# 5 WESTCHESTER PLAZA

**WESTCHESTER COUNTY**

**ELMSFORD, NEW YORK**

# Remediation Action Alternative Analysis Report

**NYSDEC BCP Number: C360205**

**Prepared for:**

Mack-Cali CW Realty Associates, L.L.C.
c/o Jay A. Jaffe, Esq.
75 Livingston Avenue, Suite 301
Roseland, NJ 07068

**Prepared by:**

JLN Engineering Services, PLLC
90 State Street, Suite 700
New York, NY 10020

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# CERTIFICATION STATEMENT

I, James Napoli, certify that I am currently a NYS registered professional engineer and that this Remedial Action Alternative Analysis 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) and Green Remediation (DER-31).

| NY PE 095911 | 10/21/26 |  |
|---|---|---|
| NYS Professional Engineer # | Date | Signature |

# Remedial Action Work Plan

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# LIST OF ACRONYMS

| Acronym | Definition |
|---|---|
| RCRA | Resource Conservation and Recovery Act |
| CVOCs | chlorinated volatile organic compounds |
| RI | remedial investigation |
| PCE | tetrachloroethene |
| TCE | trichloroethene |
| SCOs | Soil Cleanup Objectives |
| Ft bgs. | feet below grade surface |
| SSDS | Sub-Slab Depressurization System |
| NYSDEC | New York State Department of Environmental Conservation |
| SSV | sub-slab vapor |
| FWIA | FISH AND WILDLIFE ASSESSMENT |
| IRM CCR | Interim Remedial Measures Construction Completion Report |
| EE | Environmental Easement |
| SMP | Site Management Plan |
| BCA | Brownfield Cleanup Agreement |
| BCP | Brownfield Cleanup Program |
| RA AAR | Remediation Action Alternative Analysis Report |
| NYSDOH | New York State Department of Health |
| USGS | United States Geological Survey |
| ECL | Environmental Conservation Law |
| RIWP | Remedial Investigation Work Plan |
| AWQS | Ambient Water Quality Standards |
| GIS | Geographic Information Systems |
| COC | Certificate of Completion |
| CAMP | Community Air Monitoring Plan |
| HASP | Health and Safety Plan |
| SGC and AGC | Short-term and Annual Guidance Concentrations |

# Executive Summary

## SITE DESCRIPTION/PHYSICAL SETTING/SITE HISTORY

The Site is limited to an approximately 20,200 square foot building that is located within an approximately 0.46-acre parcel at 5 Westchester Plaza in Elmsford, New York. The parcel is bounded by commercial properties which are zoned within a "Non-Residential Planned Development District." The current and continued proposed use of the Site is consistent with the non-residential (commercial) planned development zoning district, and it is currently divided into five separate leaseholds in the 5 Westchester Plaza Building.

The Site building was constructed in 1968 and prior land use was either agricultural or undeveloped. A former tenant at the Site, Clinical Technologies Association, operated at the Site from at least 1983 to at least 2007 and was listed as having been a Resource Conservation and Recovery Act (RCRA) generator of hazardous wastes containing chlorinated volatile organic compounds (CVOCs).

## SUMMARY OF THE REMEDIAL INVESTIGATION

The remedial investigation (RI) evaluated soil, groundwater, soil vapor and indoor air conditions at the Site and identified site-related contaminants of concern , consisting of tetrachloroethene (PCE), and trichloroethene (TCE). These contaminants were detected in soil vapor and indoor air but were not identified in soil or groundwater at concentrations exceeding applicable regulatory standards.

Soil sampling did not identify any VOCs or other analytes above Unrestricted Use Soil Cleanup Objectives (SCOs), with a single copper exceedance in a duplicate sample determined to be anomalous and unrepresentative of site conditions. Groundwater investigations confirmed that groundwater occurs at depths greater than 40 feet below grade surface (ft. bgs), and analytical results from permanent bedrock monitoring wells did not indicate site-related impacts requiring further investigation.

Vapor intrusion investigations identified PCE and TCE in sub-slab vapor and indoor air at concentrations exceeding applicable NYSDOH criteria, and additional off-site sampling successfully delineated the extent of vapor intrusion impacts associated with the Site and confirmed these impacts do not extend into surrounding buildings. Diagnostic testing for the design and implementation of a Sub-Slab Depressurization System (SSDS) for 5 Westchester Plaza has been performed and approved by New York State Department of Environmental Conservation (NYSDEC), and the installation of the SSDS was completed in May 2026. Based on the findings, the Site does not exhibit soil or groundwater contamination requiring remediation, and the remedial investigation for all media is considered complete, with vapor intrusion mitigation representing the only required remedial action.

## QUALITATIVE HUMAN HEALTH EXPOSURE ASSESSMENT

The vapor intrusion pathway is the only pathway that may pose a potential risk to human health if left unaddressed. Soil and groundwater sampling indicated there were no Site-related impacts to those potential pathways and there are no potentially potable wells present on-Site and therefore there is no current or anticipated groundwater use at the Site. Based on a review of available documentation and the NYSDEC's New York State Mines and Wells database, no private wells are located onsite or on adjacent properties. The current and expected Site use is commercial and the potential receptors for this Site include the employees of the commercial tenants working in the building over their 8-hour shifts. It is estimated that this includes less than 50 employees and their potential exposure is predominantly through potential inhalation while occupying the interior spaces at the Site. An SSDS was approved and subsequently installed and activated to mitigate vapor intrusion exposures. The following table summarizes the current and potential exposures for the site and its approved mitigations.

**In-Text Table 1: Qualitative Human Health Exposure Assessment Summary**

| Environmental Media and Exposure Route | Human Exposure Assessment |
|---|---|
| Inhalation of air (exposures related to soil vapor intrusion) | Vapor intrusion sampling has confirmed sub-slab vapor (SSV) and indoor air impacts at the Site.<br>Offsite buildings are not impacted by the Site.<br>A SSDS was approved to mitigate vapor intrusion exposures. The SSDS was installed in May 2026 and is currently active. |

## FISH AND WILDLIFE ASSESSMENT (FWIA)

The Site is a commercial property and there are no ecologically sensitive receptors on or adjacent to the Site; therefore, there are no actual or potential adverse impacts to fish and wildlife resources and no known pathway to potentially impact ecologically sensitive resources.

## SUMMARY OF THE REMEDY

The following is a summary of proposed remedial actions for the Site:

1. A remedial program will be implemented to provide the details necessary for the construction, operation, optimization, maintenance, and monitoring of the remedial program. Green remediation principles and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per DER-31. The major green remediation components are as follows:

    - Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
    - Reducing direct and indirect greenhouse gases and other emissions;
    - Increasing energy efficiency and minimizing use of non-renewable energy;
    - Conserving and efficiently managing resources and materials;
    - Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;
    - Maximizing habitat value and creating habitat when possible;
    - Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals;
    - Integrating the remedy with the end use where possible and encouraging green and sustainable re-development; and
    - Additionally, to incorporate green remediation principles and techniques to the extent feasible in the future development at this site, any future on-site buildings shall be constructed, at a minimum, to meet the 2020 Energy Conservation Construction Code of New York (or most recent edition) to improve energy efficiency as an element of construction.

    As part of the remedial program, to evaluate the remedy with respect to green and sustainable remediation principles, an environmental footprint analysis will be completed. The environmental footprint analysis will be completed using an accepted environmental footprint analysis calculator such as SEFA (Spreadsheets for Environmental

Footprint Analysis, USEPA), SiteWise$^{TM}$ (available in the Sustainable Remediation Forum [SURF] library) or similar Department accepted tool. Water consumption, greenhouse gas emissions, renewable and non-renewable energy use, waste reduction and material use will be estimated, and goals for the project related to these green and sustainable remediation metrics, as well as for minimizing community impacts, protecting habitats and natural and cultural resources, and promoting environmental justice, will be incorporated into the remedial program, as appropriate. The project will include detailed requirements to achieve the green and sustainable remediation goals. Further, progress with respect to green and sustainable remediation metrics will be tracked during implementation of the remedial action and reported in the IRM Construction Completion Report (IRM CCR), including a comparison to the goals established during the remedial program.

Additionally, the remedial program will include a climate change vulnerability assessment, to evaluate the impact of climate change on the project site and the proposed remedy. Potential vulnerabilities associated with extreme weather events (e.g., hurricanes, lightning, heat stress and drought), flooding, and sea level rise will be identified, and the remedial program will incorporate measures to minimize the impact of climate change on potential identified vulnerabilities.

2. In accordance with the approved July 2025 Vapor Intrusion Mitigation System Design Plan, a SSDS was installed between May 2 and 19, 2026. Monitoring of the SSDS is being performed on a routine basis to verify proper system operation and continued effectiveness in mitigating vapor intrusion.

3. Collection and analysis of commissioning samples to evaluate the performance of the remedy with respect to attainment of Track 4 SCOs;

4. Appropriate off-Site disposal of all material removed from the Site in accordance with all Federal, State and local rules and regulations for handling, transport, and disposal;

5. Recording of an Environmental Easement (EE), including Institutional Controls, to prevent future exposure to any residual contamination remaining at the Site (a copy of the Environmental Easement is provided in Appendix A);

6. Publication of a Site Management Plan (SMP) for long term management of residual contamination as required by the Environmental Easement, including plans for: (1)

Institutional and Engineering Controls, (2) monitoring, (3) operation and maintenance and (4) reporting;

7. All responsibilities associated with the Remedial Action, including permitting requirements and pretreatment requirements, will be addressed in accordance with all applicable Federal, State and local rules and regulations.

# Remediation Action Alternative Analysis Report

## 1.0 INTRODUCTION

Mack-Cali CW Realty Associates LLC entered into a Brownfield Cleanup Agreement (BCA) with the New York State Department of Environmental Conservation (NYSDEC) in April 2021, to investigate and remediate the Site located at 5 Westchester Plaza, Elmsford, New York. Mack-Cali CW Realty Associates LLC is a Participant in the Brownfield Cleanup Program. Commercial and industrial use is proposed for the property. Refer to the Brownfield Cleanup Program (BCP) application for additional details.

This Remediation Action Alternative Analysis Report (RA AAR) summarizes the nature and extent of contamination as determined from data gathered during the Remedial Investigation (RI), performed between March 2022 and March 2025. It provides an evaluation of a Track 4 cleanup and other applicable Remedial Action alternatives, their associated costs, and the recommended and preferred remedy. The remedy described in this document is consistent with the procedures defined in DER-10, DER-31, and complies with all applicable standards, criteria and guidance. The remedy described in this document also complies with all applicable Federal, State and local laws, regulations and requirements. The NYSDEC and New York State Department of Health (NYSDOH) have determined that this Site does not pose a significant threat to human health and the environment. The RI for this Site did not identify fish and wildlife resources.

A formal Remedial Design document was previously prepared. The Vapor Intrusion Mitigation System Design Plan was submitted in July 2025 and subsequently approved by NYSDEC in July 2025.

### 1.1 Site Location and Description

The Site is located in the County of Westchester, Elmsford, New York and is identified as a portion of Block 19, Lot 8 on the Elmsford Tax Map. A United States Geological Survey (USGS) topographical quadrangle or other suitable type map (Figure 1) shows the Site location. The Site is situated on an approximately 0.476-acre area and the property on which the Site is located is bounded by 7 Westchester Plaza to the north, 1 Westchester Plaza to the south,

Westchester Plaza to the east, and 3 Westchester Plaza to the west (see Figure 2). A boundary map is attached to the BCA as required by Environmental Conservation Law (ECL) Title 14 Section 27-1419.

### 1.2 Contemplated Redevelopment Plan

There are no redevelopment activities currently planned.

### 1.3 Description of Surrounding Property

The property on which the Site is located is bounded to the north, south, east, and west by commercially developed properties located within a Non-Residential Planned Development District. Land use in the immediate vicinity of the Site is predominantly commercial in nature, with commercial properties adjoining the Site on all sides. The Site was evaluated for environmentally sensitive areas and human receptors including schools, parks, childcare centers, and other sensitive populations. There are no applicable environmentally sensitive areas or human receptors within 1,000 feet of the Site.

## 2.0 DESCRIPTION OF REMEDIAL INVESTIGATION FINDINGS

The Site was investigated in accordance with the scope of work presented in the NYSDEC-approved Remedial Investigation Work Plan (RIWP) dated May 2021 and approved by NYSDEC on December 22, 2021, the March 2024 Supplemental Remedial Investigation Workplan (2024 SRIWP) approved by NYSDEC on March 15, 2024, and the March 2025 SRIWP (2025 SRIWP) approved by NYSDEC on March 27. The investigation was conducted between March 2022 and March 2025. The Remedial Investigation Report (RIR) was submitted to NYSDEC in August 2026.

### 2.1 SOIL REMEDIAL INVESTIGATION FINDINGS

As documented in the RIR, the remedial investigation included the advancement of a total of nine soil borings (denoted as SB-4 through SB-12) to total depths of 15 feet or refusal. Due to access restrictions inside the building, boring locations were modified from those detailed in the RIWP, with concurrence from NYSDEC prior to advancing the borings. The soil borings were

advanced via direct push with macro-core samplers. As per the approved RIWP, three soil samples were collected from seven of the nine borings as described below:

- 0-2 inches below slab: a discrete grab sample collected and analyzed for VOCs, Metals, SVOCs, PCBs, pesticides, herbicides, PFAS, and 1,4-dioxane.
- 2-24 inches below slab: a discrete grab sample analyzed for VOCs biased towards evidence of impacts. A composite sample analyzed for metals, SVOCs, PCBs, pesticides, herbicides, PFAS, and 1,4-dioxane.
- 2-15 feet below slab: a discrete grab sample collected and analyzed for VOCs biased towards evidence of impacts.

Soil boring SB-4 was only sampled for VOCs from 0.5-1 ft. bgs as refusal was encountered 6-inches below the base of the building slab and access restrictions within the leasehold space where SB-4 was advanced did not allow for a boring at an alternate location. Additionally, soil boring SB-8 was added after the RIWP was approved to investigate potential impacts related to a floor drain. Two soil samples were collected from SB-8 for VOCs. Samples collected during this event were submitted to Aqua Protech Laboratories (APL, NY ELAP #11634) for analysis.

Copper was detected at a maximum concentration of 75.1 mg/kg in the duplicate sample (DUP-2) for soil sample SB-9 (0.5-1) exceeding the NYSDEC Unrestricted Use Soil Cleanup Objective (SCO) of 50 mg/kg. This result does not exceed the applicable NYSDEC Clean-Up Commercial SCO of 280 mg/kg. Copper was detected at a concentration of 14.1 mg/kg in the parent sample (SB-9(0.5-1)) and was at a concentration of 34.1 mg/kg in the composite sample at SB-9; therefore, the copper exceedance is considered an anomaly and not representative of soil quality underlying the Site. No other soil samples collected had a copper concentration exceeding the Unrestricted Use or Commercial Use SCOs.

Chromium was detected at a maximum concentration of 34.8 mg/kg in the composite sample for soil sample SB-6 exceeding the NYSDEC Unrestricted Use SCO of 30 mg/kg but does not exceed the applicable NYSDEC Clean-Up Commercial SCO of 1,700 mg/kg. In addition, chromium was detected at a concentration of 21.8 mg/kg in the SB-6 discrete sample taken directly beneath the slab at 0.5-1 ft bgs which does not indicate the presence of a discharge to the environment and therefore the chromium exceedance can be considered an anomaly and not representative of soil quality underlying the Site. No other soil samples collected had a chromium concentration exceeding the Unrestricted Use of Commercial Use SCOS.

No other soil sample analyses, including VOCs, SVOCs, metals, PCBs, pesticides, herbicides, PFAS, and 1,4-dioxane, were detected at concentrations exceeding their NYSDEC Commercial and Unrestricted Use SCOs.

## 2.2 GROUNDWATER REMEDIAL INVESTIGATION FINDINGS

As discussed in the RIR, the remedial investigation included installation of three monitoring wells in June 2023 after a failed attempt in June 2022. The three monitoring wells were sampled on June 22, 2023, via the low-flow purging and sampling method.

The groundwater results indicated that the concentration of benzo[b]fluoranthene exceeded the Ambient Water Quality Standards (AWQS) at MW-1; and, benzo[b]fluoranthene and other PAHs were also present in the field blank. Upon discussion with the laboratory, the laboratory indicated that since those PAHs were in the lab's method blank, the PAHs were confirmed to be a lab contaminant and not from the collected field sample. Therefore, no further investigation is required for PAHs in groundwater.

For metals, the results indicated that the concentrations of iron, manganese, sodium and magnesium exceeded the AWQS in monitoring wells MW-1, MW-2, and MW-3; however, these metals are not contaminants of concern at the Site as there has been no documented usage or discharge of these metals at the Site and, based on the soil sample results, are associated with natural background groundwater conditions. Therefore, no further investigation is required for metals in groundwater.

PFAS compounds (PFOA and PFOS) were detected at concentrations in excess of the NYSDEC's current guidance levels, 6.7 ng/l and 2.7 ng/l, respectively, at the three wells as described below.

- PFOA -
    - MW-1 = 12.9 ng/l
    - MW-2 = 67.0 ng/l
    - MW-3 = 10.8 ng/l
- PFOS
    - MW-1 = 11.3 ng/l
    - MW-2 = 20.1 ng/l
    - MW-3 = 29.0 ng/l

Soil samples collected at the Site did not identify PFOA or PFOS at detectable concentrations and based on a review of available records there was no manufacturing or use of PFAS documented onsite. Therefore, no source of PFAS was identified onsite. Based on the lack of a source present onsite, the distribution of the compounds (highest concentrations present in the upgradient well, MW-3, and the side-gradient well, MW-2), and the groundwater flow direction to the west, the PFAS exceedances are associated with an offsite source. Therefore, no further investigation is required for PFAS in groundwater and the investigation of groundwater at the Site is complete.

## 2.3 VAPOR INTRUSION INVESTIGATION FINDINGS

As further detailed in the RIR, between March 2022 and March 2025, three vapor intrusion sampling events were conducted to investigate the nature and extent of the soil vapor contamination at and surrounding the 5 Westchester Plaza building. The summary of vapor intrusion results is included as **Tables 1** through **3**, and sample locations are presented on **Drawings 3** through **5**.

Based on the investigations at and surrounding 5 Westchester Plaza and 1 Westchester Plaza, the contaminants of concern at the Site requiring mitigation are limited to TCE and PCE. The source of the TCE and PCE soil vapor impacts has been identified as the former Clinical Technologies Association leasehold at the Site. The extent of the PCE and TCE soil vapor impacts from the former tenant space at the Site have been fully delineated and extended outside of the building to the north and south but do not extend to adjacent buildings located at 1 and 7 Westchester Plaza.

Although BTEX/petroleum contaminants were detected in SSV and indoor air at 5 Westchester Plaza, the detected concentrations did not trigger mitigation. BTEX/petroleum contaminant concentrations detected in offsite soil vapor samples collected from the parking lots and roadways surrounding the Site in 2024 and 2025 were over an order of magnitude greater than those detected in the SSV at 5 Westchester Plaza. Based on the offsite concentrations from the parking lots and roadways being greater than those detected on-Site, the BTEX/petroleum contaminants are from an unknown off-site source and do not originate from the Site building, therefore no further action is required regarding those compounds.

## 2.4 GEOLOGICAL CONDITIONS

The Site is located approximately 270 feet above mean sea level (amsl) according to the Brownfield, New York United States Geologic Survey (USGS) Topographic Quadrangle. Topography in the surrounding areas slopes gently to the southwest towards the Hudson River.

According to the United States Department of Agriculture Web Soil Survey soil database, the Site is described as "urban land." According to the Lower Hudson Bedrock Geographic Information Systems (GIS) Map from the New York State Museum, the Site is contained within the Manhattan Formation which consists primarily of pelitic schists and amphibolite. Weathered bedrock was observed at the bottom of one soil boring (SB-6) at eight ft. bgs. Bedrock was confirmed to be present during the attempted installation of a monitoring well at a depth of 12.5 ft. bgs. Based on the soil borings conducted during the soil investigation, Site soils beneath the building consist of brown medium-fine sand with some silt, and a little gravel.

## 2.5 CONCEPTUAL MODEL OF SITE CONTAMINATION

The source of contamination has been identified as a former tenant who operated at 5 Westchester Plaza from at least 1983 to approximately 2007 and was listed as a RCRA large-quantity generator of hazardous halogenated solvent waste. Though no information regarding the specific use or generation of halogenated solvents by the tenant was available. The operations conducted by this tenant may have resulted in minor releases of chlorinated solvents which could have migrated through the building slab, impacting sub-slab vapor, where the greatest concentrations of PCE and TCE in sub-slab vapor samples were detected.

## 2.6 IDENTIFICATION OF STANDARDS, CRITERIA AND GUIDANCE

- The following standards, criteria, and guidance are typically applicable to Remedial Action projects in New York State, and will be consulted and adhered to as applicable:
- 6 NYCRR Part 364 - NYS Waste Transporter Permits
- 6 NYCRR Part 360 - NYS Solid Waste Management Requirements
- 6 NYCRR Part 371 - Identification and Listing of Hazardous Wastes
- 6 NYCRR Part 372 - Hazardous Waste Manifest System and Related Standards for Generators, Transporters and Facilities
- 6 NYCRR Subpart 374-2 - Standards for the Management of Used Oil

- 6 NYCRR Part 375 - Environmental Remediation Programs
- 6 NYCRR Parts 700-706 – Classes and Standards of Quality and Purity
- 6 NYCRR Part 750 - State Pollutant Discharge Elimination System (SPDES) Permits
- 29 CFR Part 1910.120 - Hazardous Waste Operations and Emergency Response
- 40 CFR Part 144 - Underground Injection Control Program
- CP-43 - Commissioner Policy on Groundwater Monitoring Well Decommissioning (2009)
- CP-49 – Climate Change and DEC Action (2022)
- CP-51- Soil Cleanup Guidance (2010)
- CP-60 – Screening and Assessment of Contaminated Sediment (2014)
- DER-2 - Making Changes to Selected Remedies (April 2008)
- DER-10 – Technical Guidance for Site Investigation and Remediation (2010)
- DER-13 – Strategy for Evaluating Soil Vapor Intrusion at Remedial Sites in New York (2006)
- DER-23 – Citizen Participation Handbook for Remedial Programs (2010, updated 2021)
- DER-31 – Green Remediation (2010)
- DER-32 – Brownfield Cleanup Program Applications and Agreements (2017)
- DER-33 – Guide to Drafting and Recording Institutional Controls (2010)
- TAGM 3028 - "Contained In" Criteria for Environmental Media: Soil Action Levels (August 1997)
- TOGS 1.1.1 - Ambient Water Quality Standards & Guidance Values and Groundwater Effluent Limitations (1998, Addenda 2000, 2004 and 2023)
- New York State Standards and Specifications for Erosion and Sediment Control (2016)
- DAR-1 (formerly Air Guide 1) - Guidelines for the Control of Toxic Ambient Air Contaminants (1997, updated 2021)
- New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan
- NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (2006)
- New York State Climate Act (2019)
- NYSDEC Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (2023)

## 2.7 ENVIRONMENTAL AND PUBLIC HEALTH ASSESSMENTS

### 2.7.1 QUALITATIVE HUMAN HEALTH EXPOSURE ASSESSMENT

The vapor intrusion pathway is the only pathway that may pose a potential risk to human health if left unaddressed. Soil and groundwater sampling indicated there were no impacts to those potential pathways. There are no potentially potable wells present on-Site and therefore there is no current or anticipated groundwater use at the Site. Based on a review of available documentation and the NYSDEC's New York State Mines and Wells database, no private wells

are located onsite or on adjacent properties. The current and expected Site use is commercial and the potential receptors for this Site include the employees of the commercial tenants working in the building during their 8-hour shifts. It is estimated that this includes less than 50 employees and their potential exposure is predominantly through potential inhalation while occupying the interior spaces at the Site. An SSDS was approved and subsequently installed to mitigate vapor intrusion exposures. The following table summarizes the current and potential exposures for the site and its approved mitigations.

**In-Text Table 1: Qualitative Human Health Exposure Assessment Summary**

| Environmental Media and Exposure Route | Human Exposure Assessment |
|---|---|
| Inhalation of air (exposures related to soil vapor intrusion) | Vapor intrusion sampling has confirmed SSV and indoor air impacts at the Site.<br>Offsite buildings are not impacted by the Site.<br>A SSDS was approved to mitigate vapor intrusion exposures. The SSDS was installed in May 2026 and is currently operating. |

### 2.7.2 FISH & WILDLIFE REMEDIAL IMPACT ANALYSIS

The Site does not contain any ecologically sensitive resources and or groundwater contamination, therefore there are no expected impacts to any ecological receptors.

### 2.8 Significant Threat

The NYSDEC and NYSDOH have evaluated the RIR and determined that the Site does not pose a significant threat to human health and the environment.

### 2.9 Remedial Action Objectives

Based on the results of the Remedial Investigation, the following Remedial Action Objectives (RAOs) have been identified for this Site.

### 2.9.1 SOIL VAPOR

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

## 2.10 GREEN SUSTAINABLE REMEDIATION

NYSDEC's DER-31 Green Remediation requires that green remediation concepts and techniques be considered during all stages of the remedial program including remedial action, with the goal of improving the sustainability of the cleanup and summarizing the net environmental benefit of any implemented green technology. This section provides an environmental footprint analysis of the remedy, as implemented at the time of this for the remedial action.

1. Waste Generation: The SSDS installation is expected to generate soil and water waste requiring disposal.
2. Energy Usage: The SSDS installation and operation will receive electricity from a dedicated breaker and will be operated in accordance with the manufacturer's recommendations.
3. Emissions: Transportation to and from the Site for the installation will be coordinated to minimize fuel usage.
4. Water usage: Water required for the SSDS installation will be provided by the drilling contractor. There is no anticipated water usage for the ongoing use of the SSDS.
5. Land and/or Ecosystems: The Site consists of a single commercial building; therefore, land and ecosystem restorations would not be necessary.

Best practices and techniques considered during the remedial activities will include:

1. Eliminating idling vehicles and equipment when possible to reduce emissions.
2. Operation of dust and VOC monitoring equipment per the Community Air Monitoring Plan during intrusive work.
3. Limiting the required transportation to and from the Site to reduce emissions.

# 3.0 Description of Remedial Action Plan

## 3.1 Evaluation of remedial alternatives

The objective of the remedy is to achieve a Track 4 cleanup for the Site due to the remaining sub-slab soil vapor contamination present. A Track 4 is expected to be achieved at the Site for the 2026 Certificate of Completion (COC). The forthcoming Construction Completion Report (CCR) will document the implementation of the remedial action at the Site.

TRACK 1

A remediation pursuant to this track must achieve compliance with unrestricted SCOs. Site soils are not compliant with the unrestricted SCOs. Groundwater concentrations do not exceed AWQS. Therefore, this track is not applicable.

TRACK 2

Remediations pursuant to this track may consider the intended use of the property to determine the appropriate cleanup levels for soils. As Site soils are compliant with the unrestricted SCOs, except where documented due to natural background concentrations and groundwater concentrations do not exceed AWQS, this track is not applicable.

TRACK 3

Remediations pursuant to this track may use modified SCOs. As no modified SCOs have been used or proposed this track is not applicable.

TRACK 4

Remediations performed pursuant to this track may be achieved with a restricted use using site-specific soil cleanup objectives with institutional and engineering controls in place. As Site soils are compliant with the commercial SCOs, and groundwater concentrations do not exceed AWQS, the Site is expected to achieve a Track 4 remedy with conditions for groundwater monitoring and soil vapor mitigation with institutional and engineering controls. The Track 4 remedy, includes the use of long-term institutional and engineering controls (active treatment).

Following the implantation of institutional and engineering controls at this Site, groundwater will be monitored via sampling of monitoring wells and annual inspections of the vapor mitigation system will be conducted in accordance with the Site Management Plan.

REMEDY SELECTION EVALUATION CRITERIA

In accordance with Section 4.2 of DER-10, the selected Track 4 remedy was evaluated with respect to the following criteria:

1) Protection of human health and the environment:

A Track 4 remedy is the most appropriate of the cleanup tracks to manage the remaining soil vapor contamination. Long term institutional and engineering controls will be put in place and managed under a SMP.

2) Compliance with standards, criteria, and guidelines (SCGs):

As Site soils are not compliant with the unrestricted SCOs, but compliant with the commercial SCOs, and groundwater concentrations do not exceed AWQS, a Track 4 cleanup is most appropriate to manage the remaining soil vapor and soil contamination at the Site.

3) Short and long Term effectiveness and impacts:

A Track 4 remedy is the best option for short and long term management of the Site as the institutional and engineering controls ensure effective mitigation of the sub-slab soil vapor contamination in the short term and the continued operation of the vapor mitigation system in the long term.

4) Reduction of toxicity, mobility, or volume of contaminated material:

A Track 4 remediation with institutional and engineering controls will reduce toxicity, mobility, and volume of contaminated sub-slab soil vapor at the Site. During the installation of the sub-slab depressurization system, short term impacts were mitigated through the implementation of the Community Air Monitoring Plan (CAMP) and Health and Safety Plan (HASP) (**Appendix B**).

5) Implementability (Constructability):

A Track 4 remediation is an implementable remedy given the location and existing use of the Site.

6) Cost Effectiveness:

The Track 4 remediation with institutional and engineering controls after SSDS installation is the most cost effective remedial option.

7) Community Acceptance

A community outreach program is incorporated into all remedial alternatives, per NYSDEC

Brownfield Program law and regulations. The Track 4 remediation with institutional and engineering controls will not affect the existing usage of the property and will mitigate the sub-slab soil vapor contamination present. Therefore, it is expected that the community should accept the remedy.

8) Land Use:

- Current Use and Historical and/or Recent Development Patterns: The Track 4 cleanup would retain the existing Site use.
- Consistency of Proposed Use with Applicable Zoning Laws and Maps: The Track 4 cleanup would not affect the existing land use of the Site which will remain a commercially zoned property.
- Brownfield Opportunity Areas: The Site is not in a Brownfield Opportunity Area.
- Applicable comprehensive community master plans or land use plans: The Track 4 cleanup would not affect any existing master or land use plans.
- Surrounding property uses: The Track 4 cleanup will not impact land use of the surrounding properties
- Citizen Participation: Citizen Participation during implementation of a remedial program will proceed in accordance with the Citizen Participation Plan (included as Appendix C) and as noted above will have minimal community impact. Any short-term impacts were addressed by the CAMP and HASP.
- Environmental justice concerns: There are no known environmental justice concerns associated with this project.
- Federal or State Land use designations: The Track 4 cleanup will have an Environmental Easement placed on the Site as an institutional control.
- Population growth patterns: The Track 4 cleanup will not impact reasonably anticipated population growth patterns in the area.
- Accessibility to Existing Infrastructure: The Track 4 cleanup will not impact accessibility to existing infrastructure.
- Proximity of the Site to Important Cultural Resources: There are no important cultural resources onsite or adjacent to the Site.
- Proximity to natural resources: Groundwater at the Site is 8 to 36 ft below ground surface and flows west towards Mine Brook which is a tributary of the Saw Mill River that eventually discharges to the Hudson River.
- Potential Vulnerability of Groundwater Contamination that might migrate from the Site: There is no groundwater contamination associated with the Site, groundwater monitoring will be conducted in accordance with the SMP.
- Proximity to Floodplains: Site is not located on a floodplain.
- Geography and geology of the Site: See Section 2.4 above.
- Current Institutional Controls: The Track 4 cleanup will have an Environmental Easement placed on the Site as an institutional control.

## 3.2 Selection of the Preferred Remedy

The remedial alternatives analysis determined that a Track 4 remedy will be the goal for the Site.

## 4.0 SUMMARY OF SELECTED REMEDIAL ACTIONS

### 4.1 Interim Remedial Measures Performed

The following is a summary of remedial actions that have been conducted under the approved July 2024 IRM Pilot Test Workplan and the approved July 2025 Vapor Intrusion Mitigation System Design Plan. The purpose of the IRM Pilot Test was to obtain the information necessary to design a SSDS capable of depressurizing the sub-slab soils to a predefined sub-slab pressure differential. The IRM Pilot Test results were previously reported in the approved July 2025 IRM Pilot Test Report. The Vapor Mitigation System installation and commissioning will be reported in the forthcoming CCR.

The following is a summary of the IRM implemented remedial actions per the approved July 2025 Vapor Intrusion Mitigation System Design Plan:

Based on the results of the IRM Pilot Test, the installation of a SSDS was proposed to depressurize the entire building footprint. This SSDS consists of five systems, the systems are paired with horizontally drilled vapor suction wells beneath the slab of the building. Each of the individual suction wells is paired and piped to an externally roof-mounted blower. The SSDS serves as an engineering control for the Track 4 remedy.

Per the NYSDEC approved Vapor Mitigation System Design Plan dated July 2025, a SSDS was constructed between May 2 and May 19, 2026. The SSDS consists of five separate SSDSs (Systems 1 through 5). Roof mounted blowers for each system are connected to horizontally drilled extraction wells via system piping. Systems 1 through 3 each consist of two horizontally drilled extraction wells paired together and piped to each respective blower. Systems 4 and 5 are single horizontally drilled extractions wells piped to a blower. On May 19, 2026, Obar representatives were onsite to activate the SSDS. Upon system start up, the mitigation fans were tuned for optimal efficiency, the building slab was inspected for integrity, and no locations were identified that required sealing. The system’s applied vacuum and airflow was measured and reported. The sub-slab pressure differentials at the test ports were also measured and reported.

### 4.1.1 Commissioning Sampling

Post-mitigation indoor air commissioning sampling events were conducted to confirm the system's efficacy. The first commissioning event was conducted at least 30 days after installation on June 22, 2026. This sampling was collected in tandem with pressure differential testing to ensure the entire building slab has been depressurized. Commissioning sampling events included an indoor air sample in each of the five tenanted spaces, one outdoor air sample, and exhaust samples from each of the five SSDS exhaust points. The exhaust data was ran through the AERSCREEN model to confirm that carbon treatment isn't needed. Since the first commissioning sampling event occurred outside of the heating season, an additional round of sampling has been planned to confirm the SSDS is effectively mitigating potential exposures to building occupants through the soil vapor intrusion pathway during the heating season.

Commissioning samples have been, and will continue to be submitted to an ELAP-accredited laboratory for analysis of VOCs via USEPA Method TO-15. Based upon communications with the ELAP-accredited laboratory (Pace), the laboratory can achieve the appropriate minimum reporting limits of less than 0.2 ug/$m^3$ for trichloroethene, 1,2-dichloroethane, 1,1-dichloroethene, carbon tetrachloride, and vinyl chloride, and one microgram per cubic meter (ug/$m^3$) for other analytes.

Sample preservation and holding times, container types and volumes, sampling methods, equipment calibration, chain of custody procedures, sample storage procedures, and laboratory data deliverable format associated with the commissioning will continue to be in accordance with procedures and guidelines presented in the NYSDOH Soil Vapor Intrusion Guidance (SVIG). Field work was and will continue to be conducted under the supervision of a qualified environmental professional and New York State licensed engineer.

Based on the efficacy of the SSDS documented by the results of the additional commissioning sampling, the SSDS may need to be optimized or expanded. Expansions may include, but are not limited to, additional horizontal piping beneath the sub-slab and/or larger blowers.

<u>Commissioning Indoor Air Sampling</u>

Prior to the sampling events, a building walkthrough and chemical inventory will be conducted with the building questionnaire completed for 5 Westchester Plaza. In addition to identifying any potential sources of indoor air contamination present in the building for removal (if possible), the intent of the walkthrough will continue to be to confirm details gathered during the prior building walkthroughs, including (1) the construction details of the building; (2) to assess the building foundation; and (3) to identify floor drains and subsurface utilities that could potentially act as preferential pathways for vapors to enter the indoor air.

The commissioning indoor air sampling will continue to consist of collecting five total interior air samples, one from each tenanted space, and one outdoor air sample which will be collected over an 8-hour period in a laboratory-supplied, batch-certified Summa® canister. Indoor and outdoor air samples will be collected in accordance with Section 2.7.3 and 2.7.4 of the NYSDOH SVIG. The location of each indoor air sample is determined during the building walkthrough and approved by the tenant and/or property owner. The outdoor air sample will continue to be collected from a representative upwind location, away from wind obstructions (trees, bushes, and/or buildings) to ensure a more accurate sample.

The indoor air sampling will continue to be conducted during normal business operating hours, pending owner approval. The work areas will be restricted to only necessary personnel. The heating, ventilation, and air conditioning system will continue to be operated to maintain normal indoor air temperatures for at least 24 hours prior to and during sampling as per the NYSDOH SVIG.

Commissioning Exhaust Sampling

The commissioning exhaust sampling consists of collecting five exhaust samples from sample ports installed in the exterior exhaust piping for each blower. These samples will continue to be collected in batch-certified 2.7-Liter (L) Summa® passivated stainless-steel canisters with a regulator-controlled collection time not exceeding 0.2 liters per minute, provided by an ELAP accredited laboratory. The proposed sample duration will continue to be 15 minutes, which is consistent with the prior effluent air sampling conducted per the previously approved IRM Workplan.

Commissioning Exhaust Sampling Results

On June 22, 2026, the commissioning test event was conducted in accordance with the approved Vapor Mitigation Design Plan. Pressure readings were collected from the SSDS blowers (System #1 to #5), the sub-slab monitoring points (MP-1 to MP-8), and effluent piping (SP1-1 to SP5-1) and are described in the table below:

| **System /Suction/Monitoring Point #** | **6/22/2026 Vacuum ("w.c)** |
|---|---|
| System #1 | 18.0 |
| System #2 | 18.5 |
| System #3 | 11.4 |
| System #4 | 19.0 |
| System #5 | 8.5 |
| SP 1-1 | 15.8 |
| SP 1-2 | 15.9 |
| SP 2-1 | 16.1 |
| SP 2-2 | 16.0 |
| SP 3-1 | 9.4 |
| SP 3-2 | 9.6 |
| SP 4-1 | 19.5 |
| SP 5-1 | 8.9 |
| MP-1 | 1.94 |
| MP-2 | 0.124 |
| MP-3 | 0.142 |
| MP-4 | 0.003 |
| MP-5 | 0.078 |

| | |
|---|---|
| MP-6 | 0.127 |
| MP-7 | 2.44 |
| MP-8 | 0.644 |

Per the approved Vapor Mitigation Design Plan, five indoor air samples (one collected from each tenant space) and one outside air sample were collected from 5 Westchester Plaza. Indoor and outdoor air samples were collected over an 8-hour period in a laboratory-supplied, batch-certified 6-liter Summa® canister. In addition, five exhaust samples were collected from the effluent piping with one sample collected from each roof mounted blower in batch-certified 2.7-Liter (L) Summa® passivated stainless-steel canisters with a regulator-controlled collection time not exceeding 0.2 liters per minute (15-minute collection time). Samples were analyzed for TO-15 analysis from Pace Analytical Services an ELAP accredited laboratory (Pace, NY Cert# 11627). Indoor and outdoor air sample results indicated that PCE and TCE were not detected in indoor air. The analytical results and vacuum readings confirm that the SSDS was operating as designed. The effluent air sample results were input into the AERSCREEN model, and the model outputs were compared to the Short-Term Guideline Concentration (SGC) and Annual Guideline Concentration (AGC). The AERSCREEN results for detected contaminants were less than the SGCs and AGCs; therefore, no carbon treatment is required for the effluent air leaving the SSDS. The Vapor Mitigation System installation and commissioning will be reported in further detail in the forthcoming CCR.

### 4.1.2 Green Remediation

As part of the remedial program, to evaluate the remedy with respect to green and sustainable remediation principles, an environmental footprint analysis (EFA) was completed. The environmental footprint analysis was completed using an accepted environmental footprint analysis calculator such as SEFA (Spreadsheets for Environmental Footprint Analysis, USEPA), SiteWise(TM). Water consumption, greenhouse gas emissions, renewable and non-renewable energy use, waste reduction and material use were estimated, and goals for the project related to these green and sustainable remediation metrics, as well as for minimizing community impacts, protecting habitats and natural and cultural resources, and promoting environmental justice, was

incorporated into the remedial program, as appropriate. The project included detailed requirements to achieve the green and sustainable remediation goals. Further, progress with respect to green and sustainable remediation metrics was tracked during implementation of the IRM and reported in this RA AAR, including a comparison to the goals established during the remedial program. The EFA is included in **Appendix D**.

### 4.2 Remedial Actions Proposed

With the completion of the IRM and the successful installation and commissioning of the SSDS, no further action is required for the remedial action. An EE will be recorded and will serve as a long-term institutional controls. The SSDS and the onsite monitoring wells will continue to operate will continue to be sampled as long-term engineering controls. The institutional and engineering controls will be managed under a SMP.

### 4.3 REPORTING

The CCR will include a table of the commissioning sample results. A sample location map with sample result callouts will also be presented in the CCR. Laboratories used for the commissioning sampling will be NYSDOH ELAP-accredited laboratory.

## 5.0 ENGINEERING CONTROLS

The SSDS has been installed as an engineering control at the Site with the objective to mitigate sub-slab soil vapor impacts and prevent vapor intrusion. The SSDS consists of five systems. The systems are paired with horizontally drilled vapor suction wells beneath the slab of the building. Each of the individual suction wells is paired and piped to an externally roof-mounted blower.

In addition, per the SMP, onsite monitoring wells will also be considered engineering controls and will be sampled as part of the SMP to assess natural attenuation, as determined by the NYSDEC project manager in consultation with NYSDOH project manager, until residual groundwater concentrations continue to be consistently below ambient water quality standards, the site SCGs, or have become asymptotic at an acceptable level over an extended period. In the event

that monitoring data indicates that monitoring may no longer be required, a proposal to discontinue the monitoring will be submitted by the remedial party. Monitoring will continue until permission to discontinue is granted in writing by the NYSDEC project manager. If groundwater contaminant levels become asymptotic at a level that is not acceptable to the NYSDEC, additional source removal, treatment and/or control measures will be evaluated.

## 6.0 INSTITUTIONAL CONTROLS

An EE will be implemented on the Site as part of the Track 4 remedy. The EE is required to: (1) implement, maintain and monitor Engineering Control systems; (2) prevent future exposure to remaining contamination; and, (3) limit the use and development of the Site to commercial as described in 6 NYCRR Part 375-1.8(g)(2)(iii) and industrial as described in 6 NYCRR Part 375-1.8(g)(2)(iv) uses only. Adherence to these ICs on the Site is required by the Environmental Easement and will be implemented under a SMP. ICs identified in the Environmental Easement may not be discontinued without an amendment to or extinguishment of the Environmental Easement. These ICs are:

- The property may be used for commercial and industrial use;
- All ECs must be operated and maintained as specified in this SMP;
- All ECs must be inspected at a frequency and in a manner defined in the SMP;
- The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the Westchester Department of Health to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department;
- Groundwater and other environmental or public health monitoring must be performed as defined in this SMP and any subsequent relevant correspondence from the NYSDEC;
- Data and information pertinent to Site management must be reported at the frequency and in a manner as defined in this SMP;
- All future activities that will disturb remaining known contaminated material must be conducted in accordance with this SMP;
- Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in this SMP;

- Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical component of the remedy shall be performed as defined in this SMP;
- Access to the Site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by the Environmental Easement.

## 7.0 SITE MANAGEMENT PLAN

An SMP will be submitted for approval prior to the approval of the CCR. Site Management will not be discontinued unless prior written approval is granted by the NYSDEC and NYSDOH. The property owner is responsible to ensure that all Site Management responsibilities defined in the EE and the SMP are performed.

The SMP is intended to provide a detailed description of the procedures required to manage the Site and operation of the SSDS. This includes: implementation, and management of all ICs and ECs; implementation of a Monitoring Plan; and submittal of Site Management Reports, performance of inspections and certification of results, and demonstration of proper communication of Site information to NYSDEC; defining criteria for termination of monitoring; and a plan to operate and maintain the monitoring well network and SSDS.

To address these needs, the SMP will include three plans as applicable: an IC/EC Plan for implementation and management of ICs/ECs; a Monitoring Plan for implementation of Site Monitoring; and an Operation and Maintenance Plan to ensure continued operation, maintenance, inspection, and reporting of any mechanical or physical components of the groundwater monitoring network and SSDS. The SMP will be prepared in accordance with the requirements in NYSDEC Draft DER-10 and the guidelines provided by NYSDEC.

Site management activities, reporting, and IC/EC certification will be scheduled on an annual certification basis. A Periodic Review Report (PRR) will be submitted to the NYSDEC beginning 16 months after the Certificate of Completion is issued. After the initial PRR, the next PRR will be submitted annually to the NYSDEC. The SMP will include a monitoring plan for the operation of the SSDS and groundwater to evaluate Site-wide performance of the remedy.

## 8.0 CONSTRUCTION COMPLETION REPORT

A IRM CCR will be prepared to document the startup and commissioning of the SSDS. The IRM CCR provides the documentation that the remedial work required under this RA AAR has been completed and has been performed in compliance with this plan. The IRM CCR will include, but it is not limited to, the following:

- SSDS startup sampling data
- AERSCREEN model results
- Standardized SSDS inspection forms (including sub-slab differential measurements)
- Operation and Maintenance procedures
- As-built drawings
- Permits

## 8.1 CERTIFICATIONS

The following certification will appear in front of the Executive Summary of the IRM CCR. The certification will be signed by the Remedial Engineer, James Napoli, who is a Professional Engineer registered in New York State. This certification will be appropriately signed and stamped. The certification will include the following statements:

I _____certify that I am currently a NYS registered professional engineer, I had primary direct responsibility for the implementation of the subject construction program, and I certify that the Remedial Design was implemented and that all construction activities were completed in substantial conformance with the DER-approved Remedial Design.

I certify that all use restrictions, institutional controls, engineering controls and/or any operation and maintenance requirements applicable to the site are contained in an environmental easement created and recorded pursuant to ECL 71-3605 and that any affected local governments, as defined in ECL 71-3603, have been notified that such easement has been recorded.

I certify that a SMP has been submitted for the continual and proper operation, maintenance, and monitoring of any engineering controls employed at the site including the proper maintenance of any remaining monitoring wells, and that such plan has been approved by the Department.

I certify that all documents generated in support of this report have been submitted in accordance with the DER's electronic submission protocols and have been accepted by the Department.

I certify that all data generated in support of this report have been submitted in accordance with the Department's electronic data deliverable and have been accepted by the Department.

