control
2134	Hot Block Digestion for Aqueous Samples EPA 3005A
2137	ICP-MS EPA 6020A
2138	Mercury Aqueous 7470A
2139	Mercury Soil 7471B
2140	AVS SEM
2141	Hydride Generation
2142	Mercury Aqueous 1631E
2143	Mercury Soil 7474
2148	Metals Soil Digestion 3050
2150	Metals Microwave 3015
2151	Metals Acid Digestion 3020
2152	Seawater Extraction of Metals
2154	TCLP 1311
2155	EPA 8270D
2157	PAH by SIM
2158	EPA 8081B
2160	EPA 8082A Aroclors/Congeners by GC and TO-10A
2162	Pesticides/PCB Aroclors/Congeners by GC/MS SIM
2164	1,4-Dioxane GC/MS SIM
2165	Separatory Funnel Extraction EPA 3510C
2166	Tissue Prep
2167	GPC
2168	Sulfur Cleanup 3660
2169	Sulfuric Acid Cleanup 3665
2170	Silica Gel Cleanup
2171	% Lipids
2172	Microscale Solvent Extraction EPA 3570
2173	Soxhlet Extraction EPA 3540C
2174	Soxhlet Extraction of PUFs
2175	% Total Solids
2182	TOC by Lloyd Kahn
2183	Particle Size Determination
2184	Particulates in Air PM-10

MANSFIELD SOP #	Title
2186	TO-15
2187	APH
2188	Air PIANO
2189	Dissolved Gases
2190	Can Cleaning
2246	TPH and SHC
2247	Alkylated PAH
2248	Organic Lead
2252	Fixed Gases
2253	TO-11A
2255	PIANO Volatiles
2256	Ethanol in Oil
2257	Whole Oil Analysis
2259	Density Determination of Oils
2260	Alumina Cleanup
2261	Shaker Table
2263	Gravimetric Determination
2264	Tissue Extraction
2265	Organic Waste Dilution
2267	Client SOP: SGC - Manual Method
2268	Client SOP: DCM Extractable Method
4246	PAHs by SPME
6398	TO-17
6438	Mercury in Sorbent Tubes by CVAA
7900	Mercury 1631E Using Cetac-M-8000 Analyzer
9077	Porewater Generation
9480	EPA-TO-12
12863	EPA 8270D GC/MS Full Scan TO-13A
13091	HPAH
13406	Particulate Organic Carbon
14500	Lead in Particulate Matter
17452	TOC by EPA 9060A
17456	Moisture, Ash and Organic Matter
18086	Total Suspended Solids (TSS) SM 2540D
17829	Specific Gravity of Soil
17830	Liquid Limit, Plastic Limit and Plasticity Index of Soils
17940	1,4-Dioxane in Drinking Water by EPA 522
18705	PCB Congeners by GC/MS-SIM EPA 8270D
18710	Trace Elements in Waters and Wastes by ICP-MS EPA 200.8

MANSFIELD SOP #	Title
18711	Metals by ICP EPA 200.7
18714	Metals by ICP EPA 6010C
18715	Mercury in Water (CVAA) EPA 245.1
18716	Hot Block Digestion for Aqueous Samples EPA 3005A
18717	Microwave Assisted Acid Digestion of TCLP Extracts EPA 3015
18718	Microwave Assisted Acid Digestion for Metals EPA 3015A/3051A
18817	Alcohols by FID- Aqueous Direct Injection EPA 8015D
19625	Glycols by GC-FID EPA 8015D
19971	Air Drying Samples for PCBs and Metals Analysis
19978	Density of Soil
22132	Data Review – Ohio VAP
23511	PFAS by LC/MS/MS by EPA 537
23528	PFAS by LC/MS/MS Isotope Dilution by EPA 537(M)
24454	Acetonitrile Extraction for Unknown Compounds via GCFID

CORPORATE SOP #	Title
1559	Sample Receipt and Login
1560	Sample Custody and Tracking
1561	Bottle Order Preparation
1562	Computer System Backup/Control
1563	Computer and Network Security
1564	Software Validation and Control
1565	Training Program
1566	Report Generation and Approval
1567	Organics Data Deliverable Package Review
1722	Customer Inquiry and Complaint Procedures
1723	Customer Service
1724	Quote/Contract Procedure
1725	Project Communication Form Generation
1726	Procedure
1727	Accounts Payable Invoice Processing
1729	Document Control
1731	Manual Integration and Compound Rejection
1732	DL LOD LOQ Generation
1734	Control Limit Generation
1736	Corrective and Preventative Actions
1739	Demonstration of Capability (DOC) Generation
1740	Internal Audit Procedure

CORPORATE SOP #	Title
1741	Data Review – Organics
1742	Calculating Measurement Uncertainty
1743	Annual Management Review
1744	Sample Compositing Procedure
1746	Nonconformance Planning/Procedures
1747	Temperature Datalogger Operation
2274	Data Validation Package
17553	Lab Supply Transfer Procedure
18821	Weights Verification
18909	PT Corrective and Preventive Action Process