I certify that all information and statements in this certification form are true. I understand that a false statement made herein is punishable as a Class “A” misdemeanor, pursuant to Section 210.45 of the Penal Law. I, James Napoli, of JLN Engineering Services, PLLC, am certifying as Owner’s Designated Site Representative for the site.

# TABLES

Project: 2847 - 5 Westchester Plaza
NYSDEC Site #: C360205
QEP: Robert Edgar

# Table 1. Vapor Intrusion Analytical Data Summary
## Volatile Organic Compounds

PEAK ENVIRONMENTAL
A Nova Group, GBC Company

| Vapor Sample Identifier / Laboratory Identifier / Sample Date / Sample Type | Chemical Abstracts Service (CAS) Number | NY-IAC-A | NY-IAC-B | NY-IAC-C | NY-SSC-A | NY-SSC-B | NY-SSC-C | IA-1 L2215549-01 3/24/2022 Indoor Air | | IA-2 L2215549-02 3/24/2022 Indoor Air | | IA-3 L2215549-03 3/24/2022 Indoor Air | | IA-4 L2215549-04 3/24/2022 Indoor Air | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Result | RL | Result | RL | Result | RL | Result | RL |
| Dichlorodifluoromethane | 75-71-8 | NS | NS | NS | NS | NS | NS | 2.52 | 0.989 | 2.62 | 0.989 | 2.4 | 0.989 | 2.49 | 0.989 |
| Chloromethane | 74-87-3 | NS | NS | NS | NS | NS | NS | 1.41 | 0.413 | 1.5 | 0.413 | 1.35 | 0.413 | 1.41 | 0.413 |
| Freon-114 | 76-14-2 | NS | NS | NS | NS | NS | NS | ND | 1.4 | ND | 1.4 | ND | 1.4 | ND | 1.4 |
| Vinyl chloride | 75-01-4 | NS | NS | 0.2 | NS | NS | 6 | ND | 0.051 | ND | 0.051 | ND | 0.051 | ND | 0.051 |
| 1,3-Butadiene | 106-99-0 | NS | NS | NS | NS | NS | NS | ND | 0.442 | ND | 0.442 | ND | 0.442 | ND | 0.442 |
| Bromomethane | 74-83-9 | NS | NS | NS | NS | NS | NS | ND | 0.777 | ND | 0.777 | ND | 0.777 | ND | 0.777 |
| Chloroethane | 75-00-3 | NS | NS | NS | NS | NS | NS | ND | 0.528 | ND | 0.528 | ND | 0.528 | ND | 0.528 |
| Ethanol | 64-17-5 | NS | NS | NS | NS | NS | NS | 115 | 9.42 | 56 | 9.42 | 127 | 9.42 | 130 | 9.42 |
| Vinyl bromide | 593-60-2 | NS | NS | NS | NS | NS | NS | ND | 0.874 | ND | 0.874 | ND | 0.874 | ND | 0.874 |
| Acetone | 67-64-1 | NS | NS | NS | NS | NS | NS | 10.6 | 2.38 | 8.67 | 2.38 | 134 | 2.38 | 27.1 | 2.38 |
| Trichlorofluoromethane | 75-69-4 | NS | NS | NS | NS | NS | NS | 1.38 | 1.12 | 1.35 | 1.12 | 1.27 | 1.12 | 1.31 | 1.12 |
| Isopropanol | 67-63-0 | NS | NS | NS | NS | NS | NS | 108 | 1.23 | 123 | 1.23 | 78.7 | 1.23 | 49.2 | 1.23 |
| 1,1-Dichloroethene | 75-35-4 | 0.2 | NS | NS | 6 | NS | NS | ND | 0.079 | ND | 0.079 | ND | 0.079 | ND | 0.079 |
| Tertiary butyl Alcohol | 75-65-0 | NS | NS | NS | NS | NS | NS | ND | 1.52 | ND | 1.52 | ND | 1.52 | ND | 1.52 |
| Methylene chloride | 75-09-2 | NS | 3 | NS | NS | 100 | NS | ND | 1.74 | 2.37 | 1.74 | 57 | 1.74 | 6.53 | 1.74 |
| 3-Chloropropene | 107-05-1 | NS | NS | NS | NS | NS | NS | ND | 0.626 | ND | 0.626 | ND | 0.626 | ND | 0.626 |
| Carbon disulfide | 75-15-0 | NS | NS | NS | NS | NS | NS | ND | 0.623 | ND | 0.623 | ND | 0.623 | ND | 0.623 |
| Freon-113 | 76-13-1 | NS | NS | NS | NS | NS | NS | ND | 1.53 | ND | 1.53 | ND | 1.53 | ND | 1.53 |
| trans-1,2-Dichloroethene | 156-60-5 | NS | NS | NS | NS | NS | NS | ND | 0.793 | ND | 0.793 | ND | 0.793 | ND | 0.793 |
| 1,1-Dichloroethane | 75-34-3 | NS | NS | NS | NS | NS | NS | ND | 0.809 | ND | 0.809 | ND | 0.809 | ND | 0.809 |
| Methyl tert butyl ether | 1634-04-4 | NS | NS | NS | NS | NS | NS | ND | 0.721 | ND | 0.721 | ND | 0.721 | ND | 0.721 |
| 2-Butanone | 78-93-3 | NS | NS | NS | NS | NS | NS | 1.66 | 1.47 | 1.67 | 1.47 | 13.4 | 1.47 | 9.5 | 1.47 |
| cis-1,2-Dichloroethene | 156-59-2 | 0.2 | NS | NS | 6 | NS | NS | ND | 0.079 | ND | 0.079 | ND | 0.079 | ND | 0.079 |
| Ethyl Acetate | 141-78-6 | NS | NS | NS | NS | NS | NS | ND | 1.8 | ND | 1.8 | 2.49 | 1.8 | ND | 1.8 |
| Chloroform | 67-66-3 | NS | NS | NS | NS | NS | NS | ND | 0.977 | ND | 0.977 | ND | 0.977 | ND | 0.977 |
| Tetrahydrofuran | 109-99-9 | NS | NS | NS | NS | NS | NS | ND | 1.47 | ND | 1.47 | 2.16 | 1.47 | 1.91 | 1.47 |
| 1,2-Dichloroethane | 107-06-2 | NS | NS | NS | NS | NS | NS | ND | 0.809 | ND | 0.809 | ND | 0.809 | ND | 0.809 |
| n-Hexane | 110-54-3 | NS | NS | NS | NS | NS | NS | ND | 0.705 | ND | 0.705 | 4.3 | 0.705 | 0.754 | 0.705 |
| 1,1,1-Trichloroethane | 71-55-6 | NS | 3 | NS | NS | 100 | NS | ND | 0.109 | ND | 0.109 | 1.98 | 0.109 | 0.207 | 0.109 |
| Benzene | 71-43-2 | NS | NS | NS | NS | NS | NS | 0.815 | 0.639 | 0.811 | 0.639 | 1.28 | 0.639 | ND | 0.639 |
| Carbon tetrachloride | 56-23-5 | 0.2 | NS | NS | 6 | NS | NS | 0.497 | 0.126 | 0.503 | 0.126 | 0.497 | 0.126 | 0.472 | 0.126 |
| Cyclohexane | 110-82-7 | NS | NS | NS | NS | NS | NS | ND | 0.688 | ND | 0.688 | 1.61 | 0.688 | ND | 0.688 |
| 1,2-Dichloropropane | 78-87-5 | NS | NS | NS | NS | NS | NS | ND | 0.924 | ND | 0.924 | ND | 0.924 | ND | 0.924 |
| Bromodichloromethane | 75-27-4 | NS | NS | NS | NS | NS | NS | ND | 1.34 | ND | 1.34 | ND | 1.34 | ND | 1.34 |
| 1,4-Dioxane | 123-91-1 | NS | NS | NS | NS | NS | NS | ND | 0.721 | ND | 0.721 | ND | 0.721 | ND | 0.721 |
| Trichloroethene | 79-01-6 | 0.2 | NS | NS | 6 | NS | NS | ND | 0.107 | ND | 0.107 | ND | 0.107 | 0.403 | 0.107 |
| 2,2,4-Trimethylpentane | 540-84-1 | NS | NS | NS | NS | NS | NS | ND | 0.934 | ND | 0.934 | 1.57 | 0.934 | ND | 0.934 |
| Heptane | 142-82-5 | NS | NS | NS | NS | NS | NS | ND | 0.82 | ND | 0.82 | 3.79 | 0.82 | ND | 0.82 |
| cis-1,3-Dichloropropene | 10061-01-5 | NS | NS | NS | NS | NS | NS | ND | 0.908 | ND | 0.908 | ND | 0.908 | ND | 0.908 |
| 4-Methyl-2-pentanone | 108-10-1 | NS | NS | NS | NS | NS | NS | ND | 2.05 | ND | 2.05 | 3.95 | 2.05 | ND | 2.05 |
| trans-1,3-Dichloropropene | 10061-02-6 | NS | NS | NS | NS | NS | NS | ND | 0.908 | ND | 0.908 | ND | 0.908 | ND | 0.908 |
| 1,1,2-Trichloroethane | 79-00-5 | NS | NS | NS | NS | NS | NS | ND | 1.09 | ND | 1.09 | ND | 1.09 | ND | 1.09 |
| Toluene | 108-88-3 | NS | NS | NS | NS | NS | NS | 1.53 | 0.754 | 1.35 | 0.754 | 24 | 0.754 | 4.26 | 0.754 |
| 2-Hexanone | 591-78-6 | NS | NS | NS | NS | NS | NS | ND | 0.82 | ND | 0.82 | ND | 0.82 | ND | 0.82 |
| Dibromochloromethane | 124-48-1 | NS | NS | NS | NS | NS | NS | ND | 1.7 | ND | 1.7 | ND | 1.7 | ND | 1.7 |
| 1,2-Dibromoethane | 106-93-4 | NS | NS | NS | NS | NS | NS | ND | 1.54 | ND | 1.54 | ND | 1.54 | ND | 1.54 |
| Tetrachloroethene | 127-18-4 | NS | 3 | NS | NS | 100 | NS | 0.17 | 0.136 | 0.149 | 0.136 | 3.47 | 0.136 | 0.868 | 0.136 |
| Chlorobenzene | 108-90-7 | NS | NS | NS | NS | NS | NS | ND | 0.921 | ND | 0.921 | ND | 0.921 | ND | 0.921 |
| Ethylbenzene | 100-41-4 | NS | NS | NS | NS | NS | NS | ND | 0.869 | ND | 0.869 | 2.48 | 0.869 | ND | 0.869 |
| p/m-Xylene | 179601-23-1 | NS | NS | NS | NS | NS | NS | ND | 1.74 | ND | 1.74 | 10.9 | 1.74 | ND | 1.74 |
| Bromoform | 75-25-2 | NS | NS | NS | NS | NS | NS | ND | 2.07 | ND | 2.07 | ND | 2.07 | ND | 2.07 |
| Styrene | 100-42-5 | NS | NS | NS | NS | NS | NS | ND | 0.852 | ND | 0.852 | 4.81 | 0.852 | ND | 0.852 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | NS | NS | NS | NS | NS | NS | ND | 1.37 | ND | 1.37 | ND | 1.37 | ND | 1.37 |
| o-Xylene | 95-47-6 | NS | NS | NS | NS | NS | NS | ND | 0.869 | ND | 0.869 | 3.61 | 0.869 | ND | 0.869 |
| 4-Ethyltoluene | 622-96-8 | NS | NS | NS | NS | NS | NS | ND | 0.983 | ND | 0.983 | ND | 0.983 | ND | 0.983 |
| 1,3,5-Trimethylbenzene | 108-67-8 | NS | NS | NS | NS | NS | NS | ND | 0.983 | ND | 0.983 | 1.01 | 0.983 | ND | 0.983 |
| 1,2,4-Trimethylbenzene | 95-63-6 | NS | NS | NS | NS | NS | NS | ND | 0.983 | ND | 0.983 | 3.48 | 0.983 | ND | 0.983 |
| Benzyl chloride | 100-44-7 | NS | NS | NS | NS | NS | NS | ND | 1.04 | ND | 1.04 | ND | 1.04 | ND | 1.04 |
| 1,3-Dichlorobenzene | 541-73-1 | NS | NS | NS | NS | NS | NS | ND | 1.2 | ND | 1.2 | ND | 1.2 | ND | 1.2 |
| 1,4-Dichlorobenzene | 106-46-7 | NS | NS | NS | NS | NS | NS | ND | 1.2 | ND | 1.2 | ND | 1.2 | ND | 1.2 |
| 1,2-Dichlorobenzene | 95-50-1 | NS | NS | NS | NS | NS | NS | ND | 1.2 | ND | 1.2 | ND | 1.2 | ND | 1.2 |
| 1,2,4-Trichlorobenzene | 120-82-1 | NS | NS | NS | NS | NS | NS | ND | 1.48 | ND | 1.48 | ND | 1.48 | ND | 1.48 |
| Hexachlorobutadiene | 87-68-3 | NS | NS | NS | NS | NS | NS | ND | 2.13 | ND | 2.13 | ND | 2.13 | ND | 2.13 |

**Notes:**

[a] - The concentrations of each isomer are added if multiple isomers are present and the results compared to the total screening level.

[b] - Levels are the lower value generated using a factor of 100x for carcinogens and a factor of 2x for noncarcinogens using the Table A-4 health-based values.

[c] - Value is based on the higher analytical reporting limit.

NS - No Standard

Q - Laboratory Qualifier

RL - Reporting Limit

NA- Not Analyzed

ND - analyte was analyzed for but not detected

NY-IAC-A: New York DOH Matrix A Indoor Air Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.

NY-IAC-B: New York DOH Matrix B Indoor Air Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.

NY-IAC-C: New York DOH Matrix C Indoor Air Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.

NY-SSC-A: New York DOH Matrix A Sub-slab Vapor Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.

NY-SSC-B: New York DOH Matrix B Sub-slab Vapor Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.

NY-SSC-C: New York DOH Matrix C Sub-slab Vapor Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.

** - contaminant was not detected at a concentration greater than the laboratory reporting limit, however the laboratory reporting limit exceeds the applicable standards

Checked by: TF
Date: 12/6/22

Project: 2847 - 5 Westchester Plaza
NYSDEC Site #: C360205
QEP: Robert Edgar

# Table 1. Vapor Intrusion Analytical Data Summary
## Volatile Organic Compounds

PEAK ENVIRONMENTAL
A Nova Group, GBC Company

| Vapor Sample Identifier / Laboratory Identifier / Sample Date / Sample Type | Chemical Abstracts Service (CAS) Number | NY-IAC-A | NY-IAC-B | NY-IAC-C | NY-SSC-A | NY-SSC-B | NY-SSC-C | IA-5 L2215549-05 3/24/2022 Indoor Air | | IA-6 L2215549-06 3/24/2022 Indoor Air | | IA-7 L2215549-07 3/24/2022 Indoor Air | | AA-1 L2215549-08 3/24/2022 Ambient Air | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Result Q | RL | Result Q | RL | Result Q | RL | Result Q | RL |
| Dichlorodifluoromethane | 75-71-8 | NS | NS | NS | NS | NS | NS | 2.62 | 0.989 | 2.5 | 0.989 | 2.66 | 0.989 | 2.48 | 0.989 |
| Chloromethane | 74-87-3 | NS | NS | NS | NS | NS | NS | 1.51 | 0.413 | 1.4 | 0.413 | 1.58 | 0.413 | 1.37 | 0.413 |
| Freon-114 | 76-14-2 | NS | NS | NS | NS | NS | NS | ND | 1.4 | ND | 1.4 | ND | 1.4 | ND | 1.4 |
| Vinyl chloride | 75-01-4 | NS | NS | 0.2 | NS | NS | 6 | ND | 0.051 | ND | 0.051 | ND | 0.051 | ND | 0.051 |
| 1,3-Butadiene | 106-99-0 | NS | NS | NS | NS | NS | NS | ND | 0.442 | ND | 0.442 | ND | 0.442 | ND | 0.442 |
| Bromomethane | 74-83-9 | NS | NS | NS | NS | NS | NS | ND | 0.777 | ND | 0.777 | ND | 0.777 | ND | 0.777 |
| Chloroethane | 75-00-3 | NS | NS | NS | NS | NS | NS | ND | 0.528 | ND | 0.528 | ND | 0.528 | ND | 0.528 |
| Ethanol | 64-17-5 | NS | NS | NS | NS | NS | NS | 127 | 9.42 | 126 | 9.42 | 185 | 9.42 | ND | 9.42 |
| Vinyl bromide | 593-60-2 | NS | NS | NS | NS | NS | NS | ND | 0.874 | ND | 0.874 | ND | 0.874 | ND | 0.874 |
| Acetone | 67-64-1 | NS | NS | NS | NS | NS | NS | 28.3 | 2.38 | 24.9 | 2.38 | 53.4 | 2.38 | 7.39 | 2.38 |
| Trichlorofluoromethane | 75-69-4 | NS | NS | NS | NS | NS | NS | 1.35 | 1.12 | 1.31 | 1.12 | 1.42 | 1.12 | 1.33 | 1.12 |
| Isopropanol | 67-63-0 | NS | NS | NS | NS | NS | NS | 54.3 | 1.23 | 10.3 | 1.23 | 20.9 | 1.23 | ND | 1.23 |
| 1,1-Dichloroethene | 75-35-4 | 0.2 | NS | NS | 6 | NS | NS | ND | 0.079 | ND | 0.079 | ND | 0.079 | ND | 0.079 |
| Tertiary butyl Alcohol | 75-65-0 | NS | NS | NS | NS | NS | NS | ND | 1.52 | ND | 1.52 | ND | 1.52 | ND | 1.52 |
| Methylene chloride | 75-09-2 | NS | 3 | NS | NS | 100 | NS | 7.54 | 1.74 | 2.41 | 1.74 | 22.1 | 1.74 | ND | 1.74 |
| 3-Chloropropene | 107-05-1 | NS | NS | NS | NS | NS | NS | ND | 0.626 | ND | 0.626 | ND | 0.626 | ND | 0.626 |
| Carbon disulfide | 75-15-0 | NS | NS | NS | NS | NS | NS | ND | 0.623 | 2.36 | 0.623 | ND | 0.623 | ND | 0.623 |
| Freon-113 | 76-13-1 | NS | NS | NS | NS | NS | NS | ND | 1.53 | ND | 1.53 | ND | 1.53 | ND | 1.53 |
| trans-1,2-Dichloroethene | 156-60-5 | NS | NS | NS | NS | NS | NS | ND | 0.793 | ND | 0.793 | ND | 0.793 | ND | 0.793 |
| 1,1-Dichloroethane | 75-34-3 | NS | NS | NS | NS | NS | NS | ND | 0.809 | ND | 0.809 | ND | 0.809 | ND | 0.809 |
| Methyl tert butyl ether | 1634-04-4 | NS | NS | NS | NS | NS | NS | ND | 0.721 | ND | 0.721 | ND | 0.721 | ND | 0.721 |
| 2-Butanone | 78-93-3 | NS | NS | NS | NS | NS | NS | 20.9 | 1.47 | 2.22 | 1.47 | 5.13 | 1.47 | ND | 1.47 |
| cis-1,2-Dichloroethene | 156-59-2 | 0.2 | NS | NS | 6 | NS | NS | ND | 0.079 | ND | 0.079 | ND | 0.079 | ND | 0.079 |
| Ethyl Acetate | 141-78-6 | NS | NS | NS | NS | NS | NS | ND | 1.8 | ND | 1.8 | 2.08 | 1.8 | ND | 1.8 |
| Chloroform | 67-66-3 | NS | NS | NS | NS | NS | NS | ND | 0.977 | ND | 0.977 | ND | 0.977 | ND | 0.977 |
| Tetrahydrofuran | 109-99-9 | NS | NS | NS | NS | NS | NS | ND | 1.47 | ND | 1.47 | ND | 1.47 | ND | 1.47 |
| 1,2-Dichloroethane | 107-06-2 | NS | NS | NS | NS | NS | NS | ND | 0.809 | ND | 0.809 | ND | 0.809 | ND | 0.809 |
| n-Hexane | 110-54-3 | NS | NS | NS | NS | NS | NS | 0.839 | 0.705 | 0.754 | 0.705 | 7.58 | 0.705 | ND | 0.705 |
| 1,1,1-Trichloroethane | 71-55-6 | NS | 3 | NS | NS | 100 | NS | 0.224 | 0.109 | ND | 0.109 | ND | 0.109 | ND | 0.109 |
| Benzene | 71-43-2 | NS | NS | NS | NS | NS | NS | 0.652 | 0.639 | ND | 0.639 | 2.19 | 0.639 | ND | 0.639 |
| Carbon tetrachloride | 56-23-5 | 0.2 | NS | NS | 6 | NS | NS | 0.497 | 0.126 | 0.478 | 0.126 | 0.465 | 0.126 | 0.503 | 0.126 |
| Cyclohexane | 110-82-7 | NS | NS | NS | NS | NS | NS | ND | 0.688 | ND | 0.688 | 3.21 | 0.688 | ND | 0.688 |
| 1,2-Dichloropropane | 78-87-5 | NS | NS | NS | NS | NS | NS | ND | 0.924 | ND | 0.924 | ND | 0.924 | ND | 0.924 |
| Bromodichloromethane | 75-27-4 | NS | NS | NS | NS | NS | NS | ND | 1.34 | ND | 1.34 | ND | 1.34 | ND | 1.34 |
| 1,4-Dioxane | 123-91-1 | NS | NS | NS | NS | NS | NS | ND | 0.721 | ND | 0.721 | ND | 0.721 | ND | 0.721 |
| Trichloroethene | 79-01-6 | 0.2 | NS | NS | 6 | NS | NS | 0.548 | 0.107 | 0.14 | 0.107 | 0.193 | 0.107 | ND | 0.107 |
| 2,2,4-Trimethylpentane | 540-84-1 | NS | NS | NS | NS | NS | NS | ND | 0.934 | ND | 0.934 | 5.7 | 0.934 | ND | 0.934 |
| Heptane | 142-82-5 | NS | NS | NS | NS | NS | NS | 0.906 | 0.82 | 1.08 | 0.82 | 5.78 | 0.82 | ND | 0.82 |
| cis-1,3-Dichloropropene | 10061-01-5 | NS | NS | NS | NS | NS | NS | ND | 0.908 | ND | 0.908 | ND | 0.908 | ND | 0.908 |
| 4-Methyl-2-pentanone | 108-10-1 | NS | NS | NS | NS | NS | NS | ND | 2.05 | ND | 2.05 | ND | 2.05 | ND | 2.05 |
| trans-1,3-Dichloropropene | 10061-02-6 | NS | NS | NS | NS | NS | NS | ND | 0.908 | ND | 0.908 | ND | 0.908 | ND | 0.908 |
| 1,1,2-Trichloroethane | 79-00-5 | NS | NS | NS | NS | NS | NS | ND | 1.09 | ND | 1.09 | ND | 1.09 | ND | 1.09 |
| Toluene | 108-88-3 | NS | NS | NS | NS | NS | NS | 4.64 | 0.754 | 3.57 | 0.754 | 19.4 | 0.754 | ND | 0.754 |
| 2-Hexanone | 591-78-6 | NS | NS | NS | NS | NS | NS | ND | 0.82 | ND | 0.82 | ND | 0.82 | ND | 0.82 |
| Dibromochloromethane | 124-48-1 | NS | NS | NS | NS | NS | NS | ND | 1.7 | ND | 1.7 | ND | 1.7 | ND | 1.7 |
| 1,2-Dibromoethane | 106-93-4 | NS | NS | NS | NS | NS | NS | ND | 1.54 | ND | 1.54 | ND | 1.54 | ND | 1.54 |
| Tetrachloroethene | 127-18-4 | NS | 3 | NS | NS | 100 | NS | 0.976 | 0.136 | 0.325 | 0.136 | 0.468 | 0.136 | ND | 0.136 |
| Chlorobenzene | 108-90-7 | NS | NS | NS | NS | NS | NS | ND | 0.921 | ND | 0.921 | ND | 0.921 | ND | 0.921 |
| Ethylbenzene | 100-41-4 | NS | NS | NS | NS | NS | NS | ND | 0.869 | ND | 0.869 | 4.34 | 0.869 | ND | 0.869 |
| p/m-Xylene | 179601-23-1 | NS | NS | NS | NS | NS | NS | 1.8 | 1.74 | ND | 1.74 | 16.4 | 1.74 | ND | 1.74 |
| Bromoform | 75-25-2 | NS | NS | NS | NS | NS | NS | ND | 2.07 | ND | 2.07 | ND | 2.07 | ND | 2.07 |
| Styrene | 100-42-5 | NS | NS | NS | NS | NS | NS | ND | 0.852 | ND | 0.852 | ND | 0.852 | ND | 0.852 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | NS | NS | NS | NS | NS | NS | ND | 1.37 | ND | 1.37 | ND | 1.37 | ND | 1.37 |
| o-Xylene | 95-47-6 | NS | NS | NS | NS | NS | NS | ND | 0.869 | ND | 0.869 | 5.34 | 0.869 | ND | 0.869 |
| 4-Ethyltoluene | 622-96-8 | NS | NS | NS | NS | NS | NS | ND | 0.983 | ND | 0.983 | ND | 0.983 | ND | 0.983 |
| 1,3,5-Trimethylbenzene | 108-67-8 | NS | NS | NS | NS | NS | NS | ND | 0.983 | ND | 0.983 | 1.31 | 0.983 | ND | 0.983 |
| 1,2,4-Trimethylbenzene | 95-63-6 | NS | NS | NS | NS | NS | NS | ND | 0.983 | ND | 0.983 | 4.32 | 0.983 | ND | 0.983 |
| Benzyl chloride | 100-44-7 | NS | NS | NS | NS | NS | NS | ND | 1.04 | ND | 1.04 | ND | 1.04 | ND | 1.04 |
| 1,3-Dichlorobenzene | 541-73-1 | NS | NS | NS | NS | NS | NS | ND | 1.2 | ND | 1.2 | ND | 1.2 | ND | 1.2 |
| 1,4-Dichlorobenzene | 106-46-7 | NS | NS | NS | NS | NS | NS | ND | 1.2 | ND | 1.2 | ND | 1.2 | ND | 1.2 |
| 1,2-Dichlorobenzene | 95-50-1 | NS | NS | NS | NS | NS | NS | ND | 1.2 | ND | 1.2 | ND | 1.2 | ND | 1.2 |
| 1,2,4-Trichlorobenzene | 120-82-1 | NS | NS | NS | NS | NS | NS | ND | 1.48 | ND | 1.48 | ND | 1.48 | ND | 1.48 |
| Hexachlorobutadiene | 87-68-3 | NS | NS | NS | NS | NS | NS | ND | 2.13 | ND | 2.13 | ND | 2.13 | ND | 2.13 |

**Notes:**

[a] - The concentrations of each isomer are added if multiple isomers are present and the results compared to the total screening level.

[b] - Levels are the lower value generated using a factor of 100x for carcinogens and a factor of 2x for noncarcinogens using the Table A-4 health-based values.

[c] - Value is based on the higher analytical reporting limit.

NS - No Standard

Q - Laboratory Qualifier

RL - Reporting Limit

NA- Not Analyzed

ND - analyte was analyzed for but not detected

NY-IAC-A: New York DOH Matrix A Indoor Air Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.

NY-IAC-B: New York DOH Matrix B Indoor Air Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.

NY-IAC-C: New York DOH Matrix C Indoor Air Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.

NY-SSC-A: New York DOH Matrix A Sub-slab Vapor Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.

NY-SSC-B: New York DOH Matrix B Sub-slab Vapor Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.

NY-SSC-C: New York DOH Matrix C Sub-slab Vapor Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.

** - contaminant was not detected at a concentration greater than the laboratory reporting limit, however the laboratory reporting limit exceeds the applicable standards

Checked by: TF
Date: 12/6/22

Project: 2847 - 5 Westchester Plaza
NYSDEC Site #: C360205
QEP: Robert Edgar

# Table 1. Vapor Intrusion Analytical Data Summary
## Volatile Organic Compounds

PEAK ENVIRONMENTAL
A Nova Group, GBC Company

| Vapor Sample Identifier / Laboratory Identifier / Sample Date / Sample Type | Chemical Abstracts Service (CAS) Number | NY-IAC-A | NY-IAC-B | NY-IAC-C | NY-SSC-A | NY-SSC-B | NY-SSC-C | SS-1 L2215549-09 3/24/2022 Sub-Slab | | SS-2 L2215549-10 3/24/2022 Sub-Slab | | SS-3 L2215549-11 3/24/2022 Sub-Slab | | SS-4 L2215549-12 3/24/2022 Sub-Slab | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Result | Q RL | Result | Q RL | Result | Q RL | Result | Q RL |
| Dichlorodifluoromethane | 75-71-8 | NS | NS | NS | NS | NS | NS | 2.58 | 0.989 | 2.4 | 0.989 | 2.63 | 0.989 | 2.53 | 0.989 |
| Chloromethane | 74-87-3 | NS | NS | NS | NS | NS | NS | 0.886 | 0.413 | 0.448 | 0.413 | ND | 0.413 | 0.564 | 0.413 |
| Freon-114 | 76-14-2 | NS | NS | NS | NS | NS | NS | ND | 1.4 | ND | 1.4 | ND | 1.4 | ND | 1.4 |
| Vinyl chloride | 75-01-4 | NS | NS | 0.2 | NS | NS | 6 | ND | 0.511 | ND | 0.511 | ND | 0.511 | ND | 0.511 |
| 1,3-Butadiene | 106-99-0 | NS | NS | NS | NS | NS | NS | ND | 0.442 | ND | 0.442 | ND | 0.442 | ND | 0.442 |
| Bromomethane | 74-83-9 | NS | NS | NS | NS | NS | NS | ND | 0.777 | ND | 0.777 | ND | 0.777 | ND | 0.777 |
| Chloroethane | 75-00-3 | NS | NS | NS | NS | NS | NS | ND | 0.528 | ND | 0.528 | ND | 0.528 | ND | 0.528 |
| Ethanol | 64-17-5 | NS | NS | NS | NS | NS | NS | 32.4 | 9.42 | 97.6 | 9.42 | 12.5 | 9.42 | 92.1 | 9.42 |
| Vinyl bromide | 593-60-2 | NS | NS | NS | NS | NS | NS | ND | 0.874 | ND | 0.874 | ND | 0.874 | ND | 0.874 |
| Acetone | 67-64-1 | NS | NS | NS | NS | NS | NS | 127 | 2.38 | 328 | 2.38 | 52.3 | 2.38 | 570 | 2.38 |
| Trichlorofluoromethane | 75-69-4 | NS | NS | NS | NS | NS | NS | 3.91 | 1.12 | 3.85 | 1.12 | 5.34 | 1.12 | 2.56 | 1.12 |
| Isopropanol | 67-63-0 | NS | NS | NS | NS | NS | NS | 40.6 | 1.23 | 134 | 1.23 | 8.92 | 1.23 | 30.5 | 1.23 |
| 1,1-Dichloroethene | 75-35-4 | 0.2 | NS | NS | 6 | NS | NS | ND | 0.793 | ND | 0.793 | ND | 0.793 | ND | 0.793 |
| Tertiary butyl Alcohol | 75-65-0 | NS | NS | NS | NS | NS | NS | 15.3 | 1.52 | 6.12 | 1.52 | ND | 1.52 | 3.88 | 1.52 |
| Methylene chloride | 75-09-2 | NS | 3 | NS | NS | 100 | NS | 2.52 | 1.74 | 2.5 | 1.74 | ND | 1.74 | 2.07 | 1.74 |
| 3-Chloropropene | 107-05-1 | NS | NS | NS | NS | NS | NS | ND | 0.626 | ND | 0.626 | ND | 0.626 | ND | 0.626 |
| Carbon disulfide | 75-15-0 | NS | NS | NS | NS | NS | NS | 2.09 | 0.623 | 1.18 | 0.623 | 0.922 | 0.623 | 2.33 | 0.623 |
| Freon-113 | 76-13-1 | NS | NS | NS | NS | NS | NS | 2.45 | 1.53 | 3.69 | 1.53 | 4.84 | 1.53 | 2.56 | 1.53 |
| trans-1,2-Dichloroethene | 156-60-5 | NS | NS | NS | NS | NS | NS | ND | 0.793 | ND | 0.793 | ND | 0.793 | ND | 0.793 |
| 1,1-Dichloroethane | 75-34-3 | NS | NS | NS | NS | NS | NS | ND | 0.809 | ND | 0.809 | ND | 0.809 | ND | 0.809 |
| Methyl tert butyl ether | 1634-04-4 | NS | NS | NS | NS | NS | NS | ND | 0.721 | ND | 0.721 | ND | 0.721 | ND | 0.721 |
| 2-Butanone | 78-93-3 | NS | NS | NS | NS | NS | NS | 10.2 | 1.47 | 13.6 | 1.47 | 4.22 | 1.47 | 24.2 | 1.47 |
| cis-1,2-Dichloroethene | 156-59-2 | 0.2 | NS | NS | 6 | NS | NS | ND | 0.793 | ND | 0.793 | ND | 0.793 | ND | 0.793 |
| Ethyl Acetate | 141-78-6 | NS | NS | NS | NS | NS | NS | ND | 1.8 | ND | 1.8 | ND | 1.8 | ND | 1.8 |
| Chloroform | 67-66-3 | NS | NS | NS | NS | NS | NS | ND | 0.977 | ND | 0.977 | ND | 0.977 | ND | 0.977 |
| Tetrahydrofuran | 109-99-9 | NS | NS | NS | NS | NS | NS | 3.27 | 1.47 | ND | 1.47 | ND | 1.47 | 1.5 | 1.47 |
| 1,2-Dichloroethane | 107-06-2 | NS | NS | NS | NS | NS | NS | ND | 0.809 | ND | 0.809 | ND | 0.809 | ND | 0.809 |
| n-Hexane | 110-54-3 | NS | NS | NS | NS | NS | NS | ND | 0.705 | 0.878 | 0.705 | ND | 0.705 | 5.46 | 0.705 |
| 1,1,1-Trichloroethane | 71-55-6 | NS | 3 | NS | NS | 100 | NS | 4.82 | 1.09 | 13.3 | 1.09 | 22.6 | 1.09 | 1.68 | 1.09 |
| Benzene | 71-43-2 | NS | NS | NS | NS | NS | NS | 0.811 | 0.639 | ND | 0.639 | ND | 0.639 | 1.32 | 0.639 |
| Carbon tetrachloride | 56-23-5 | 0.2 | NS | NS | 6 | NS | NS | ND | 1.26 | ND | 1.26 | ND | 1.26 | ND | 1.26 |
| Cyclohexane | 110-82-7 | NS | NS | NS | NS | NS | NS | ND | 0.688 | ND | 0.688 | ND | 0.688 | ND | 0.688 |
| 1,2-Dichloropropane | 78-87-5 | NS | NS | NS | NS | NS | NS | ND | 0.924 | ND | 0.924 | ND | 0.924 | ND | 0.924 |
| Bromodichloromethane | 75-27-4 | NS | NS | NS | NS | NS | NS | ND | 1.34 | ND | 1.34 | ND | 1.34 | ND | 1.34 |
| 1,4-Dioxane | 123-91-1 | NS | NS | NS | NS | NS | NS | 15.7 | 0.721 | 1.83 | 0.721 | ND | 0.721 | 5.12 | 0.721 |
| Trichloroethene | 79-01-6 | 0.2 | NS | NS | 6 | NS | NS | ND | 1.07 | ND | 1.07 | ND | 1.07 | ND | 1.07 |
| 2,2,4-Trimethylpentane | 540-84-1 | NS | NS | NS | NS | NS | NS | ND | 0.934 | ND | 0.934 | ND | 0.934 | ND | 0.934 |
| Heptane | 142-82-5 | NS | NS | NS | NS | NS | NS | ND | 0.82 | 1.28 | 0.82 | ND | 0.82 | 3.52 | 0.82 |
| cis-1,3-Dichloropropene | 10061-01-5 | NS | NS | NS | NS | NS | NS | ND | 0.908 | ND | 0.908 | ND | 0.908 | ND | 0.908 |
| 4-Methyl-2-pentanone | 108-10-1 | NS | NS | NS | NS | NS | NS | 5.66 | 2.05 | 3.64 | 2.05 | ND | 2.05 | 19.5 | 2.05 |
| trans-1,3-Dichloropropene | 10061-02-6 | NS | NS | NS | NS | NS | NS | ND | 0.908 | ND | 0.908 | ND | 0.908 | ND | 0.908 |
| 1,1,2-Trichloroethane | 79-00-5 | NS | NS | NS | NS | NS | NS | ND | 1.09 | ND | 1.09 | ND | 1.09 | ND | 1.09 |
| Toluene | 108-88-3 | NS | NS | NS | NS | NS | NS | 1.55 | 0.754 | 1.13 | 0.754 | 0.976 | 0.754 | 2.46 | 0.754 |
| 2-Hexanone | 591-78-6 | NS | NS | NS | NS | NS | NS | ND | 0.82 | 1.15 | 0.82 | ND | 0.82 | 3.43 | 0.82 |
| Dibromochloromethane | 124-48-1 | NS | NS | NS | NS | NS | NS | ND | 1.7 | ND | 1.7 | ND | 1.7 | ND | 1.7 |
| 1,2-Dibromoethane | 106-93-4 | NS | NS | NS | NS | NS | NS | ND | 1.54 | ND | 1.54 | ND | 1.54 | ND | 1.54 |
| Tetrachloroethene | 127-18-4 | NS | 3 | NS | NS | 100 | NS | 133 | 1.36 | 38.7 | 1.36 | 1370 | 3.09 | 670 | 1.36 |
| Chlorobenzene | 108-90-7 | NS | NS | NS | NS | NS | NS | ND | 0.921 | ND | 0.921 | ND | 0.921 | ND | 0.921 |
| Ethylbenzene | 100-41-4 | NS | NS | NS | NS | NS | NS | ND | 0.869 | ND | 0.869 | ND | 0.869 | 13.2 | 0.869 |
| p/m-Xylene | 179601-23-1 | NS | NS | NS | NS | NS | NS | ND | 1.74 | 1.87 | 1.74 | ND | 1.74 | 169 | 1.74 |
| Bromoform | 75-25-2 | NS | NS | NS | NS | NS | NS | ND | 2.07 | ND | 2.07 | ND | 2.07 | ND | 2.07 |
| Styrene | 100-42-5 | NS | NS | NS | NS | NS | NS | ND | 0.852 | ND | 0.852 | ND | 0.852 | ND | 0.852 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | NS | NS | NS | NS | NS | NS | ND | 1.37 | ND | 1.37 | ND | 1.37 | ND | 1.37 |
| o-Xylene | 95-47-6 | NS | NS | NS | NS | NS | NS | ND | 0.869 | ND | 0.869 | ND | 0.869 | 57.3 | 0.869 |
| 4-Ethyltoluene | 622-96-8 | NS | NS | NS | NS | NS | NS | ND | 0.983 | ND | 0.983 | ND | 0.983 | 7.18 | 0.983 |
| 1,3,5-Trimethylbenzene | 108-67-8 | NS | NS | NS | NS | NS | NS | ND | 0.983 | ND | 0.983 | ND | 0.983 | 18.5 | 0.983 |
| 1,2,4-Trimethylbenzene | 95-63-6 | NS | NS | NS | NS | NS | NS | 1.32 | 0.983 | ND | 0.983 | ND | 0.983 | 53.6 | 0.983 |
| Benzyl chloride | 100-44-7 | NS | NS | NS | NS | NS | NS | ND | 1.04 | ND | 1.04 | ND | 1.04 | ND | 1.04 |
| 1,3-Dichlorobenzene | 541-73-1 | NS | NS | NS | NS | NS | NS | ND | 1.2 | ND | 1.2 | ND | 1.2 | ND | 1.2 |
| 1,4-Dichlorobenzene | 106-46-7 | NS | NS | NS | NS | NS | NS | ND | 1.2 | ND | 1.2 | ND | 1.2 | ND | 1.2 |
| 1,2-Dichlorobenzene | 95-50-1 | NS | NS | NS | NS | NS | NS | ND | 1.2 | ND | 1.2 | ND | 1.2 | ND | 1.2 |
| 1,2,4-Trichlorobenzene | 120-82-1 | NS | NS | NS | NS | NS | NS | ND | 1.48 | ND | 1.48 | ND | 1.48 | ND | 1.48 |
| Hexachlorobutadiene | 87-68-3 | NS | NS | NS | NS | NS | NS | ND | 2.13 | ND | 2.13 | ND | 2.13 | ND | 2.13 |

**Notes:**

[a] - The concentrations of each isomer are added if multiple isomers are present and the results compared to the total screening level.

[b] - Levels are the lower value generated using a factor of 100x for carcinogens and a factor of 2x for noncarcinogens using the Table A-4 health-based values.

[c] - Value is based on the higher analytical reporting limit.

NS - No Standard

Q - Laboratory Qualifier

RL - Reporting Limit

NA- Not Analyzed

ND - analyte was analyzed for but not detected

NY-IAC-A: New York DOH Matrix A Indoor Air Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.

NY-IAC-B: New York DOH Matrix B Indoor Air Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.

NY-IAC-C: New York DOH Matrix C Indoor Air Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.

NY-SSC-A: New York DOH Matrix A Sub-slab Vapor Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.

NY-SSC-B: New York DOH Matrix B Sub-slab Vapor Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.

NY-SSC-C: New York DOH Matrix C Sub-slab Vapor Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.

** - contaminant was not detected at a concentration greater than the laboratory reporting limit, however the laboratory reporting limit exceeds the applicable standards

Checked by: TF
Date: 12/6/22

# Table 1. Vapor Intrusion Analytical Data Summary
## Volatile Organic Compounds

| Vapor Sample Identifier / Laboratory Identifier / Sample Date / Sample Type | Chemical Abstracts Service (CAS) Number | NY-IAC-A | NY-IAC-B | NY-IAC-C | NY-SSC-A | NY-SSC-B | NY-SSC-C | SS-5 L2215549-13 3/24/2022 Sub-Slab | | | SS-6 L2215549-14 3/24/2022 Sub-Slab | | | SS-7 L2215549-15 3/24/2022 Sub-Slab | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Result | Q | RL | Result | Q | RL | Result | Q | RL |
| Dichlorodifluoromethane | 75-71-8 | NS | NS | NS | NS | NS | NS | ND | | 30.3 | 2.68 | | 0.989 | 2.44 | | 0.989 |
| Chloromethane | 74-87-3 | NS | NS | NS | NS | NS | NS | ND | | 12.6 | 0.421 | | 0.413 | 1.6 | | 0.413 |
| Freon-114 | 76-14-2 | NS | NS | NS | NS | NS | NS | ND | | 42.8 | ND | | 1.4 | ND | | 1.4 |
| Vinyl chloride | 75-01-4 | NS | NS | 0.2 | NS | NS | 6 | ND | ** | 15.6 | ND | | 0.511 | ND | | 0.511 |
| 1,3-Butadiene | 106-99-0 | NS | NS | NS | NS | NS | NS | ND | | 13.5 | ND | | 0.442 | ND | | 0.442 |
| Bromomethane | 74-83-9 | NS | NS | NS | NS | NS | NS | ND | | 23.8 | ND | | 0.777 | ND | | 0.777 |
| Chloroethane | 75-00-3 | NS | NS | NS | NS | NS | NS | ND | | 16.1 | ND | | 0.528 | ND | | 0.528 |
| Ethanol | 64-17-5 | NS | NS | NS | NS | NS | NS | ND | | 288 | 147 | | 9.42 | 107 | | 9.42 |
| Vinyl bromide | 593-60-2 | NS | NS | NS | NS | NS | NS | ND | | 26.8 | ND | | 0.874 | ND | | 0.874 |
| Acetone | 67-64-1 | NS | NS | NS | NS | NS | NS | 139 | | 72.7 | 182 | | 2.38 | 90.5 | | 2.38 |
| Trichlorofluoromethane | 75-69-4 | NS | NS | NS | NS | NS | NS | ND | | 34.4 | 1.21 | | 1.12 | ND | | 1.12 |
| Isopropanol | 67-63-0 | NS | NS | NS | NS | NS | NS | ND | | 37.6 | 14.2 | | 1.23 | 8.14 | | 1.23 |
| 1,1-Dichloroethene | 75-35-4 | 0.2 | NS | NS | 6 | NS | NS | ND | ** | 24.3 | ND | | 0.793 | ND | | 0.793 |
| Tertiary butyl Alcohol | 75-65-0 | NS | NS | NS | NS | NS | NS | ND | | 46.4 | 14.9 | | 1.52 | 1.56 | | 1.52 |
| Methylene chloride | 75-09-2 | NS | 3 | NS | NS | 100 | NS | ND | | 53.2 | ND | | 1.74 | 24.7 | | 1.74 |
| 3-Chloropropene | 107-05-1 | NS | NS | NS | NS | NS | NS | ND | | 19.2 | ND | | 0.626 | ND | | 0.626 |
| Carbon disulfide | 75-15-0 | NS | NS | NS | NS | NS | NS | ND | | 19.1 | 1.8 | | 0.623 | 1.52 | | 0.623 |
| Freon-113 | 76-13-1 | NS | NS | NS | NS | NS | NS | ND | | 46.9 | ND | | 1.53 | ND | | 1.53 |
| trans-1,2-Dichloroethene | 156-60-5 | NS | NS | NS | NS | NS | NS | ND | | 24.3 | ND | | 0.793 | ND | | 0.793 |
| 1,1-Dichloroethane | 75-34-3 | NS | NS | NS | NS | NS | NS | ND | | 24.8 | ND | | 0.809 | ND | | 0.809 |
| Methyl tert butyl ether | 1634-04-4 | NS | NS | NS | NS | NS | NS | ND | | 22.1 | ND | | 0.721 | ND | | 0.721 |
| 2-Butanone | 78-93-3 | NS | NS | NS | NS | NS | NS | ND | | 45.1 | 11.5 | | 1.47 | 11.4 | | 1.47 |
| cis-1,2-Dichloroethene | 156-59-2 | 0.2 | NS | NS | 6 | NS | NS | 52.3 | | 24.3 | ND | | 0.793 | 1.13 | | 0.793 |
| Ethyl Acetate | 141-78-6 | NS | NS | NS | NS | NS | NS | ND | | 55.1 | 1.95 | | 1.8 | ND | | 1.8 |
| Chloroform | 67-66-3 | NS | NS | NS | NS | NS | NS | ND | | 29.9 | ND | | 0.977 | ND | | 0.977 |
| Tetrahydrofuran | 109-99-9 | NS | NS | NS | NS | NS | NS | ND | | 45.1 | ND | | 1.47 | ND | | 1.47 |
| 1,2-Dichloroethane | 107-06-2 | NS | NS | NS | NS | NS | NS | ND | | 24.8 | ND | | 0.809 | ND | | 0.809 |
| n-Hexane | 110-54-3 | NS | NS | NS | NS | NS | NS | ND | | 21.6 | ND | | 0.705 | 10.8 | | 0.705 |
| 1,1,1-Trichloroethane | 71-55-6 | NS | 3 | NS | NS | 100 | NS | ND | | 33.4 | ND | | 1.09 | ND | | 1.09 |
| Benzene | 71-43-2 | NS | NS | NS | NS | NS | NS | ND | | 19.6 | 1.13 | | 0.639 | 6.96 | | 0.639 |
| Carbon tetrachloride | 56-23-5 | 0.2 | NS | NS | 6 | NS | NS | ND | ** | 38.5 | ND | | 1.26 | ND | | 1.26 |
| Cyclohexane | 110-82-7 | NS | NS | NS | NS | NS | NS | ND | | 21.1 | ND | | 0.688 | 4.78 | | 0.688 |
| 1,2-Dichloropropane | 78-87-5 | NS | NS | NS | NS | NS | NS | ND | | 28.3 | ND | | 0.924 | ND | | 0.924 |
| Bromodichloromethane | 75-27-4 | NS | NS | NS | NS | NS | NS | ND | | 41 | ND | | 1.34 | ND | | 1.34 |
| 1,4-Dioxane | 123-91-1 | NS | NS | NS | NS | NS | NS | ND | | 22.1 | ND | | 0.721 | ND | | 0.721 |
| Trichloroethene | 79-01-6 | 0.2 | NS | NS | 6 | NS | NS | 14200 | | 32.9 | 5.35 | | 1.07 | 12.7 | | 1.07 |
| 2,2,4-Trimethylpentane | 540-84-1 | NS | NS | NS | NS | NS | NS | ND | | 28.6 | ND | | 0.934 | 5 | | 0.934 |
| Heptane | 142-82-5 | NS | NS | NS | NS | NS | NS | ND | | 25.1 | ND | | 0.82 | 6.31 | | 0.82 |
| cis-1,3-Dichloropropene | 10061-01-5 | NS | NS | NS | NS | NS | NS | ND | | 27.8 | ND | | 0.908 | ND | | 0.908 |
| 4-Methyl-2-pentanone | 108-10-1 | NS | NS | NS | NS | NS | NS | ND | | 62.7 | 2.91 | | 2.05 | 3.03 | | 2.05 |
| trans-1,3-Dichloropropene | 10061-02-6 | NS | NS | NS | NS | NS | NS | ND | | 27.8 | ND | | 0.908 | ND | | 0.908 |
| 1,1,2-Trichloroethane | 79-00-5 | NS | NS | NS | NS | NS | NS | ND | | 33.4 | ND | | 1.09 | ND | | 1.09 |
| Toluene | 108-88-3 | NS | NS | NS | NS | NS | NS | ND | | 23.1 | 0.897 | | 0.754 | 16.8 | | 0.754 |
| 2-Hexanone | 591-78-6 | NS | NS | NS | NS | NS | NS | ND | | 25.1 | 2.07 | | 0.82 | ND | | 0.82 |
| Dibromochloromethane | 124-48-1 | NS | NS | NS | NS | NS | NS | ND | | 52.1 | ND | | 1.7 | ND | | 1.7 |
| 1,2-Dibromoethane | 106-93-4 | NS | NS | NS | NS | NS | NS | ND | | 47 | ND | | 1.54 | ND | | 1.54 |
| Tetrachloroethene | 127-18-4 | NS | 3 | NS | NS | 100 | NS | 10200 | | 41.5 | 136 | | 1.36 | 2.69 | | 1.36 |
| Chlorobenzene | 108-90-7 | NS | NS | NS | NS | NS | NS | ND | | 28.2 | ND | | 0.921 | ND | | 0.921 |
| Ethylbenzene | 100-41-4 | NS | NS | NS | NS | NS | NS | ND | | 26.6 | ND | | 0.869 | 3.01 | | 0.869 |
| p/m-Xylene | 179601-23-1 | NS | NS | NS | NS | NS | NS | ND | | 53 | ND | | 1.74 | 9.95 | | 1.74 |
| Bromoform | 75-25-2 | NS | NS | NS | NS | NS | NS | ND | | 63.3 | ND | | 2.07 | ND | | 2.07 |
| Styrene | 100-42-5 | NS | NS | NS | NS | NS | NS | ND | | 26.1 | ND | | 0.852 | 1.15 | | 0.852 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | NS | NS | NS | NS | NS | NS | ND | | 42 | ND | | 1.37 | ND | | 1.37 |
| o-Xylene | 95-47-6 | NS | NS | NS | NS | NS | NS | ND | | 26.6 | ND | | 0.869 | 3.25 | | 0.869 |
| 4-Ethyltoluene | 622-96-8 | NS | NS | NS | NS | NS | NS | ND | | 30.1 | ND | | 0.983 | ND | | 0.983 |
| 1,3,5-Trimethylbenzene | 108-67-8 | NS | NS | NS | NS | NS | NS | ND | | 30.1 | ND | | 0.983 | ND | | 0.983 |
| 1,2,4-Trimethylbenzene | 95-63-6 | NS | NS | NS | NS | NS | NS | ND | | 30.1 | 1.95 | | 0.983 | 2.55 | | 0.983 |
| Benzyl chloride | 100-44-7 | NS | NS | NS | NS | NS | NS | ND | | 31.7 | ND | | 1.04 | ND | | 1.04 |
| 1,3-Dichlorobenzene | 541-73-1 | NS | NS | NS | NS | NS | NS | ND | | 36.8 | ND | | 1.2 | ND | | 1.2 |
| 1,4-Dichlorobenzene | 106-46-7 | NS | NS | NS | NS | NS | NS | ND | | 36.8 | ND | | 1.2 | ND | | 1.2 |
| 1,2-Dichlorobenzene | 95-50-1 | NS | NS | NS | NS | NS | NS | ND | | 36.8 | ND | | 1.2 | ND | | 1.2 |
| 1,2,4-Trichlorobenzene | 120-82-1 | NS | NS | NS | NS | NS | NS | ND | | 45.4 | ND | | 1.48 | ND | | 1.48 |
| Hexachlorobutadiene | 87-68-3 | NS | NS | NS | NS | NS | NS | ND | | 65.3 | ND | | 2.13 | ND | | 2.13 |

**Notes:**

[a] - The concentrations of each isomer are added if multiple isomers are present and the results compared to the total screening level.

[b] - Levels are the lower value generated using a factor of 100x for carcinogens and a factor of 2x for noncarcinogens using the Table A-4 health-based values.

[c] - Value is based on the higher analytical reporting limit.

NS - No Standard

Q - Laboratory Qualifier

RL - Reporting Limit

NA- Not Analyzed

ND - analyte was analyzed for but not detected

NY-IAC-A: New York DOH Matrix A Indoor Air Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.

NY-IAC-B: New York DOH Matrix B Indoor Air Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.

NY-IAC-C: New York DOH Matrix C Indoor Air Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.

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NY-SSC-B: New York DOH Matrix B Sub-slab Vapor Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.

NY-SSC-C: New York DOH Matrix C Sub-slab Vapor Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.

** - contaminant was not detected at a concentration greater than the laboratory reporting limit, however the laboratory reporting limit exceeds the applicable standards

Checked by: TF
Date: 12/6/22

Project: 2847 - 5 Westchester Plaza
NYSDEC Site # C360205
QEP: Rober Edgar

# Table 2 - Soil Vapor Analytical Data Summary
## April 2024

| Vapor Sample Identifier / Laboratory Identifier / Sample Date / Sample Depth (ft. bgs) / Sample Type | Chemical Abstracts Service (CAS) Number | NY-SSC-A | NY-SSC-B | NY-SSC-C | NY-SSC-D | NY-SSC-E | NY-SSC-F | SG-E1 041724 / L2421612-01 / 4/17/2024 / 3.5-5 / Exterior Soil Gas | | | SG-W1 041724 / L2421612-03 / 4/17/2024 / 3.5-5 ft / Exterior Soil Gas | | | SG-W2 041724 / L2421612-04 / 4/17/2024 / 3.5-5 ft / Exterior Soil Gas | | | SG-N1 041724 / L2421612-05 / 4/17/2024 / 3.5-5 ft / Exterior Soil Gas | | | SG-N2 041724 / L2421612-06 / 4/17/2024 / 3.5-5 ft / Exterior Soil Gas | | | SG-S1 041724 / L2421612-07 / 4/17/2024 / 3.5-5 ft / Exterior Soil Gas | | | SG-S2 041724 / L2421612-08 / 4/17/2024 / 3.5-5 ft / Exterior Soil Gas | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Result | Q | RL | Result | Q | RL | Result | Q | RL | Result | Q | RL | Result | Q | RL | Result | Q | RL | Result | Q | RL |
| 1,1,1-Trichloroethane | 71-55-6 | NS | 100 | NS | NS | NS | NS | ND | | 16 | 260 | | 5.46 | 18 | | 1.09 | ND | | 9.11 | 2.42 | | 1.09 | ND | | 1.6 | ND | | 1.09 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | NS | NS | NS | NS | NS | NS | ND | | 20.2 | ND | | 6.87 | ND | | 1.37 | ND | | 11.5 | ND | | 1.37 | ND | | 2.02 | ND | | 1.37 |
| 1,1,2-Trichloroethane | 79-00-5 | NS | NS | NS | NS | NS | NS | ND | | 16 | ND | | 5.46 | ND | | 1.09 | ND | | 9.11 | ND | | 1.09 | ND | | 1.6 | ND | | 1.09 |
| 1,1-Dichloroethane | 75-34-3 | 6 | NS | NS | NS | NS | NS | ND | | 11.9 | 16.3 | | 4.05 | ND | | 0.809 | ND | | 6.76 | ND | | 0.809 | ND | | 1.19 | ND | | 0.809 |
| 1,1-Dichloroethene | 75-35-4 | NS | NS | NS | NS | NS | NS | ND | | 11.7 | ND | | 3.96 | ND | | 0.793 | ND | | 6.62 | ND | | 0.793 | ND | | 1.17 | ND | | 0.793 |
| 1,2,4-Trichlorobenzene | 120-82-1 | NS | NS | NS | NS | NS | NS | ND | | 21.8 | ND | | 7.42 | ND | | 1.48 | ND | | 12.4 | ND | | 1.48 | ND | | 2.18 | ND | | 1.48 |
| 1,2,4-Trimethylbenzene | 95-63-6 | NS | NS | NS | 60 | NS | NS | 654 | | 14.5 | 541 | | 4.92 | 449 | | 0.983 | 178 | | 8.21 | 322 | | 0.983 | 164 | | 1.45 | 149 | | 0.983 |
| 1,2-Dibromoethane | 106-93-4 | NS | NS | NS | NS | NS | NS | ND | | 22.6 | ND | | 7.69 | ND | | 1.54 | ND | | 12.8 | ND | | 1.54 | ND | | 2.26 | ND | | 1.54 |
| 1,2-Dichlorobenzene | 95-50-1 | NS | NS | NS | NS | NS | NS | ND | | 17.7 | ND | | 6.01 | ND | | 1.2 | ND | | 10 | ND | | 1.2 | ND | | 1.77 | ND | | 1.2 |
| 1,2-Dichloroethane | 107-06-2 | NS | NS | NS | NS | NS | NS | ND | | 11.9 | ND | | 4.05 | ND | | 0.809 | ND | | 6.76 | ND | | 0.809 | ND | | 1.19 | ND | | 0.809 |
| 1,2-Dichloropropane | 78-87-5 | NS | NS | NS | NS | NS | NS | ND | | 13.6 | ND | | 4.62 | ND | | 0.924 | ND | | 7.72 | ND | | 0.924 | ND | | 1.36 | ND | | 0.924 |
| 1,3,5-Trimethylbenzene | 108-67-8 | NS | NS | NS | 60 | NS | NS | 221 | | 14.5 | 181 | | 4.92 | 171 | | 0.983 | 66.4 | | 8.21 | 111 | | 0.983 | 52.1 | | 1.45 | 47.1 | | 0.983 |
| 1,3-Butadiene | 106-99-0 | NS | NS | NS | NS | NS | NS | 7.15 | | 6.5 | 10.3 | | 2.21 | 3.5 | | 0.442 | 6.13 | | 3.69 | 4.51 | | 0.442 | 4.51 | | 0.65 | 4.27 | | 0.442 |
| 1,3-Dichlorobenzene | 541-73-1 | NS | NS | NS | NS | NS | NS | ND | | 17.7 | ND | | 6.01 | 1.89 | | 1.2 | ND | | 10 | 1.51 | | 1.2 | ND | | 1.77 | ND | | 1.2 |
| 1,4-Dichlorobenzene | 106-46-7 | NS | NS | NS | NS | NS | NS | ND | | 17.7 | ND | | 6.01 | ND | | 1.2 | ND | | 10 | ND | | 1.2 | ND | | 1.77 | ND | | 1.2 |
| 1,4-Dioxane | 123-91-1 | NS | NS | NS | NS | NS | NS | ND | | 10.6 | ND | | 3.6 | ND | | 0.721 | ND | | 6.02 | ND | | 0.721 | ND | | 1.06 | ND | | 0.721 |
| 2,2,4-Trimethylpentane | 540-84-1 | NS | NS | NS | 60 | NS | NS | 542 | | 13.7 | 265 | | 4.67 | 174 | | 0.934 | 134 | | 7.8 | 308 | | 0.934 | 159 | | 1.37 | 42.7 | | 0.934 |
| 2-Butanone | 78-93-3 | NS | NS | NS | NS | NS | NS | ND | | 21.6 | 8.79 | | 7.37 | 8.11 | | 1.47 | ND | | 12.3 | 18.3 | | 1.47 | 7.08 | | 2.17 | 19.6 | | 1.47 |
| 2-Hexanone | 591-78-6 | NS | NS | NS | NS | NS | NS | ND | | 12 | ND | | 4.1 | ND | | 0.82 | ND | | 6.84 | ND | | 0.82 | ND | | 1.2 | ND | | 0.82 |
| 3-Chloropropene | 107-05-1 | NS | NS | NS | NS | NS | NS | ND | | 9.2 | ND | | 3.13 | ND | | 0.626 | ND | | 5.23 | ND | | 0.626 | ND | | 0.92 | ND | | 0.626 |
| 4-Ethyltoluene | 622-96-8 | NS | NS | NS | NS | NS | NS | 175 | | 14.5 | 132 | | 4.92 | 131 | | 0.983 | 46.9 | | 8.21 | 90.5 | | 0.983 | 32.3 | | 1.45 | 29.3 | | 0.983 |
| 4-Methyl-2-pentanone | 108-10-1 | NS | NS | NS | NS | NS | NS | ND | | 30.1 | ND | | 10.2 | ND | | 2.05 | ND | | 17.1 | ND | | 2.05 | ND | | 3.01 | ND | | 2.05 |
| Acetone | 67-64-1 | NS | NS | NS | NS | NS | NS | ND | | 34.9 | 142 | | 11.9 | 119 | | 2.38 | 127 | | 19.8 | 193 | | 2.38 | 580 | | 3.49 | 214 | | 2.38 |
| Benzene | 71-43-2 | NS | NS | NS | 60 | NS | NS | 323 | | 9.39 | 66.8 | | 3.19 | 43.4 | | 0.639 | 25.8 | | 5.34 | 46 | | 0.639 | 12.8 | | 0.939 | 25.5 | | 0.639 |
| Benzyl chloride | 100-44-7 | NS | NS | NS | NS | NS | NS | 18.3 | | 15.2 | ND | | 5.18 | ND | | 1.04 | ND | | 8.65 | ND | | 1.04 | ND | | 1.52 | ND | | 1.04 |
| Bromodichloromethane | 75-27-4 | NS | NS | NS | NS | NS | NS | ND | | 19.7 | ND | | 6.7 | ND | | 1.34 | ND | | 11.2 | ND | | 1.34 | ND | | 1.97 | ND | | 1.34 |
| Bromoform | 75-25-2 | NS | NS | NS | NS | NS | NS | ND | | 30.4 | ND | | 10.3 | ND | | 2.07 | ND | | 17.3 | ND | | 2.07 | ND | | 3.04 | ND | | 2.07 |
| Bromomethane | 74-83-9 | NS | NS | NS | NS | NS | NS | ND | | 11.4 | ND | | 3.88 | ND | | 0.777 | ND | | 6.48 | ND | | 0.777 | ND | | 1.14 | ND | | 0.777 |
| Carbon disulfide | 75-15-0 | NS | NS | NS | NS | NS | NS | ND | | 9.16 | ND | | 3.11 | 1.78 | | 0.623 | 8.38 | | 5.2 | 39.9 | | 0.623 | ND | | 0.916 | 3.92 | | 0.623 |
| Carbon tetrachloride | 56-23-5 | 6 | NS | NS | NS | NS | NS | ND | | 18.5 | ND | | 6.29 | ND | | 1.26 | ND | | 10.5 | ND | | 1.26 | ND | | 1.85 | ND | | 1.26 |
| Chlorobenzene | 108-90-7 | NS | NS | NS | NS | NS | NS | ND | | 13.5 | ND | | 4.61 | ND | | 0.921 | ND | | 7.69 | ND | | 0.921 | ND | | 1.35 | ND | | 0.921 |
| Chloroethane | 75-00-3 | NS | NS | NS | NS | NS | NS | ND | | 7.76 | ND | | 2.64 | ND | | 0.528 | ND | | 4.41 | ND | | 0.528 | ND | | 0.776 | 1.4 | | 0.528 |
| Chloroform | 67-66-3 | NS | NS | NS | NS | NS | NS | ND | | 14.4 | 39.8 | | 4.88 | 4.37 | | 0.977 | 14.9 | | 8.16 | 1.87 | | 0.977 | 25.8 | | 1.44 | 10.1 | | 0.977 |
| Chloromethane | 74-87-3 | NS | NS | NS | NS | NS | NS | ND | | 6.07 | ND | | 2.07 | 1.38 | | 0.413 | ND | | 3.45 | 0.518 | | 0.413 | ND | | 0.607 | 1.45 | | 0.413 |
| cis-1,2-Dichloroethene | 156-59-2 | 6 | NS | NS | NS | NS | NS | ND | | 11.7 | ND | | 3.96 | ND | | 0.793 | 14.7 | | 6.62 | 1.28 | | 0.793 | ND | | 1.17 | ND | | 0.793 |
| cis-1,3-Dichloropropene | 10061-01-5 | NS | NS | NS | NS | NS | NS | ND | | 13.3 | ND | | 4.54 | ND | | 0.908 | ND | | 7.58 | ND | | 0.908 | ND | | 1.33 | ND | | 0.908 |
| Cyclohexane | 110-82-7 | NS | NS | NS | 60 | NS | NS | 427 | | 10.1 | 146 | | 3.44 | 87.8 | | 0.688 | 92.9 | | 5.75 | 233 | | 0.688 | 55.4 | | 1.01 | 17 | | 0.688 |
| Dibromochloromethane | 124-48-1 | NS | NS | NS | NS | NS | NS | ND | | 25 | ND | | 8.52 | ND | | 1.7 | ND | | 14.2 | ND | | 1.7 | ND | | 2.5 | ND | | 1.7 |
| Dichlorodifluoromethane | 75-71-8 | NS | NS | NS | NS | NS | NS | ND | | 14.5 | ND | | 4.94 | 2.42 | | 0.989 | ND | | 8.26 | 29.4 | | 0.989 | 2.14 | | 1.45 | 2.32 | | 0.989 |
| Ethanol | 64-17-5 | NS | NS | NS | NS | NS | NS | 1670 | | 138 | 1040 | | 47.1 | 669 | | 9.42 | 543 | | 78.6 | 349 | | 9.42 | 644 | | 13.8 | 125 | | 9.42 |
| Ethyl Acetate | 141-78-6 | NS | NS | NS | NS | NS | NS | ND | | 26.5 | ND | | 9.01 | ND | | 1.8 | ND | | 15 | ND | | 1.8 | ND | | 2.65 | ND | | 1.8 |
| Ethylbenzene | 100-41-4 | NS | NS | NS | 60 | NS | NS | 947 | | 12.8 | 460 | | 4.34 | 318 | | 0.869 | 238 | | 7.25 | 248 | | 0.869 | 174 | | 1.28 | 138 | | 0.869 |
| Freon-113 | 76-13-1 | NS | NS | NS | NS | NS | NS | ND | | 22.5 | ND | | 7.66 | ND | | 1.53 | 17.6 | | 12.8 | 55 | | 1.53 | ND | | 2.25 | ND | | 1.53 |
| Freon-114 | 76-14-2 | NS | NS | NS | NS | NS | NS | ND | | 20.5 | ND | | 6.99 | ND | | 1.4 | ND | | 11.7 | ND | | 1.4 | ND | | 2.05 | ND | | 1.4 |
| Heptane | 142-82-5 | NS | NS | NS | NS | 200 | NS | 1110 | | 12 | 313 | | 4.1 | 209 | | 0.82 | 93.4 | | 6.84 | 150 | | 0.82 | 93 | | 1.2 | 37.9 | | 0.82 |
| Hexachlorobutadiene | 87-68-3 | NS | NS | NS | NS | NS | NS | ND | | 31.4 | ND | | 10.7 | ND | | 2.13 | ND | | 17.8 | ND | | 2.13 | ND | | 3.14 | ND | | 2.13 |
| Isopropanol | 67-63-0 | NS | NS | NS | NS | NS | NS | ND | | 18 | 8.31 | | 6.15 | 5.9 | | 1.23 | ND | | 10.3 | 3.59 | | 1.23 | 3.79 | | 1.81 | 17.8 | | 1.23 |
| Methyl tert butyl ether | 1634-04-4 | NS | NS | NS | NS | NS | NS | ND | | 10.6 | ND | | 3.61 | ND | | 0.721 | ND | | 6.02 | ND | | 0.721 | ND | | 1.06 | ND | | 0.721 |
| Methylene chloride | 75-09-2 | NS | 100 | NS | NS | NS | NS | ND | | 25.5 | ND | | 8.69 | 8.58 | | 1.74 | ND | | 14.5 | ND | | 1.74 | ND | | 2.55 | 3.37 | | 1.74 |
| Naphthalene | 91-20-3 | NS | NS | NS | 60 | NS | NS | ND | | 15.4 | 5.56 | | 5.24 | 6.87 | | 1.05 | ND | | 8.76 | ND | | 1.05 | ND | | 1.54 | 4.31 | | 1.05 |
| n-Hexane | 110-54-3 | NS | NS | NS | NS | 200 | NS | 902 | | 10.4 | 197 | | 3.52 | 118 | | 0.705 | 63.8 | | 5.89 | 109 | | 0.705 | 36.3 | | 1.04 | 15.2 | | 0.705 |
| o-Xylene | 95-47-6 | NS | NS | NS | 60 | NS | NS | 1220 | | 12.8 | 686 | | 4.34 | 669 | E | 4.34 | 361 | | 7.25 | 357 | | 0.869 | 235 | | 1.28 | 211 | | 0.869 |
| p/m-Xylene | 179601-23-1 | NS | NS | NS | NS | 200 | NS | 3210 | | 25.5 | 1490 | | 8.69 | 834 | | 1.74 | 838 | | 14.5 | 712 | | 1.74 | 486 | | 2.55 | 486 | | 1.74 |
| Styrene | 100-42-5 | NS | NS | NS | NS | NS | NS | ND | | 12.5 | ND | | 4.26 | ND | | 0.852 | ND | | 7.11 | ND | | 0.852 | ND | | 1.25 | ND | | 0.852 |
| Tertiary butyl Alcohol | 75-65-0 | NS | NS | NS | NS | NS | NS | ND | | 22.3 | 8.97 | | 7.58 | 8.82 | | 1.52 | ND | | 12.6 | 12.6 | | 1.52 | 21.1 | | 2.23 | 7.82 | | 1.52 |
| Tetrachloroethene | 127-18-4 | NS | 100 | NS | NS | NS | NS | ND | | 19.9 | ND | | 6.78 | 1.55 | | 1.36 | 888 | | 11.3 | 502 | | 1.36 | 24.5 | | 1.99 | 43.6 | | 1.36 |
| Tetrahydrofuran | 109-99-9 | NS | NS | NS | NS | NS | NS | ND | | 21.6 | ND | | 7.37 | 1.77 | | 1.47 | ND | | 12.3 | 2.14 | | 1.47 | 3.42 | | 2.17 | 3.3 | | 1.47 |
| Toluene | 108-88-3 | NS | NS | NS | NS | NS | 300 | 3030 | | 11.1 | 923 | | 3.77 | 678 | E | 3.77 | 302 | | 6.29 | 262 | | 0.754 | 276 | | 1.11 | 251 | | 0.754 |
| trans-1,2-Dichloroethene | 156-60-5 | NS | NS | NS | NS | NS | NS | ND | | 11.7 | ND | | 3.96 | ND | | 0.793 | ND | | 6.62 | ND | | 0.793 | ND | | 1.17 | ND | | 0.793 |
| trans-1,3-Dichloropropene | 10061-02-6 | NS | NS | NS | NS | NS | NS | ND | | 13.3 | ND | | 4.54 | ND | | 0.908 | ND | | 7.58 | ND | | 0.908 | ND | | 1.33 | ND | | 0.908 |
| Trichloroethene | 79-01-6 | 6 | NS | NS | NS | NS | NS | ND | | 15.8 | ND | | 5.37 | 3.25 | | 1.07 | 2340 | | 8.97 | 522 | | 1.07 | 14.6 | | 1.58 | 18.2 | | 1.07 |
| Trichlorofluoromethane | 75-69-4 | NS | NS | NS | NS | NS | NS | ND | | 16.5 | ND | | 5.62 | 1.6 | | 1.12 | ND | | 9.38 | ND | | 1.12 | ND | | 1.65 | ND | | 1.12 |
| Vinyl bromide | 593-60-2 | NS | NS | NS | NS | NS | NS | ND | | 12.9 | ND | | 4.37 | ND | | 0.874 | ND | | 7.3 | ND | | 0.874 | ND | | 1.29 | ND | | 0.874 |
| Vinyl chloride | 75-01-4 | NS | NS | 6 | NS | NS | NS | ND | | 7.52 | ND | | 2.56 | ND | | 0.511 | ND | | 4.27 | ND | | 0.511 | ND | | 0.752 | ND | | 0.511 |

Checked by: MS
Date: 1/28/2026

# Table 2 - Soil Vapor Analytical Data Summary
## April 2024

**Notes:**

[a] - The concentrations of each isomer are added if multiple isomers are present and the results compared to the total screening level.

[b] - Levels are the lower value generated using a factor of 100x for carcinogens and a factor of 2x for noncarcinogens using the Table A-4 health-based values.

[c] - Value is based on the higher analytical reporting limit.

NS - No Standard

Q - Laboratory Qualifier

RL - Reporting Limit

NA- Not Analyzed

ND - analyte was analyzed for but not detected

NY-IAC-A: New York DOH Matrix A Indoor Air Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.
NY-IAC-B: New York DOH Matrix B Indoor Air Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.
NY-IAC-C: New York DOH Matrix C Indoor Air Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.
NY-IAC-D: New York DOH Matrix D Indoor Air Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.
NY-IAC-E: New York DOH Matrix E Indoor Air Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.
NY-IAC-F: New York DOH Matrix F Indoor Air Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.
NY-SSC-A: New York DOH Matrix A Sub-slab Vapor Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.
NY-SSC-B: New York DOH Matrix B Sub-slab Vapor Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.
NY-SSC-C: New York DOH Matrix C Sub-slab Vapor Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.
NY-SSC-D: New York DOH Matrix D Sub-slab Vapor Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.
NY-SSC-E: New York DOH Matrix E Sub-slab Vapor Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.
NY-SSC-F: New York DOH Matrix F Sub-slab Vapor Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.

** - contaminant was not detected at a concentration greater than the laboratory reporting limit, however the laboratory reporting limit exceeds the applicable standards

Project: 2847 - 5 Westchester Plaza
NYSDEC Site # C360205
QEP: Rober Edgar

# Table 3 - Vapor Intrusion Analytical Data Summary
## March 2025

PEAK ENVIRONMENTAL
A Nova Group, GBC Company

| Vapor Sample Identifier / Laboratory Identifier / Sample Date / Sample Depth (ft. bgs) / Sample Type | Chemical Abstracts Service (CAS) Number | NY-IAC-A | NY-IAC-B | NY-IAC-C | NY-IAC-D | NY-IAC-E | NY-IAC-F | NY-SSC-A | NY-SSC-B | NY-SSC-C | NY-SSC-D | NY-SSC-E | NY-SSC-F | B1-IA-1 032825 / L2519584-01 / 3/28/2025 / ‡ / Indoor Air | | B1-IA-2 032825 / L2519584-02 / 3/28/2025 / ‡ / Indoor Air | | B1-OA-1 032825 / L2519584-03 / 3/28/2025 / ‡ / Ambient Air | | SG-N3 032825 / L2519584-05 / 3/28/2025 / 4.5-5 / Exterior Soil Gas | | SG-N5 032825 / L2519584-06 / 3/28/2025 / 4-4.5 / Exterior Soil Gas | | SG-N7 032825 / L2519584-08 / 3/28/2025 / 4.5-5 / Exterior Soil Gas | | B1-SS-1 032925 / L2519575-01 / 3/29/2025 / ‡ / Sub Slab | | B1-SS-2 032925 / L2519575-02 / 3/29/2025 / ‡ / Sub Slab | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Result | Q | RL | Result | Q | RL | Result | Q | RL | Result | Q | RL | Result | Q | RL | Result | Q | RL | Result | Q | RL |
| 1,1,1-Trichloroethane | 71-55-6 | NS | 3 | NS | NS | NS | NS | NS | 100 | NS | NS | NS | NS | NA | | | NA | | | NA | | | ND | | 5.46 | ND | | 6.06 | ND | | 1.09 | ND | | 1.09 | ND | | 1.09 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | ND | | 1.37 | ND | | 1.37 | ND | | 1.37 | ND | | 6.87 | ND | | 7.62 | ND | | 1.37 | ND | | 1.37 | ND | | 1.37 |
| 1,1,2-Trichloroethane | 79-00-5 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | ND | | 1.09 | ND | | 1.09 | ND | | 1.09 | ND | | 5.46 | ND | | 6.06 | ND | | 1.09 | ND | | 1.09 | ND | | 1.09 |
| 1,1-Dichloroethane | 75-34-3 | 0.2 | NS | NS | NS | NS | NS | NS | 6 | NS | NS | NS | NS | ND | | 0.809 | ND | | 0.809 | ND | | 0.809 | ND | | 4.05 | ND | | 4.49 | ND | | 0.809 | ND | | 0.809 | ND | | 0.809 |
| 1,1-Dichloroethene | 75-35-4 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NA | | | NA | | | NA | | | ND | | 3.96 | ND | | 4.4 | ND | | 0.793 | ND | | 0.793 | ND | | 0.793 |
| 1,2,4-Trichlorobenzene | 120-82-1 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | ND | | 1.48 | ND | | 1.48 | ND | | 1.48 | ND | | 7.42 | ND | | 8.24 | ND | | 1.48 | ND | | 1.48 | ND | | 1.48 |
| 1,2,4-Trimethylbenzene | 95-63-6 | NS | NS | NS | 2 | NS | NS | NS | NS | NS | 60 | NS | NS | ND | | 0.983 | ND | | 0.983 | ND | | 0.983 | ND | | 4.92 | ND | | 5.46 | ND | | 0.983 | 1.13 | | 0.983 | 4.18 | | 0.983 |
| 1,2-Dibromoethane | 106-93-4 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | ND | | 1.54 | ND | | 1.54 | ND | | 1.54 | ND | | 7.69 | ND | | 8.53 | ND | | 1.54 | ND | | 1.54 | ND | | 1.54 |
| 1,2-Dichlorobenzene | 95-50-1 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | ND | | 1.2 | ND | | 1.2 | ND | | 1.2 | ND | | 6.01 | ND | | 6.67 | ND | | 1.2 | ND | | 1.2 | ND | | 1.2 |
| 1,2-Dichloroethane | 107-06-2 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | ND | | 0.809 | ND | | 0.809 | ND | | 0.809 | ND | | 4.05 | ND | | 4.49 | ND | | 0.809 | ND | | 0.809 | ND | | 0.809 |
| 1,2-Dichloropropane | 78-87-5 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | ND | | 0.924 | ND | | 0.924 | ND | | 0.924 | ND | | 4.62 | ND | | 5.13 | ND | | 0.924 | ND | | 0.924 | ND | | 0.924 |
| 1,3,5-Trimethylbenzene | 108-67-8 | NS | NS | NS | 2 | NS | NS | NS | NS | NS | 60 | NS | NS | ND | | 0.983 | ND | | 0.983 | ND | | 0.983 | ND | | 4.92 | ND | | 5.46 | ND | | 0.983 | ND | | 0.983 | 2.72 | | 0.983 |
| 1,3-Butadiene | 106-99-0 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | ND | | 0.442 | ND | | 0.442 | ND | | 0.442 | ND | | 2.21 | 21.8 | | 2.46 | 2.54 | | 0.442 | ND | | 0.442 | 1.17 | | 0.442 |
| 1,3-Dichlorobenzene | 541-73-1 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | ND | | 1.2 | ND | | 1.2 | ND | | 1.2 | ND | | 6.01 | ND | | 6.67 | ND | | 1.2 | ND | | 1.2 | ND | | 1.2 |
| 1,4-Dichlorobenzene | 106-46-7 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | ND | | 1.2 | 2.27 | | 1.2 | ND | | 1.2 | ND | | 6.01 | ND | | 6.67 | ND | | 1.2 | ND | | 1.2 | ND | | 1.2 |
| 1,4-Dioxane | 123-91-1 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | ND | | 0.721 | ND | | 0.721 | ND | | 0.721 | ND | | 3.6 | ND | | 4 | ND | | 0.721 | ND | | 0.721 | ND | | 0.721 |
| 2,2,4-Trimethylpentane | 540-84-1 | NS | NS | NS | 2 | NS | NS | NS | NS | NS | 60 | NS | NS | 1.31 | | 0.934 | ND | | 0.934 | ND | | 0.934 | ND | | 4.67 | 5.37 | | 5.18 | ND | | 0.934 | ND | | 0.934 | 1.15 | | 0.934 |
| 2-Butanone | 78-93-3 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | 1.79 | | 1.47 | ND | | 1.47 | 1.87 | | 1.47 | 23.2 | | 7.37 | 28.6 | | 8.2 | 4.75 | | 1.47 | 6.84 | | 1.47 | 11.4 | | 1.47 |
| 2-Hexanone | 591-78-6 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | ND | | 0.82 | ND | | 0.82 | ND | | 0.82 | ND | | 4.1 | ND | | 4.55 | ND | | 0.82 | ND | | 0.82 | ND | | 0.82 |
| 3-Chloropropene | 107-05-1 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | ND | | 0.626 | ND | | 0.626 | ND | | 0.626 | ND | | 3.13 | ND | | 3.47 | ND | | 0.626 | ND | | 0.626 | ND | | 0.626 |
| 4-Ethyltoluene | 622-96-8 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | ND | | 0.983 | ND | | 0.983 | ND | | 0.983 | ND | | 4.92 | ND | | 5.46 | ND | | 0.983 | ND | | 0.983 | 1.42 | | 0.983 |
| 4-Methyl-2-pentanone | 108-10-1 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | ND | | 2.05 | ND | | 2.05 | ND | | 2.05 | ND | | 10.2 | ND | | 11.4 | ND | | 2.05 | ND | | 2.05 | ND | | 2.05 |
| Acetone | 67-64-1 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | 25.7 | | 2.38 | 4.25 | | 2.38 | 11.3 | | 2.38 | ND | | 11.9 | 159 | | 13.2 | 27.8 | | 2.38 | 61 | | 2.38 | 87.7 | | 2.38 |
| Benzene | 71-43-2 | NS | NS | NS | 2 | NS | NS | NS | NS | NS | 60 | NS | NS | 1.63 | | 0.639 | ND | | 0.639 | ND | | 0.639 | 4.86 | | 3.19 | 6.13 | | 3.55 | 0.92 | | 0.639 | 1.2 | | 0.639 | 3.51 | | 0.639 |
| Benzyl chloride | 100-44-7 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | ND | | 1.04 | ND | | 1.04 | ND | | 1.04 | ND | | 5.18 | ND | | 5.75 | ND | | 1.04 | ND | | 1.04 | ND | | 1.04 |
| Bromodichloromethane | 75-27-4 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | ND | | 1.34 | ND | | 1.34 | ND | | 1.34 | ND | | 6.7 | ND | | 7.44 | ND | | 1.34 | ND | | 1.34 | ND | | 1.34 |
| Bromoform | 75-25-2 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | ND | | 2.07 | ND | | 2.07 | ND | | 2.07 | ND | | 10.3 | ND | | 11.5 | ND | | 2.07 | ND | | 2.07 | ND | | 2.07 |
| Bromomethane | 74-83-9 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | ND | | 0.777 | ND | | 0.777 | ND | | 0.777 | ND | | 3.88 | ND | | 4.31 | ND | | 0.777 | ND | | 0.777 | ND | | 0.777 |
| Carbon disulfide | 75-15-0 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | ND | | 0.623 | ND | | 0.623 | ND | | 0.623 | 12.3 | | 3.11 | 15.8 | | 3.46 | 3.99 | | 0.623 | ND | | 0.623 | 2.39 | | 0.623 |
| Carbon tetrachloride | 56-23-5 | 0.2 | NS | NS | NS | NS | NS | NS | 6 | NS | NS | NS | NS | NA | | | NA | | | NA | | | ND | | 6.29 | ND | | 6.98 | ND | | 1.26 | ND | | 1.26 | ND | | 1.26 |
| Chlorobenzene | 108-90-7 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | ND | | 0.921 | ND | | 0.921 | ND | | 0.921 | ND | | 4.61 | ND | | 5.11 | ND | | 0.921 | ND | | 0.921 | ND | | 0.921 |
| Chloroethane | 75-00-3 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | ND | | 0.528 | ND | | 0.528 | ND | | 0.528 | ND | | 2.64 | 4.12 | | 2.93 | ND | | 0.528 | ND | | 0.528 | ND | | 0.528 |
| Chloroform | 67-66-3 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | 2.17 | | 0.977 | ND | | 0.977 | ND | | 0.977 | ND | | 4.88 | ND | | 5.42 | ND | | 0.977 | 3.14 | | 0.977 | ND | | 0.977 |
| Chloromethane | 74-87-3 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | 1.12 | | 0.413 | 1.14 | | 0.413 | 1.1 | | 0.413 | 8.09 | | 2.07 | 10.8 | | 2.29 | 0.787 | | 0.413 | 0.558 | | 0.413 | 0.902 | | 0.413 |
| cis-1,2-Dichloroethene | 156-59-2 | 0.2 | NS | NS | NS | NS | NS | NS | 6 | NS | NS | NS | NS | NA | | | NA | | | NA | | | ND | | 3.96 | ND | | 4.4 | 1.68 | | 0.793 | ND | | 0.793 | ND | | 0.793 |
| cis-1,3-Dichloropropene | 10061-01-5 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | ND | | 0.908 | ND | | 0.908 | ND | | 0.908 | ND | | 4.54 | ND | | 5.04 | ND | | 0.908 | ND | | 0.908 | ND | | 0.908 |
| Cyclohexane | 110-82-7 | NS | NS | NS | 2 | NS | NS | NS | NS | NS | 60 | NS | NS | 0.854 | | 0.688 | ND | | 0.688 | ND | | 0.688 | 13.4 | | 3.44 | 14.5 | | 3.82 | 0.706 | | 0.688 | 0.73 | | 0.688 | 0.716 | | 0.688 |
| Dibromochloromethane | 124-48-1 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | ND | | 1.7 | ND | | 1.7 | ND | | 1.7 | ND | | 8.52 | ND | | 9.46 | ND | | 1.7 | ND | | 1.7 | ND | | 1.7 |
| Dichlorodifluoromethane | 75-71-8 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | 2.29 | | 0.989 | 2.2 | | 0.989 | 2.32 | | 0.989 | ND | | 4.94 | ND | | 5.49 | ND | | 0.989 | 2.31 | | 0.989 | 2.27 | | 0.989 |
| Ethanol | 64-17-5 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | 92.1 | | 9.42 | 66.5 | | 9.42 | ND | | 9.42 | 57.3 | | 47.1 | 63.3 | | 52.4 | 11 | | 9.42 | 497 | | 9.42 | 933 | | 9.42 |
| Ethyl Acetate | 141-78-6 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | 3.96 | | 1.8 | ND | | 1.8 | ND | | 1.8 | ND | | 9.01 | ND | | 10 | ND | | 1.8 | 3.37 | | 1.8 | 117 | | 1.8 |
| Ethylbenzene | 100-41-4 | NS | NS | NS | 2 | NS | NS | NS | NS | NS | 60 | NS | NS | ND | | 0.869 | ND | | 0.869 | ND | | 0.869 | 534 | | 4.34 | 691 | | 4.82 | 127 | | 0.869 | 1.29 | | 0.869 | 3.96 | | 0.869 |
| Freon-113 | 76-13-1 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | ND | | 1.53 | ND | | 1.53 | ND | | 1.53 | 109 | | 7.66 | 133 | | 8.51 | 6.32 | | 1.53 | ND | | 1.53 | ND | | 1.53 |
| Freon-114 | 76-14-2 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | ND | | 1.4 | ND | | 1.4 | ND | | 1.4 | ND | | 6.99 | ND | | 7.76 | ND | | 1.4 | ND | | 1.4 | ND | | 1.4 |
| Heptane | 142-82-5 | NS | NS | NS | NS | 6 | NS | NS | NS | NS | NS | 200 | NS | 1.19 | | 0.82 | ND | | 0.82 | ND | | 0.82 | 30.8 | | 4.1 | 31.6 | | 4.55 | 2.28 | | 0.82 | 0.91 | | 0.82 | 5.33 | | 0.82 |
| Hexachlorobutadiene | 87-68-3 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | ND | | 2.13 | ND | | 2.13 | ND | | 2.13 | ND | | 10.7 | ND | | 11.8 | ND | | 2.13 | ND | | 2.13 | ND | | 2.13 |
| Isopropanol | 67-63-0 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | 45.2 | | 2.46 | 33.9 | | 2.46 | 9.59 | | 2.46 | 66.4 | | 12.3 | 46.2 | | 13.7 | 4.13 | | 2.46 | 24.5 | | 2.46 | 82.1 | | 2.46 |
| Methyl tert butyl ether | 1634-04-4 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | ND | | 0.721 | ND | | 0.721 | ND | | 0.721 | ND | | 3.61 | ND | | 4 | ND | | 0.721 | ND | | 0.721 | ND | | 0.721 |
| Methylene chloride | 75-09-2 | NS | 3 | NS | NS | NS | NS | NS | 100 | NS | NS | NS | NS | 74.7 | | 1.74 | 18.8 | | 1.74 | ND | | 1.74 | ND | | 8.69 | ND | | 9.66 | ND | | 1.74 | 70.2 | | 1.74 | 4.59 | | 1.74 |
| Naphthalene | 91-20-3 | NS | NS | NS | 2 | NS | NS | NS | NS | NS | 60 | NS | NS | ND | | 0.996 | ND | | 0.996 | ND | | 0.996 | ND | | 4.98 | ND | | 5.56 | ND | | 0.996 | ND | | 0.996 | ND | | 0.996 |
| n-Hexane | 110-54-3 | NS | NS | NS | NS | 6 | NS | NS | NS | NS | NS | 200 | NS | 10.4 | | 0.705 | 4.9 | | 0.705 | 1.17 | | 0.705 | 18.4 | | 3.52 | 16.5 | | 3.91 | 2.88 | | 0.705 | 2.55 | | 0.705 | 3.63 | | 0.705 |
| o-Xylene | 95-47-6 | NS | NS | NS | 2 | NS | NS | NS | NS | NS | 60 | NS | NS | 0.869 | | 0.869 | 1.17 | | 0.869 | ND | | 0.869 | 539 | | 4.34 | 708 | | 4.82 | 142 | | 0.869 | 1.75 | | 0.869 | 5.56 | | 0.869 |
| p/m-Xylene | 179601-23-1 | NS | NS | NS | NS | 6 | NS | NS | NS | NS | NS | 200 | NS | 1.92 | | 1.74 | 2.41 | | 1.74 | ND | | 1.74 | 1650 | | 8.69 | 1960 | | 9.64 | 379 | | 1.74 | 4.73 | | 1.74 | 14.4 | | 1.74 |
| Styrene | 100-42-5 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | ND | | 0.852 | 2.12 | | 0.852 | ND | | 0.852 | ND | | 4.26 | ND | | 4.73 | ND | | 0.852 | ND | | 0.852 | ND | | 0.852 |
| Tertiary butyl Alcohol | 75-65-0 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | ND | | 1.52 | ND | | 1.52 | ND | | 1.52 | 22.6 | | 7.58 | 25.5 | | 8.43 | 6 | | 1.52 | 4.46 | | 1.52 | 6.28 | | 1.52 |
| Tetrachloroethene | 127-18-4 | NS | 3 | NS | NS | NS | NS | NS | 100 | NS | NS | NS | NS | NA | | | NA | | | NA | | | ND | | 6.78 | ND | | 7.53 | ND | | 1.36 | ND | | 1.36 | 5.08 | | 1.36 |
| Tetrahydrofuran | 109-99-9 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | 70.8 | | 1.47 | 7.61 | | 1.47 | ND | | 1.47 | ND | | 7.37 | ND | | 8.2 | ND | | 1.47 | 43.1 | | 1.47 | 5.93 | | 1.47 |
| Toluene | 108-88-3 | NS | NS | NS | NS | NS | 10 | NS | NS | NS | NS | NS | 300 | 5.31 | | 0.754 | 1.3 | | 0.754 | ND | | 0.754 | 30.1 | | 3.77 | 42.6 | | 4.18 | 5.39 | | 0.754 | 4.97 | | 0.754 | 17.9 | | 0.754 |
| trans-1,2-Dichloroethene | 156-60-5 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | 2.98 | | 0.793 | 7.49 | | 0.793 | ND | | 0.793 | ND | | 3.96 | ND | | 4.4 | ND | | 0.793 | 8.6 | | 0.793 | 1.79 | | 0.793 |
| trans-1,3-Dichloropropene | 10061-02-6 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | ND | | 0.908 | ND | | 0.908 | ND | | 0.908 | ND | | 4.54 | ND | | 5.04 | ND | | 0.908 | ND | | 0.908 | ND | | 0.908 |
| Trichloroethene | 79-01-6 | 0.2 | NS | NS | NS | NS | NS | 6 | NS | NS | NS | NS | NS | NA | | | NA | | | NA | | | ND | | 5.37 | ND | | 5.97 | ND | | 1.07 | ND | | 1.07 | ND | | 1.07 |
| Trichlorofluoromethane | 75-69-4 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | 1.21 | | 1.12 | 1.24 | | 1.12 | 1.37 | | 1.12 | ND | | 5.62 | ND | | 6.24 | ND | | 1.12 | 1.31 | | 1.12 | 1.26 | | 1.12 |
| Vinyl bromide | 593-60-2 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | ND | | 0.874 | ND | | 0.874 | ND | | 0.874 | ND | | 4.37 | ND | | 4.85 | ND | | 0.874 | ND | | 0.874 | ND | | 0.874 |
| Vinyl chloride | 75-01-4 | NS | NS | 0.2 | NS | NS | NS | NS | NS | 6 | NS | NS | NS | NA | | | NA | | | NA | | | ND | | 2.56 | ND | | 2.84 | 0.951 | | 0.511 | ND | | 0.511 | ND | | 0.511 |
| **VOLATILE ORGANICS IN AIR BY SIM** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | NS | 3 | NS | NS | NS | NS | NS | 100 | NS | NS | NS | NS | ND | | 0.109 | ND | | 0.109 | ND | | 0.109 | NA | | | NA | | | NA | | | NA | | | NA | | |
| 1,1-Dichloroethane | 75-34-3 | 0.2 | NS | NS | NS | NS | NS | 6 | NS | NS | NS | NS | NS | ND | | 0.079 | ND | | 0.079 | ND | | 0.079 | NA | | | NA | | | NA | | | NA | | | NA | | |
| Carbon tetrachloride | 56-23-5 | 0.2 | NS | NS | NS | NS | NS | 6 | NS | NS | NS | NS | NS | 0.428 | | 0.126 | 0.434 | | 0.126 | 0.465 | | 0.126 | NA | | | NA | | | NA | | | NA | | | NA | | |
| cis-1,2-Dichloroethene | 156-59-2 | 0.2 | NS | NS | NS | NS | NS | 6 | NS | NS | NS | NS | NS | ND | | 0.079 | ND | | 0.079 | ND | | 0.079 | NA | | | NA | | | NA | | | NA | | | NA | | |
| Methylene chloride | 75-09-2 | NS | 3 | NS | NS | NS | NS | NS | 100 | NS | NS | NS | NS | ND | | 0.136 | 0.244 | | 0.136 | ND | | 0.136 | NA | | | NA | | | NA | | | NA | | | NA | | |
| Tetrachloroethene | 127-18-4 | NS | 3 | NS | NS | NS | NS | NS | 100 | NS | NS | NS | NS | ND | | 0.107 | ND | | 0.107 | ND | | 0.107 | NA | | | NA | | | NA | | | NA | | | NA | | |
| Vinyl chloride | 75-01-4 | NS | NS | 0.2 | NS | NS | NS | NS | NS | 6 | NS | NS | NS | ND | | 0.051 | ND | | 0.051 | ND | | 0.051 | NA | | | NA | | | NA | | | NA | | | NA | | |

Checked by: MS
Date: 1/28/2026

# Table 3 - Vapor Intrusion Analytical Data Summary
March 2025

**Notes:**

[a] - The concentrations of each isomer are added if multiple isomers are present and the results compared to the total screening level.

[b] - Levels are the lower value generated using a factor of 100x for carcinogens and a factor of 2x for noncarcinogens using the Table A-4 health-based values.

[c] - Value is based on the higher analytical reporting limit.

‡: Indoor air and ambient air samples were collected from approximate breathing height. SSV samples were collected immediately beneath the building slab.

NS - No Standard

Q - Laboratory Qualifier

RL - Reporting Limit

NA- Not Analyzed

ND - analyte was analyzed for but not detected

NY-IAC-A: New York DOH Matrix A Indoor Air Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.

NY-IAC-B: New York DOH Matrix B Indoor Air Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.

NY-IAC-C: New York DOH Matrix C Indoor Air Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.

NY-IAC-D: New York DOH Matrix D Indoor Air Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.

NY-IAC-E: New York DOH Matrix E Indoor Air Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.

NY-IAC-F: New York DOH Matrix F Indoor Air Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.

NY-SSC-A: New York DOH Matrix A Sub-slab Vapor Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.

NY-SSC-B: New York DOH Matrix B Sub-slab Vapor Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.

NY-SSC-C: New York DOH Matrix C Sub-slab Vapor Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.

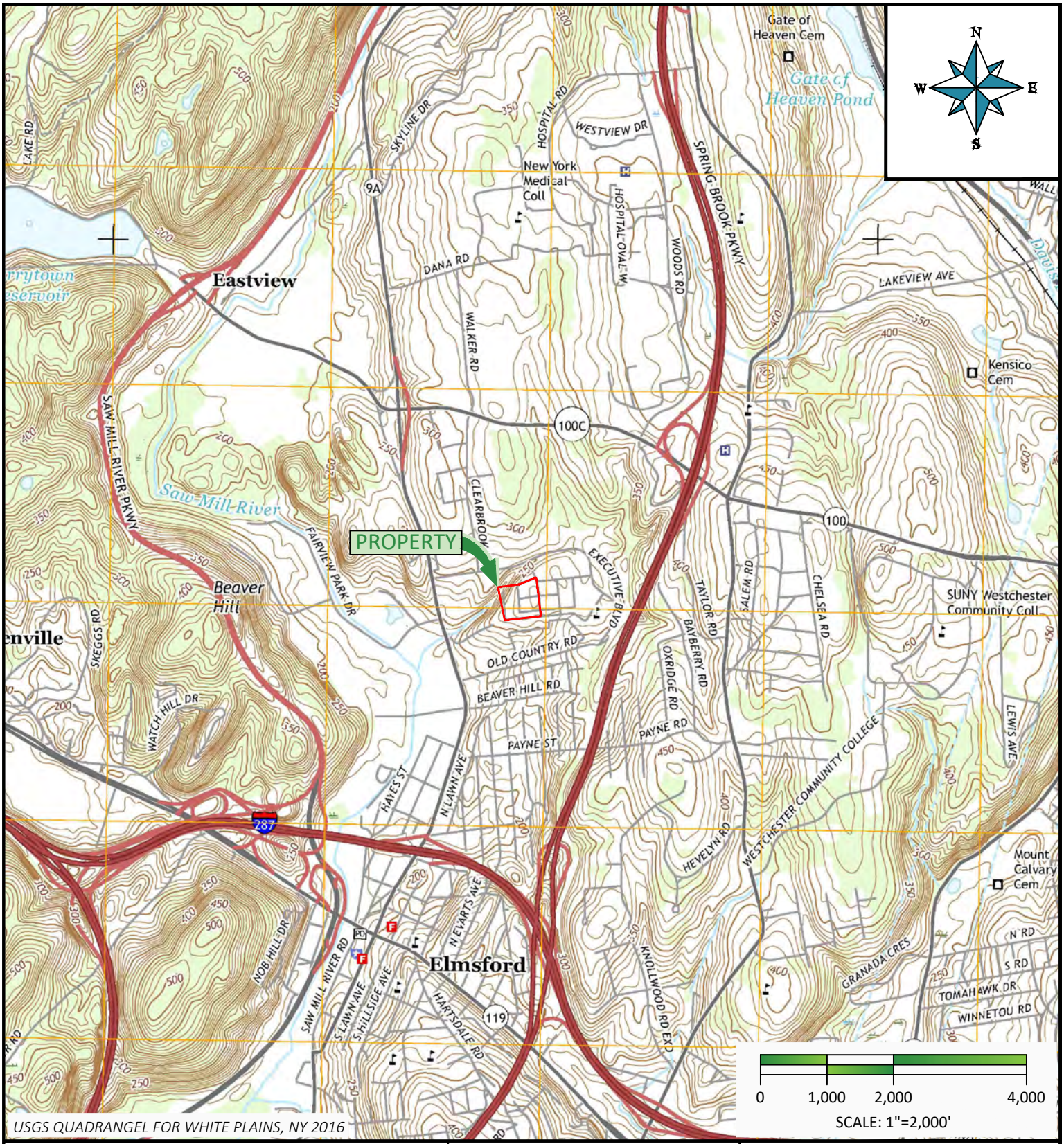
NY-SSC-D: New York DOH Matrix D Sub-slab Vapor Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.

NY-SSC-E: New York DOH Matrix E Sub-slab Vapor Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.

NY-SSC-F: New York DOH Matrix F Sub-slab Vapor Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.

** - contaminant was not detected at a concentration greater than the laboratory reporting limit, however the laboratory reporting limit exceeds the applicable standards

# DRAWINGS




USGS QUADRANGEL FOR WHITE PLAINS, NY 2016

PEAK ENVIRONMENTAL
A Nova Group, GBC Company
26 KENNEDY BOULEVARD, SUITE A, EAST BRUNSWICK, NJ 08816
PHONE: 732-326-1010 WWW.PEAK-ENVIRONMENTAL.COM

**SITE LOCATION MAP**

*US GEOLOGICAL SURVEY MAPS*
*http://www.usgs.gov/*

**5 WESTCHESTER PLAZA**
**ELMSFORD, NEW YORK**

DRAWN BY: JK
CHECKED BY: MS

PROJECT: 2847
NYSDEC SITE #:C360205
DATE: 11/03/2022

DRAWING
1

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PEAK ENVIRONMENTAL
A Nova Group, GBC Company
26 KENNEDY BOULEVARD, SUITE A, EAST BRUNSWICK, NJ 08816
PHONE: 732-326-1010 WWW.PEAK-ENVIRONMENTAL.COM

**LEGEND**

PROPERTY BOUNDARY

BROWNFIELD SITE BOUNDARY LINE

**SOURCES:**

1. MAP CREATED IN HARN/NY.NY-EF, NEW YORK STATE PLANE, EAST ZONE, U.S. SURVEY FOOT
2. AERIAL IMAGE FROM 2019 GOOGLE MAPS.
3. SITE BOUNDARY GRAPHICALLY SHOWN PER THE WESTCHESTER COUNTY GEOGRAPHIC INFORMATION SYSTEMS WEBSITE.

**SITE MAP**

**5 WESTCHESTER PLAZA**
**ELMSFORD, NEW YORK**

NYSDEC SITE #: C360205

PROJECT: 2847

DATE: NOVEMBER 3, 2022

DRAWN BY: JK

CHECKED BY: MS

DRAWING 2

Z:\0000_PROJECTS\2847_MACKCALI - WESTCHESTER, NY\01-CAD\2022-11-03_RIR MAP SET.DWG

**Soil Vapor/Indoor Air Matrix 1**

| SUB-SLAB VAPOR CONCENTRATION of COMPOUND ($\mu g/m^3$) | INDOOR AIR CONCENTRATION of COMPOUND ($\mu g/m^3$) | | | |
|---|---|---|---|---|
| | < 0.25 | 0.25 to < 1 | 1 to < 5.0 | 5.0 and above |
| < 5 | 1. No further action | 2. Take reasonable and practical actions to identify source(s) and reduce exposures | 3. Take reasonable and practical actions to identify source(s) and reduce exposures | 4. Take reasonable and practical actions to identify source(s) and reduce exposures |
| 5 to < 50 | 5. No further action | 6. MONITOR | 7. MONITOR | 8. MITIGATE |
| 50 to < 250 | 9. MONITOR | 10. MONITOR/MITIGATE | 11. MITIGATE | 12. MITIGATE |
| 250 and above | 13. MITIGATE | 14. MITIGATE | 15. MITIGATE | 16. MITIGATE |

Notes

Matrix obtained from New York State Department of Health Guidance for Evaluating Soil Vapor Intrusion in the State of New York

Decision Matrix 1 for carbon tetrachloride and trichloroethene

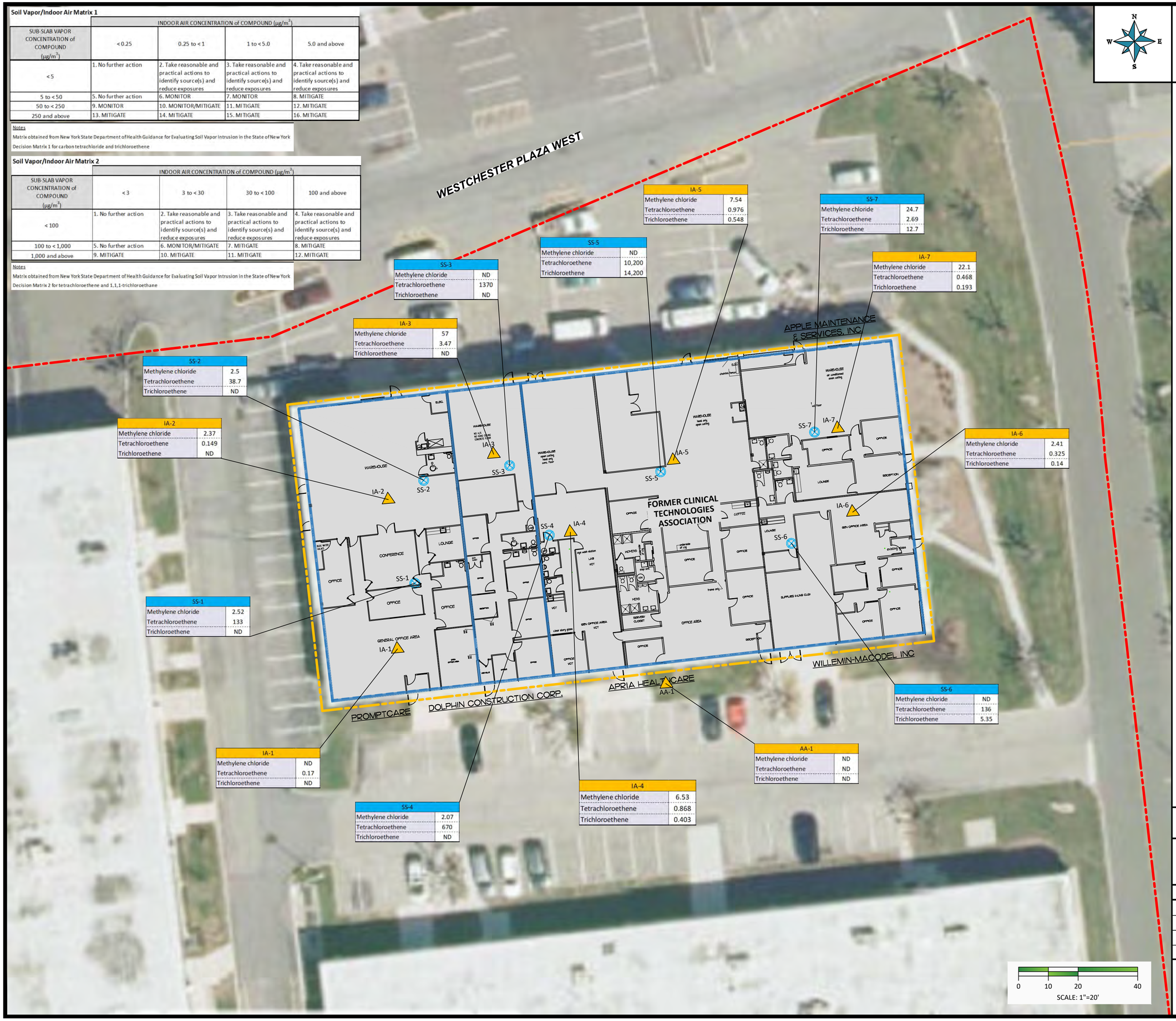
**Soil Vapor/Indoor Air Matrix 2**

| SUB-SLAB VAPOR CONCENTRATION of COMPOUND ($\mu g/m^3$) | INDOOR AIR CONCENTRATION of COMPOUND ($\mu g/m^3$) | | | |
|---|---|---|---|---|
| | < 3 | 3 to < 30 | 30 to < 100 | 100 and above |
| < 100 | 1. No further action | 2. Take reasonable and practical actions to identify source(s) and reduce exposures | 3. Take reasonable and practical actions to identify source(s) and reduce exposures | 4. Take reasonable and practical actions to identify source(s) and reduce exposures |
| 100 to < 1,000 | 5. No further action | 6. MONITOR/MITIGATE | 7. MITIGATE | 8. MITIGATE |
| 1,000 and above | 9. MITIGATE | 10. MITIGATE | 11. MITIGATE | 12. MITIGATE |

Notes

Matrix obtained from New York State Department of Health Guidance for Evaluating Soil Vapor Intrusion in the State of New York

Decision Matrix 2 for tetrachloroethene and 1,1,1-trichloroethane




| IA-5 | |
|---|---|
| Methylene chloride | 7.54 |
| Tetrachloroethene | 0.976 |
| Trichloroethene | 0.548 |

| SS-7 | |
|---|---|
| Methylene chloride | 24.7 |
| Tetrachloroethene | 2.69 |
| Trichloroethene | 12.7 |

| SS-5 | |
|---|---|
| Methylene chloride | ND |
| Tetrachloroethene | 10,200 |
| Trichloroethene | 14,200 |

| IA-7 | |
|---|---|
| Methylene chloride | 22.1 |
| Tetrachloroethene | 0.468 |
| Trichloroethene | 0.193 |

| SS-3 | |
|---|---|
| Methylene chloride | ND |
| Tetrachloroethene | 1370 |
| Trichloroethene | ND |

| IA-3 | |
|---|---|
| Methylene chloride | 57 |
| Tetrachloroethene | 3.47 |
| Trichloroethene | ND |

| SS-2 | |
|---|---|
| Methylene chloride | 2.5 |
| Tetrachloroethene | 38.7 |
| Trichloroethene | ND |

| IA-2 | |
|---|---|
| Methylene chloride | 2.37 |
| Tetrachloroethene | 0.149 |
| Trichloroethene | ND |

| IA-6 | |
|---|---|
| Methylene chloride | 2.41 |
| Tetrachloroethene | 0.325 |
| Trichloroethene | 0.14 |

| SS-1 | |
|---|---|
| Methylene chloride | 2.52 |
| Tetrachloroethene | 133 |
| Trichloroethene | ND |

| SS-6 | |
|---|---|
| Methylene chloride | ND |
| Tetrachloroethene | 136 |
| Trichloroethene | 5.35 |

| IA-1 | |
|---|---|
| Methylene chloride | ND |
| Tetrachloroethene | 0.17 |
| Trichloroethene | ND |

| AA-1 | |
|---|---|
| Methylene chloride | ND |
| Tetrachloroethene | ND |
| Trichloroethene | ND |

| IA-4 | |
|---|---|
| Methylene chloride | 6.53 |
| Tetrachloroethene | 0.868 |
| Trichloroethene | 0.403 |

| SS-4 | |
|---|---|
| Methylene chloride | 2.07 |
| Tetrachloroethene | 670 |
| Trichloroethene | ND |

0 10 20 40

SCALE: 1"=20'


PEAK ENVIRONMENTAL
A Nova Group, GBC Company
26 KENNEDY BOULEVARD, SUITE A, EAST BRUNSWICK, NJ 08816
PHONE: 732-326-1010 WWW.PEAK-ENVIRONMENTAL.COM


**LEGEND**

- PROPERTY BOUNDARY
- BROWNFIELD SITE BOUNDARY LINE
- LEASEHOLD BOUNDARY
- INDOOR/AMBIENT AIR SAMPLE LOCATION
- SUB-SLAB SOIL VAPOR SAMPLE LOCATION

**NOTE:**

1. SAMPLE RESULTS WERE COMPARED TO THE NYDOH DECISION MATRICES.

**SOURCES:**

1. MAP CREATED IN HARN/NY.NY-EF, NEW YORK STATE PLANE, EAST ZONE, U.S. SURVEY FOOT
2. AERIAL IMAGE FROM 2019 GOOGLE MAPS.
3. SITE BOUNDARY GRAPHICALLY SHOWN PER THE WESTCHESTER COUNTY GEOGRAPHIC INFORMATION SYSTEMS WEBSITE.
4. BUILDING LAYOUT DETAIL OBTAINED FROM CLIENT SUPPLIED PDF ENTITLED "FLOOR PLAN". UNDATED.

**MARCH 2022 VAPOR INTRUSION SAMPLE LOCATION MAP WITH BUILDING INTERIOR WALLS**

**5 WESTCHESTER PLAZA**
**ELMSFORD, NEW YORK**

NYSDEC SITE #: C360205

PROJECT: 2847

DATE: NOVEMBER 14, 2022

DRAWN BY: JK

CHECKED BY: MS

DRAWING 3

Z:\2000_PROJECTS\2847_MACKCALL - WESTCHESTER, NY\01-CAD\2022-11-03_RIR MAP SET.DWG

**Soil Vapor/Indoor Air Matrix 1**

| SUB-SLAB VAPOR CONCENTRATION of COMPOUND (µg/m³) | INDOOR AIR CONCENTRATION of COMPOUND (mcg/m³) < 0.2 | 0.2 to < 1 | 1 and above |
|---|---|---|---|
| < 6 | 1. No further action | 2. No further action | 3. Identify source(s) and resample or mitigate |
| 6 to < 60 | 4. No further action | 5. MONITOR | 6. MITIGATE |
| 60 and above | 7. MITIGATE | 8. MITIGATE | 9. MITIGATE |

Notes

Matrix obtained from New York State Department of Health Guidance for Evaluating Soil Vapor Intrusion in the State of New York

Decision Matrix 1 for carbon tetrachloride and trichloroethene

Analytes Assigned:
Trichloroethene (TCE), cis-1,2-Dichloroethene (c-1,2-DCE), 1,1-Dichloroethene (1,1-DCE), Carbon Tetrachloride

**Soil Vapor/Indoor Air Matrix 2**

| SUB-SLAB VAPOR CONCENTRATION of COMPOUND (µg/m³) | INDOOR AIR CONCENTRATION of COMPOUND (mcg/m³) < 3 | 3 to < 10 | 10 and above |
|---|---|---|---|
| < 100 | 1. No further action | 2. No further action | 3. Identify source(s) and resample or mitigate |
| 100 to < 1,000 | 4. No further action | 5. MONITOR | 6. MITIGATE |
| 1,000 and above | 7. MITIGATE | 8. MITIGATE | 9. MITIGATE |

Notes

Matrix obtained from New York State Department of Health Guidance for Evaluating Soil Vapor Intrusion in the State of New York

Decision Matrix 2 for tetrachloroethene and 1,1,1-trichloroethane

Analytes Assigned:
Tetrachloroethene (PCE), 1,1,1-Trichloroethane (1,1,1-TCA), Methylene Chloride

WESTCHESTER PLAZA WEST

APPLE MAINTENANCE & SERVICES, INC.

FORMER CLINICAL TECHNOLOGIES ASSOCIATION

PROMPTCARE

DOLPHIN CONSTRUCTION CORP.

APRIA HEALTHCARE

WILLEMIN-MACODEL INC

| SG-N2 | |
|---|---|
| Cis-1,2-DCE | 1.28 |
| Tricloroethylene | 522 |
| Tetrachloroethene | 502 |

| SG-N1 | |
|---|---|
| Cis-1,2-DCE | 14.7 |
| Tricloroethylene | 2,340 |
| Tetrachloroethene | 888 |

| SG-E1 | |
|---|---|
| Cis-1,2-DCE | ND |
| Tricloroethylene | ND |
| Tetrachloroethene | ND |

| SG-W2 | |
|---|---|
| 111-TCA | 18 |
| Cis-1,2-DCE | ND |
| Tricloroethylene | 3.25 |
| Tetrachloroethene | 1.55 |

| SG-W1 | |
|---|---|
| 111-TCA | 260 |
| Cis-1,2-DCE | ND |
| Tricloroethylene | ND |
| Tetrachloroethene | ND |

| SG-S1 | |
|---|---|
| Cis-1,2-DCE | ND |
| Tricloroethylene | 14.6 |
| Tetrachloroethene | 24.5 |

| SG-S2 | |
|---|---|
| Cis-1,2-DCE | ND |
| Tricloroethylene | 18.2 |
| Tetrachloroethene | 43.6 |

N W E S

0 10 20 40
SCALE: 1"=20'

PEAK ENVIRONMENTAL
A Nova Group, GBC Company
26 KENNEDY BOULEVARD, SUITE A, EAST BRUNSWICK, NJ 08816
PHONE: 732-326-1010 WWW.PEAK-ENVIRONMENTAL.COM

**LEGEND**

- PROPERTY BOUNDARY
- BROWNFIELD SITE BOUNDARY LINE
- LEASEHOLD BOUNDARY
- SOIL VAPOR SAMPLE LOCATION

**NOTE:**

1. SAMPLE RESULTS WERE COMPARED TO THE NYDOH DECISION MATRICES.

**SOURCES:**

1. MAP CREATED IN HARN/NY.NY-EF, NEW YORK STATE PLANE, EAST ZONE, U.S. SURVEY FOOT
2. AERIAL IMAGE FROM 2019 GOOGLE MAPS.
3. SITE BOUNDARY GRAPHICALLY SHOWN PER THE WESTCHESTER COUNTY GEOGRAPHIC INFORMATION SYSTEMS WEBSITE.
4. BUILDING LAYOUT DETAIL OBTAINED FROM CLIENT SUPPLIED PDF ENTITLED "FLOOR PLAN". UNDATED.

**APRIL 2024 SOIL VAPOR SAMPLE LOCATION MAP**

**5 WESTCHESTER PLAZA
ELMSFORD, NEW YORK**

NYSDEC SITE #: C360205

PROJECT: 2847

DATE: JUNE 16, 2026

DRAWN BY: MG

CHECKED BY: MS

DRAWING 4

Z:\2000_PROJECTS\2847_MACOCAL_-_WESTCHESTER_NY\01-CAD\2024-06-11_RIR_MAP SET.DWG

**Soil Vapor/Indoor Air Matrix 1**

| SUB-SLAB VAPOR CONCENTRATION of COMPOUND (µg/m³) | INDOOR AIR CONCENTRATION of COMPOUND (mcg/m³) < 0.2 | 0.2 to < 1 | 1 and above |
|---|---|---|---|
| < 6 | 1. No further action | 2. No further action | 3. Identify source(s) and resample or mitigate |
| 6 to < 60 | 4. No further action | 5. MONITOR | 6. MITIGATE |
| 60 and above | 7. MITIGATE | 8. MITIGATE | 9. MITIGATE |

Notes

Matrix obtained from New York State Department of Health Guidance for Evaluating Soil Vapor Intrusion in the State of New York

Decision Matrix 1 for carbon tetrachloride and trichloroethene

Analytes Assigned:
Trichloroethene (TCE), cis-1,2-Dichloroethene (c-1,2-DCE), 1,1-Dichloroethene (1,1-DCE), Carbon Tetrachloride

**Soil Vapor/Indoor Air Matrix 2**

| SUB-SLAB VAPOR CONCENTRATION of COMPOUND (µg/m³) | INDOOR AIR CONCENTRATION of COMPOUND (mcg/m³) < 3 | 3 to < 10 | 10 and above |
|---|---|---|---|
| < 100 | 1. No further action | 2. No further action | 3. Identify source(s) and resample or mitigate |
| 100 to < 1,000 | 4. No further action | 5. MONITOR | 6. MITIGATE |
| 1,000 and above | 7. MITIGATE | 8. MITIGATE | 9. MITIGATE |

Notes

Matrix obtained from New York State Department of Health Guidance for Evaluating Soil Vapor Intrusion in the State of New York

Decision Matrix 2 for tetrachloroethene and 1,1,1-trichloroethane

Analytes Assigned:
Tetrachloroethene (PCE), 1,1,1-Trichloroethane (1,1,1-TCA), Methylene Chloride

| SG-N5 032825 | |
|---|---|
| Chloromethane | 10.8 |
| 1,3-Butadiene | 21.8 |
| Chloroethane | 4.12 |
| Ethanol | 63.3 |
| Acetone | 159 |
| Isopropanol | 46.2 |
| Tertiary butyl Alcohol | 25.5 |
| Carbon disulfide | 15.8 |
| Freon-113 | 133 |
| 2-Butanone | 28.6 |
| n-Hexane | 16.5 |
| Benzene | 6.13 |
| Cyclohexane | 14.5 |
| 2,2,4-Trimethylpentane | 5.37 |
| Heptane | 31.6 |
| Toluene | 42.6 |
| Ethylbenzene | 691 |
| p/m-Xylene | 1960 |
| o-Xylene | 708 |

| SG-N3 032825 | |
|---|---|
| Chloromethane | 8.09 |
| Ethanol | 57.3 |
| Isopropanol | 66.4 |
| Tertiary butyl Alcohol | 22.6 |
| Carbon disulfide | 12.3 |
| Freon-113 | 109 |
| 2-Butanone | 23.2 |
| n-Hexane | 18.4 |
| Benzene | 4.86 |
| Cyclohexane | 13.4 |
| Heptane | 30.8 |
| Toluene | 30.1 |
| Ethylbenzene | 534 |
| p/m-Xylene | 1650 |
| o-Xylene | 539 |

| SG-N7 032825 | |
|---|---|
| Chloromethane | 0.787 |
| Vinyl chloride | 0.951 |
| 1,3-Butadiene | 2.54 |
| Ethanol | 11 |
| Acetone | 27.8 |
| Isopropanol | 4.13 |
| Tertiary butyl Alcohol | 6 |
| Carbon disulfide | 3.99 |
| Freon-113 | 6.32 |
| 2-Butanone | 4.75 |
| cis-1,2-Dichloroethene | 1.68 |
| n-Hexane | 2.88 |
| Benzene | 0.92 |
| Cyclohexane | 0.706 |
| Heptane | 2.28 |
| Toluene | 5.39 |
| Ethylbenzene | 127 |
| p/m-Xylene | 379 |
| o-Xylene | 142 |

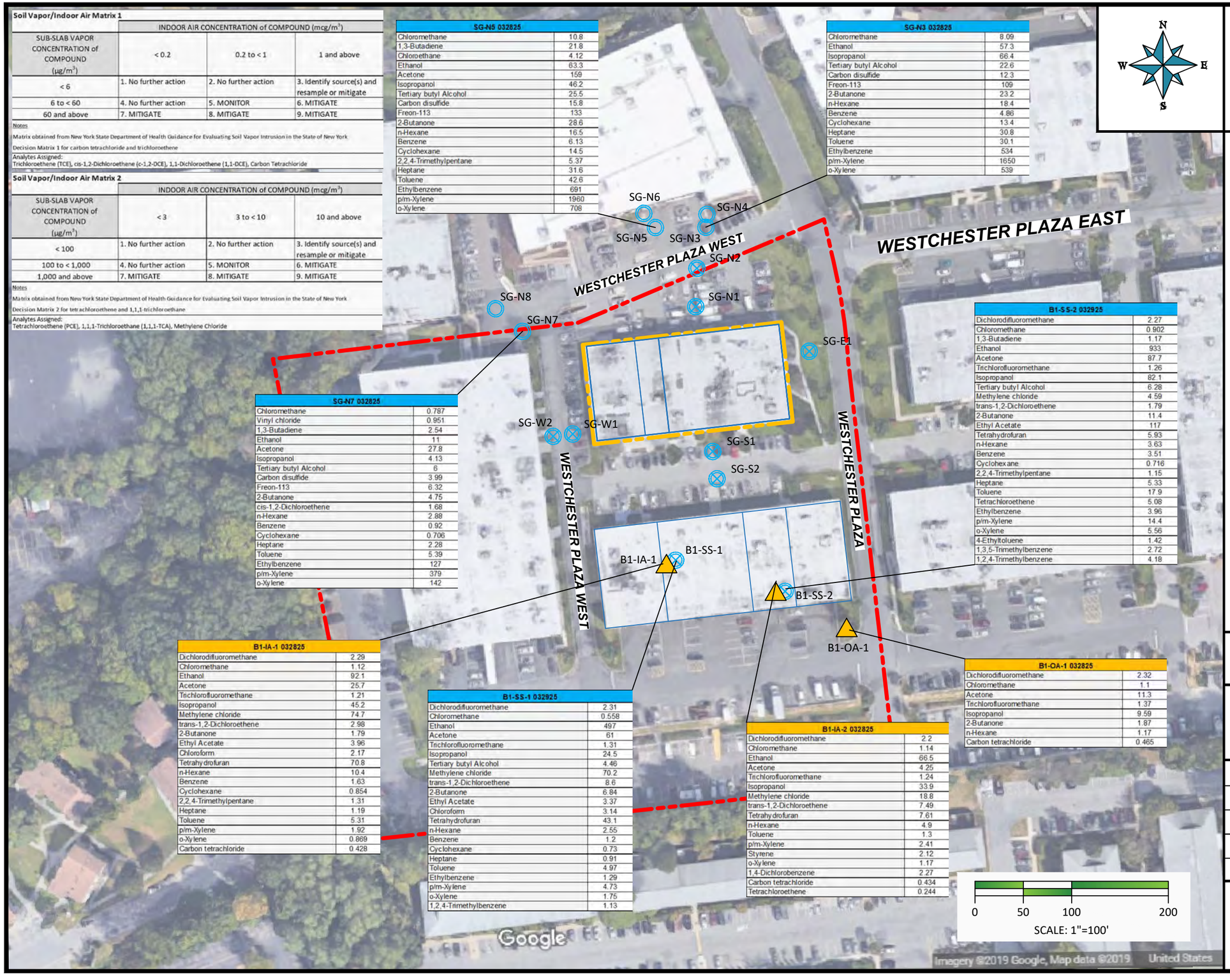
| B1-SS-2 032925 | |
|---|---|
| Dichlorodifluoromethane | 2.27 |
| Chloromethane | 0.902 |
| 1,3-Butadiene | 1.17 |
| Ethanol | 933 |
| Acetone | 87.7 |
| Trichlorofluoromethane | 1.26 |
| Isopropanol | 82.1 |
| Tertiary butyl Alcohol | 6.28 |
| Methylene chloride | 4.59 |
| trans-1,2-Dichloroethene | 1.79 |
| 2-Butanone | 11.4 |
| Ethyl Acetate | 117 |
| Tetrahydrofuran | 5.93 |
| n-Hexane | 3.63 |
| Benzene | 3.51 |
| Cyclohexane | 0.716 |
| 2,2,4-Trimethylpentane | 1.15 |
| Heptane | 5.33 |
| Toluene | 17.9 |
| Tetrachloroethene | 5.08 |
| Ethylbenzene | 3.96 |
| p/m-Xylene | 14.4 |
| o-Xylene | 5.56 |
| 4-Ethyltoluene | 1.42 |
| 1,3,5-Trimethylbenzene | 2.72 |
| 1,2,4-Trimethylbenzene | 4.18 |

| B1-IA-1 032825 | |
|---|---|
| Dichlorodifluoromethane | 2.29 |
| Chloromethane | 1.12 |
| Ethanol | 92.1 |
| Acetone | 25.7 |
| Trichlorofluoromethane | 1.21 |
| Isopropanol | 45.2 |
| Methylene chloride | 74.7 |
| trans-1,2-Dichloroethene | 2.98 |
| 2-Butanone | 1.79 |
| Ethyl Acetate | 3.96 |
| Chloroform | 2.17 |
| Tetrahydrofuran | 70.8 |
| n-Hexane | 10.4 |
| Benzene | 1.63 |
| Cyclohexane | 0.854 |
| 2,2,4-Trimethylpentane | 1.31 |
| Heptane | 1.19 |
| Toluene | 5.31 |
| p/m-Xylene | 1.92 |
| o-Xylene | 0.869 |
| Carbon tetrachloride | 0.428 |

| B1-SS-1 032925 | |
|---|---|
| Dichlorodifluoromethane | 2.31 |
| Chloromethane | 0.558 |
| Ethanol | 497 |
| Acetone | 61 |
| Trichlorofluoromethane | 1.31 |
| Isopropanol | 24.5 |
| Tertiary butyl Alcohol | 4.46 |
| Methylene chloride | 70.2 |
| trans-1,2-Dichloroethene | 8.6 |
| 2-Butanone | 6.84 |
| Ethyl Acetate | 3.37 |
| Chloroform | 3.14 |
| Tetrahydrofuran | 43.1 |
| n-Hexane | 2.55 |
| Benzene | 1.2 |
| Cyclohexane | 0.73 |
| Heptane | 0.91 |
| Toluene | 4.97 |
| Ethylbenzene | 1.29 |
| p/m-Xylene | 4.73 |
| o-Xylene | 1.75 |
| 1,2,4-Trimethylbenzene | 1.13 |

| B1-IA-2 032825 | |
|---|---|
| Dichlorodifluoromethane | 2.2 |
| Chloromethane | 1.14 |
| Ethanol | 66.5 |
| Acetone | 4.25 |
| Trichlorofluoromethane | 1.24 |
| Isopropanol | 33.9 |
| Methylene chloride | 18.8 |
| trans-1,2-Dichloroethene | 7.49 |
| Tetrahydrofuran | 7.61 |
| n-Hexane | 4.9 |
| Toluene | 1.3 |
| p/m-Xylene | 2.41 |
| Styrene | 2.12 |
| o-Xylene | 1.17 |
| 1,4-Dichlorobenzene | 2.27 |
| Carbon tetrachloride | 0.434 |
| Tetrachloroethene | 0.244 |

| B1-OA-1 032825 | |
|---|---|
| Dichlorodifluoromethane | 2.32 |
| Chloromethane | 1.1 |
| Acetone | 11.3 |
| Trichlorofluoromethane | 1.37 |
| Isopropanol | 9.59 |
| 2-Butanone | 1.87 |
| n-Hexane | 1.17 |
| Carbon tetrachloride | 0.465 |




PEAK ENVIRONMENTAL
A Nova Group, GBC Company
26 KENNEDY BOULEVARD, SUITE A, EAST BRUNSWICK, NJ 08816
PHONE: 732-326-1010 WWW.PEAK-ENVIRONMENTAL.COM

**LEGEND**

- PROPERTY BOUNDARY
- BROWNFIELD SITE BOUNDARY LINE
- LEASEHOLD BOUNDARY
- SOIL VAPOR SAMPLE
- SUB-SLAB SAMPLE
- INDOOR/OUTDOOR AIR QUALITY SAMPLE

**SOURCES:**

1. MAP CREATED IN HARN/NY.NY-EF, NEW YORK STATE PLANE, EAST ZONE, U.S. SURVEY FOOT
2. AERIAL IMAGE FROM 2019 GOOGLE MAPS.
3. SITE BOUNDARY GRAPHICALLY SHOWN PER THE WESTCHESTER COUNTY GEOGRAPHIC INFORMATION SYSTEMS WEBSITE.

# SOIL VAPOR, INDOOR AIR, OUTDOOR AIR SAMPLE LOCATION MAP MARCH 2025

**5 WESTCHESTER PLAZA ELMSFORD, NEW YORK**

NYSDEC SITE #: C360205

PROJECT: 2847

DATE: APRIL 2025

DRAWN BY: MG

CHECKED BY: MS

DRAWING 5

Z:\0000_PROJECTS\2847_MACKCALI - WESTCHESTER, NY\01-CAD\2025-06-03_RIR MAP SET.DWG




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PEAK ENVIRONMENTAL
A Nova Group, GBC Company

26 KENNEDY BOULEVARD, SUITE A, EAST BRUNSWICK, NJ 08816
PHONE: 732-326-1010 WWW.PEAK-ENVIRONMENTAL.COM

**LEGEND**

- PROPERTY BOUNDARY
- SITE/ ENVIRONMENTAL EASEMENT BOUNDARY
- PARCEL BOUNDARY

**SOURCES:**

1. MAP CREATED IN HARN/NY.NY-EF, NEW YORK STATE PLANE, EAST ZONE, U.S. SURVEY FOOT
2. AERIAL IMAGE FROM 2019 GOOGLE MAPS.
3. SITE BOUNDARY GRAPHICALLY SHOWN PER THE WESTCHESTER COUNTY GEOGRAPHIC INFORMATION SYSTEMS WEBSITE.

**ENVIRONMENTAL EASEMENT PLAN**

**5 WESTCHESTER PLAZA**
**ELMSFORD, NEW YORK**

NYSDEC SITE #: C360205

PROJECT: 2847

DATE: JULY 2026

DRAWN BY: JK

CHECKED BY: MS

DRAWING 6

Z:\0000_PROJECTS\2847_MACKCALI - WESTCHESTER, NY\01-CAD\2026-07-10__RIW MAP SET FINAL.DWG

LEGEND:

INSTALLATION

- SUCTION POINT
- 4" CONVEYANCE PIPE
- 3" CONVEYANCE PIPE
- 3" SUB SLAB HORIZONTAL PIPE
- ROOF MOUNTED MITIGATION BLOWER
- MONITORING TEST PORT

Scale: 1" = 5'

0 5' 21'

2' 11'

N W E S

System 5
Roof Mounted
GBR-89
240V

System 4
Roof Mounted
GBR76-UD
240V

System 3
Roof Mounted
GBR76-UD
240V

System 2
Roof Mounted
GBR76-UD
240V

System 1
Roof Mounted
GBR76-UD
240V

Horizontal Pipe Run on Exterior of Building

Horizontal Pipe Run on Exterior of Building

OBAR EDG Gateway & Local Alert

Horizontal Pipe Run on Exterior of Building

SP 3-2

SP 3-1

SP 1-2

SP 2-1

SP 1-2

SP 1-1

Well Length 90'

Well Length 45'

Well Length 90'

Well Length 50'

Well Length 90'

Well Length 89'

Well Length 89'

Well Length 90'

MP 5

MP 7

MP 6

MP 2

MP 8

MP 3

MP 1

MP 4

Notes:

NOTES

| REV: | DESCRIPTION: | BY: | DATE: |
|---|---|---|---|
| STATUS: | | | |

OBAR SYSTEMS, INC.
2989 NJ 23, Newfoundland, NJ, 07435

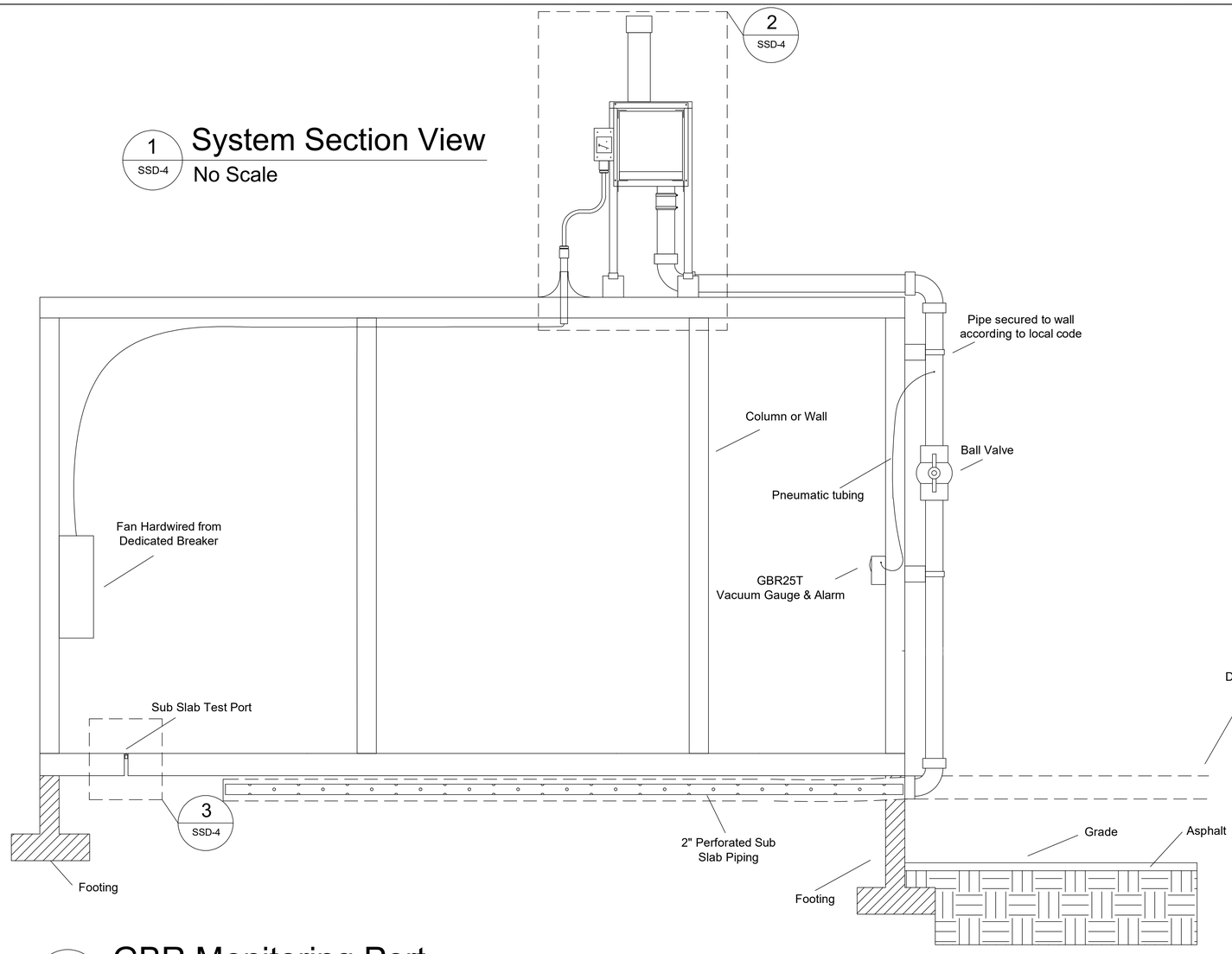
OBAR SYSTEMS, INC.

SITE: 5 Westchester Plaza, Elmsford, NY 10523

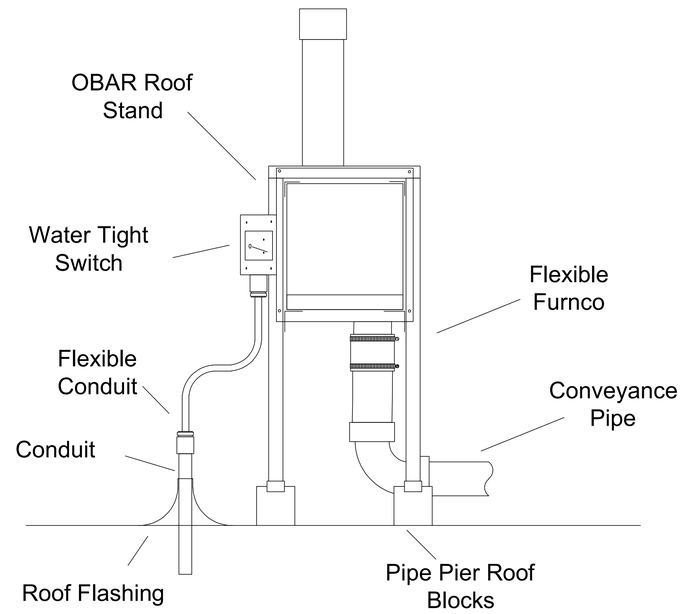
| DATE: | DRAWN: |
|---|---|
| 3/5/2026 | SM |

| SHEET #: | SHEET NAME: | SHEET SIZE: |
|---|---|---|
| DRAWING 7a | System As Built | ARCH E1 |

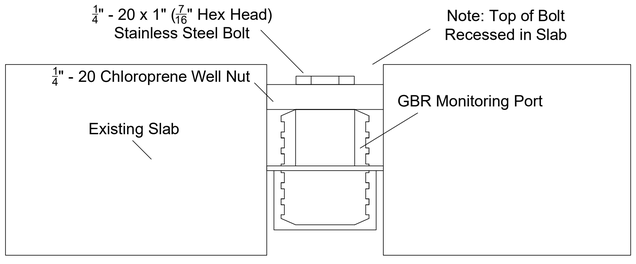
## 1 SSD-4 System Section View
No Scale



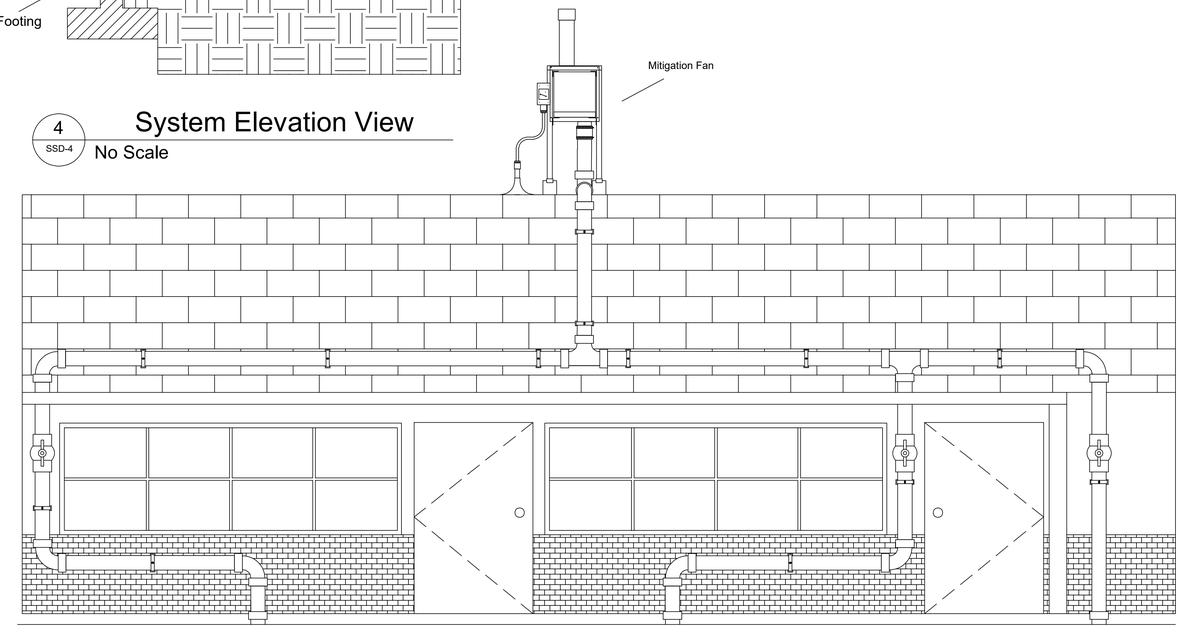

## 2 SSD-4 GBR Fan on Roof
No Scale




## 3 SSD-4 GBR Monitoring Port
No Scale




## 4 SSD-4 System Elevation View
No Scale




ADDITIONAL NOTES:

8. PIPING IS SHOWN DIAGRAMMATICALLY AND DOES NOT SHOW ALL OFFSETS, DROPS AND RISES OF RUNS. EXACT LOCATIONS ARE SUBJECT TO APPROVAL OF ARCHITECT. COORDINATION WITH EXISTING SERVICES, INCLUDING OF OTHER TRADES IS REQUIRED.
9. SUPPORT ALL PIPING FROM BUILDING STRUCTURE AND/OR FRAMING IN AN APPROVED MANNER. WHERE OVERHEAD CONSTRUCTION DOES NOT PERMIT FASTENING OR SUPPORTS FROM EQUIPMENT FURNISHED ADDITIONAL FRAMING.
10. PROVIDE ALL NECESSARY FLASHING AND COUNTER FLASHING TO MAINTAIN THE WATERPROOFING INTEGRITY OF THIS BUILDING AS REQUIRED BY THE INSTALLATION OF PIPES.
11. WHERE PENETRATIONS THROUGH FIRED RATED WALLS ARE NOT FIRE PROOFED THIS CONTRACTOR SHALL BE RESPONSIBLE TO SEAL SAME TO MAINTAIN THE RATED INTEGRITY.

Notes:

1. ALL PIPING SHALL BE INSTALLED IN ACCORDANCE WITH THE LOCAL BUILDING CODE
2. ALL HORIZONTAL PIPE RUNS (ABOVE GROUND AND UNDERGROUND) MUST BE PITCHED A MINIMUM OD 1/8-INCH VERTICAL PER FOOT HORIZONTAL (1% SLOPE) TOWARDS SSDS SUCTION PIT/PIPE. THE SYSTEM SHALL BE INSTALLED SUCH THAT NO PORTION WILL ALLOW EXCESS ACCUMULATION OF CONDENSATION.
3. RISERS AND EXHAUST STACKS SHALL BE SECURELY ANCHORED WITH ADEQUATE STRUCTURAL SUPPORTS.
4. ELECTRICAL WORK TO BE COMPLETED BY LICENSED ELECTRICIAN IN ACCORDANCE TO CODE.
5. SYSTEM INSTALLATION SHALL ADHERE TO APPLICABLE LOCAL AND NATIONAL VAPOR INTRUSION TECHNICAL GUIDANCE DOCUMENTS
6. CONTRACTOR SHALL CONFIRM LOCATIONS OF ALL EQUIPMENT PIPING AND SUCTION POINTS ARE IN COMPLIANCE PRIOR TO INSTALLATION
7. THE WORK IN THE BUILDING SHALL BE DONE WHEN AND AS DIRECTED, AND IN A MANNER SATISFACTORY TO THE OWNER. THE WORK SHALL BE PERFORMED SO AS TO CAUSE THE LEAST POSSIBLE INCONVENIENCE AND DISTURBANCE TO THE PRESENT OCCUPANTS.

| REV: | DESCRIPTION: | BY: | DATE: |
|---|---|---|---|
| STATUS: | | | |


OBAR SYSTEMS, INC.
2989 NJ 23, Newfoundland, NJ, 07435


OBAR SYSTEMS, INC.

SITE: 5 Westchester Plaza, Elmsford, NY 10523

DATE: 12/9/2024 DRAWN: SM

SHEET NO: DRAWING 7b | SHEET NAME: System Details | REVISION: ARCH E1

# APPENDIX A

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

**THIS INDENTURE** made this _____day of _____, 20__, between Owner, NYIP Owner III LLC, having an office at c/o Dune Real Estate Partners, 640 Fifth Ave., 17 Fl., New York, County of New York, State of New York (the "Grantor"), and The People of the State of New York (the "Grantee"), acting through their Commissioner of the Department of Environmental Conservation (the "Commissioner", or "NYSDEC" or "Department" as the context requires) with its headquarters located at 625 Broadway, Albany, New York 12233,

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

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

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

**WHEREAS,** Grantor, is the owner of real property located at the address of 5 Westchester Plaza in the Town of Greenburgh, County of Westchester and State of New York, known and designated on the tax map of the County Clerk of Westchester as tax map parcel number: Section 7.120 Block 19 Lot 8, being the same as that property conveyed to Grantor by deed dated December 29, 2021 and recorded in the Westchester County Clerk's Office in Instrument No. 613563279. The property subject to this Environmental Easement (the "Controlled Property") comprises a portion of Lot 8 of approximately 0.476 +/- acres, and is hereinafter more fully described in the Land Title Survey dated September 23, 2025 prepared by Thomas Anthony English, which will be attached to the Site Management Plan. The Controlled Property description is set forth in and attached hereto as Schedule A; and

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

**NOW THEREFORE**, in consideration of the mutual covenants contained herein and the terms and conditions of Brownfield Cleanup Agreement IndexNumber: C360205-03-21, Grantor conveys to Grantee a permanent Environmental Easement pursuant to ECL Article 71, Title 36 in, on, over, under, and upon the Controlled Property as more fully described herein ("Environmental Easement").

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

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

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

**Commercial as described in 6 NYCRR Part 375-1.8(g)(2)(iii) and Industrial as described in 6 NYCRR Part 375-1.8(g)(2)(iv)**

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

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

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

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

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

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

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

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

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

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

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

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

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

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

**This property is subject to an Environmental Easement held by the New York State Department of Environmental Conservation pursuant to Title 36 of Article 71 of the Environmental Conservation Law.**

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

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

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

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

(i) are in-place;

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

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

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

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

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

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

(7) the information presented is accurate and complete.

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

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

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

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

5. Enforcement

A. This Environmental Easement is enforceable in law or equity in perpetuity by Grantor, Grantee, or any affected local government, as defined in ECL Section 71-3603, against the owner of the Property, any lessees, and any person using the land. Enforcement shall not be defeated because of any subsequent adverse possession, laches, estoppel, or waiver. It is not a

defense in any action to enforce this Environmental Easement that: it is not appurtenant to an interest in real property; it is not of a character that has been recognized traditionally at common law; it imposes a negative burden; it imposes affirmative obligations upon the owner of any interest in the burdened property; the benefit does not touch or concern real property; there is no privity of estate or of contract; or it imposes an unreasonable restraint on alienation.

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

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

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

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

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

Parties shall address correspondence to:

Site Number: C360205
Office of General Counsel
NYSDEC
625 Broadway
Albany New York 12233-5500

With a copy to:

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

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

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

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

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

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

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

**Remainder of Page Intentionally Left Blank**

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

NYIP Owner III LLC:

By: _____

Print Name: _____

Title:_____ Date:_____

**Grantor's Acknowledgment**

STATE OF NEW YORK )
) ss:
COUNTY OF )

On the _____ day of _____, in the year 20 __, before me, the undersigned, personally appeared _____, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

_____
Notary Public - State of New York

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

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

**Grantee's Acknowledgment**

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

On the _____ day of _____, in the year 20__, before me, the undersigned, personally appeared Andrew O. Guglielmi, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/ executed the same in his/her/ capacity as Designee of the Commissioner of the State of New York Department of Environmental Conservation, and that by his/her/ signature on the instrument, the individual, or the person upon behalf of which the individual acted, executed the instrument.

_____
Notary Public - State of New York

## SCHEDULE "A" PROPERTY DESCRIPTION

**Easement Description:**

All that certain, plat, piece or parcel of landed, situate, lying and being in the Town of Greenburgh, County of Westchester and State of New York, bounded and described as follows:

Commencing at a point distant South 10 degrees 49 minutes 00 seconds East 272.23 feet from Monument #23, located in the southerly side of Hunter Lane as show on a certain map entitled "Subdivision Map of Cross Westchester Industrial Park" dated 07/25/1967 and filed in the Westchester County Clerk's Office, Division of Land Records, August 20, 1967 as Map No. 15544 and running:

A. Thence, North 83 degrees 39 minutes 00 second East, a distance of 317.14 feet;
B. Thence, South 48 degrees 11 minutes 49 seconds East, a distance of 31.97 feet to the true Point of Beginning:

Following the exterior walls of the building known as #5 Westchester Plaza the following four (4) courses:

1. Thence, North 83 degrees 39 minutes 00 seconds East, a distance of 201.93 feet;
2. Thence, South 06 degrees 21 minutes 00 Seconds East, a distance of 102.71 feet
3. Thence, South 83 degrees 39 minutes 00 seconds West, a distance of 201.93 feet;
4. Thence North 06 degrees 21 minutes 00 seconds West, a distance of 102.71 feet to the Point of Beginning.

Containing 20,740 square feet or 0.476 of an acre, more or less.

**Deed Description (Full Lot 8)**

ALL THAT CERTAIN PLOT, PIECE OR PARCEL OF LAND SITUATE, LYING AND BEING IN THE TOWN OF GREENBURGH, COUNTY OF WESTCHESTER AND STATE OF NEW YORK, BOUNDED AND DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT DISTANT SOUTH 10° 49' 00" EAST 272.23 FEET FROM MONUMENT #23, LOCATED ON THE SOUTHERLY SIDE OF HUNTER LANE AS SHOWN ON A CERTAIN MAP ENTITLED, "SUBDIVISION MAP OF CROSS WESTCHESTER INDUSTRIAL PARK", DATED JULY 25, 1967 AND FILED IN THE WESTCHESTER COUNTY CLERK'S OFFICES, DIVISION OF LAND RECORDS, AUGUST 28, 1967 AS MAP NO. 15544;

THENCE FROM SAID POINT OF BEGINNING ALONG OTHER LANDS NOW OR FORMERLY OF ROBERT MARTIN COMPANY:

1. NORTH 83° 39' 00" EAST 317.14 FEET; AND
2. NORTH 66° 48' 00" EAST 288.00 FEET TO THE WESTERLY SIDE OF WESTCHESTER PLAZA;

THENCE ALONG THE SAME:

1. SOUTHERLY ON A CURVE TO THE RIGHT HAVING A RADIUS OF 485.00 FEET A DISTANCE OF 110.31 FEET; AND
2. SOUTH 06° 21' 00" EAST 489.41 FEET TO LANDS NOW OR FORMERLY OF WESTCHESTER HILLS CONDOMINIUM;

THENCE ALONG SAID LANDS, SOUTH 83° 39' 00" WEST 565.00 FEET TO LAND NOW OR FORMERLY OF GREENBURGH HOUSING AUTHORITY;

THENCE ALONG SAID LAST MENTIONED LANDS AND LANDS NOW OR FORMERLY OF YUKON REALTY CORP., NORTH 10° 49' WEST 516.87 FEET TO THE POINT OF BEGINNING.

EXCEPTING THEREFROM SO MUCH THEREOF AS WAS CONVEYED TO THE TOWN OF GREENBURGH BY THE DEED RECORDED IN LIBER 6920 CP 658.

# APPENDIX B

# COMMUNITY AIR MONITORING PLAN

5 Westchester Plaza
Elmsford
Westchester County, New York




## *November 2021*

**Peak Project #** 2847

**NYSDEC Site#**
C360205

**Prepared for:**
Mack-Cali CW Realty Associates L.L.C.
210 Hudson St., Suite 400
Jersey City, NJ 07311

**Prepared By:**
Peak Environmental LLC
26 Kennedy Blvd, Suite A
East Brunswick, NJ 08816

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# 1 INTRODUCTION

Mack-Cali CW Realty Associates L.L.C. (Mack-Cali) has entered into a Brownfield Cleanup Agreement (BCA) with the New York State Department of Environmental Conservation (NYSDEC) to investigate potential chlorinated volatile organic compound (CVOC) contamination at 5 Westchester Plaza (Site, NYSDEC Site #C360205). Peak Environmental LLC (Peak) has prepared this Community Air Monitoring Plan (CAMP) to support Remedial Investigation (RI) activities required at the Site.

The CAMP for this site requires real-time monitoring for particulates (i.e., dust) and volatile organic compounds (VOCs) at the upwind and downwind perimeters and adjacent to the nearest residential structure within the work area when certain activities are in progress at the site. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide protection for residents within the designated work area and the downwind community (e.g., off-site potential receptors including adjacent and other nearby residences and local pedestrians not involved with the subject work activities) from potential airborne contaminant releases as a direct result of remedial construction activities. The action levels specified herein require monitoring and, when necessary, corrective actions to abate emissions, and/or shutdown work. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air. Reliance on the CAMP should not preclude simple, common-sense measures, including visual observations, to keep dust at a minimum around the work areas.

# 2 MONITORING

The CAMP conducted at the site will monitor volatile organic compounds (VOCs), particulate dust, and meteorological conditions throughout the investigation. The locations, frequency, and methodology for the parameters listed above will be described in sections 2.1, 2.2, and 2.3, respectively.

## 2.1 VOC Monitoring

VOC monitoring will be conducted using a photoionization detector (PID). Whether monitoring is continuous or periodic is determined by the scope of work being completed. Table 2.1 summarizes the monitoring required by specific site activities that may occur onsite.

Table 2.1 Utility of Continuous and Periodic Monitoring

| **Type of Monitoring** | **Examples of Activities** |
|---|---|
| Continuous Monitoring | Intrusive<br>• Soil/waste excavation and handling<br>• Instillation of test pits<br>• Installation of soil borings and monitoring wells |
| Periodic Monitoring | Non-Intrusive<br>• Collection of soil samples |

| | |
|---|---|
| | • Collection of groundwater samples from existing monitoring wells |

Once arriving onsite, the wind direction will be established to determine up and downwind directions. A background VOC level will be determined at this time from the upwind perimeter. In the case of changes in wind direction, a new reading will be taken once the upwind location is identified, and this establishes a new baseline level. The downwind reading will be performed immediately downwind of the work area. This is to ensure any VOCs being released by site activities are being monitored and if work needs to be stopped temporarily. Table 2.2 below summarizes the monitoring requirements for continuous monitoring.

Table 2.2 Location and Frequency/Activity for VOC Monitoring

| **Location** | **Frequency/Activity** |
|---|---|
| Upwind of work area | • Start of each day<br>• Change of wind direction<br>• Need of background levels to be re-established |
| Downwind of immediate work area | • Continuous monitoring during ground-intrusive activities<br>• Periodic monitoring during non-intrusive activities |

## 2.2 Particulate Monitoring

Particulate monitoring will be conducted using a dust monitor located at up and downwind locations of the site. At the start of each day, the wind direction will be identified, and this will determine the up and downwind locations for the dust monitors. Dust monitoring instruments will be calibrated per manufacturer specifications before use. The monitors will be capable of continuously measuring particulate matter less than 10 micrometers in size (PM-10) and logging data every 15 minutes to compare against the action levels described below. The monitors will be equipped with an audible alarm to indicate any exceedance of the action level. Wind direction should be monitored throughout the day, and if it does change, the locations of the dust monitor will change to match the up and downwind directions.

## 2.3 Meteorological Monitoring

Meteorological monitoring will take place daily and will be written in the field notes. This includes wind direction, precipitation, temperature, and any other relevant environmental conditions. Any distinct change in wind direction or changes in environmental conditions will be noted in the field notes.

# 3 RESPONSE AND ACTION LEVELS

This section will describe the response and action levels for VOC and particulate monitoring.

## 3.1 VOC Action Levels

VOC monitoring data gathered per Section 2.1 will be evaluated based on the response levels in Table 3.1 below and appropriate actions taken. Table 3.1 below summarizes the action levels and actions to be taken under each circumstance.

Table 3.1 Response and Action Plan for VOC exceedances

| **Response Levels** | **Actions** |
|---|---|
| Total VOCs downwind were to exceed 5 parts per million (ppm) above the background concentrations (upwind) for longer than 15-minute average | • Work must be temporarily halted<br>• Once back-to-back readings are less than 5 ppm greater than the background level, then work can resume |
| Total VOCs downwind were to persistently exceed between 5 ppm and 25 ppm above the background concentrations for longer than 15-minute average | • Work must be halted<br>• The source of vapors needs to be identified, and actions must be taken to abate any VOCs. Ex.) instruments such as a fan could be used to blow VOCs away from workers<br>• After actions taken, if VOCs 200ft downgradient (or ½ distance to nearest receptor) of work area are below 5 ppm work may continue |
| Total VOC were to exceed 25 ppm above the background concentrations for longer than 15-minute average | • All work activities on site must shutdown<br>• Contact Project Manager |

## 3.2 Particulate Action Levels

Particulate monitoring data gathered per Section 2.2 will be evaluated based on the response levels in Table 3.2 below and appropriate actions taken. Table 3.2 below summarizes the action levels and actions to be taken.

Table 3.2 Response and Action Plan for Particulate Matter exceedances

| **Response Levels** | **Actions** |
|---|---|
| PM-10 levels at downwind monitor are greater than 100 µg/m$^3$ than background (upwind) levels for a 15-minute period. | • Work must be temporarily halted<br>• Dust suppression techniques implemented, and work may continue if PM-10 less than 150 µg/m$^3$ |

| | |
|---|---|
| Airborne dust is leaving work area | • If needed, stop work and re-evaluate activities |

## 4 DOCUMENTATION

During the implementation of the CAMP, the following information will be recorded and maintained:

- Calibration logs of all instruments used at the site;
- Field notes with periodic VOC readings;
- Daily air monitoring log with 15-min dust monitor readings;
- Climatological conditions including wind direction, precipitation, temperature, and any other relevant environmental conditions and times associated with them included in field notes;

VOC 15-min readings will be made available for review by the State (DEC and NYSDOH) if requested. All particulate readings will made available for review by the State (DEC and NYSDOH) and County Health personnel if requested.

PEAK ENVIRONMENTAL
A Nova Group, GBC Company

# *SITE SPECIFIC HEALTH AND SAFETY PLAN*

5 Westchester Plaza
5 Westchester Plaza
Elmsford, New York, 10523



## *April 2021*

**Peak Project #**
2847

**NYSDEC#**
C360205

**Prepared for:**
Mack-Cali CW Realty Associates L.L.C.
120 Hudson St., Suite 400,
Jersey City, NJ 07311

**Prepared by:**
Peak Environmental LLC
26 Kennedy Boulevard
Suite A
East Brunswick, NJ 08816

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# 1 SITE SPECIFIC HEALTH AND SAFETY PLAN

## 1.1 General Information

Site Name: 5 Westchester Plaza

Site Location: 5 Westchester Plaza, Elmsford, New York, 10523

**Information and assistance can be obtained in an emergency by calling the following telephone numbers:**

| | |
|---|---|
| General | 911 |
| Peak Environmental LLC | (732) 326-1010 |
| Client Contact: Gary Wagner | [Client Phone] |
| Pocantico Hills Fire Department | (914) 831-2710 |
| White Plains Hospital | (914) 681-0600 |
| Ambulance Service | 911 |

Prepared by: Grace Billy _____

Reviewed by: Michael Stopen _____

**Directions to the nearest hospital and an Accident Form are found inside the front cover of this Health and Safety Plan.**

**Background Information:**

Sub-slab vapor impacts were identified at the Site, and are likely associated with a previous operator at the building. The investigation will include, installation of monitoring wells, collection of groundwater, sub-slab vapor, indoor air, and soil samples.

**Purpose of Health and Safety Plan:**

To provide workers with an awareness of and means to safeguard them from potential hazards that may be encountered during investigative and remedial activities at this site. Such activities may include test pit and boring installations and soil and/or groundwater sampling. Potential equipment that may be used includes a backhoe, drill rig, pumps, generators, and manual and power sampling augers.

**Overall Hazard Summary:**

This HASP is based upon relevant analytical data and / or anticipated conditions which were reviewed by the Senior Project Manager (Sr. PM)/Project Manager (PM) and if requested, may have also been reviewed by the Corporate Health Safety Manager (CHSM), and/or a contracted Certified Industrial Hygienist (CIH)/Certified Safety Professional (CSP).

The contaminants of concern (COCs) that have been identified include Tetrachloroethene and Trichloroethene.

**The Chain of Command for Responsible Individuals at the site in ascending order is:**

1. Site Safety Officer (SSO) -Jennifer Sabbak, (732) 326-1010
2 Project Manager (PM) - Michael Stopen, (732) 326-1010
3 Senior Project Manager (Sr.PM) – Chris Schmidt, (732) 326-1010
4. Corporate Health and Safety Manager (CHSM) -Carly Atkins, (732) 326-1010
5. Qualified Environmental Professional (QEP)/Partner in Charge (PIC) - Rob Edgar, (732) 326-1010

## 2 LIMITATIONS

This Health and Safety Plan is provided as a general guideline of the procedures to be followed during the course of work activities. This document is not intended to be all encompassing, nor is it provided to serve as a final plan. It is a living document that will be subject to review/revision by the designated on-site, Site Safety Officer (SSO) as any site-specific health and safety issues arise.

## 3 INTRODUCTION

This site specific health and safety plan ("HASP") details the Standard Operating Procedures (SOPs) to be employed while conducting specific operations at the Site during the execution of field tasks associated with this project and is intended to maximize the protection of onsite personnel and subcontractors from potential physical and environmental hazards. This HASP is not a comprehensive training manual nor details all procedures that may be utilized on site but is intended to be a guidance manual for specific operations. Detailed information and guidance on materials covered in this plan is provided by Peak Environmental LLC. (“Peak”).

The SSO will be responsible for the implementation of and the conformance with this HASP by all applicable personnel entering the site and is responsible for the following:

- Conducting daily health and safety meetings prior to the start of each workday, when changing tasks and/or when weather or site conditions change. Daily health and safety meetings will be documented on the Tailgate Safety Meeting / Job Safety Analysis Form (Appendix A).
- To review the applicable aspects of the HASP, tasks to be performed and the current site conditions (the daily health and safety meetings may also be conducted by the PM, Sr. PM, CHSM and/or QEP).
- Monitoring site safety performance.
- Confirming that all onsite personnel and subcontractors have received the appropriate training in the procedures described in the HASP.
- Stopping work if there is perceived to be an immediate threat to life, health, or safety or if unexplained/unexpected dangerous conditions arise.
- Preparing accident/incident reports.

The PM and SSO, and if requested, the CHSM and or CSP or CIH, are responsible for the following:

- Identifying and evaluating potential hazards, which may include evaluating chemical hazard information and modifying the HASP as needed to protect workers from those potential hazards.
- Selecting the personal protection levels and necessary protective clothing/equipment.

# 4 KEY PERSONNEL

The following sections define the lines of authority at the site.

## 4.1 Senior Project Manager / Project Manager

The PM Michael Stopen for 5 Westchester Plaza will work with the SSO and if needed and requested, the CHSM, Robert Barnes to address the responsibilities listed below:

- Monitoring and maintenance of the Peak Health and Safety Plan;
- Determine the level and nature of training required by employees for each task assigned;
- Health and safety orientation for new employees on site.

## 4.2 Corporate Health and Safety Manager

If requested by the Sr. PM or PM, the CHSM, Robert Barnes can help with the following tasks:

- Monitoring and maintenance of the Peak Health and Safety Plan;
- Determining the level and nature of training required by employees for each task assigned;
- Health and safety orientation for new employees on site.

## 4.3 Site Safety Officer

The Sr. PM/PM will assign a qualified SSO for each Peak field project. The SSO will report to the PM and will direct the health and safety activities at each work site.

A SSO is defined by OSHA as “an individual who is located on a hazardous waste site who is responsible to the employer and has the authority and knowledge necessary to implement the site safety and health plan and verify compliance with applicable safety and health requirements” (29 CFR 19010.120(a)(3)). Under some circumstances, the designated SSO may be required to have eight hours of additional supervisory training beyond the initial 40-hour HAZWOPER training and the annual 8-hour refresher HAZWOPER training.

The primary responsibilities of the SSO are:

- Implement the site-specific HASP;
- Perform on-site health and safety monitoring (e.g., air monitoring, personnel monitoring);
- Write, implement and maintain job safety analysis;
- Supervise and maintain safe work practices during field work;
- Conduct air monitoring (where applicable) and ensure the health and safety monitoring equipment (e.g., PID, FID) is in good working condition;
- Verify that the site-specific HASP and program specific templates address site-specific health and safety concerns and recommend changes to the Sr. PM/PM and CHSM, as necessary;
- Investigate and report accidents, illnesses, and incidents occurring on a project-related site;

- Conduct daily health and safety meetings and ensure that site-specific training is conducted (where necessary) for onsite personnel;
- Transport field personnel with non-life threatening situations to the hospital, as necessary;
- Call emergency personnel for field personnel with life-threatening situations;
- Order shut down of any project-related site activities upon determination of an imminent health or safety hazard; and
- Accompany OSHA and other government agency personnel visiting the site in response to health and safety issues, as necessary.

### 4.4 Subcontractors and Visitors

Visitors (who are simply observers from Peak or other outside entities) are required to report to the SSO prior to entering the defined work zones. The SSO will document decisions regarding access to the site. If granted limited access, visitors must provide the SSO with proper documentation that shows compliance with the training and medical requirements of the HASP, compliance with other applicable sections, and satisfy additional conditions placed on them as deemed appropriate by the SSO to ensure visitor safety. The SSO will provide site briefing information to all site personnel and visitors. At some job sites/areas, it may be appropriate for visitors to sign in and out (daily) under the SSO's direction for the duration of their approved visit. At some job sites/areas, it may be appropriate for trained personnel to escort all visitors throughout the site.

It is important for site personnel to be informed of the applicable project hazards and protective measures. The following items will be included in but not limited to, the site orientation. The SSO will review the HASP, highlighting the following information to subcontractors and visitors and document the orientation for the project files.

- Acute and chronic health effects of contaminants of concern, hazard communication program;
- Physical and mechanical hazards;
- Personal hygiene procedures;
- Work zones;
- Required Personal Protective Equipment (PPE);
- Evacuation plan and assembly area;
- Air monitoring program; and,
- Hazard recognition, reporting, and site safety.

## 5 DESCRIPTION OF POTENTIAL SITE SPECIFIC HAZARDS

Below is a listing of some of the known, suspected and potential site-specific hazards that may be associated with the tasks being performed at this site.

Potential Hazards (check boxes that apply to the site):

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Visible soil contamination | | Open lagoons | | Underground tanks | | Air stack emissions |
| | Observed free product | | Visible leachate | | Surface tanks | | Visible onsite releases |
| X | Underground utilities | X | Odors | | Observed tanks | | Visible offsite releases |
| | Building contamination | X | Dust | | Confined spaces | | Visible onsite erosion |

| | | | |
|---|---|---|---|
| ☐ Onsite surface water contamination | ☐ Open pits | ☐ Excess debris | ☐ Overhead electric lines |
| ☐ Offsite surface water contamination | ☐ No hazards | ☐ High traffic issues | ☐ Corroded containers |

List Other COVID-19

## 5.1 Chemicals/Contaminants

The following is a tabulated list of contaminants that could be encountered on-site during the performance of a project related task:

| Contaminant Name | CAS # | §TLV/PEL (ppm) | Max Conc in Soil (mg/kg) | Max Conc in Soil Vapor (ug/m³) | Health Hazards/ Comments |
|---|---|---|---|---|---|
| Tetrachloroethene (PCE) | 127-18-4 | 25/100 TWA | 0.0048 | 13,000 | Irritation to eyes, skin, nose, throat, respiratory system; nausea; flush face, neck; dizziness, incoordination; headache, drowsiness; skin erythema (skin redness); liver damage; [potential occupational carcinogen] |
| Trichloroethene (TCE) | 79-01-6 | 50/100 TWA | ND | 470 | Irritation to eyes, skin; headache, visual disturbance, lassitude (weakness, exhaustion), dizziness, tremor, drowsiness, nausea, vomiting, dermatitis; cardiac arrhythmias, paresthesia; liver injury; [potential occupational carcinogen] |

*§Please note TLV value is for an 8-hour TWA (Time Waited Average)*

### 5.1.1 *Pathways to Worker Exposure*

The pathways to exposure include Ingestion, Injection, Skin and/or Eye Contact, Skin Absorption, Inhalation of vapors, fumes or dusts.

### 5.1.2 *Health Effects and Medical Monitoring*

Health effects include irritation. Infection may result from skin and/or eye contact or skin absorption. Nausea and possibly severe illness may result from ingestion, injection or inhalation. Consult a physician if medical attention is considered necessary.

### 5.1.3 *Steps to Take if Exposed*

- Inhalation – Receive respiratory support.
- Absorption –
    - Skin Contact – Soap wash promptly.

- Eye Contact – Irrigate eyes immediately.

- Injection – Receive medical attention immediately.
- Ingestion – Receive medical attention immediately.

## 5.2 Weather Related Hazards

Daily and seasonal weather changes may occur during the implementation of this HASP. Workers should be aware of predicted weather changes, dress accordingly and bring extra clothing as/if needed. If during an event the weather conditions change (i.e lightning, snow, ice, rain, high winds, etc.) a brief meeting should be conducted to evaluate any new potential hazards and what preventative measures should be taken to keep safe.

Workers wearing protective clothing on warm or hot days will be susceptible to heat stress and need to be briefed on the signs, symptoms, and treatment of heat exposure. If anticipated, further details regarding exposure to cold and heat stress hazards should be inserted below.

All field workers, even those not wearing protective equipment, should be monitored for heat stress by monitoring a radial (wrist) pulse, body temperature, or visual observations in regions where ambient temperatures reach or exceed 95°F.

1. Pulse Rate

Team members pulse rates should be monitored at the beginning of a rest period. The radial (wrist) pulse will be counted during a 30-second period. If the heart rate exceeds 110 beats per minute at the beginning of the rest period, shorten the next work cycle by one-third and keep the rest period the same. If the heart rate still exceeds 100 beats per minute at the next rest period, shorten the following work cycle by one third.

2. Body Temperature

Body temperature should also be monitored at the beginning of the rest period, before drinking.

- If the oral temperature exceeds 99.6°F, shorten the next work cycle by one third without changing the rest period.
- If the oral temperature still exceeds 99.6°F at the beginning of the next rest period, shorten the following work cycle by one third.

No one should wear semi-permeable or impermeable garments when his/her oral temperature exceeds 100.6°F.

**Suggested Frequency of Physiological Monitoring for Fit and Acclimatized Workers**

| Temperature | Normal Work Clothing | Impermeable Work Clothing |
|---|---|---|
| 90°F or above | after each 45 minutes of work | after each 15 minutes of work |
| 87.5°F to 90°F | after each 60 minutes of work | after each 30 minutes of work |
| 82.5°F to 87.5°F | after each 90 minutes of work | after each 60 minutes of work |
| 77.5°F to 82.5°F | after each 120 minutes of work | after each 90 minutes of work` |

| | | |
|---|---|---|
| 72.5°F to 77.5°F | after each 150 minutes of work | after each 120 minutes of work |

Please note that there can be situations where normal work clothing is worn (for example, in a manner necessary to prevent biological hazards - tick bites, etc) where more frequent monitoring is appropriate.

Taking the following steps can avert heat stress illnesses:

1. Adjust work schedules:
   Mandate work slowdowns, as necessary,
   Rotate personnel,
   Perform work during cooler hours of day (early morning or late afternoon).
2. Provide shelter, such as air-conditioned vehicles or shaded areas, to allow workers to rest.
3. DRINK FLUIDS!!! Daily fluid intake shall equal body water lost through perspiration. The normal thirst mechanism is not sensitive enough to ensure enough water will be ingested to replace lost body fluids. When heavy sweating occurs, gradually drink liquids such as Gatorade or similar electrolytic beverages.
4. Provide cooling devices to aid natural body heat exchange.

| Apparent Temperature (°F) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Air Temperature (°F) | 125 | 123 | 141 | | | | | | | | |
| | 120 | 116 | 130 | 148 | | | | | | | |
| | 115 | 111 | 120 | 135 | 151 | | | | | | |
| | 110 | 105 | 112 | 123 | 137 | 150 | | | | | |
| | 105 | 100 | 105 | 113 | 123 | 135 | 149 | | | | |
| | 100 | 95 | 99 | 104 | 110 | 120 | 132 | 144 | | | |
| | 95 | 90 | 93 | 96 | 101 | 107 | 114 | 124 | 136 | | |
| | 90 | 85 | 87 | 90 | 93 | 96 | 100 | 106 | 113 | 122 | |
| | 85 | 80 | 82 | 84 | 86 | 88 | 90 | 93 | 97 | 102 | 108 |
| | 80 | 75 | 77 | 78 | 79 | 81 | 82 | 85 | 86 | 88 | 91 |
| | 75 | 70 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 |
| | 70 | 65 | 66 | 67 | 68 | 69 | 70 | 70 | 71 | 71 | 72 |
| | % | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| | Percent Humidity | | | | | | | | | | |

Exposure to cold is common during winter months when workers do not adequately protect themselves from the elements. Situations of concern that may arise include, but are not limited to, prolonged exposure to cold weather, moisture, and wind (wind chill) without proper protection. It is important to dress properly to avoid injury. Wear several layers of thick, loose-fitting clothing to insulate your body by trapping warm, dry air inside. Loosely woven cotton and wool cloths best trap air and resists dampness. The head and neck lose heat faster than any other part of the body. Your cheeks, ears, and nose are the most prone to frostbite. Wear a hat, scarf, and turtleneck sweater to protect these areas.

*Symptoms:*

- Pale, cool skin

- Slow, weak pulse
- Lethargy, drowsiness, lack of muscular co-ordination
- Uncommunicative, poor judgment
- Shivering

*First Aid:*

- Warm slowly by adding additional clothing, heating source, body heat
- If wet, initially warm the casualty, then change clothing
- When partially recovered, give warm fluids
- When able to stand, encourage mild exercise

**Frost Bite**

The extent of frostbite is difficult to judge until several hours after thawing.

*Symptoms:*

- Superficial frostbite is characterized by gray, yellow or white patches on the affected areas. The skin remains soft and pliable, but becomes red and flaky after thawing.
- Deep frostbite is characterized by waxy and pale skin, the affected parts feel cold, hard, and solid which may turn blue or purple upon thawing. Large blisters may also appear after the skin regains its warmth.

*First Aid:*

- Move the victim to a warm place immediately.
- Remove any constrictive clothing that could impair circulation.
- If you notice signs of frostbite, seek medical attention immediately.
- If a body part is partially thawed, place frostbitten part in warm water (102 to 106 degrees Fahrenheit). If a thermometer is not available, test the water first to see if it is warm. Normal body temperature usually returns within 20 to 40 minutes during warming or until tissues soften.
- DO NOT rub or massage the frostbite area.
-

**Hypothermia**

Hypothermia is a potentially fatal condition that especially affects the elderly. The body's core temperature is lowered to the extent that brain function is impaired and the heart's activity may be compromised. Urgent first aid intervention is required.

*Symptoms:*

- Pale, cold skin - no capillary return when fingernails are pressed
- Slow pulse, sometimes skipping a beat
- Slow, shallow respiration
- Blurred, or double vision
- Casualty is silent, appears asleep, difficult to rouse; or unconscious
- Casualty experiences a sense of 'well-being'
- Absence of shivering
- If very cold, may have non-reacting pupils and appear 'death-like'

*First Aid:*

- Urgent ambulance transport
- Warm casualty slowly, wrap in 'space blanket' or similar
- If wet, leave less bulky clothing on and warm slowly
- Once casualty commences shivering, reassess heating
- Nothing by mouth until fully recovered
- Be prepared for sudden collapse and resuscitation

## 5.3 Slip, Trip and Fall Hazards

Personnel shall be cognizant of slipping, tripping and falling hazards. The potential hazards may result from ongoing construction, loose soft soils, open pits, uneven surfaces and debris, equipment and materials, vegetation, muddy or icy conditions or a variety of other reasons. Although not all inclusive, the following procedures are recommended to mitigate slipping, tripping and falling hazards: maintaining a safe distance (at least 15 feet) from open excavations, removing obvious surface debris (must be equipped with appropriate personal protection equipment beforehand), maintaining an organized work area, removing or controlling excessive vegetative growth (permits will be required if in certain wetland areas), refraining from performing site activities during inclement weather (e.g., precipitation events) or when surface conditions are unfavorable, modifying surface conditions (e.g. placing salt or sand on ice, crushed stone in muddy areas, clearing overgrown vegetation) and inspecting protective footwear for loss of integrity.

## 5.4 Manual Handling

Be cautious and plan ahead to mobilize heavy equipment and supplies yourself especially to/from a vehicle trunk/flatbed. Manual handling of various soil analysis and drill boring equipment, instruments, bending below the waist and above the shoulders raise the risk of Muscular Skeletal Disorders (MSDs). MSDs can occur suddenly, often from an awkward or sudden movement, such as crouching for hours and then straining your back when you get up and reach for something heavy on a high shelf. MSD related injuries can also develop gradually, such as pain and cramping in the hands when tendons in the wrist become inflamed.

Biological agents may be viral, fungal, bacterial, or of higher orders: insects (including ticks and stinging insects), wild animals (especially snakes) and domesticated animals. Any mammal encountered on-site should be considered potentially rabid. In many parts of the northeast United States, tick-borne diseases pose a significant health risk during warm months (see Attachment J, Ticks and Tick-Borne Diseases). Field personnel are encouraged to use insect repellents before donning PPE. To avoid snake bites, check for snakes before walking through grassy or debris strewn areas. The presence of medical waste suggests the possibility that pathogenic micro-organisms may be present. A fully-stocked first aid kit, insect and tick repellent must be available for use in the field.

**Coronavirus Disease 2019 (COVID-19)**

**Steps to protect yourself during field activities:**

1. Plan your work event to incorporate the following steps and communicate that plan electronically to project Team members.

i.) If the site is active and/or occupied, communicate with property representatives to share relevant information regarding protection of occupants and our staff, as well as property protocols you need to be aware of. These measures should be implemented regardless of whether work is interior or exterior.
ii.) Communicate protection steps with other site personnel on arrival and during tailgate meetings (keep 6 feet of distance between yourself and others).

2. Eliminate non-essential travel and stops for supplies (if needed, bring ice from the office, coffee and/or lunch from home to avoid stopping and potential exposure in store);
3. Wear nitrile gloves and avoid direct contact (for example, shaking hands) with people and recently obtained laboratory and/or rental equipment and supplies);
4. Practice "social distancing" by putting at least 6 feet of distance between yourself and other people;
   a.) Do not drive with others. One person per vehicle.
   b.) Arrange inspections at times that minimize interaction with others, and best allow for the implementation of the above referenced steps to protect yourself.
   c.) Avoid touching objects used by others or wear protective gloves when doing so. When this can't be avoided (like driving a company vehicle) decontaminate by wiping down surfaces with disinfectant wipes before use.
   d.) Bring your own food/beverages
5. Wash your hands often and thoroughly with soap and water for at least 20 seconds after you have been in a public place, or after blowing your nose, coughing, or sneezing;
   a.) If soap and water are not available, use a hand sanitizer or hand rub that contains at least 60% alcohol. Cover all surfaces of your hands and rub them together until they feel dry.
4. Avoid touching your eyes, nose, and mouth with unwashed hands;
5. Cover your mouth and nose if you need to cough or sneeze, also known as "respiratory etiquette";
6. Decontaminate/Wipe down vehicle steering wheels, control knobs/buttons, mirrors, door handles, etc. and any equipment used with disinfectant wipes before and after use;
7. Discard wipes, tissues, and disposable PPE to avoid cross contamination.

**Background**

Coronaviruses are a large family of viruses that are common in humans and many different species of animals. Current symptoms reported for patients with COVID-19 have included mild to severe respiratory illness with fever, cough, and difficulty breathing. As this is a newly discovered virus information is evolving. Here is a Center for Disease Control (CDC) link to help identify COVID-19 Symptoms (if you are reading hard copy use: https://www.cdc.gov/coronavirus/2019-ncov/about/symptoms.html). The OSHA Guidance on Preparing Workplaces for COVID-19 can be found here (if you are reading hard copy use: https://www.osha.gov/Publications/OSHA3990.pdf).

There is currently no vaccine to prevent coronavirus disease 2019 (COVID-19). The best way to prevent illness is to avoid being exposed to the virus. The virus is thought to spread mainly from person-to-person.

•Between people who are in close contact with one another
•Through respiratory droplets produced when an infected person coughs or sneezes.

Respiratory droplets are produced when an infected person coughs or sneezes and can land in the mouths or noses, or possibly be inhaled into the lungs, of people who are nearby. Close contact may include:

- Being within approximately 6 feet of an individual with COVID-19 for a prolonged period of time.
- Having direct contact with body fluids (such as blood, phlegm, and respiratory droplets) from an individual with COVID-19.

## 6 MONITORING EQUIPMENT AND INSTRUMENTS

Monitoring equipment and instruments may vary based on the scope of work being performed and potential hazards. The following subsections describe the applicable equipment and instruments used for monitoring the known or potential hazards.

Peak will use an ultraviolet Photoionization Detector ("PID") to screen the site for semi- and volatile organic gases and vapors during the field work. If vapors are present, a Combustible Gas Indicator ("CGI") may be appropriate to monitor the lower explosive limit ("LEL") in the atmosphere. These instruments are described as follows:

| **Instrument:** | PID | CGI |
|---|---|---|
| **Detection Method:** | Ionizes molecules using UV radiation; produces a current that is proportional to the number of ions. | A filament usually made of platinum is heated by burning the combustible gas or vapor. The increase in heat is measured. |
| **Limitations:** | Does not detect Methane or any compound if the probe used has a lower energy level than the compound's ionization potential. Response may change when gases are mixed. Other volatile sources may interfere with measurements. Reading can only be reported to the calibration standard used. Response may be affected by humidity. | Accuracy depends in part on the difference between calibration and sampling temperatures. Sensitivity is a function of the differences in the chemical and physical property between the calibration gas and the sample gas. Silicones, tetraethyl lead, halides and oxygen enriched atmospheres can damage the filament. Does not pro- vide a valid reading under oxygen deficient conditions. |
| **General Care and Maintenance:** | Recharge or replace battery. Regularly clean and maintain the instrument and accessories. | Recharge or replace battery. Calibrate immediately before use. |

| | | |
|---|---|---|
| **Operating Times:** | 10 hours; 5 hours with strip chart recorder. | Life of battery, or for the recommended interval between calibrations. |

The Photoionization Detector (PID) or equivalent will be used to detect trace concentrations of certain organic gases and a few inorganic gases in the air. PID readings reflect total (readable) vapors in the air. The PID detects mixtures of compounds simultaneously. PID readings do not measure concentrations of any individual compound when a mixture of compounds is present.

The PID will be calibrated twice each day (before start of work and after the conclusion of work) using an isobutylene standard (molecular weight = 56.2) for calibration. Calibrations will be logged. PID readings should be measured in the breathing zone of the most highly exposed worker (i.e., the person who is closest to the source of known or suspected contamination) at least hourly.

## 7 TRAINING

All personnel working in areas where hazardous substances or hazardous wastes are present or suspected may be trained in accordance with OSHA requirements set forth in 29 CFR 1910.120(e)(1) and (2), which is a 40-hour training program consistent with job function and responsibilities. As warranted by the project, employees directly responsible for or who supervise employees engaged in hazardous waste operations shall complete at least eight additional hours of specialized supervisory training at the time of job assignment, in accordance with 29 CFR 1910.120(e)(3).

The SSO (or project manager after conferring with the SSO) will provide daily briefing, when new operations are planned, when changes in work practices must be implemented due to new information, or if site or environmental conditions change. Briefings will be documented on the Tailgate Forms (Appendix A). Briefings will facilitate conformance with prescribed safety practices when performance deficiencies are identified during routine activities or as a result of safety audits. Site training and daily briefings will include the following:

- Eating, drinking, chewing tobacco and smoking is prohibited in the contaminated or potentially contaminated area or where the possibility for the transfer of contamination exists.
- Smoking or carrying smoking materials or flame producing devices within restricted areas is prohibited.
- Avoid whenever possible, contact with potentially contaminated substances and try to avoid walking through puddles, pools, mud, etc. Also avoid, whenever possible, kneeling on the ground, leaning or sitting on drums, equipment or ground. Do not place monitoring equipment on potentially contaminated surfaces (i.e., drum, ground, etc.).
- Prevent, to the extent possible, spillage. In the event that a spillage occurs, contain liquid if possible.
- No visitors will be allowed on site unaccompanied.
- Locate a decontamination area between site operations and the site exit.
- Protective equipment including, boots, gloves, and splash shields will be washed off before leaving the site and stored on-site in a predetermined location. Boots may be

decontaminated at the end of the field effort. Gloves, disposable suits, and splash shields should be thrown away.

## 8 PERSONNEL MONITORING

As required by the scope of work, known and potential hazards, air monitoring will be performed during working operations to ensure worker safety and health and to evaluate ambient air conditions at the site. The primary unit to be utilized is the photoionization detector. This unit will be calibrated daily in accordance with its operating manual.

### 8.1 Personnel Protective Equipment Monitoring

Skin contact with potentially contaminated soils, and vapor and dust inhalation are expected to be the primary exposure hazards to workers at the site. The SSO will monitor workers usage of proper personnel protective equipment (PPE).

## 9 LEVELS OF PROTECTION

An initial modified Level D will be donned for non-volatile and non-dust containing atmospheres. During intrusive work a PID will be used by the SSO to scan the area for volatile organics. The following criteria will define the action levels for the use of respiratory protective gear at the site:

| PID READING OF AMBIENT AIR | ACTION |
|---|---|
| 0-10 ppm above background | CONTINUE IN LEVEL D |
| 10-200 ppm above background | EVACUATE THE AREA, LEVEL C PPE REQUIRED |

* These action levels pertain to volatile organic compounds identified at the site. If other acutely toxic compounds are identified, action levels may need to be altered.

Peak personnel are not permitted to work under conditions that require Level C or above PPE. Only those workers who are medically certified to work wearing respirator protection will be permitted to continue activities. Level C will also be required if contaminated soil-dust becomes entrained in the air during field activities. The soils will be lightly wet down to help reduce dust.

PPE are required when engineering controls and work practices are not feasible. PPE are necessary to reduce doses of hazardous substances to concentrations below the PELs, as defined in 29 CFR 1910.120(g)(1)(ii). A PPE assessment is performed for all field tasks through the HASP. The following table provides guidance on action levels for PPE use.

| Potential Air Contaminant | Instrument | Action Levels | Level of PPE Protection |
|---|---|---|---|
| Asbestos<br>Lead-based paint | PCM or<br>PDM Mini-Ram<br>or equivalent [1] | > 1 fibers/cubic centimeter<br>< 0.03 mg/$m^3$ | Evacuate affected area |
| Explosive Vapors | CGI | Oxygen levels ≤ 19.5%<br>or > 10% LEL<br>Oxygen levels > 19.5% or < 23.5%<br>or < 10% LEL | Evacuate affected area [2]<br><br>Level D |

| | | | |
|---|---|---|---|
| Radiation | RAD | ≤ 2 mRem/hr.<br>> 2 mRem/hr | Level D<br>Evacuate affected area [3] |
| Nuisance Particulates | Mini-Ram | < 5 mg/$m^3$<br>> 5 mg/$m^3$ | Level D<br>Evacuate affected area |
| Organic Vapors | PID/FID<br><br>PID/FID | Continuous sustained (> 5 min.) readings < 5 units above background in the breathing zone and no visible dust<br>Sustained (> 5 min.) readings > 5 units above background in the breathing zone and/or sustained dust clouds | Level D<br><br>Evacuate affected area |

**[1] An equivalent unit shall be approved by the CHSM.**

**[2] Peak personnel are not trained for Level C work. At these levels, personnel shall leave the affected area for situation evaluation.**

**[3] Personnel are not trained for radiation work. If radiation levels exceed 2 mRem/hour, personnel shall evacuate the affected work area.**

All PPE shall be of safe design and construction for the work to be performed and shall meet applicable American National Standards Institute (ANSI) standards, the NIOSH guidelines and/or OSHA regulations. PPE shall properly fit each employee. Our firm will provide all PPE free of charge to employees.

Eye and/or face protection will be provided when hazards exist from flying particles, liquid chemicals, or chemical gases or vapors. Safety glasses shall always incorporate side shields. Safety glasses not equipped with side shields will require the addition of such equipment. Safety glasses must be used in conjunction with splash/face shields, as the face shields are not impact rated or ANSI tested and approved. If prescription glasses are utilized, larger safety glasses or goggles will be provided to fit over the employee's glasses.

Hard hats will be provided whenever hazards from falling objects, overhead hazards, or low clearance hazards exist. Hard hats shall always be worn in the manner for which they are tested and designed. The hardhat brim shall always face forward. Hard hats shall be periodically inspected for cracks, gouges, or other defects that may not adequately protect the employee.

The levels of protection selected should be based primarily on:

- Type(s) and measured concentration(s) of the contaminant / chemical substance(s) in the ambient atmosphere and its toxicity.
- Potential or measured exposure to substances in the air, splashes or liquids, or other direct contact with material due to work being performed.

In situations where the type(s) of contaminant / chemical(s), concentration(s), and possibilities of contact are not known, the appropriate level of protection must be selected on the basis of professional experience and judgment until the hazards can be better characterized.

The recommended level of protection worn for each specific task will be determined by the SSO, PM, and/or CHSM, and protection levels are based on the known and suspected hazard characteristics of the site and subject to upgrading or downgrading based on changing environmental conditions and different work procedures. If needed, the SSO, PM and CHSM can obtain advice from the contract CIH/CSP.

While PPE reduces the potential for contact with harmful substances, the health and safety of response personnel requires safe work practices, decontamination, site entry protocols, and other safety considerations. Together, these protocols establish a combined approach for reducing potential harm to workers.

The following brief description of equipment is provided.

## 9.1 Level D

Level D is primarily a work uniform. It can be worn in areas where only boots or gloves can be contaminated or there are no inhalable toxic substances. Initially, Level D personal protection will be worn at the site by all personnel. The SSO, however, may require appropriate upgrading of PPE depending on actual site conditions.

Level D personnel protective equipment may include:

- Coveralls or Tyvek suits.
- Gloves.
- Boots/shoes, leather or chemical-resistant, steel toe and shank. Additional equipment (dependent on actual conditions) may include:
    - Boots (outer), chemical-resistant (disposable).
    - Safety glasses or chemical splash goggles.
    - Hard hat (with face shield).
    - Escape mask.

The actual combination of protective equipment worn will be decided by the SSO based on site conditions.

## 9.2 Cleaning, Maintenance, and Disposal

Each employee is responsible for inspecting his/her PPE before and after each use. Any damaged or defective PPE is to be taken out of service immediately and repaired or replaced.

Used or disposable PPE items are to be properly contained at job sites and disposed in accordance with the site-specific work plan. Non-disposable items, such as hard hats, are to be decontaminated at the job site. Personnel are responsible for cleaning their own PPE after each work shift. Cleaning procedures are listed in Section 16.

# 10 SITE CONTROL ZONES

Prior to the initiation of any field activities, site control measures (i.e., establishment of work zones) shall be implemented to:

- Reduce accidental spread of hazardous substances by workers or equipment from contaminated areas to the clean area;
- Confine work activities to appropriate areas, minimizing likelihood of accidental exposure,
- Facilitate location and evacuation of personnel in case of an emergency.

In general, three work zones are used: the exclusion zone (work area), the contaminant reduction zone, and the support zone. The wind direction will be taken into account when establishing these zones. The wind direction will be monitored continuously, and zones modified if need be. Each of these is discussed in the following sections.

## 10.1 Exclusion Zone

The exclusion zone is the area where contamination is either known or expected to occur and the greatest potential for exposure or contaminants of concern exists. The exclusion zone ("hot zone") separates the area of contamination from the rest of the site and should be physically secured (barrier tape, fences, chains) from the rest of the site. The exclusion zone may also be referred to as a work zone where an individual(s) could perform a job task. The hot zone:

- Provides sufficient space to protect personnel outside the zone from potential fire or explosions;
- Allows an adequate area in which to conduct site operations; and
- Reduces the potential for contaminant migration.

Access is restricted in the Exclusion Zone to authorized site personnel. However, all personnel located in the Exclusion Zone shall receive instruction in the proper evacuation procedures in case of a hazardous substance release or other emergency.

## 10.2 Contaminant Reduction Zone

The contaminant reduction zone (CRZ) is the transition area between the exclusion zone ("hot zone") and the support zone ("clean zone"). The CRZ is the area in which decontamination procedures take place so that contamination decreases while progressing from the exclusion zone to the support zone.

The SSO shall exercise professional judgment in determining how the Contamination Reduction Zone will be organized and what decontamination materials will be used. Factors to be considered include:

- The extent and type of hazard expected;
- Number of site personnel requiring decontamination facilities;
- Explosive potential;
- Meteorological conditions;
- Topography;
- Levels of protection selected; and,
- Availability of equipment and supplies.

Access is restricted in the Containment Reduction Zone to authorized site personnel. However, all personnel located in the Containment Zone shall receive instruction in the proper evacuation procedures in case of a hazardous substance release or other emergency.

### 10.3 Support Zone

The Support Zone is the uncontaminated area where workers are unlikely to be exposed to hazardous substances or dangerous conditions. The Support Zone is the appropriate location for the command post, medical station, equipment and supply center, field laboratory and any other administrative or support functions that are necessary to keep site operations running efficiently.

Access is restricted in the Support Zone to authorized site personnel. However, all personnel located in the Support Zone shall receive instruction in the proper evacuation procedures in case of a hazardous substance release or other emergency.

## 11 EMERGENCY AND FIRST AID EQUIPMENT AND COMMUNICATIONS

Basic emergency and first aid equipment will be available and include a first aid kit, emergency eyewash or drench system, fire extinguisher, and Level D protective equipment. A telephone may be located at the Response Vehicle for communication with emergency support services/facilities. If not appropriate for this particular project, the nearest public phones or cell phones shall be identified.

## 12 EMERGENCY PROCEDURES

When possible and practicable (following PM's assessment), personnel on-site will use the "buddy" system (pairs). Buddies will use pre-arranged hand signals or other means of emergency signals for communication in case of radio breakdown.

In emergencies, the following hand signals are to be used:

- Hand gripping throat: Out of air, can't breathe.
- Grip partner's wrist or place both hands around waist: Leave area immediately!
- Hands on top of head: Need assistance.
- Thumbs up: OK, I'm all right, I understand.
- Thumbs down: No, negative.

Visual contact will be maintained between "buddies" on-site with the team remaining in close proximity in order to assist each other in case of emergencies. Site entrance and exit routes will be planned and emergency escape routes will be delineated by the PM and/or SSO.

Field crew members will inform each other of non-visual effects of possible toxic exposure:

- headaches
- dizziness
- blurred vision
- cramps
- irritation of eyes, skin or respiratory tract

In the event that any member of the field crew experiences any adverse effects or symptoms of exposure while on scene, the entire field crew will immediately halt work and act according to the instructions provided by the SSO.

The discovery of any condition that would suggest the existence of a situation more hazardous than anticipated should result in the evacuation of the field team and a re-evaluation will be conducted by appropriate on-site Health and Safety personnel.

## 13 ON-SITE EVACUATION PLAN

Should either a fire or explosion occur on-site, all personnel will proceed to the nearest safe zone. At this time, the local fire and police department will be called for assistance. The acting officer of the fire department and the SSO will determine if further evacuation is necessary. This evacuation would include all personnel and inhabitants of any surrounding area which are in immediate danger.

## 14 SPILL CONTROL PLAN

The best emergency spill plan is planning to avoid and prevent spills. Upon planning a job the PM will inquire if there are any site-specific emergency procedures or spill kits on-site and inform the SSO and field team, as appropriate. In the event of accidental spillage, the following spill response protocol will be implemented as follows:

1. First Aid will be administered to injured/contaminated persons. Any employee observing a spill will act immediately to remove and/or protect injured/contaminated persons from any life-threatening situation. First Aid and/or decontamination procedures will be implemented as appropriate.
2. Warn unsuspecting persons of the hazard. Personnel will act to prevent any unsuspecting persons from coming in contact with spilled materials by alerting other nearby persons and by obtaining assistance of other personnel who are familiar with spill control and cleanup techniques.
3. Stop the spill at the source, if possible. Hit/activate an emergency stop button if one exists. Without taking unnecessary risks, personnel will attempt to stop the spill at the source. Personnel will not expend more than a brief effort prior to notifying the SSO.
4. Utilizing available personal radio communications or other rapid communication procedures, the SSO will be notified of the spill, including information on material spilled, quantity, personnel injuries, and immediate life-threatening hazards.
5. Spill assessment and primary containment. The SSO will make a rapid assessment of the spill and direct primary containment measures which may include, but are not limited to:
    A. Construction of a temporary containment beam utilizing on-site absorbent pads and booms or earth.
    B. Digging a sump, installing a polyethylene liner and diverting the spilled material to the sump.
6. Spill clean-up. Personnel will cleanup all spills following the above referenced and any additional appropriate spill clean-up procedures.

## 15 ACCIDENT AND INCIDENT REPORTING AND INVESTIGATIONS

### 15.1 Personal Injury

Emergency first aid shall be applied on site as deemed necessary. Then decontaminate and transport the individual to the nearest medical facility if needed. Decontamination may be waived prior to

transport, if the injury or illness is life threatening. The ambulance/rescue squad shall be contacted for transportation as necessary in an emergency. A Route to Hospital Map is provided behind the front cover of this HASP and in Appendix B if transportation is required without the assistance of an ambulance. If an accident occurs, an accident report will be filed by the SSO. A blank accident form is provided behind the Route to Hospital Map. The phone numbers listed on the first page and the primary hospital route will be kept in a designated location (e.g. site vehicle) and/or posted at the work site.

## 15.2 Accident / Incident Reporting

The SSO will maintain logs and reports covering health and safety aspects of the project throughout the duration of work activities. In the event of an on-site accident resulting in an exposure or injury, the SSO will immediately complete an Accident/Incident Form (Appendix C) and send copies to PM and CHSM within 72 hours.

## 15.3 Accident Investigations

Accidents are usually complex. An accident may have 10 or more events that can be causes. A detailed analysis of an accident will normally reveal three cause levels: basic, indirect, and direct. At the lowest level, an accident results only when a person or object receives an amount of energy or hazardous material that cannot be absorbed safely. This energy or hazardous material is the direct cause of the accident. The direct cause is usually the result of one or more unsafe acts or unsafe conditions, or both. Unsafe acts and conditions are the indirect causes or symptoms. In turn, indirect causes are usually traceable to basic causes such as poor management policies and decisions, or to personal or environmental factors.

Most accidents are preventable by eliminating one or more causes. Accident investigations determine not only what happened, but also how and why. The information gained from these investigations can prevent recurrence of similar or perhaps more disastrous accidents. Accident investigators are interested in each event as well as in the sequence of events that led to an accident. The accident type is also important to the investigator. The recurrence of accidents of a particular type or those with common causes shows areas needing special accident prevention emphasis.

The initial investigation has three purposes:

1. Prevent further possible injury and property damage
2. Collect facts about the accident
3. Collect and preserve evidence (where applicable)

The SSO will be responsible for the reporting associated with an accident and for obtaining all relevant information. The SSO will be responsible for the reporting of the accident and for promptly informing the PM. The SSO will take the following steps:

a. Secure the area. Do not disturb the scene unless a hazard exists.
b. Prepare the sketches and photographs necessary to help determine the cause(s) of the accident. Label each carefully and keep accurate records.
c. Interview each victim and witness. Also interview those who were present before the accident and those who arrived at the site shortly after the accident. Keep accurate records of each interview. Use a recording device if desired and if approved.

# 16 DECONTAMINATION PROCEDURES

This section establishes general decontamination guidelines for activities involving known or potential hazardous substances. This section applies to all field activities where exposure to hazardous substances may occur.

## 16.1 Personal Decontamination

Decontamination procedures are dependent on the level of respiratory and dermal protection employed during site activities. The higher the level of protection, the more steps in the decontamination procedures. Personnel typically conduct field activities by utilizing Level C and Level D respiratory / dermal protection; therefore, this section discusses the full decontamination procedures for these PPE levels only. If Level B protection is required, specific procedures will be incorporated into the site-specific HASP and associated training provided accordingly.

- Equipment necessary for decontamination of personnel should include:
- Plastic drop cloths
- Hay bales, soil or some other means to contain liquids;
- Plastic wash tubs;
- Long-handled brushes;
- Decontamination fluids (e.g., alconox, water);
- Paper towels;
- Spray units; and,
- Containers for collection of wash water (as necessary).

### *16.1.1 Level D Decontamination Procedures*

The following section outlines the decontamination procedures for Level D dermal protection, which consists of:

- Steel toed boots
- Chemical-resistant outer gloves
- Nitrile gloves
- Hard hat (as required)
- Safety glasses or goggles

In general, the steps for Level D shall be followed; however, the decontamination procedures may be modified in the site-specific HASP, with the approval of the SSO.

1. Segregated equipment drop
2. Outer glove/coverall/boot cover wash and rinse
3. Outer glove/coverall/boot cover removal
4. Inner glove wash and rinse
5. Inner glove and safety glasses/googles removal

## 17 SITE PLAN




N
W
E
S

PEAK ENVIRONMENTAL LLC
26 Kennedy Boulevard, Suite A, East Brunswick, NJ 08816
Phone: 732-326-1010 www.peak-environmental.com

**LEGEND**

PROPERTY BOUNDARY

BROWNFIELD SITE BOUNDARY LINE

**SOURCE:**

1. MAP CREATED IN HARN/NY.NY-EF, NEW YORK STATE PLANE, EAST ZONE, U.S. SURVEY FOOT
2. AERIAL IMAGE FROM 2019 GOOGLE MAPS.
3. SITE BOUNDARY GRAPHICALLY SHOWN PER THE WESTCHESTER COUNTY GEOGRAPHIC INFORMATION SYSTEMS WEBSITE.

**SITE MAP**

**5 WESTESTER PLAZA**
**ELMSFORD, NEW YORK**

PROJECT: 2847

DATE: APRIL 05, 2021

DRAWN BY: EC

CHECKED BY: MB

DRAWING 2

G:\0000_PROJECTS\2847_MACKCALI - WESTCHESTER_NY\01-CAD\2021-04-05_RIW MAP SET\2021-04-05_BROWNFIELD APP.DWG

## 18 APPENDIX A: TAILGATE SAFETY MEETING / JOB SAFETY ANALYSIS FORM

PEAK ENVIRONMENTAL INC

# TAILGATE SAFETY MEETING FORM / JOB SAFETY ANALYSIS

Project Name / Number: _____ Date: _____ Time: _____

Client: _____ Site Address: _____

Weather Conditions: _____ Forecasted Weather: _____

Wind Direction: _____ Safe Haven: _____

Evacuation Routes: _____

Assembly Point: _____

Hospital Name / Address: _____

Hospital Phone #: Ambulance Phone #: 911

**Work Activities:** **Personal Protective Equipment:**

Activity: _____ PPE Level: _____

Activity: _____ PPE Level: _____

Activity: _____ PPE Level: _____

Activity: _____ PPE Level: _____

**Equipment:** _____

**Other Safety Topic(s):** _____

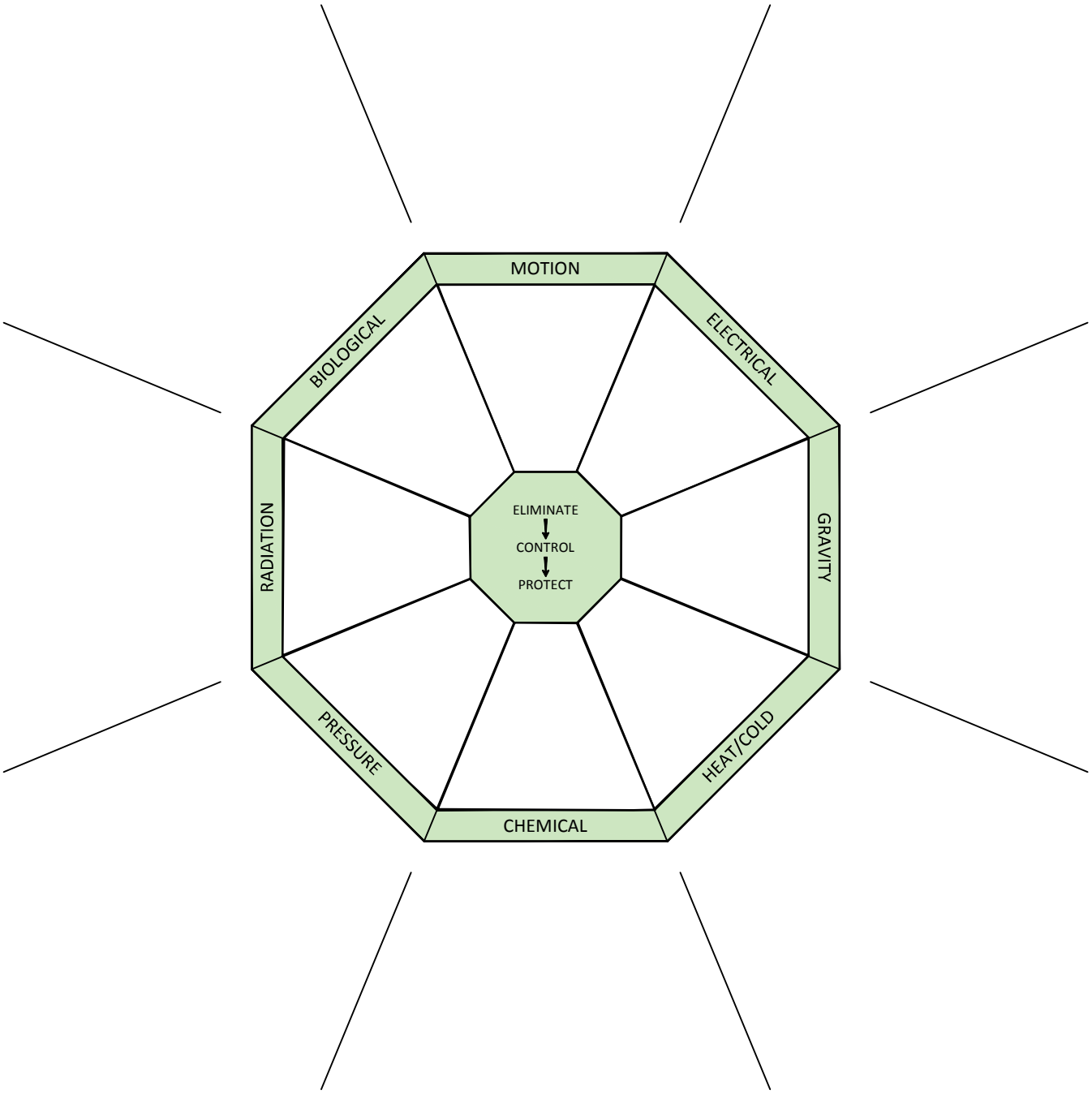
**H&S Topics Presented by Subcontractor:**

| **Potential H&S Hazard:** | **Mitigation Plan:** |
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**Attendees**

| **Printed Name** | **Signature** |
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| | |

Meeting Conducted by:




PEAK ENVIRONMENTAL LLC
26 Kennedy Blvd, Suite A, East Brunswick, NJ 08816
Phone: 732-326-1010 www.peak-environmental.com

Note all related health and safety hazards in the inner box.
Describe actions that will be taken to mitigate hazards the outer box.

# Job Safety Analysis Checklist Form

**DATE:**
**JOB#:**
**PERMIT#:**
**ISSUED BY:**
**SUPERVISOR**:

**Job Analyzed:** _____ **Project Name:** _____

Consider the following and check the items which apply to the job, then review with the work crew.

**PERMITS**
_____ Excavation
_____ Cold Work
_____ Hot Work
_____ Confined Space Entry Permit
_____ All Conditions Met
_____ Signed-off When Complete
_____ Road/Sidewalk Opening Permit
_____ Traffic Control Officer
_____ Other:

**PPE**
_____ Subcontractor HASP/JSA
_____ Chemical Protective Gloves
_____ Leather Gloves
_____ Special Purpose Gloves (e.g. Whizards)
_____ Chemical Protective Coveralls
_____ Acid Suit
_____ Chemical protective Boots
_____ Chemical Splash Goggles
_____ Face Shield
_____ Respirator
_____ Fresh Air Ventilation
_____ PID
_____ Multi-gas Meter
_____ Dust Monitor
_____ Hearing Protection
_____ Safety Harness
_____ Traffic Cones/Signs
_____ Sunscreen
_____ Drinking Water Available
_____ Other:

**TOOLS**
_____ Current Inspection
_____ Proper Tools for the Job
_____ Good Tool Condition
_____ Qualifications, e.g. explosive actuated tool
_____ Other:

**EMERGENCY EQUIPMENT**
_____ Fire Extinguishers
_____ Safety Shower/Eyewash
_____ Evacuation Route Mapped
_____ Other:

**ACCESS**
_____ Scaffold (properly inspected ____)
_____ Scaffold Training
_____ Ladder (HS 302 followed)
_____ Man-lift
_____ Personnel Basket (inspected/approved)
_____ Operator Training
_____ Special Provisions
_____ Other:

**WELDING**
_____ Flash-burns
_____ Combustibles
_____ Spark Containment
_____ Shields
_____ Fire Resistant Suit
_____ Goggles
_____ Welder's Helmet
_____ Grounding
_____ Water Hose
_____ Fire Extinguisher
_____ Fire Blanket
_____ Fire Watch
_____ Sewer Covers
_____ Other:

**OVERHEAD WORK**
_____ Barricades
_____ Signs
_____ Hole Cover
_____ Handrail
_____ Other:

**ELECTRICAL**
_____ Locked & Tagged out
_____ Try Start/Stop Switch
_____ GFCI Test
_____ Assured Grounding
_____ Extension Cord Inspection
_____ Other:

**LIFTING**
_____ Forklift
_____ Boom Truck
_____ Load Chart
_____ Angle
_____ Crane
_____ Chain-fall
_____ Proper Rigging Practices
_____ Manual Lifting
_____ Condition of Equipment
_____ Operator Certification

**DRILLING / DIRECT PUSH**
_____ Underground Utilities
_____ Overhead Hazards
_____ Rig Inspected
_____ Air Monitoring
_____ Emergency Procedures
_____ Other:

**HAZARDS (ENVIRONMENTAL)**
_____ Cold Stress
_____ Heat Stress
_____ Heavy Objects/Manual Lifting
_____ Hot/Cold Surfaces or Materials
_____ Inadequate Lighting
_____ Irritating Plants
_____ Noise
_____ Vehicular Traffic
_____ Heavy Weather
_____ Water/Flooding Hazards
_____ Insects/Animals
_____ Other:

**HAZARDS (CHEMICALS)**
_____ CoCs Identified
_____ Chemical Burn Skin/Eyes
_____ Flammable
_____ Ingestion
_____ Inhalation
_____ Skin Contact

**HAZARDS (BODY)**
_____ Fall Potential
_____ Pinch Points
_____ Slip-Trip Potential
_____ Other:

**OTHER WORK IN AREA**
_____ Others Working Overhead
_____ Type Work Others Doing
_____ PPE Due to Other Work
_____ Other:

**CONFINED SPACE ENTRY**
_____ Permit Required
_____ Permit Completed
_____ Personnel Trained
_____ Rescue Services Available

**EXCAVATION**
_____ Permit Completed
_____ Competent Person Supervising
_____ Underground Utilities
_____ Overhead Hazards
_____ Soils Tested
_____ Heavy Equipment Inspected
_____ Perimeter Protection
_____ Daily Inspections
_____ Protective Systems
_____ Air Monitoring

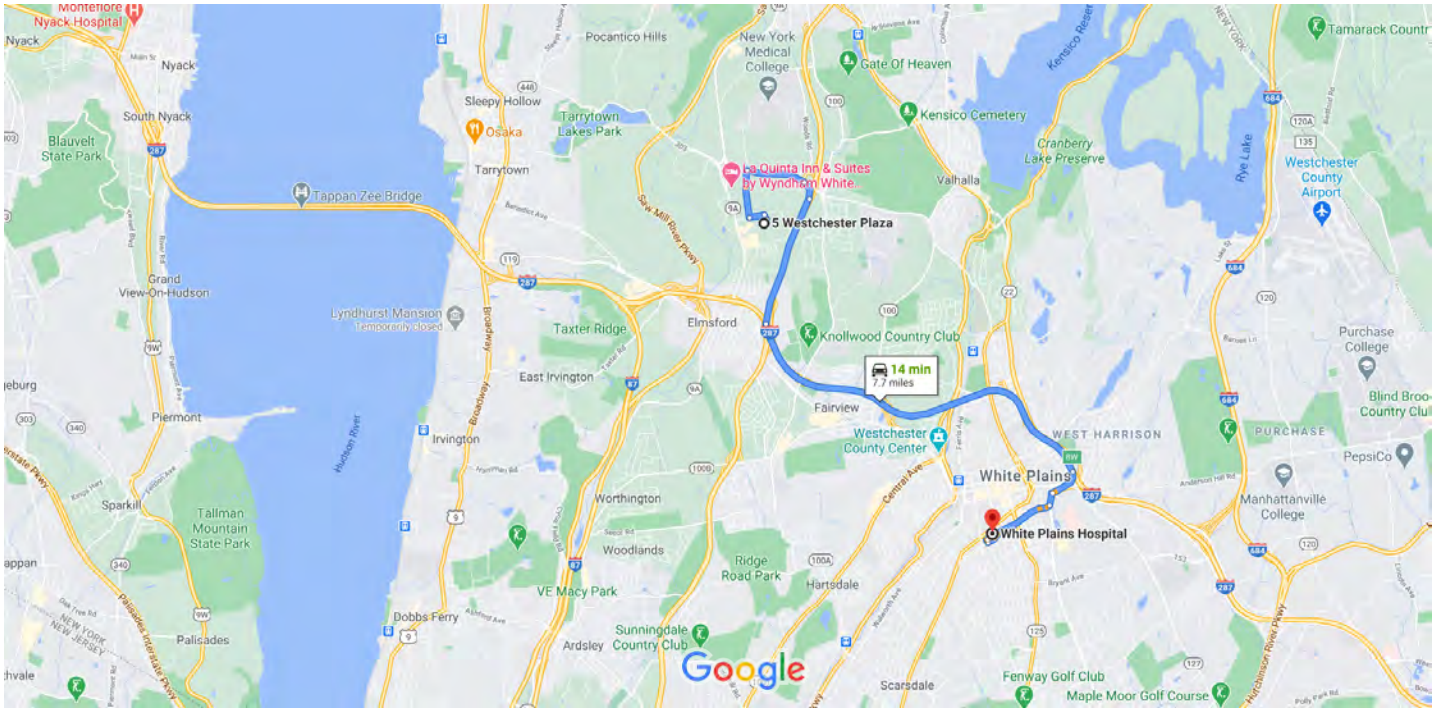
SUPERVISOR/FOREMAN RECOMMENDATIONS:

# 19 APPENDIX B: MAPS

Google Maps

# 5 Westchester Plaza, Elmsford, NY 10523 to White Plains Hospital

Drive 7.7 miles, 14 min




Map data ©2021 1 mi

## 5 Westchester Plaza

Elmsford, NY 10523

### Get on Sprain Brook Pkwy S from Clearbrook Rd and NY-100C E

4 min (1.4 mi)

1. Head north toward Westchester Plaza W

85 ft

2. Turn right onto Westchester Plaza W

95 ft

3. Turn left onto Westchester Plaza

276 ft

4. Turn left onto Executive Blvd/Hunter Ln

0.1 mi

5. Turn right onto Clearbrook Rd

0.5 mi

6. Turn right onto NY-100C E

0.6 mi

7. Use the right lane to take the ramp onto Sprain Brook Pkwy S

0.2 mi

### Take I-287 E to Bloomingdale Rd in White Plains. Take exit 8W from I-287 E

6 min (5.3 mi)

8. Merge onto Sprain Brook Pkwy S

1.3 mi

9. Use the left lane to merge onto I-287 E toward White Plains

3.7 mi

10. Take exit 8W for Bloomingdale Rd

0.3 mi

### Take Maple Ave to your destination

5 min (0.9 mi)

11. Use the middle lane to turn left onto Bloomingdale Rd

0.1 mi

12. Turn right onto Maple Ave

0.7 mi

13. Turn right onto Davis Ave

151 ft

14. Turn right

Destination will be on the right

285 ft

## White Plains Hospital

41 E Post Rd, White Plains, NY 10601

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

## 20 APPEXDIX C: SIGNATURE PAGE

# SITE SPECIFIC HEALTH AND SAFETY PLAN SIGNATURE PAGE

Prior to the start of work, this Health and Safety Plan has been reviewed by the following:

| Company | Name | Signature | Date |
|---|---|---|---|
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## 21 APPENDIX D: ACCIDENT FORM

# Employee's Report of Injury Form

**Instructions:** Employees shall use this form to report all work related injuries, illnesses, or "near miss" events (which could have caused injury or illness) – *no matter how minor*. This helps us to identify and correct hazards before they cause serious injuries. This form shall be completed by employees as soon as possible and given to a supervisor for further action.

| | |
|---|---|
| I am reporting a work related: ☐ Injury ☐ Illness ☐ Near Miss | |
| Your Name: | |
| Job title: | |
| Supervisor: | |
| Have you told your supervisor about this injury/near miss? ☐ Yes ☐ No | |
| Date of injury/near miss: | Time of injury/near miss: |
| Name of witnesses (if any): | |
| Where, exactly, did it happen? | |
| Where, exactly, did it happen? | |
| What were you doing at the time? | |
| Describe step by step what led up to the injury/near miss. (continue on the back if necessary): | |
| What could have been done to prevent this injury/near miss? | |
| What parts of your body were injured? If a near miss, how could you have been hurt? | |
| Did you see a doctor about this injury/illness? ☐ Yes ☐ No | |
| If yes, whom did you see? | Doctor's phone number: |
| Date: | Time: |
| Has this part of your body been injured before? ☐ Yes ☐ No | |
| If yes, when? | Supervisor: |
| Your signature: | Date: |

# Supervisor's Accident Investigation Form

Name of Injured Person_____
Date of Birth_____ Telephone Number_____
Address_____
City_____ State_____ Zip_____
(Circle one) Male Female
What part of the body was injured: Describe in detail. _____
_____
_____
Describe fully how the accident happened: What was employee doing prior to the event?
What equipment, tools being used?_____
_____
_____
Names of all witnesses:
_____ _____
_____ _____
Date of Event_____ Time of Event_____
Exact location of event:_____
What caused the event?_____
_____
_____
Were safety regulations in place and used? If not, what was wrong?_____
_____
Employee went to doctor/hospital? Doctor's Name_____
Hospital Name_____
Recommended preventive action to take in the future to prevent reoccurrence.
_____
_____
_____

_____ _____
Supervisor Signature Date

# APPENDIX C

NEW YORK STATE | Department of Environmental Conservation

# Brownfield Cleanup Program

## Citizen Participation Plan
**for**
## 5 Westchester Plaza

April 2021

C360205

5 Westchester Plaza

Elmsford

Westchester County, New York

## Contents


**Section** **Page Number**

**1. What is New York's Brownfield Cleanup Program? ..... 3**

**2. Citizen Participation Activities..... 3**

**3. Major Issues of Public Concern..... 9**

**4. Site Information..... 9**

**5. Investigation and Cleanup Process ..... 10**

**Appendix A - Project Contacts and Locations of Reports and Information ..... 14**

**Appendix B - Site Contact List..... 15**

**Appendix C - Site Location Map..... 16**

**Appendix D - Brownfield Cleanup Program Process ..... 17**


* * * * *

**Note:** The information presented in this Citizen Participation Plan was current as of the date of its approval by the New York State Department of Environmental Conservation. Portions of this Citizen Participation Plan may be revised during the site's investigation and cleanup process.

Applicant: **Mack-Cali CW Realty Associates L.L.C. ("Applicant")**
Site Name: **5 Westchester Plaza ("Site")**
Site Address: **5 Westchester Plaza**
Site County: **Westchester**
Site Number: **C360205**

## 1. What is New York's Brownfield Cleanup Program?

New York's Brownfield Cleanup Program (BCP) works with private developers to encourage the voluntary cleanup of contaminated properties known as "brownfields" so that they can be reused and developed. These uses include recreation, housing, and business.

A *brownfield* is any real property that is difficult to reuse or redevelop because of the presence or potential presence of contamination. A brownfield typically is a former industrial or commercial property where operations may have resulted in environmental contamination. A brownfield can pose environmental, legal, and financial burdens on a community. If a brownfield is not addressed, it can reduce property values in the area and affect economic development of nearby properties.

The BCP is administered by the New York State Department of Environmental Conservation (NYSDEC) which oversees Applicants who conduct brownfield site investigation and cleanup activities. An Applicant is a person who has requested to participate in the BCP and has been accepted by NYSDEC. The BCP contains investigation and cleanup requirements, ensuring that cleanups protect public health and the environment. When NYSDEC certifies that these requirements have been met, the property can be reused or redeveloped for the intended use.

For more information about the BCP, go online at:
http://www.dec.ny.gov/chemical/8450.html .

## 2. Citizen Participation Activities

*Why NYSDEC Involves the Public and Why It Is Important*

NYSDEC involves the public to improve the process of investigating and cleaning up contaminated sites, and to enable citizens to participate more fully in decisions that affect their health, environment, and social well-being. NYSDEC provides opportunities for citizen involvement and encourages early two-way communication with citizens before decision makers form or adopt final positions.

Involving citizens affected and interested in site investigation and cleanup programs is important for many reasons. These include:

- Promoting the development of timely, effective site investigation and cleanup programs that protect public health and the environment

- Improving public access to, and understanding of, issues and information related to a particular site and that site's investigation and cleanup process

- Providing citizens with early and continuing opportunities to participate in NYSDEC's site investigation and cleanup process

- Ensuring that NYSDEC makes site investigation and cleanup decisions that benefit from input that reflects the interests and perspectives found within the affected community

- Encouraging dialogue to promote the exchange of information among the affected/interested public, State agencies, and other interested parties that strengthens trust among the parties, increases understanding of site and community issues and concerns, and improves decision making.

This Citizen Participation (CP) Plan provides information about how NYSDEC will inform and involve the public during the investigation and cleanup of the site identified above. The public information and involvement program will be carried out with assistance, as appropriate, from the Applicant.

*Project Contacts*

Appendix A identifies NYSDEC project contact(s) to whom the public should address questions or request information about the site's investigation and cleanup program. The public's suggestions about this CP Plan and the CP program for the site are always welcome. Interested people are encouraged to share their ideas and suggestions with the project contacts at any time.

*Locations of Reports and Information*

The locations of the reports and information related to the site's investigation and cleanup program also are identified in Appendix A. These locations provide convenient access to important project documents for public review and comment. Some documents may be placed on the NYSDEC web site. If this occurs, NYSDEC will inform the public in fact sheets distributed about the site and by other means, as appropriate.

*Site Contact List*

Appendix B contains the site contact list. This list has been developed to keep the community informed about, and involved in, the site's investigation and cleanup process. The site contact list will be used periodically to distribute fact sheets that provide updates about the status of the project. These will include notifications of upcoming activities at the site (such as fieldwork), as well as availability of project documents and announcements about public comment periods.
The site contact list includes, at a minimum:

- chief executive officer and planning board chairperson of each county, city, town and village in which the site is located;
- residents, owners, and occupants of the site and properties adjacent to the site;
- the public water supplier which services the area in which the site is located;
- any person who has requested to be placed on the site contact list;
- the administrator of any school or day care facility located on or near the site for purposes of posting and/or dissemination of information at the facility;
- location(s) of reports and information.

The site contact list will be reviewed periodically and updated as appropriate. Individuals and organizations will be added to the site contact list upon request. Such requests should be submitted to the NYSDEC project contact(s) identified in Appendix A. Other additions to the site contact list may be made at the discretion of the NYSDEC project manager, in consultation with other NYSDEC staff as appropriate.

**Note:** The first site fact sheet (usually related to the draft Remedial Investigation Work Plan) is distributed both by paper mailing through the postal service and through DEC Delivers, its email listserv service. The fact sheet includes instructions for signing up with the appropriate county listserv to receive future notifications about the site. See http://www.dec.ny.gov/chemical/61092.html .

Subsequent fact sheets about the site will be distributed exclusively through the listserv, except for households without internet access that have indicated the need to continue to receive site information in paper form. Please advise the NYSDEC site project manager identified in Appendix A if that is the case. Paper mailings may continue during the investigation and cleanup process for some sites, based on public interest and need.

*CP Activities*

The table at the end of this section identifies the CP activities, at a minimum, that have been and will be conducted during the site's investigation and cleanup program. The flowchart in Appendix D shows how these CP activities integrate with the site investigation and cleanup process. The public is informed about these CP activities

through fact sheets and notices distributed at significant points during the program. Elements of the investigation and cleanup process that match up with the CP activities are explained briefly in Section 5.

- **Notices and fact sheets** help the interested and affected public to understand contamination issues related to a site, and the nature and progress of efforts to investigate and clean up a site.

- **Public forums, comment periods and contact with project managers** provide opportunities for the public to contribute information, opinions and perspectives that have potential to influence decisions about a site's investigation and cleanup.

The public is encouraged to contact project staff at any time during the site's investigation and cleanup process with questions, comments, or requests for information.

This CP Plan may be revised due to changes in major issues of public concern identified in Section 3 or in the nature and scope of investigation and cleanup activities. Modifications may include additions to the site contact list and changes in planned citizen participation activities.

*Technical Assistance Grant*

NYSDEC must determine if the site poses a significant threat to public health or the environment. This determination generally is made using information developed during the investigation of the site, as described in Section 5.

If the site is determined to be a significant threat, a qualifying community group may apply for a Technical Assistance Grant (TAG). The purpose of a TAG is to provide funds to the qualifying group to obtain independent technical assistance. This assistance helps the TAG recipient to interpret and understand existing environmental information about the nature and extent of contamination related to the site and the development/implementation of a remedy.

An eligible community group must certify that its membership represents the interests of the community affected by the site, and that its members' health, economic well-being or enjoyment of the environment may be affected by a release or threatened release of contamination at the site.

As of the date the declaration (page 2) was signed by the NYSDEC project manager, the significant threat determination for the site had not yet been made.

To verify the significant threat status of the site, the interested public may contact the NYSDEC project manager identified in Appendix A.

For more information about TAGs, go online at
http://www.dec.ny.gov/regulations/2590.html

Note: The table identifying the citizen participation activities related to the site's investigation and cleanup program follows on the next page:

| Citizen Participation Activities | Timing of CP Activity(ies) |
|---|---|
| **Application Process:** | |
| • Prepare site contact list<br>• Establish document repository(ies) | At time of preparation of application to participate in the BCP. |
| • Publish notice in Environmental Notice Bulletin (ENB) announcing receipt of application and 30-day public comment period<br>• Publish above ENB content in local newspaper<br>• Mail above ENB content to site contact list<br>• Conduct 30-day public comment period | When NYSDEC determines that BCP application is complete. The 30-day public comment period begins on date of publication of notice in ENB. End date of public comment period is as stated in ENB notice. Therefore, ENB notice, newspaper notice, and notice to the site contact list should be provided to the public at the same time. |
| **After Execution of Brownfield Site Cleanup Agreement (BCA):** | |
| • Prepare Citizen Participation (CP) Plan | Before start of Remedial Investigation<br>**Note:** Applicant must submit CP Plan to NYSDEC for review and approval within 20 days of the effective date of the BCA. |
| **Before NYSDEC Approves Remedial Investigation (RI) Work Plan:** | |
| • Distribute fact sheet to site contact list about proposed RI activities and announcing 30-day public comment period about draft RI Work Plan<br>• Conduct 30-day public comment period | Before NYSDEC approves RI Work Plan. If RI Work Plan is submitted with application, public comment periods will be combined and public notice will include fact sheet. Thirty-day public comment period begins/ends as per dates identified in fact sheet. |
| **After Applicant Completes Remedial Investigation:** | |
| • Distribute fact sheet to site contact list that describes RI results | Before NYSDEC approves RI Report |
| **Before NYSDEC Approves Remedial Work Plan (RWP):** | |
| • Distribute fact sheet to site contact list about draft RWP and announcing 45-day public comment period<br>• Public meeting by NYSDEC about proposed RWP (if requested by affected community or at discretion of NYSDEC project manager)<br>• Conduct 45-day public comment period | Before NYSDEC approves RWP. Forty-five day public comment period begins/ends as per dates identified in fact sheet. Public meeting would be held within the 45-day public comment period. |
| **Before Applicant Starts Cleanup Action:** | |
| • Distribute fact sheet to site contact list that describes upcoming cleanup action | Before the start of cleanup action. |
| **After Applicant Completes Cleanup Action:** | |
| • Distribute fact sheet to site contact list that announces that cleanup action has been completed and that NYSDEC is reviewing the Final Engineering Report<br>• Distribute fact sheet to site contact list announcing NYSDEC approval of Final Engineering Report and issuance of Certificate of Completion (COC) | At the time the cleanup action has been completed.<br>**Note:** The two fact sheets are combined when possible if there is not a delay in issuing the COC. |

## 3. Major Issues of Public Concern

This section of the CP Plan identifies major issues of public concern that relate to the site. Additional major issues of public concern may be identified during the course of the site's investigation and cleanup process.

Concentrations of the chlorinated solvents tetrachloroethene (PCE) and trichloroethene (TCE) were detected within sub-slab soil vapor samples collected on Site in March 2019. Impacts in sub-slab vapor are likely due to releases caused by a former tenant which utilized these chlorinated solvents. PCE and TCE exceeded their respective New York State Department of Health Soil Vapor/Indoor Air Decision Matrices (NYSDH-DM) sub-slab vapor threshold values for commercial properties, warranting additional investigation.

TCE and PCE are volatile chemicals that may travel through vapor migration and intrusion to indoor air. When present in indoor air, they may pose a threat to human health. Possible health risks associated with short term TCE and PCE exposure include dizziness, headache, nose and throat irritation, and nausea. Chronic long term health exposures include liver and kidney damage and incidence of cancer.

Stakeholders of the Site contamination include building occupants where the exposure pathway of vapor migration and intrusion to indoor air may be possible. Prior soil sampling on site did not indicate PCE and TCE at concentrations exceeding their respective Commercial Soil Cleanup Objectives (SCOs). Groundwater has not yet been investigated, but none was found during the initial investigation to a depth of 13.5 feet below ground. At this time, no potential impacts on nearby public water supply or private wells, restrictions on community activities, or public health concerns have been identified.

## 4. Site Information

Appendix C contains a map identifying the location of the site.

*Site Description*
The Site is located at 5 Westchester Plaza, Elmsford, NY within the Township of Greenburg and Westchester County. The Site is approximately 0.46 acres and is considered urban land for commercial use. Surrounding properties adjacent to the Site are identified as being utilized for commercial purposes.

The Site consists of one approximately 20,200 square foot building built in 1968. The building is one-story and does not contain a basement. The Site is currently active with commercial tenants and is zoned for non-residential planned development. The Site is divided into five separate leasehold spaces.

*History of Site Use, Investigation, and Cleanup*

The 20,200 square foot building identified as the Site was constructed in 1968. Prior to construction, the Site was used as agricultural land or undeveloped land from at least 1892. Since development in 1968, the Site has been used for various commercial and industrial tenant operations. A tenant which operated at the Site from approximately 1983 to 2007 was listed as having been a generator of waste, PCE and TCE, which can be harmful to human health.

On January 30, 2019, EBI Consulting prepared a Phase I Environmental Site Assessment to evaluate if potential contamination was present on Site. Additional investigation was recommended and in March 2019 a Phase II Environmental Site Assessment was conducted which included soil and sub slab vapor sampling.

Soil sampling results did not reveal contaminant concentrations above their respective NYSDEC Commercial Soil Cleanup Objectives (SCOs).

Sub-slab vapor sampling results revealed PCE and TCE concentrations exceeding their respective NYSDH-DM threshold for commercial properties, which warrant additional sampling to confirm sub-slab vapor impacts and to evaluate if vapor intrusion is occurring. Vapor mitigation activities may be recommended depending on the results of soil vapor resampling and indoor air sampling.

**5. Investigation and Cleanup Process**

*Application*

The Applicant has applied for and been accepted into New York's Brownfield Cleanup Program as a Volunteer. This means that the Applicant was not responsible for the disposal or discharge of the contaminants or whose ownership or operation of the site took place after the discharge or disposal of contaminants. The Volunteer must fully characterize the nature and extent of contamination onsite, and must conduct a "qualitative exposure assessment," a process that characterizes the actual or potential exposures of people, fish and wildlife to contaminants on the site and to contamination that has migrated from the site.

The Applicant in its Application proposes that the site will be used for restricted purposes.

To achieve this goal, the Applicant will conduct investigation activities at the site with oversight provided by NYSDEC. The Brownfield Cleanup Agreement executed by NYSDEC and the Applicant sets forth the responsibilities of each party in conducting

NYSDEC and the Applicant sets forth the responsibilities of each party in conducting these activities at the site.

*Investigation*

The Applicant has completed a partial site investigation before it entered into the BCP. For the partial investigation, NYSDEC will determine if the data are useable.

The Applicant will conduct an investigation of the site officially called a “remedial investigation” (RI). This investigation will be performed with NYSDEC oversight. The Applicant must develop a remedial investigation workplan, which is subject to public comment.

The site investigation has several goals:

1) define the nature and extent of contamination in soil, surface water, groundwater and any other parts of the environment that may be affected;
2) identify the source(s) of the contamination;
3) assess the impact of the contamination on public health and the environment; and
4) provide information to support the development of a proposed remedy to address the contamination or the determination that cleanup is not necessary.

The Applicant submits a draft “Remedial Investigation Work Plan” to NYSDEC for review and approval. NYSDEC makes the draft plan available to the public review during a 30-day public comment period.

When the investigation is complete, the Applicant will prepare and submit a report that summarizes the results. This report also will recommend whether cleanup action is needed to address site-related contamination. The investigation report is subject to review and approval by NYSDEC.

NYSDEC will use the information in the investigation report to determine if the site poses a significant threat to public health or the environment. If the site is a “significant threat,” it must be cleaned up using a remedy selected by NYSDEC from an analysis of alternatives prepared by the Applicant and approved by NYSDEC. If the site does not pose a significant threat, the Applicant may select the remedy from the approved analysis of alternatives.

*Interim Remedial Measures*

An Interim Remedial Measure (IRM) is an action that can be undertaken at a site when a source of contamination or exposure pathway can be effectively addressed before the site investigation and analysis of alternatives are completed. If an IRM is likely to

represent all or a significant part of the final remedy, NYSDEC will require a 30-day public comment period.

*Remedy Selection*

When the investigation of the site has been determined to be complete, the project likely would proceed in one of two directions:

1. The Applicant may recommend in its investigation report that no action is necessary at the site. In this case, NYSDEC would make the investigation report available for public comment for 45 days. NYSDEC then would complete its review, make any necessary revisions, and, if appropriate, approve the investigation report. NYSDEC would then issue a "Certificate of Completion" (described below) to the Applicant.

**or**

2. The Applicant may recommend in its investigation report that action needs to be taken to address site contamination. After NYSDEC approves the investigation report, the Applicant may then develop a cleanup plan, officially called a "Remedial Work Plan". The Remedial Work Plan describes the Applicant's proposed remedy for addressing contamination related to the site.

When the Applicant submits a draft Remedial Work Plan for approval, NYSDEC would announce the availability of the draft plan for public review during a 45-day public comment period.

*Cleanup Action*

NYSDEC will consider public comments, and revise the draft cleanup plan if necessary, before approving the proposed remedy. The New York State Department of Health (NYSDOH) must concur with the proposed remedy. After approval, the proposed remedy becomes the selected remedy. The selected remedy is formalized in the site Decision Document.

The Applicant may then design and perform the cleanup action to address the site contamination. NYSDEC and NYSDOH oversee the activities. When the Applicant completes cleanup activities, it will prepare a final engineering report that certifies that cleanup requirements have been achieved or will be achieved within a specific time frame. NYSDEC will review the report to be certain that the cleanup is protective of public health and the environment for the intended use of the site.

*Certificate of Completion*

When NYSDEC is satisfied that cleanup requirements have been achieved or will be achieved for the site, it will approve the final engineering report. NYSDEC then will issue a Certificate of Completion (COC) to the Applicant. The COC states that cleanup goals have been achieved, and relieves the Applicant from future liability for site-related contamination, subject to certain conditions. The Applicant would be eligible to redevelop the site after it receives a COC.

*Site Management*

The purpose of site management is to ensure the safe reuse of the property if contamination will remain in place. Site management is the last phase of the site cleanup program. This phase begins when the COC is issued. Site management incorporates any institutional and engineering controls required to ensure that the remedy implemented for the site remains protective of public health and the environment. All significant activities are detailed in a Site Management Plan.

An *institutional control* is a non-physical restriction on use of the site, such as a deed restriction that would prevent or restrict certain uses of the property. An institutional control may be used when the cleanup action leaves some contamination that makes the site suitable for some, but not all uses.

An *engineering control* is a physical barrier or method to manage contamination. Examples include: caps, covers, barriers, fences, and treatment of water supplies.

Site management also may include the operation and maintenance of a component of the remedy, such as a system that pumps and treats groundwater. Site management continues until NYSDEC determines that it is no longer needed.

## Appendix A -
## Project Contacts and Locations of Reports and Information

### Project Contacts

For information about the site's investigation and cleanup program, the public may contact any of the following project staff:

**New York State Department of Environmental Conservation (NYSDEC):**

Mark Domaracki, P.G.
Project Manager
NYSDEC, Region 3
Division of Environmental Remediation
625 Broadway, 12th floor
Albany, NY 12233-7014
(518) 402-9832
Mark.domaracki@dec.ny.gov

John Petronella
Regional Permit Administrator
Citizen Participation Specialist
NYSDEC Region 3
21 South Putt Corners Road
New Paltz, NY 12561-1696
(845) 256-3018

**New York State Department of Health (NYSDOH):**

Maureen Schuck
NYSDOH Regional Chief
NYSDOH Region 3
Bureau of Environmental Exposure Investigation
New York State Department of Health
Empire State Plaza, Corning Tower,
Room 1739
Albany, NY 12237
(518) 402-7860
Maureen.schuck@health.ny.gov

### Locations of Reports and Information

The facilities identified below are being used to provide the public with convenient access to important project documents

Greenburgh Public Library
300 Tarrytown Road
Elmsford, NY 10523

Hours: M, W, Th, F 10am-1pm; T 10am-1pm and 4pm-7pm; Sat 10am-1pm and 2pm-4pm.

# Appendix B: Site Contact List

| Contact Name | Title | Address | Phone Number | Email |
|---|---|---|---|---|
| George Latimer | Westchester County Executive | 148 Martine Aveune, White Plains, NY 10601 | (914) 995-2000 | NA |
| Richard Hyman | Chairperson Westchester County Planning board | 148 Martine Aveune, White Plains, NY 10601 | (914) 995-2001 | NA |
| Paul Feiner | Greenburgh Town Supervisor | 177 Hillside Avenue, Greenburgh, NY 10607 | (914) 989-1540 | pfeiner@greenburghny.com |
| Walter Simon | Chairperson Greenburgh Planning Board | 178 Hillside Avenue, Greenburgh, NY 10607 | NA | NA |
| Robert Williams | Mayor of Elmsford | 15 South Stone Ave, Elmsford, NY 10523 | (914) 592-6555 | robertwilliams@elmsfordny.org |
| David Perilli | Chairperson Elmsford Planning Board | 15 South Stone Ave, Elmsford, NY 10523 | (914) 345-1553 | NA |
| Westchester County Press | Newspaper | P.O. Box 152, White Plains, NY 10602 | (914) 953-2620 | westchestercountypress@yahoo.com |
| The Journal News | Newspaper | 1133 Westchester Avenue, Suite N110, White Plains, NY 10604 | (888) 516-9220 | legals@lohud.com |
| Christie Dilorenzo | Director of Bright Horizons at Westchester Executive Park | 77 Executive Blvd, Elmsford, NY 10523 | (914) 592-2890 | NA |
| Joe Diaz | Water Foreman Elmsford Water/ Facilities Department | 2 Winthrop Avenue, Elmsford, NY 15023 | (914) 592-8383 | jdiaz@elmsfordny.org |
| British Apparel Collection | Occupant of 1 Westchester Plaza | 1 Westchester Plaza, Elmsford, NY 15023 | NA | NA |
| Carrier Enterprise Northeast | Occupant of 1 Westchester Plaza | 1 Westchester Plaza, Elmsford, NY 15023 | NA | NA |
| RS Knapp Company Inc. | Occupant of 1 Westchester Plaza | 1 Westchester Plaza, Elmsford, NY 15023 | NA | NA |
| University Pathology, P.C | Occupant of 1 Westchester Plaza | 1 Westchester Plaza, Elmsford, NY 15023 | NA | NA |
| Orkin LLC | Occupant of 2 Westchester Plaza | 2 Westchester Plaza, Elmsford, NY 15023 | NA | NA |
| Strategem Security, Inc. | Occupant of 2 Westchester Plaza | 2 Westchester Plaza, Elmsford, NY 15023 | NA | NA |
| Westchester Community Opportunity | Occupant of 2 Westchester Plaza | 2 Westchester Plaza, Elmsford, NY 15023 | NA | NA |
| Johnson Controls Security | Occupant of 2 Westchester Plaza | 2 Westchester Plaza, Elmsford, NY 15023 | NA | NA |
| Limelife USA, LLC | Occupant of 3 Westchester Plaza | 3 Westchester Plaza, Elmsford, NY 15023 | NA | NA |
| Securitas Electronic Security | Occupant of 3 Westchester Plaza | 3 Westchester Plaza, Elmsford, NY 15023 | NA | NA |
| Wine Cellar Group, Inc, | Occupant of 3 Westchester Plaza | 3 Westchester Plaza, Elmsford, NY 15023 | NA | NA |
| Fabrication Enterprises, Inc. | Occupant of 3 Westchester Plaza | 3 Westchester Plaza, Elmsford, NY 15023 | NA | NA |
| Vivint Solar Developer | Occupant of 3 Westchester Plaza | 3 Westchester Plaza, Elmsford, NY 15023 | NA | NA |
| Westchester County Electric | Occupant of 3 Westchester Plaza | 3 Westchester Plaza, Elmsford, NY 15023 | NA | NA |
| Westchester Swim Studios | Occupant of 3 Westchester Plaza | 3 Westchester Plaza, Elmsford, NY 15023 | NA | NA |
| Dolphin Construction Corp. | Occupant of 5 Westchester Plaza | 5 Westchester Plaza, Elmsford, NY 15023 | NA | NA |
| Promtcare Companies Inc. | Occupant of 5 Westchester Plaza | 5 Westchester Plaza, Elmsford, NY 15023 | NA | NA |
| Apple Maintenance & Services | Occupant of 5 Westchester Plaza | 5 Westchester Plaza, Elmsford, NY 15023 | NA | NA |
| Willemin-Macodel Inc. | Occupant of 5 Westchester Plaza | 5 Westchester Plaza, Elmsford, NY 15023 | NA | NA |
| Apria Healthcare LLC | Occupant of 5 Westchester Plaza | 5 Westchester Plaza, Elmsford, NY 15023 | NA | NA |
| Aqua Turf Irrigation Systems | Occupant of 6 Westchester Plaza | 6 Westchester Plaza, Elmsford, NY 15023 | NA | NA |
| Bauer Office Solutions Inc. | Occupant of 6 Westchester Plaza | 6 Westchester Plaza, Elmsford, NY 15023 | NA | NA |
| Acorn Engineering Co. & Morris-Croker LLC | Occupant of 6 Westchester Plaza | 6 Westchester Plaza, Elmsford, NY 15023 | NA | NA |
| Girard Rubber Corp. | Occupant of 6 Westchester Plaza | 6 Westchester Plaza, Elmsford, NY 15023 | NA | NA |
| Technovax, Inc. | Occupant of 6 Westchester Plaza | 6 Westchester Plaza, Elmsford, NY 15023 | NA | NA |
| Emigrant Bank | Occupant of 7 Westchester Plaza | 7 Westchester Plaza, Elmsford, NY 15023 | NA | NA |
| MCI Metro Access Transmission Service LLC | Occupant of 7 Westchester Plaza | 7 Westchester Plaza, Elmsford, NY 15023 | NA | NA |
| Acorn Engineering Co. & Morris-Croker LLC | Occupant of 7 Westchester Plaza | 7 Westchester Plaza, Elmsford, NY 15023 | NA | NA |
| RX Vitamins, Inc. | Occupant of 8 Westchester Plaza | 8 Westchester Plaza, Elmsford, NY 15023 | NA | NA |
| BBA Project Inc. | Occupant of 8 Westchester Plaza | 8 Westchester Plaza, Elmsford, NY 15023 | NA | NA |
| Best Plumbing Supply Inc. | Occupant of 8 Westchester Plaza | 8 Westchester Plaza, Elmsford, NY 15023 | NA | NA |
| Cubicle Enterprises LLC | Occupant of 8 Westchester Plaza | 8 Westchester Plaza, Elmsford, NY 15023 | NA | NA |
| Lite Concepts, Ltd. | Occupant of 8 Westchester Plaza | 8 Westchester Plaza, Elmsford, NY 15023 | NA | NA |
| Executive Printing & Direct | Occupant of 8 Westchester Plaza | 8 Westchester Plaza, Elmsford, NY 15023 | NA | NA |
| Gene Link, Inc. | Occupant of 8 Westchester Plaza | 8 Westchester Plaza, Elmsford, NY 15023 | NA | NA |
| SMK Imaging | Occupant of 8 Westchester Plaza | 8 Westchester Plaza, Elmsford, NY 15023 | NA | NA |
| Mormax Company, Inc. | Occupant of 8 Westchester Plaza | 8 Westchester Plaza, Elmsford, NY 15023 | NA | NA |
| Eastern Jungle Gym, Inc. | Occupant of 50 Executive Blvd. | 50 Executive Blvd., Elmsford, NY 15023 | NA | NA |
| Agent support Services North | Occupant of 50 Executive Blvd. | 50 Executive Blvd., Elmsford, NY 15023 | NA | NA |
| Greenburgh Public Library | Location of Document Repository | 300 Tarrytown Road, Elmsford, NY 10523 | (914) 721-8200 | NA |




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PEAK ENVIRONMENTAL LLC
26 Kennedy Boulevard, Suite A, East Brunswick, NJ 08816
Phone: 732-326-1010 www.peak-environmental.com

**LEGEND**

- PROPERTY BOUNDARY
- BROWNFIELD SITE BOUNDARY LINE
- PARCEL BOUNDARY

**SOURCE:**

1. MAP CREATED IN HARN/NY.NY-EF, NEW YORK STATE PLANE, EAST ZONE, U.S. SURVEY FOOT
2. AERIAL IMAGE FROM 2019 GOOGLE MAPS.
3. SITE BOUNDARY GRAPHICALLY SHOWN PER THE WESTCHESTER COUNTY GEOGRAPHIC INFORMATION SYSTEMS WEBSITE.

**SITE LOCATION MAP**

**5 WESTESTER PLAZA**
**ELMSFORD, NEW YORK**

PROJECT: 2847

DATE: DECEMBER 1, 2020

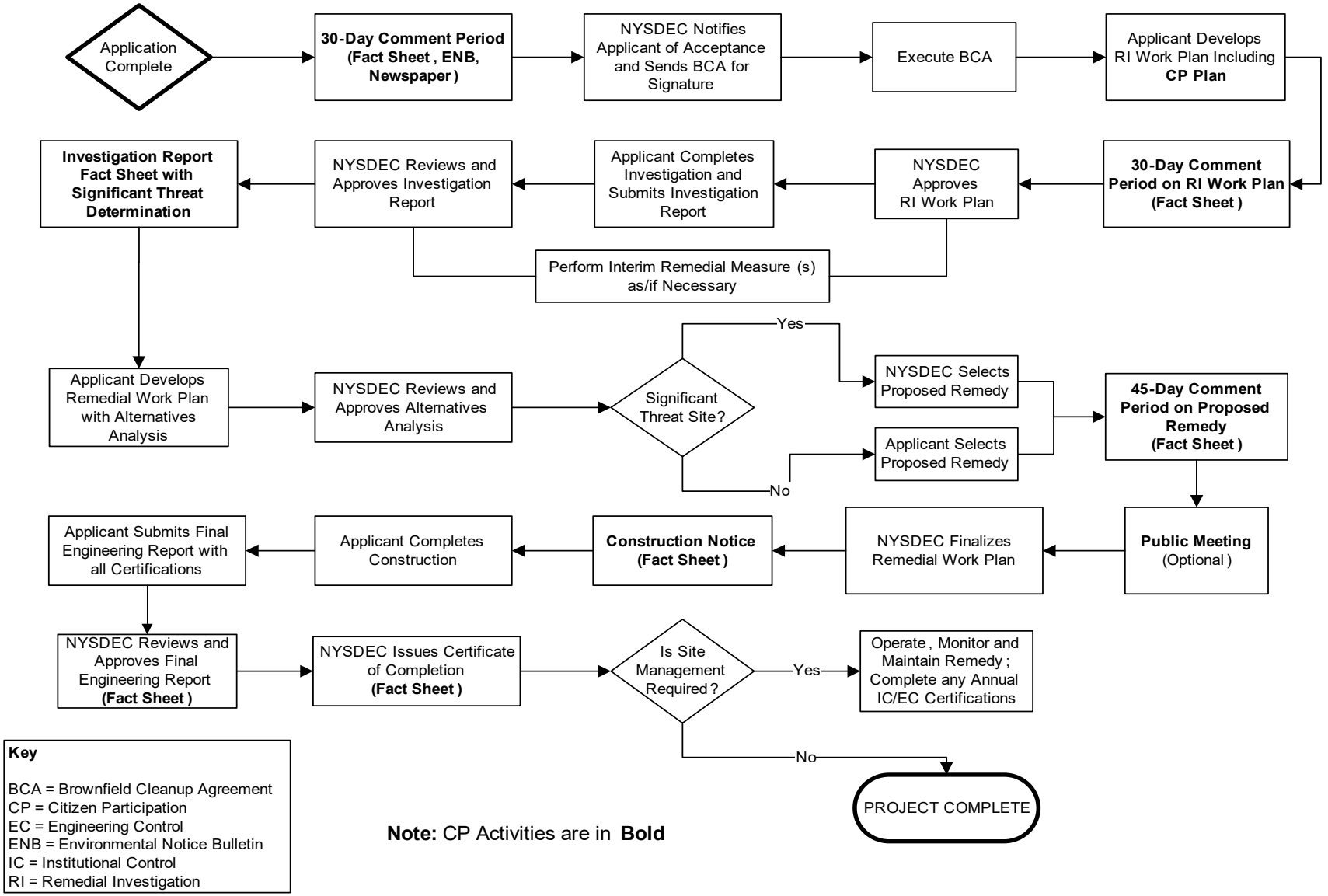
DRAWN BY: JK

CHECKED BY: DRAFT

# APPENDIX C

G:\0000_PROJECTS\2847_MACKCALI - WESTCHESTER, NY\01-CAD\2020-12-01_PARCELS MAP.DWG

# Appendix D– Brownfield Cleanup Program Process




**Key**

BCA = Brownfield Cleanup Agreement
CP = Citizen Participation
EC = Engineering Control
ENB = Environmental Notice Bulletin
IC = Institutional Control
RI = Remedial Investigation

**Note:** CP Activities are in **Bold**

# APPENDIX D

**Input Summary**

| Remedy Component Number → | | 1 | 2 | 3 | 4 | 5 | 6 | | | | | | | | | Remedy Component Subtotals | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Column headings in Row 6 must match the name of "Input" tabs in this workbook for Columns C - P in this table to be populated ("0" in Row 4 means "Input" tab is turned Off and will not be grouped to a Remedy Component (Columns Q - V) or used in subsequent calculations) | | | | | | | | | | | | | | | | | | | | |
| Item | | Input Template | Input Template (2) | Input Template (3) | Input Template (4) | Input Template (5) | Input Template (6) | Input Template (7) | Input Template (8) | Input Template (9) | Input Template (10) | Input Template (11) | Input Template (12) | Input Template (13) | Input Template (14) | 1 | 2 | 3 | 4 | 5 | 6 | Total |
| **On-Site** | | | | | | | | | | | | | | | | | | | | | | |
| *On-site Renewable Energy* | | | | | | | | | | | | | | | | | | | | | | |
| Renewable electricity generated on-site | MWh | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Landfill gas combusted on-site for energy use | ccf $CH_4$ | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| On-site biodiesel use | gal | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| On-site biodiesel use - Other | gal | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined on-site renewable energy use #1 | TBD | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined on-site renewable energy use #2 | TBD | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | | | | | | | | | | | | | | | | |
| *On-Site Conventional Energy* | | | | | | | | | | | | | | | | | | | | | | |
| Grid electricity | MWh | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| On-site diesel use - Other | Gal | 22.5 | | | | | | | | | | | | | | 22.5 | 0 | 0 | 0 | 0 | 0 | 22.5 |
| On-site diesel use <75 hp | Gal | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| On-site diesel use 75<hp<750 | Gal | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| On-site diesel use >750 hp | Gal | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| On-site gasoline use - Other | Gal | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| On-site gasoline use <25 hp | Gal | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| On-site gasoline use >25 hp | Gal | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| On-site natural gas use | ccf | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| On-site compressed natural gas use - Other | ccf | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| On-site compressed natural gas use | ccf | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| On-site liquified petroleum gas use - Other | gal | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| On-site liquified petroleum gas use | gal | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other forms of on-site conventional energy use #1 | TBD | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other forms of on-site conventional energy use #2 | TBD | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | | | | | | | | | | | | | | | | |
| *Other On-site Emissions* | | | | | | | | | | | | | | | | | | | | | | |
| On-site HAP process emissions | Lbs | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| On-site GHG emissions | Lbs CO2e | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| On-site carbon storage | Lbs CO2e | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| GHG avoided by flaring on-site landfill methane | ccf CH4 | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other on-site NOx emissions or reductions | Lbs | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other on-site SOx emissions or reductions | Lbs | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other on-site PM emissions or reductions | Lbs | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | | | | | | | | | | | | | | | | |
| **Electricity Generation** | | | | | | | | | | | | | | | | | | | | | | |
| Grid electricity | MWh | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Voluntary purchase of renewable electricity | MWh | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Voluntary purchase of RECs | MWh | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | | | | | | | | | | | | | | | | |
| **Transportation** | | | | | | | | | | | | | | | | | | | | | | |
| *Transportation Fuel Use Breakdown* | | | | | | | | | | | | | | | | | | | | | | |
| Biodiesel use - Personnel Transport | gal | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Biodiesel use - Personnel Transport - User Defined | gal | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Biodiesel use - Equipment Transport | gal | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Biodiesel use - Equipment Transport - User Defined | gal | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Biodiesel use - Material Transport | gal | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Biodiesel use - Material Transport - User Defined | gal | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Biodiesel use - Waste Transport | gal | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Biodiesel use - Waste Transport - User Defined | gal | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Diesel use - Personnel Transport - other vehicles | gal | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Diesel use - Personnel Transport - car | gal | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Diesel use - Personnel Transport - passenger truck | gal | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Diesel use - Personnel Transport - User Defined | gal | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Diesel use - Equipment Transport | gal | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Diesel use - Equipment Transport - User Defined | gal | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Diesel use - Material Transport | gal | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Diesel use - Material Transport - User Defined | gal | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Diesel use - Waste Transport | gal | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Diesel use - Waste Transport - User Defined | gal | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gasoline use - Personnel Transport - other vehicles | gal | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gasoline use - Personnel Transport - car | gal | 12.3 | | | | | | | | | | | | | | 12.3 | 0 | 0 | 0 | 0 | 0 | 12.3 |
| Gasoline use - Personnel Transport - passenger truck | gal | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gasoline use - Personnel Transport - User Defined | gal | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gasoline use - Equipment Transport | gal | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gasoline use - Equipment Transport - User Defined | gal | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Natural Gas use - Personnel Transport | ccf | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Natural Gas use - Personnel Transport - User Defined | ccf | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Natural Gas use - Equipment Transport | ccf | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | | | | | | | | | | | | | | | | |

**Input Summary**

| Remedy Component Number → | | 1 | 2 | 3 | 4 | 5 | 6 | | | | | | | | | Remedy Component Subtotals | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Column headings in Row 6 must match the name of "Input" tabs in this workbook for Columns C - P in this table to be populated ("0" in Row 4 means "Input" tab is turned Off and will not be grouped to a Remedy Component (Columns Q - V) or used in subsequent calculations) | | | | | | | | | | | | | | | | | | | | |
| Item | | Input Template | Input Template (2) | Input Template (3) | Input Template (4) | Input Template (5) | Input Template (6) | Input Template (7) | Input Template (8) | Input Template (9) | Input Template (10) | Input Template (11) | Input Template (12) | Input Template (13) | Input Template (14) | 1 | 2 | 3 | 4 | 5 | 6 | Total |
| *Conventional Energy* | | | | | | | | | | | | | | | | | | | | | | |
| Transportation diesel use | gal | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Transportation gasoline use | gal | 12.3 | | | | | | | | | | | | | | 12.3 | 0 | 0 | 0 | 0 | 0 | 12.3 |
| Transportation natural gas use | ccf | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined conventional energy transportation #1 | TBD | 10 | | | | | | | | | | | | | | 10 | 0 | 0 | 0 | 0 | 0 | 10 |
| User-defined conventional energy transportation #2 | TBD | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Renewable Energy* | | | | | | | | | | | | | | | | | | | | | | |
| Transportation biodiesel use | gal | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined renewable energy transportation #1 | TBD | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined renewable energy transportation #2 | TBD | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Off-Site** | | | | | | | | | | | | | | | | | | | | | | |
| *Construction Materials* | | | | | | | | | | | | | | | | | | | | | | |
| Aluminum, Rolled Sheet | lb | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Asphalt, mastic | lb | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Asphalt, paving-grade | lb | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ethanol, Corn, 95% | lb | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ethanol, Corn, 99.7% | lb | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ethanol, Petroleum, 99.7% | lb | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gravel/Sand Mix, 65% Gravel | lb | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gravel/sand/clay | lb | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| HDPE | lb | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Photovoltaic system (installed) | W | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PVC | lb | 1200 | | | | | | | | | | | | | | 1200 | 0 | 0 | 0 | 0 | 0 | 1200 |
| Portland cement, US average | lb | 10 | | | | | | | | | | | | | | | | | | | | |
| Ready-mixed concrete, 20 MPa | ft3 | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Round Gravel | lb | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sand | lb | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Stainless Steel | lb | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Steel | lb | 100 | | | | | | | | | | | | | | 100 | 0 | 0 | 0 | 0 | 0 | 100 |
| Other refined construction materials | lb | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other unrefined construction materials | lb | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Treatment Materials & Chemicals* | | | | | | | | | | | | | | | | | | | | | | |
| Cheese Whey | lbs | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Emulsified vegetable oil | lbs | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Granular activated carbon, primary | lbs | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Granular activated carbon, regenerated | lbs | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Hydrogen Peroxide, 50% in H2O | lbs | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Iron (II) Sulfate | lbs | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lime, Hydrated, Packed | lbs | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Molasses | lbs | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Phosphoric Acid, 70% in H2O | lbs | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Potassium Permanganate | lbs | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sodium Hydroxide, 50% in H2O | lbs | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Treatment Chemicals & Materials | lbs | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Material Type* | | | | | | | | | | | | | | | | | | | | | | |
| Total Virgin Refined Materials | tons | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Recycled Refined Materials | tons | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Reused Refined Materials | tons | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Refined Material | tons | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Virgin Unrefined Materials | tons | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Recycled Unrefined Materials | tons | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Reused Unrefined Materials | tons | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Unrefined Material | tons | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Fuel Processing* | | | | | | | | | | | | | | | | | | | | | | |
| Biodiesel produced | gal | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Diesel produced | gal | 22.5 | | | | | | | | | | | | | | 22.5 | 0 | 0 | 0 | 0 | 0 | 22.5 |
| Gasoline produced | gal | 12.3 | | | | | | | | | | | | | | 12.3 | 0 | 0 | 0 | 0 | 0 | 12.3 |
| Compressed natural gas produced | ccf | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Liquified petroleum gas produced | gal | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Natural gas produced | ccf | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Water Use* | | | | | | | | | | | | | | | | | | | | | | |
| Public Water Supply | gal x 1000 | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Extracted Groundwater | gal x 1000 | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Surface Water | gal x 1000 | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reclaimed Water | gal x 1000 | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Collected/Diverted Storm Water | gal x 1000 | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined water resource #1 | gal x 1000 | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined water resource #2 | gal x 1000 | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**Input Summary**

| Remedy Component Number → | | 1 | 2 | 3 | 4 | 5 | 6 | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Column headings in Row 6 must match the name of "Input" tabs in this workbook for Columns C - P in this table to be populated ("0" in Row 4 means "Input" tab is turned Off and will not be grouped to a Remedy Component (Columns Q - V) or used in subsequent calculations) | | | | | | | | | | | | | | Remedy Component Subtotals | | | | | | |
| Item | | Input Template | Input Template (2) | Input Template (3) | Input Template (4) | Input Template (5) | Input Template (6) | Input Template (7) | Input Template (8) | Input Template (9) | Input Template (10) | Input Template (11) | Input Template (12) | Input Template (13) | Input Template (14) | 1 | 2 | 3 | 4 | 5 | 6 | Total |
| *Waste/Recycle Handling* | | | | | | | | | | | | | | | | | | | | | | |
| Hazardous waste incineration | lbs | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Off-site waste water treatment (POTW) | gal x 1000 | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Off-site non-hazardous waste landfill | tons | 4.5 | | | | | | | | | | | | | | 4.5 | 0 | 0 | 0 | 0 | 0 | 4.5 |
| Off-site hazardous waste landfill | tons | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Recycled/Reused On-Site | tons | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Recycled/Reused Off-Site | tons | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | | | | | | | | | | | | | | | | |
| *Solid Waste Totals* | | | | | | | | | | | | | | | | | | | | | | |
| Total Non-Hazardous Waste | tons | 4.5 | | | | | | | | | | | | | | 4.5 | 0 | 0 | 0 | 0 | 0 | 4.5 |
| Total Hazardous Waste | tons | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Recycled/Reused | tons | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Waste (all types) | tons | 4.5 | | | | | | | | | | | | | | 4.5 | 0 | 0 | 0 | 0 | 0 | 4.5 |
| | | | | | | | | | | | | | | | | | | | | | | |
| *Lab Services* | | | | | | | | | | | | | | | | | | | | | | |
| Off-site Laboratory Analysis - Other | sample | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Off-site Laboratory Analysis - Metals | sample | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Off-site Laboratory Analysis - Mercury | sample | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Off-site Laboratory Analysis - Inorganic Anions | sample | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Off-site Laboratory Analysis - Alkalinity | sample | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Off-site Laboratory Analysis - Perchlorate | sample | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Off-site Laboratory Analysis - Nitrogen/Nitrate | sample | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Off-site Laboratory Analysis - Sulfate | sample | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Off-site Laboratory Analysis - PCBs | sample | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Off-site Laboratory Analysis - VOCs | sample | 12 | | | | | | | | | | | | | | 12 | 0 | 0 | 0 | 0 | 0 | 12 |
| Off-site Laboratory Analysis - SVOCs | sample | 1 | | | | | | | | | | | | | | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| | | | | | | | | | | | | | | | | | | | | | | |
| *Resource Extraction for Electricity* | | | | | | | | | | | | | | | | | | | | | | |
| Coal extraction and processing | MWh | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Natural gas extraction and processing | MWh | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nuclear fuel extraction and processing | MWh | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Oil extraction and processing | MWh | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other fuel extraction and processing | MWh | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | | | | | | | | | | | | | | | | |
| *Electricity Transmission* | | | | | | | | | | | | | | | | | | | | | | |
| Transmission and distribution losses | MWh | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | | | | | | | | | | | | | | | | |

**Input Summary**

| Remedy Component Number → | | 1 | 2 | 3 | 4 | 5 | 6 | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Column headings in Row 6 must match the name of "Input" tabs in this workbook for Columns C - P in this table to be populated ("0" in Row 4 means "Input" tab is turned Off and will not be grouped to a Remedy Component (Columns Q - V) or used in subsequent calculations) | | | | | | | | | | | | | | Remedy Component Subtotals | | | | | | |
| Item | | Input Template | Input Template (2) | Input Template (3) | Input Template (4) | Input Template (5) | Input Template (6) | Input Template (7) | Input Template (8) | Input Template (9) | Input Template (10) | Input Template (11) | Input Template (12) | Input Template (13) | Input Template (14) | 1 | 2 | 3 | 4 | 5 | 6 | Total |
| *Other* | | | | | | | | | | | | | | | | | | | | | | |
| User-defined material #1 | TBD | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined material #2 | TBD | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined material #3 | TBD | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined material #4 | TBD | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined material #5 | TBD | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined material #6 | TBD | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined material #7 | TBD | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined material #8 | TBD | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined material #9 | TBD | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined material #10 | TBD | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined material #11 | TBD | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined material #12 | TBD | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined material #13 | TBD | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined material #14 | TBD | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined material #15 | TBD | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined material #16 | TBD | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined material #17 | TBD | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined material #18 | TBD | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined material #19 | TBD | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined material #20 | TBD | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | | | | | | | | | | | | | | | | |
| *User-defined Waste Destinations* | | | | | | | | | | | | | | | | | | | | | | |
| User-defined recycled/reused on-site #1 | TBD | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined recycled/reused on-site #2 | TBD | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined recycled/reused on-site #3 | TBD | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined recycled/reused off-site #1 | TBD | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined recycled/reused off-site #2 | TBD | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined recycled/reused off-site #3 | TBD | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined non-hazardous waste destination #1 | TBD | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined non-hazardous waste destination #2 | TBD | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined non-hazardous waste destination #3 | TBD | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined hazardous waste destination #1 | TBD | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined hazardous waste destination #2 | TBD | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined hazardous waste destination #3 | TBD | 0 | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

*Spreadsheets for Environmental Footprint Analysis (SEFA) Version 3.0, November 2019*

***Fuel Mix for Grid Electricity***

**Please Select One Option for Fuel Mix -->** | **Use Different Fuel Mixes**

| Mix per Remedy Component | 1 | 2 | 3 | 4 | 5 | 6 | *Default Fuel Mix |
|---|---|---|---|---|---|---|---|
| Type of Fuel | % of Total | % of Total | % of Total | % of Total | % of Total | % of Total | % of Total |
| Coal | 30.5% | 6.0% | 6.0% | 6.0% | 6.0% | 6.0% | 30.5% |
| Natural Gas | 33.9% | 10.0% | 10.0% | 10.0% | 10.0% | 10.0% | 33.9% |
| Oil | 0.7% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 0.7% |
| Nuclear | 19.8% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 19.8% |
| Biomass | 1.7% | 66.0% | 66.0% | 66.0% | 66.0% | 66.0% | 1.7% |
| Geothermal | 0.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.4% |
| Hydro | 6.4% | 11.0% | 11.0% | 11.0% | 11.0% | 11.0% | 6.4% |
| Solar | 0.9% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.9% |
| Wind | 5.6% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 5.6% |
| Other (enter information in table below) | 0.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.1% |
| **Total** | **100%** | **100%** | **100%** | **100%** | **100%** | **100%** | 100% |

***U.S. national average fuel mix from 2016 is noted in Column N, and is populated as the default fuel mix in Column B.***
***For use of this worksheet, please see instructions at the end of the worksheet.***

****The Default Fuel Mix noted in Column N is a simplified representation of the U.S. national average fuel mix from 2016. Column B is also populated with the default fuel mix. The default fuel mix is taken from EPA's "eGRID2016 - Year 2016 Summary Tables", created February 2018.***

| Item or Service Used | Unit | User Defined Conversion Factors for "Other" Fuel Type in Fuel Mix table (above) Parameters Used, Extracted, Emitted, or Generated | | | | | | Ref |
|---|---|---|---|---|---|---|---|---|
| | | Energy (MMBtu/MWh) | GHG (lbs CO2e/MWh) | NOx (lbs/MWh) | SOx (lbs/MWh) | PM (lbs/MWh) | Air Toxics (lbs/MWh) | |
| Electricity generation with "Other" fuel | MWh | # | | | | | | |
| Fuel extraction & processing for "Other" fuel | MWh | | | | | | | |

***"MMBtu" = millions of Btus***

***"MWh" = megawatt hours (i.e., thousands of kilowatt-hours or millions of Watt-hours)***

**Please fill in all yellow cells in the User Defined Conversion Factors table above**

***Notes and References***

## Input Worksheet for Input Template

| Please specify which Remedy Component this Input worksheet is part of: (Select "Off" to exclude this Input worksheet from calculations and results) | Component 1 | SSDS Installation and Commissioning |
|---|---|---|

***General Scope***

Sub-slab Depressurization System (SSDS) Installation - field staff conducts oversite of system's subcontractor and driller (5/2/26, 5/4/26-5/6/26, 5/13/26). Samples were collected from the drums generated dur to the SSDS installation. On 5/13/26, the SSDS system began running and confirmatory air samples were collected by field staff.

***Example Items Eliminated through Screening Process***

***Other Notes and References***

***Personnel Transportation***

| Participant | Number of Roundtrips to Site | Roundtrip Distance to Site (miles) | Mode of Transportation* | Transport Fuel Type* | Total Distance Transported (miles) | Default Fuel Usage Rate** | Fuel Usage Rate Override** | Fuel Used for Personnel Transport** | Activity or Notes |
|---|---|---|---|---|---|---|---|---|---|
| Field Staff (from house to Site, round trip) | 4 | 34 | Car | Gasoline | 136 | 25 | | 5.4 | |
| Field Staff (from house to Site, one way) | 2 | 17 | Car | Gasoline | 34 | 25 | | 1.4 | |
| Field Staff (from Site to Lab) | 1 | 47 | Car | Gasoline | 47 | 25 | | 1.9 | |
| Field Staff (from Lab to house) | 1 | 25 | Car | Gasoline | 25 | 25 | | 1 | |
| Field Staff (from Site to Office) | 1 | 64 | Car | Gasoline | 64 | 25 | | 2.6 | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

**** See the "Detailed Notes and Explanations" tab for explanation of transport and fuel options.***

***** for biodiesel, B20, diesel, and gasoline, units are gallons for Fuel Used and miles/gallon for Fuel Usage Rate; for natural gas, units are hundreds of cubic feet (ccf) for Fuel Used and ccf/miles for Fuel Usage Rate; for electricity, units are miles/kWh for Fuel Usage Rate and the kWh (Fuel Used) are added to total grid electricity used (cell G69).***

***On-Site Equipment Use and Transportation***

| Equipment Type* | HP* | Load Factor (%)* | Equipment Fuel Type** | Equipment Fuel Usage Rate | Equipment Hours Operated | Fuel Used for On-site Equipment | Equipment weight (tons) | Number of Equipment Roundtrips to Site | Roundtrip Distance to Site (miles) | Total Distance Transported (miles) | Mode of Transportation | Transport Fuel Type*** | Default Transport Fuel Usage Rate (gptm or mpg) | Transport Fuel Usage Rate Override (gptm or mpg) | Fuel Used for Equipment Transport (gallons) | Activity or Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Drilling - direct push (60 HP) | 60 | 75% | Diesel | 2.25 | 10 | 22.5 | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |

**** HP and Load Factor must be entered by user in Columns C and D. Please see the "Detailed Notes and Explanations" tab for further explanation.***

***** For biodiesel, B20, diesel, gasoline, and liquified petroleum gas, units are gallons for Fuel Used for On-site Equipment and gallons/hr for Equipment Fuel Usage Rate; for compressed natural gas units are ccf (hundreds of cubic feet) for Fuel Used for On-site Equipment and ccf/hr for Equipment Fuel Usage Rate.***

****** Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation and other aspects of data entry in Columns M, N, and P. Units are gallons for Fuel Used for Equipment Transport and miles/gallon (mpg) or gallons per ton-mile (gptm) for Transport Fuel Usage Rate.***

## Input Worksheet for Input Template

| Remedy Component that this Input worksheet is part of: | Component 1 | SSDS Installation and Commissioning |
|---|---|---|

***On-Site Electricity Use***

| Equipment Type | HP | Load Factor (%) | Efficiency (%) | Electrical Rating (kW) | Hours Used | Energy Used (kWh) | Notes |
|---|---|---|---|---|---|---|---|
| <Equip. with HP, Efficiency, and Hours> | | | | | | | |
| <Equip. with HP, Efficiency, and Hours> | | | | | | | |
| <Equip. with HP, Efficiency, and Hours> | | | | | | | |
| <Equip. with HP, Efficiency, and Hours> | | | | | | | |
| <Equip. with known kW rating> | | | | | | | |
| <Equip. with known kW rating> | | | | | | | |
| <Equip. with known kW rating> | | | | | | | |
| <Equip. with known kW rating> | | | | | | | |
| <Equip. with known total Energy Used> | | | | | | | |
| <Equip. with known total Energy Used> | | | | | | | |
| <Equip. with known total Energy Used> | | | | | | | |
| <Equip. with known total Energy Used> | | | | | | | |
| Estimated Total Electricity Usage Based on Above | | | | | | 0 | |
| Renewable Electricity Generated On-Site* | | | | | | | |
| Total Electricity Usage Based on Personnel Transportation | | | | | | 0 | |
| Total Grid Electricity Used | | | | | | 0 | |

**** Electricity generated on-site from renewable resources, for which the facility retains the rights to the renewable energy (i.e., does not sell renewable energy certificates associated with the renewable energy generation).***

***On-Site Natural Gas Use***

| Equipment Type | Power Rating (Btu/hr) | Efficiency (%) | Hours Used | Energy Required (Btu) | Natural Gas Used (ccf) | Notes |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| | | | | | 0 | |
| | | | | 0 | | |
| Totals | | | 0 | 0 | 0 | |

***Landfill Gas Combusted On-Site for Energy Use***

| Equipment Type | Landfill Gas (ccf) | % Methane by volume | Used for electricity? | Landfill Gas Methane Used (ccf) | Notes |
|---|---|---|---|---|---|
| | | | | 0 | |
| | | | | 0 | |
| | | | | 0 | |
| Total | | | | 0 | |

***Please see the "Detailed Notes and Explanations" tab for instructions on using the two tables above ("On-site Natural Gas Use" and "Landfill Gas Combusted On-Site for Energy Use"). In the two tables above, ccf = hundreds of cubic feet.***

***Materials Use and Transportation***

| Material Type* | Unit | Quantity | Tons | Is the Material Refined or Unrefined?** | Material Source: Virgin, Recycled, or Reused?** | Calculate Item Footprint?** | Default One-way Distance to Site (miles) | One-way Distance to Site Override (miles) | Number of One-way Trips to Site | Include Return Trip in Calculations? | Total Distance Transported (miles) | Mode of Transportation*** | Transport Fuel Type | Default Transport Fuel Usage Rate (gptm or mpg) | Transport Fuel Usage Rate Override (gptm or mpg) | Fuel Used for Materials Transport (gallons) | Notes and Description of Materials |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PVC | lb | 1200 | 0.6 | | Virgin | Yes | 500 | 50 | 1 | | 50 | | | | | | |
| Steel | lb | 100 | 0.05 | | Virgin | Yes | 500 | 50 | 1 | | 50 | | | | | | |
| Portland cement, US average | lb | 10 | 0.005 | | Virgin | Yes | 25 | 50 | 1 | | 50 | | | | | | |
| | | | 0 | | | | | | | | | | | | | | |
| | | | 0 | | | | | | | | | | | | | | |
| | | | 0 | | | | | | | | | | | | | | |
| | | | 0 | | | | | | | | | | | | | | |
| | | | 0 | | | | | | | | | | | | | | |
| | | | 0 | | | | | | | | | | | | | | |
| | | | 0 | | | | | | | | | | | | | | |
| | | | 0 | | | | | | | | | | | | | | |
| | | | 0 | | | | | | | | | | | | | | |
| | | | 0 | | | | | | | | | | | | | | |
| | | | 0 | | | | | | | | | | | | | | |
| | | | 0 | | | | | | | | | | | | | | |
| | | | 0 | | | | | | | | | | | | | | |
| | | | 0 | | | | | | | | | | | | | | |
| | | | 0 | | | | | | | | | | | | | | |

**** Please see the "Detailed Notes and Explanations" tab for instructions on specifying "User-Defined Materials" in the dropdown menu.***

***** Selections must be made in Columns F - H in order for the footprint calculations to be performed. Please see the "Detailed Notes and Explanations" tab for further information.***

****** Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation, accounting for empty return trips, and other aspects of data entry in Columns L, N, O, and Q. Units are gallons for Fuel Used for Materials Transport and miles/gallon (mpg) or gallons per ton-mile (gptm) for Transport Fuel Usage Rate.***

## Input Worksheet for Input Template

| Remedy Component that this Input worksheet is part of: | Component 1 | SSDS Installation and Commissioning |
|---|---|---|

***Waste Disposal and Transportation***

| Waste Destination* | Unit | Quantity | Tons | Default One-way Distance to Site (miles) | One-way Distance to Site Override (miles) | Number of One-way Trips to Site | Include Return Trip in Calculations? | Total Distance Transported (miles) | Mode of Transportation ** | Transport Fuel Type | Default Transport Fuel Usage Rate (gptm or mpg) | Transport Fuel Usage Rate Override (gptm or mpg) | Fuel Used for Waste Transport (gallons) | Notes and Description of Waste |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Off-site non-hazardous waste landfill | tons | 4.5 | 4.5 | 25 | | | | 25 | | | | | | |
| | | | 0 | | | | | | | | | | | |
| | | | 0 | | | | | | | | | | | |
| | | | 0 | | | | | | | | | | | |
| | | | 0 | | | | | | | | | | | |
| | | | 0 | | | | | | | | | | | |
| | | | 0 | | | | | | | | | | | |
| | | | 0 | | | | | | | | | | | |
| | | | 0 | | | | | | | | | | | |
| | | | 0 | | | | | | | | | | | |
| | | | 0 | | | | | | | | | | | |
| | | | 0 | | | | | | | | | | | |

**** No footprint is calculated for the Recycled/Reused On-Site and Off-Site selections. Please see the "Detailed Notes and Explanations" tab for instructions on specifying "User-Defined" selections in the dropdown menu.***

***** Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation, accounting for empty return trips, and other aspects of data entry in Columns I, K, L, and N. Units are gallons for Fuel Used for Waste Transport and miles/gallon (mpg) or gallons per ton-mile (gptm) for Transport Fuel Usage Rate.***

***Type of Water Used***

| Source of Water Used* | Unit | Quantity | Tons | Source Location/Aquifer (optional) | Quality of Water Used (optional) | Water Uses (optional) | Fate of Used Water (optional) |
|---|---|---|---|---|---|---|---|
| | | | 0 | | | | |
| | | | 0 | | | | |
| | | | 0 | | | | |
| | | | 0 | | | | |
| | | | 0 | | | | |
| | | | 0 | | | | |
| | | | 0 | | | | |
| | | | 0 | | | | |
| | | | 0 | | | | |
| | | | 0 | | | | |
| | | | 0 | | | | |

**** Only the "Public Water" selection has an associated footprint. No footprint is calculated for the other water source selections.***

***Note: Information entered in Columns F - V (Source/Quality/Use/Fate) is not compiled or reported by SEFA.***

## Input Worksheet for Input Template

| Remedy Component that this Input worksheet is part of: | Component 1 | SSDS Installation and Commissioning |
|---|---|---|

***Other Energy Use and Air Emissions***

| Item | | Units | Quantity | Notes |
|---|---|---|---|---|
| *On-Site* | | | | |
| User-defined on-site conventional energy use #1 | *User-Defined | TBD | | |
| User-defined on-site conventional energy use #2 | *User-Defined | TBD | | |
| On-site HAP process emissions** | | lbs | | |
| On-site GHG emissions** | | lbs CO2e | | |
| On-site carbon storage** | | lbs CO2e | | |
| Landfill gas flared on-site | | ccf CH4 | | |
| Other on-site NOx emissions or reductions** | | lbs | | |
| Other on-site SOx emissions or reductions** | | lbs | | |
| Other on-site PM emissions or reductions** | | lbs | | |
| | | | | |
| *Transportation* | | **Units** | **Quantity** | **Notes** |
| User-defined conventional energy transportation #1 | *User-Defined | TBD | 10 | |
| User-defined conventional energy transportation #2 | *User-Defined | TBD | | |

**** Enter units and conversion factors on "User Defined Factors" tab***
***** Enter a positive number for emissions and a negative number for reductions, avoidances, or storage***
***See the "Detailed Notes and Explanations" tab for use of this table.***

***Other Voluntary Renewable Energy Use***

| Item | | Units | Quantity | Notes |
|---|---|---|---|---|
| User-defined on-site renewable energy use #1 | *User-Defined | TBD | | |
| User-defined on-site renewable energy use #2 | *User-Defined | TBD | | |
| User-defined renewable energy transportation #1 | *User-Defined | TBD | | |
| User-defined renewable energy transportation #2 | *User-Defined | TBD | | |
| Voluntary purchase of renewable electricity** | | MWh | | |
| Voluntary purchase of RECs** | | MWh | | |

**** Enter units and conversion factors on "User Defined Factors" tab***
***** Complete information on provider in the table to the right. No footprint reductions are associated with the voluntary purchases.***
***See the "Detailed Notes and Explanations" tab for use of this table***

***Off-Site Laboratory Analysis***

| Parameter and Notes | Number of Samples | Comments |
|---|---|---|
| Off-site Laboratory Analysis - SVOCs | 1 | |
| Off-site Laboratory Analysis - VOCs | 1 | |
| Off-site Laboratory Analysis - VOCs | 6 | |
| Off-site Laboratory Analysis - VOCs | 5 | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| **Totals** | **13** | |

| | | |
|---|---|---|
| Description of purchased renewable electricity (green pricing product or green marketing product) | Provider: | |
| | Type of product: | |
| | Type of renewable energy source: | |
| | Date of renewable system installation: | |
| Description of purchased RECs | Provider: | |
| | Type of renewable energy source: | |
| | Date of renewable system installation: | |
| | Location of renewable system installation: | |

## SSDS Installation and Commissioning - On-Site Footprint (Scope 1)

| Contributors to Footprints | Units | Usage | Energy | | GHG | | NOx | | SOx | | PM | | HAPs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Conv. Factor | MMBtus | Conv. Factor | lbs CO2e | Conv. Factor | lbs | Conv. Factor | lbs | Conv. Factor | lbs | Conv. Factor | lbs |
| **On-Site** | | | | | | | | | | | | | | |
| *On-site Renewable Energy* | | | | | | | | | | | | | | |
| Renewable electricity generated on-site | MWh | 0 | 3.413 | 0 | | | | | | | | | | |
| Landfill gas combusted on-site for energy use | ccf CH4 | 0 | 0.103 | 0 | 13.1 | 0 | 0.01 | 0 | 0.0000063 | 0 | 0.00076 | 0 | 0.0000084 | 0 |
| On-site biodiesel use | gal | 0 | 0.127 | 0 | 22.3 | 0 | 0.2 | 0 | 0 | 0 | 0.00099 | 0 | NP | |
| On-site biodiesel use - User Defined | gal | 0 | 0.127 | 0 | 22.3 | 0 | 0.2 | 0 | 0 | 0 | 0.00099 | 0 | NP | |
| User-defined on-site renewable energy use #1 | gal | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined on-site renewable energy use #2 | TBD | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **On-site Renewable Energy Subtotals** | | | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** |
| Notes: | | | | | | | | | | | | | | |
| *On-site Conventional Energy* | | | | | | | | | | | | | | |
| On-site grid electricity | MWh | 0 | 3.413 | 0 | | | | | | | | | | |
| On-site diesel use - Other | Gal | 22.5 | 0.139 | 3.1275 | 22.5 | 506.25 | 0.17 | 3.825 | 0.0054 | 0.1215 | 0.0034 | 0.0765 | 0.0000052 | 0.000117 |
| On-site diesel use <75 hp | Gal | 0 | 0.139 | 0 | 22.21 | 0 | 0.1565 | 0 | 0.000145 | 0 | 0.0145 | 0 | 0.00004 | 0 |
| On-site diesel use 75<hp<750 | Gal | 0 | 0.139 | 0 | 22.24 | 0 | 0.101 | 0 | 0.00013 | 0 | 0.009 | 0 | 0.00004 | 0 |
| On-site diesel use >750 hp | Gal | 0 | 0.139 | 0 | 22.24 | 0 | 0.149 | 0 | 0.00013 | 0 | 0.006 | 0 | 0.00004 | 0 |
| On-site gasoline use - Other | Gal | 0 | 0.124 | 0 | 19.6 | 0 | 0.11 | 0 | 0.0045 | 0 | 0.00054 | 0 | 0.000039 | 0 |
| On-site gasoline use <25 hp | Gal | 0 | 0.124 | 0 | 17.48 | 0 | 0.037 | 0 | 0.00025 | 0 | 0.165 | 0 | 0.00008 | 0 |
| On-site gasoline use >25 hp | Gal | 0 | 0.124 | 0 | 19.93 | 0 | 0.032 | 0 | 0.00029 | 0 | 0.002 | 0 | 0.00009 | 0 |
| On-site natural gas use | ccf | 0 | 0.103 | 0 | 13.1 | 0 | 0.01 | 0 | 0.0000063 | 0 | 0.00076 | 0 | 0.0000084 | 0 |
| On-site compressed natural gas use - Other | ccf | 0 | NP | | 1957.835 | 0 | 16.0325 | 0 | 0.023045 | 0 | 0.2775 | 0 | 0 | 0 |
| On-site compressed natural gas use | ccf | 0 | NP | | 1957.835 | 0 | 16.0325 | 0 | 0.023045 | 0 | 0.2775 | 0 | 0 | 0 |
| On-site liquified petroleum gas use - Other | gal | 0 | NP | | 12.69 | 0 | 0.021 | 0 | 0.00013 | 0 | 0.001 | 0 | 0 | 0 |
| On-site liquified petroleum gas use | gal | 0 | NP | | 12.69 | 0 | 0.021 | 0 | 0.00013 | 0 | 0.001 | 0 | 0 | 0 |
| Other forms of on-site conventional energy use #1 | TBD | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other forms of on-site conventional energy use #2 | TBD | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **On-site Conventional Energy Subtotals** | | | | **3** | | **506** | | **4** | | **0** | | **0** | | **0** |
| Notes: | | | | | | | | | | | | | | |
| *Other On-site Emissions* | | | | | | | | | | | | | | |
| On-site HAP process emissions | lbs | 0 | | | | | | | | | | | 1 | 0 |
| On-site GHG emissions | lbs CO2e | 0 | | | 1 | 0 | | | | | | | | |
| On-site carbon storage | lbs CO2e | 0 | | | 1 | 0 | | | | | | | | |
| GHG avoided by flaring on-site landfill methane | Lbs | 0 | | | -262 | 0 | 0.01 | 0 | 0.0000063 | 0 | 0.00076 | 0 | 0.0000084 | 0 |
| Other on-site NOx emissions or reductions | lbs | 0 | | | | | 1 | 0 | | | | | | |
| Other on-site SOx emissions or reductions | lbs | 0 | | | | | | | 1 | 0 | | | | |
| Other on-site PM emissions or reductions | lbs | 0 | | | | | | | | | 1 | 0 | | |
| User-defined recycled/reused on-site #2 | TBD | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined recycled/reused on-site #3 | TBD | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined recycled/reused off-site #1 | TBD | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Notes: | | | | | | | | | | | | | | |
| **On-site Totals** | | | | **3.13** | | **506** | | **4** | | **0** | | **0** | | **0** |

## SSDS Installation and Commissioning - Electricity Generation Footprint (Scope 2)

| Contributors to Footprints | Units | Usage | Energy | | GHG | | NOx | | SOx | | PM | | HAPs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Conv. Factor | MMBtus | Conv. Factor | lbs CO2e | Conv. Factor | lbs | Conv. Factor | lbs | Conv. Factor | lbs | Conv. Factor | lbs |
| *Electricity Generation* | | | | | | | | | | | | | | |
| Grid electricity | MWh | 0 | 6.929 | 0 | 1124.3 | 0 | 2.2421 | 0 | 4.6078874 | 0 | 0.057518 | 0 | 0.2102371 | 0 |
| | | | | | | | | | | | | | | |
| Voluntary purchase of renewable electricity | MWh | 0 | | | | | | | | | | | | |
| Voluntary purchase of RECs | MWh | 0 | | | | | | | | | | | | |
| Notes: | | | | | | | | | | | | | | |

## SSDS Installation and Commissioning - Transportation Footprint (Scope 3a)

| Category | Units | Usage | Energy | | Greenhouse Gas | | NOx | | SOx | | PM | | HAPs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Conv. Factor | MMBtus | Conv. Factor | lbs CO2e | Conv. Factor | lbs | Conv. Factor | lbs | Conv. Factor | lbs | Conv. Factor | lbs |
| *Conventional Energy* | | | | | | | | | | | | | | |
| Transportation diesel use | gal | 0 | 0.139 | 0 | 22.5 | 0 | 0.17 | 0 | 0.0054 | 0 | 0.0034 | 0 | 0.0000052 | 0 |
| Transportation diesel use - car | gal | 0 | 0.139 | 0 | 22.57 | 0 | 0.015 | 0 | 0.0002 | 0 | 0.003 | 0 | 0.00252 | 0 |
| Transportation diesel use - passenger truck | gal | 0 | 0.139 | 0 | 22.545 | 0 | 0.0585 | 0 | 0.0002 | 0 | 0.007 | 0 | 0.002605 | 0 |
| Transportation diesel use - User Defined | gal | 0 | 0.139 | 0 | 22.5 | 0 | 0.17 | 0 | 0.0054 | 0 | 0.0034 | 0 | 0.0000052 | 0 |
| Transportation gasoline use | gal | 0 | 0.124 | 0 | 19.6 | 0 | 0.11 | 0 | 0.0045 | 0 | 0.00054 | 0 | 0.000039 | 0 |
| Transportation gasoline use - car | gal | 12.3 | 0.124 | 1.5252 | 19.77 | 243.171 | 0.027 | 0.3321 | 0.00036 | 0.004428 | 0.003 | 0.0369 | 0.0067 | 0.08241 |
| Transportation gasoline use - passenger truck | gal | 0 | 0.124 | 0 | 19.79 | 0 | 0.035 | 0 | 0.00036 | 0 | 0.003 | 0 | 0.00661 | 0 |
| Transportation gasoline use - User Defined | gal | 0 | 0.124 | 0 | 19.6 | 0 | 0.11 | 0 | 0.0045 | 0 | 0.00054 | 0 | 0.000039 | 0 |
| Transportation natural gas use | ccf | 0 | 0.103 | 0 | 13.1 | 0 | 0.01 | 0 | 0.0000063 | 0 | 0.00076 | 0 | 0.0000084 | 0 |
| Transportation natural gas use - User Defined | ccf | 0 | 0.103 | 0 | 13.1 | 0 | 0.01 | 0 | 0.0000063 | 0 | 0.00076 | 0 | 0.0000084 | 0 |
| User-defined conventional energy transportation #1 | TBD | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined conventional energy transportation #2 | TBD | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Conventional Energy Subtotals** | | | | **2** | | **243** | | **0** | | **0** | | **0** | | **0** |
| Notes: | | | | | | | | | | | | | | |
| *Renewable Energy* | | | | | | | | | | | | | | |
| Transportation biodiesel use | gal | 0 | 0.127 | 0 | 22.3 | 0 | 0.2 | 0 | 0 | 0 | 0.00099 | 0 | NP | |
| Transportation biodiesel use - User Defined | gal | 0 | 0.127 | 0 | 22.3 | 0 | 0.2 | 0 | 0 | 0 | 0.00099 | 0 | NP | |
| User-defined renewable energy transportation #1 | TBD | 0 | Biodiesel | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Ref. | |
| User-defined renewable energy transportation #2 | TBD | 0 | mpg or pmp | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Renewable Energy Subtotals** | | | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** |
| Notes: | | | | | | | | | | | | | | |
| **Transportation Totals** | | | | **2** | | **243** | | **0** | | **0** | | **0** | | **0** |

## SSDS Installation and Commissioning - Off-Site Footprint (Scope 3b)

| Category | Units | Usage | Energy | | Greenhouse Gas | | NOx | | SOx | | PM | | HAPs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Conv. Factor | MMBtus | Conv. Factor | lbs CO2e | Conv. Factor | lbs | Conv. Factor | lbs | Conv. Factor | lbs | Conv. Factor | lbs |
| *Construction Materials* | | | | | | | | | | | | | | |
| Aluminum, Rolled Sheet | lb | 0 | 0.0633 | 0 | 9.15 | 0 | 0.0148 | 0 | 0.0283 | 0 | 0.0088 | 0 | 0.00102 | 0 |
| Asphalt, mastic | lb | 0 | 0.0412 | 0 | 0.85 | 0 | 0.00271 | 0 | 0.00798 | 0 | 0.000766 | 0 | 0.00107 | 0 |
| Asphalt, paving-grade | lb | 0 | 0.5 | 0 | 8.58 | 0 | 0.0299 | 0 | 0.0969 | 0 | 0.0091 | 0 | 0.0133 | 0 |
| Ethanol, Corn, 95% | lb | 0 | 0.0318 | 0 | -0.0199 | 0 | 0.00425 | 0 | 0.00303 | 0 | 0.000469 | 0 | 0.0000846 | 0 |
| Ethanol, Corn, 99.7% | lb | 0 | 0.0324 | 0 | 0.0591 | 0 | 0.00431 | 0 | 0.0031 | 0 | 0.000472 | 0 | 0.000087 | 0 |
| Ethanol, Petroleum, 99.7% | lb | 0 | 0.0205 | 0 | 1.25 | 0 | 0.00199 | 0 | 0.00214 | 0 | 0.000277 | 0 | 0.0000589 | 0 |
| Gravel/Sand Mix, 65% Gravel | lb | 0 | 0.0000248 | 0 | 0.0024 | 0 | 0.000018 | 0 | 4.52E-06 | 0 | 2.61E-06 | 0 | 3.08E-07 | 0 |
| Gravel/sand/clay | lb | 0 | 0.000028 | 0 | 0.00335 | 0 | 0.0000165 | 0 | 0.000015 | 0 | 0.000002 | 0 | 2.05E-10 | 0 |
| HDPE | lb | 0 | 0.0332 | 0 | 1.94 | 0 | 0.00325 | 0 | 0.00409 | 0 | 0.000439 | 0 | 0.0000641 | 0 |
| Photovoltaic system (installed) | W | 0 | 0.0336 | 0 | 4.47 | 0 | 0.015 | 0 | 0.032 | 0 | 0.00063 | 0 | 0.0000029 | 0 |
| PVC | lb | 1200 | 0.0262 | 31.44 | 2.02 | 2424 | 0.004 | 4.8 | 0.00274 | 3.288 | 0.000372 | 0.4464 | 0.000375 | 0.45 |
| Portland cement, US average | lb | 0 | 0.0139 | 0 | 1.34 | 0 | 0.00654 | 0 | 0.0104 | 0 | 0.00378 | 0 | 0.00097 | 0 |
| Ready-mixed concrete, 20 MPa | ft3 | 0 | 0.217 | 0 | 19.5 | 0 | 0.0975 | 0 | 0.154 | 0 | 0.057 | 0 | 0.0141 | 0 |
| Round Gravel | lb | 0 | 0.0000248 | 0 | 0.0024 | 0 | 0.000018 | 0 | 4.52E-06 | 0 | 2.61E-06 | 0 | 3.08E-07 | 0 |
| Sand | lb | 0 | 0.0000248 | 0 | 0.0024 | 0 | 0.000018 | 0 | 4.52E-06 | 0 | 2.61E-06 | 0 | 3.08E-07 | 0 |
| Stainless Steel | lb | 0 | 0.0116 | 0 | 3.4 | 0 | 0.0075 | 0 | 0.012 | 0 | 0.0044 | 0 | 0.000144 | 0 |
| Steel | lb | 100 | 0.0044 | 0.44 | 1.1 | 110 | 0.0014 | 0.14 | 0.0017 | 0.17 | 0.00056 | 0.056 | 0.000067 | 0.0067 |
| Other refined construction materials | lb | 0 | 0.01885 | 0 | 2.115 | 0 | 0.0040375 | 0 | 0.0051325 | 0 | 0.0014428 | 0 | 0.0001625 | 0 |
| Other unrefined construction materials | lb | 0 | 0.000028 | 0 | 0.00335 | 0 | 0.0000165 | 0 | 0.000015 | 0 | 0.000002 | 0 | 2.05E-10 | 0 |

Notes:

## SSDS Installation and Commissioning - Off-Site Footprint (Scope 3b)

| | | | Energy | | Greenhouse Gas | | NOx | | SOx | | PM | | HAPs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Category | Units | Usage | Conv. Factor | MMBtus | Conv. Factor | lbs CO2e | Conv. Factor | lbs | Conv. Factor | lbs | Conv. Factor | lbs | Conv. Factor | lbs |
| | | | | | | | | | | | | | | |
| *Treatment Materials & Chemicals* | | | | | | | | | | | | | | |
| Cheese Whey | lbs | 0 | 0.0025 | 0 | 0.031 | 0 | 0.000062 | 0 | 0.000033 | 0 | 0.000002 | 0 | NP | |
| Emulsified vegetable oil | lbs | 0 | 0.0077 | 0 | 3.44 | 0 | 0.0066 | 0 | 0.0019 | 0 | 0.000033 | 0 | NP | |
| Granular activated carbon, primary | lbs | 0 | 0.0356 | 0 | 4.82 | 0 | 0.0793 | 0 | 0.128 | 0 | 0.000987 | 0 | 0.000657 | 0 |
| Granular activated carbon, regenerated | lbs | 0 | 0.00873 | 0 | 1.7 | 0 | 0.00733 | 0 | 0.0129 | 0 | 0.000886 | 0 | 0.000671 | 0 |
| Hydrogen Peroxide, 50% in H2O | lbs | 0 | 0.00979 | 0 | 1.19 | 0 | 0.00142 | 0 | 0.0024 | 0 | 0.000308 | 0 | 0.0000629 | 0 |
| Iron (II) Sulfate | lbs | 0 | 0.00147 | 0 | 0.167 | 0 | 0.000316 | 0 | 0.000589 | 0 | 0.000103 | 0 | 0.000023 | 0 |
| Lime, Hydrated, Packed | lbs | 0 | 0.00206 | 0 | 0.762 | 0 | 0.000513 | 0 | 0.000358 | 0 | 0.00013 | 0 | 6.57E-06 | 0 |
| Molasses | lbs | 0 | 0.0044 | 0 | 0.48 | 0 | 0.0011 | 0 | 0.00024 | 0 | 0.0000041 | 0 | NP | |
| Phosphoric Acid, 70% in H2O | lbs | 0 | 0.0067 | 0 | 0.882 | 0 | 0.00282 | 0 | 0.0294 | 0 | 0.00171 | 0 | 0.000163 | 0 |
| Potassium Permanganate | lbs | 0 | 0.00981 | 0 | 1.16 | 0 | 0.00234 | 0 | 0.0032 | 0 | 0.000422 | 0 | 0.000122 | 0 |
| Sodium Hydroxide, 50% in H2O | lbs | 0 | 0.00977 | 0 | 1.09 | 0 | 0.00194 | 0 | 0.00352 | 0 | 0.000403 | 0 | 0.000129 | 0 |
| Other Treatment Chemicals & Materials | lbs | 0 | 0.015 | 0 | 1.67 | 0 | 0.003 | 0 | 0.0065 | 0 | 0.00061 | 0 | 0.000016 | 0 |
| Notes: | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| *Fuel Processing* | | | | | | | | | | | | | | |
| Biodiesel produced | gal | 0 | 0.029 | 0 | -16.8 | 0 | 0.018 | 0 | 0.033 | 0 | 0.00082 | 0 | NP | |
| Diesel produced | gal | 22.5 | 0.017 | 0.3825 | 3.02 | 67.95 | 0.0051 | 0.11475 | 0.0062 | 0.1395 | 0.0017 | 0.03825 | 0.0011 | 0.02475 |
| Gasoline produced | gal | 12.3 | 0.033 | 0.4059 | 2.8 | 34.44 | 0.0046 | 0.05658 | 0.005 | 0.0615 | 0.0015 | 0.01845 | 0.001 | 0.0123 |
| Liquefied Petroleum Gas Produced | gal | 0 | 0.088 | 0 | 1.47 | 0 | 0.0016 | 0 | 0.0024 | 0 | 0.0007 | 0 | 0.0003 | 0 |
| Natural Gas - Compressed Produced | ccf | 0 | 19.983 | 0 | 343.92 | 0 | 0.4732 | 0 | 2.1651 | 0 | 0.1846 | 0 | 0.2895 | 0 |
| Natural Gas Produced | ccf | 0 | 0.0052 | 0 | 2.2 | 0 | 0.0037 | 0 | 0.0046 | 0 | 0.000072 | 0 | 0.0000061 | 0 |
| **Fuel Processing Subtotals** | | | | **0.7884** | | **102.39** | | **0.17133** | | **0.201** | | **0.0567** | | **0.03705** |
| Notes: | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| *Public water* | gal x 1000 | 0 | 0.0092 | 0 | 5 | 0 | 0.0097 | 0 | 0.0059 | 0 | 0.016 | 0 | 0.000015 | 0 |
| *User-defined water resource #1* | gal x 1000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *User-defined water resource #2* | gal x 1000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Notes: | | | | | | | | | | | | | | |

## SSDS Installation and Commissioning - Off-Site Footprint (Scope 3b)

| | | | Energy | | Greenhouse Gas | | NOx | | SOx | | PM | | HAPs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Conv. | | Conv. | | Conv. | | Conv. | | Conv. | | Conv. | |
| **Category** | **Units** | **Usage** | **Factor** | **MMBtus** | **Factor** | **lbs CO2e** | **Factor** | **lbs** | **Factor** | **lbs** | **Factor** | **lbs** | **Factor** | **lbs** |
| *Off-Site Services* | | | | | | | | | | | | | | |
| Hazardous waste incineration | lb | 0 | 0.00609 | 0 | 2.43 | 0 | 0.0016 | 0 | 0.00167 | 0 | 0.000209 | 0 | 0.000087 | 0 |
| Off-site waste water treatment (POTW) | gal x 1000 | 0 | 0.015 | 0 | 4.4 | 0 | 0.016 | 0 | 0.015 | 0 | NP | | NP | |
| Off-site non-hazardous waste landfill | ton | 4.5 | 0.16 | 0.72 | 25 | 112.5 | 0.14 | 0.63 | 0.075 | 0.3375 | 0.4 | 1.8 | 0.0014 | 0.0063 |
| Off-site hazardous waste landfill | ton | 0 | 0.18 | 0 | 27.5 | 0 | 0.154 | 0 | 0.0825 | 0 | 0.44 | 0 | 0.00154 | 0 |
| Off-site Laboratory Analysis - Other | sample | 0 | 0.058071 | 0 | 6.8534384 | 0 | 0.131402 | 0 | 0.3038758 | 0 | 0.0455698 | 0 | 0.0330165 | 0 |
| Off-site Laboratory Analysis - Metals | sample | 0 | 0.212 | 0 | 27.4693 | 0 | 0.6423 | 0 | 1.5072 | 0 | 0.2264 | 0 | 0.1643 | 0 |
| Off-site Laboratory Analysis - Mercury | sample | 0 | 0.0731715 | 0 | 9.325458 | 0 | 0.2127439 | 0 | 0.4982396 | 0 | 0.0747359 | 0 | 0.0542332 | 0 |
| Off-site Laboratory Analysis - Inorganic Anions | sample | 0 | 0.0074025 | 0 | 0.6459478 | 0 | 0.0067681 | 0 | 0.0147929 | 0 | 0.0022024 | 0 | 0.0015542 | 0 |
| Off-site Laboratory Analysis - Alkalinity | sample | 0 | 0.0174398 | 0 | 1.3381922 | 0 | 0.0070106 | 0 | 0.0132496 | 0 | 0.00194 | 0 | 0.0012831 | 0 |
| Off-site Laboratory Analysis - Perchlorate | sample | 0 | 0.023885 | 0 | 1.8717054 | 0 | 0.0079807 | 0 | 0.0141535 | 0 | 0.0020547 | 0 | 0.0012875 | 0 |
| Off-site Laboratory Analysis - Nitrogen/Nitrate | sample | 0 | 0.0336475 | 0 | 4.29897 | 0 | 0.0954592 | 0 | 0.2226646 | 0 | 0.0335099 | 0 | 0.0242506 | 0 |
| Off-site Laboratory Analysis - Sulfate | sample | 0 | 0.0141225 | 0 | 1.4726728 | 0 | 0.0079807 | 0 | 0.0136024 | 0 | 0.0019797 | 0 | 0.0012015 | 0 |
| Off-site Laboratory Analysis - PCBs | sample | 0 | 0.0512769 | 0 | 5.224902 | 0 | 0.0833339 | 0 | 0.1904774 | 0 | 0.0284393 | 0 | 0.0212083 | 0 |
| Off-site Laboratory Analysis - VOCs | sample | 12 | 0.0762045 | 0.9144538 | 9.016814 | 108.20177 | 0.104498 | 1.2539765 | 0.2270738 | 2.7248856 | 0.0339508 | 0.4074101 | 0.0235892 | 0.2830706 |
| Off-site Laboratory Analysis - SVOCs | sample | 1 | 0.0715602 | 0.0715602 | 7.870422 | 7.870422 | 0.1459445 | 0.1459445 | 0.3373038 | 0.3373038 | 0.0504853 | 0.0504853 | 0.0372577 | 0.0372577 |
| Notes: | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| *Resource Extraction for Electricity* | | | | | | | | | | | | | | |
| Coal extraction and processing | MWh | 0 | 3.1 | 0 | 180.0 | 0 | 0.8 | 0 | 0.2 | 0 | 0.0 | 0 | NP | |
| Natural gas extraction and processing | MWh | 0 | 1.6 | 0 | 270.0 | 0 | 0.2 | 0 | 13.0 | 0 | 0.0 | 0 | NP | |
| Nuclear fuel extraction and processing | MWh | 0 | 0.2 | 0 | 25.0 | 0 | 0.2 | 0 | 0.5 | 0 | 0.0 | 0 | NP | |
| Oil extraction and processing | MWh | 0 | 2.3 | 0 | 270.0 | 0 | 1.7 | 0 | 0.1 | 0 | 0.0 | 0 | NP | |
| Other fuel extraction and processing | MWh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Resource Extraction Subtotals** | | | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** |
| Notes: | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| *Electricity Transmission* | | | | | | | | | | | | | | |
| Transmission and distribution losses | MWh | 0 | 1.0342 | 0 | 112.43 | 0 | 0.22421 | 0 | 0.4607887 | 0 | 0.0057518 | 0 | 0.0210237 | 0 |
| Notes: | | | | | | | | | | | | | | |

## SSDS Installation and Commissioning - Off-Site Footprint (Scope 3b)

| | | | Energy | | Greenhouse Gas | | NOx | | SOx | | PM | | HAPs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Conv. | | Conv. | | Conv. | | Conv. | | Conv. | | Conv. | |
| **Category** | **Units** | **Usage** | **Factor** | **MMBtus** | **Factor** | **lbs CO2e** | **Factor** | **lbs** | **Factor** | **lbs** | **Factor** | **lbs** | **Factor** | **lbs** |
| *User-defined Materials* | | | | | | | | | | | | | | |
| User-defined material #1 | TBD | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined material #2 | TBD | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined material #3 | TBD | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined material #4 | TBD | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined material #5 | TBD | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined material #6 | TBD | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined material #7 | TBD | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined material #8 | TBD | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined material #9 | TBD | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined material #10 | TBD | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined material #11 | TBD | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined material #12 | TBD | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined material #13 | TBD | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined material #14 | TBD | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined material #15 | TBD | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined material #16 | TBD | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined material #17 | TBD | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined material #18 | TBD | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined material #19 | TBD | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined material #20 | TBD | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Notes: | | | | | | | | | | | | | | |
| *User-defined Waste Destinations* | | | | | | | | | | | | | | |
| User-defined recycled/reused off-site #1 | TBD | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined recycled/reused off-site #2 | TBD | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined recycled/reused off-site #3 | TBD | 0 | gy(MMBtu/u | | (lbs CO2e/u | | Ox(lbs/unit | | Ox(lbs/unit) | | M(lbs/unit) | | APs(lbs/unit | |
| User-defined non-hazardous waste destination #1 | TBD | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined non-hazardous waste destination #2 | TBD | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined non-hazardous waste destination #3 | TBD | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined hazardous waste destination #1 | TBD | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined hazardous waste destination #2 | TBD | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined hazardous waste destination #3 | TBD | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Notes: | | | | | | | | | | | | | | |
| **Off-site Totals** | | | | **34.374414** | | **2864.9622** | | **7.141251** | | **7.0586894** | | **2.8169954** | | **0.8203784** |

## SSDS Installation and Commissioning - Intermediate Totals

| Category | Units | Usage | Energy | | Greenhouse Gas | | NOx | | SOx | | PM | | HAPs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Conv. Factor | MMBtus | Conv. Factor | lbs CO2e | Conv. Factor | lbs | Conv. Factor | lbs | Conv. Factor | lbs | Conv. Factor | lbs |
| **Total Grid Electricity Footprint** | | | | | | | | | | | | | | |
| On-site grid electricity | MWh | 0 | 3.413 | 0 | | | | | | | | | | |
| *Electricity Generation* | | | | | | | | | | | | | | |
| Grid electricity | MWh | 0 | 6.929 | 0 | 1124.3 | 0 | 2.2421 | 0 | 4.6078874 | 0 | 0.057518 | 0 | 0.2102371 | 0 |
| *Resource Extraction for Electricity* | | | | | | | | | | | | | | |
| Coal extraction and processing | MWh | 0 | 3.1 | 0 | 180.0 | 0 | 0.8 | 0 | 0.2 | 0 | 0.0 | 0 | NP | |
| Natural gas extraction and processing | MWh | 0 | 1.6 | 0 | 270.0 | 0 | 0.2 | 0 | 13.0 | 0 | 0.0 | 0 | NP | |
| Nuclear fuel extraction and processing | MWh | 0 | 0.2 | 0 | 25.0 | 0 | 0.2 | 0 | 0.5 | 0 | 0.0 | 0 | NP | |
| Oil extraction and processing | MWh | 0 | 2.3 | 0 | 270.0 | 0 | 1.7 | 0 | 0.1 | 0 | 0.0 | 0 | NP | |
| Other fuel extraction and processing | MWh | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 |
| *Electricity Transmission* | | | | | | | | | | | | | | |
| Transmission and distribution losses | MWh | 0 | 1.0342 | 0 | 112.43 | 0 | 0.22421 | 0 | 0.4607887 | 0 | 0.0057518 | 0 | 0.0210237 | 0 |
| **Total Grid Electricity Footprint** | | | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** |
| **Total Fuel Footprints** | | | | | | | | | | | | | | |
| Total Gasoline Footprint | | | | | | | | | | | | | | |
| On-site gasoline use - Other | gal | 0 | 0.124 | 0 | 19.6 | 0 | 0.11 | 0 | 0.0045 | 0 | 0.00054 | 0 | 0.000039 | 0 |
| On-site gasoline use <25 hp | gal | 0 | 0.124 | 0 | 17.48 | 0 | 0.037 | 0 | 0.00025 | 0 | 0.165 | 0 | 0.00008 | 0 |
| On-site gasoline use >25 hp | gal | 0 | 0.124 | 0 | 19.93 | 0 | 0.032 | 0 | 0.00029 | 0 | 0.002 | 0 | 0.00009 | 0 |
| Transportation gasoline use | gal | 0 | 0.124 | 0 | 19.6 | 0 | 0.11 | 0 | 0.0045 | 0 | 0.00054 | 0 | 0.000039 | 0 |
| Transportation gasoline use - car | gal | 12.3 | 0.124 | 1.5252 | 19.77 | 243.171 | 0.027 | 0.3321 | 0.00036 | 0.004428 | 0.003 | 0.0369 | 0.0067 | 0.08241 |
| Transportation gasoline use - passenger truck | gal | 0 | 0.124 | 0 | 19.79 | 0 | 0.035 | 0 | 0.00036 | 0 | 0.003 | 0 | 0.00661 | 0 |
| Transportation gasoline use - User Defined | gal | 0 | 0.124 | 0 | 19.6 | 0 | 0.11 | 0 | 0.0045 | 0 | 0.00054 | 0 | 0.000039 | 0 |
| Gasoline produced | gal | 12.3 | 0.033 | 0.4059 | 2.8 | 34.44 | 0.0046 | 0.05658 | 0.005 | 0.0615 | 0.0015 | 0.01845 | 0.001 | 0.0123 |
| **Total Gasoline Footprint** | | **12.3** | | **1.9311** | | **277.611** | | **0.38868** | | **0.065928** | | **0.05535** | | **0.09471** |
| Total Diesel Footprint | | | | | | | | | | | | | | |
| On-site diesel use - Other | gal | 22.5 | 0.139 | 3.1275 | 22.5 | 506.25 | 0.17 | 3.825 | 0.0054 | 0.1215 | 0.0034 | 0.0765 | 0.0000052 | 0.000117 |
| On-site diesel use <75 hp | gal | 0 | 0.139 | 0 | 22.21 | 0 | 0.1565 | 0 | 0.000145 | 0 | 0.0145 | 0 | 0.00004 | 0 |
| On-site diesel use 75<hp<750 | gal | 0 | 0.139 | 0 | 22.24 | 0 | 0.101 | 0 | 0.00013 | 0 | 0.009 | 0 | 0.00004 | 0 |
| On-site diesel use >750 hp | gal | 0 | 0.139 | 0 | 22.24 | 0 | 0.149 | 0 | 0.00013 | 0 | 0.006 | 0 | 0.00004 | 0 |
| Transportation diesel use | gal | 0 | 0.139 | 0 | 22.5 | 0 | 0.17 | 0 | 0.0054 | 0 | 0.0034 | 0 | 0.0000052 | 0 |
| Transportation diesel use - car | gal | 0 | 0.139 | 0 | 22.57 | 0 | 0.015 | 0 | 0.0002 | 0 | 0.003 | 0 | 0.00252 | 0 |
| Transportation diesel use - passenger truck | gal | 0 | 0.139 | 0 | 22.545 | 0 | 0.0585 | 0 | 0.0002 | 0 | 0.007 | 0 | 0.002605 | 0 |
| Transportation diesel use - User Defined | gal | 0 | 0.139 | 0 | 22.5 | 0 | 0.17 | 0 | 0.0054 | 0 | 0.0034 | 0 | 0.0000052 | 0 |
| Diesel produced | gal | 22.5 | 0.017 | 0.3825 | 3.02 | 67.95 | 0.0051 | 0.11475 | 0.0062 | 0.1395 | 0.0017 | 0.03825 | 0.0011 | 0.02475 |
| **Total Diesel Footprint** | | **22.5** | | **3.51** | | **574.2** | | **3.93975** | | **0.261** | | **0.11475** | | **0.024867** |
| Total Biodiesel Footprint | | | | | | | | | | | | | | |
| On-site biodiesel use | gal | 0 | 0.127 | 0 | 22.3 | 0 | 0.2 | 0 | 0 | 0 | 0.00099 | 0 | NP | |
| On-site biodiesel use - User Defined | gal | 0 | 0.127 | 0 | 22.3 | 0 | 0.2 | 0 | 0 | 0 | 0.00099 | 0 | NP | |
| Transportation biodiesel use | gal | 0 | 0.127 | 0 | 22.3 | 0 | 0.2 | 0 | 0 | 0 | 0.00099 | 0 | NP | |
| Transportation biodiesel use - User Defined | gal | 0 | 0.127 | 0 | 22.3 | 0 | 0.2 | 0 | 0 | 0 | 0.00099 | 0 | NP | |
| Biodiesel produced | gal | 0 | 0.029 | 0 | -16.8 | 0 | 0.018 | 0 | 0.033 | 0 | 0.00082 | 0 | NP | |
| **Total Biodiesel Footprint** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** |
| Total Natural Gas Footprint | | | | | | | | | | | | | | |
| On-site natural gas use | ccf | 0 | 0.103 | 0 | 13.1 | 0 | 0.01 | 0 | 0.0000063 | 0 | 0.00076 | 0 | 0.0000084 | 0 |
| Transportation natural gas use | ccf | 0 | 0.103 | 0 | 13.1 | 0 | 0.01 | 0 | 0.0000063 | 0 | 0.00076 | 0 | 0.0000084 | 0 |
| Transportation natural gas use - User Defined | ccf | 0 | 0.103 | 0 | 13.1 | 0 | 0.01 | 0 | 0.0000063 | 0 | 0.00076 | 0 | 0.0000084 | 0 |
| Natural gas produced | ccf | 0 | 0.0052 | 0 | 2.2 | 0 | 0.0037 | 0 | 0.0046 | 0 | 0.000072 | 0 | 0.0000061 | 0 |
| **Total Natural Gas Footprint** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** |
| Total Liquified Petroleum Gas Footprint | | | | | | | | | | | | | | |
| On-site liquified petroleum gas use - Other | ccf | 0 | NP | | 12.69 | 0 | 0.021 | 0 | 0.00013 | 0 | 0.001 | 0 | 0 | 0 |
| On-site liquified petroleum gas use | ccf | 0 | NP | | 12.69 | 0 | 0.021 | 0 | 0.00013 | 0 | 0.001 | 0 | 0 | 0 |
| Liquified petroleum gas produced | ccf | 0 | 0.088 | 0 | 1.47 | 0 | 0.0016 | 0 | 0.0024 | 0 | 0.0007 | 0 | 0.0003 | 0 |
| **Total Natural Gas Footprint** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** |
| Total Compressed Gas Footprint | | | | | | | | | | | | | | |
| On-site compressed gas use - Other | ccf | 0 | NP | | 1957.835 | 0 | 16.0325 | 0 | 0.023045 | 0 | 0.2775 | 0 | 0 | 0 |
| On-site compressed gas use | ccf | 0 | NP | | 1957.835 | 0 | 16.0325 | 0 | 0.023045 | 0 | 0.2775 | 0 | 0 | 0 |
| Compressed gas produced | ccf | 0 | 19.983 | 0 | 343.92 | 0 | 0.4732 | 0 | 2.1651 | 0 | 0.1846 | 0 | 0.2895 | 0 |
| **Total Natural Gas Footprint** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** |

Notes:

***Note: Please refer to the "Default Conversions" tab for references for the default conversion factors used on this calculation sheet.***

Space below available for notes and calculations:

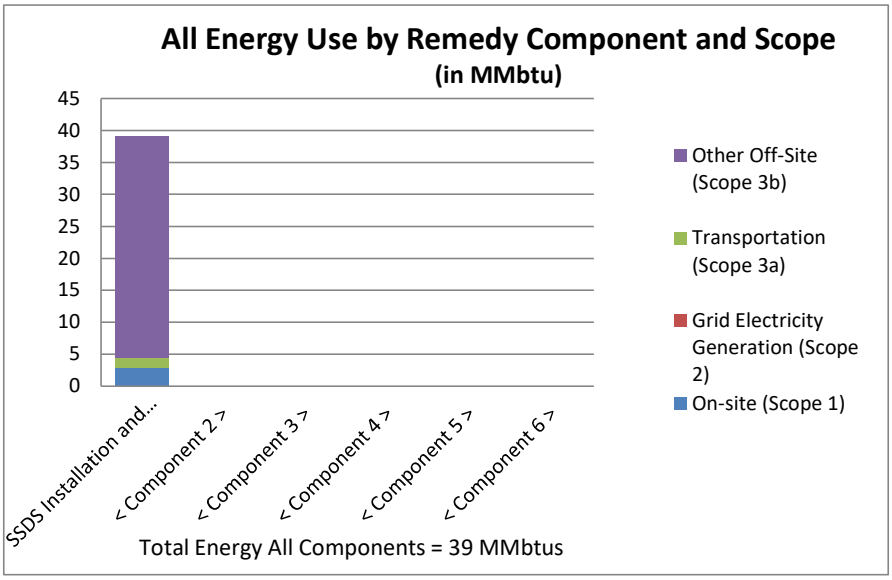
# Environmental Footprint Summary

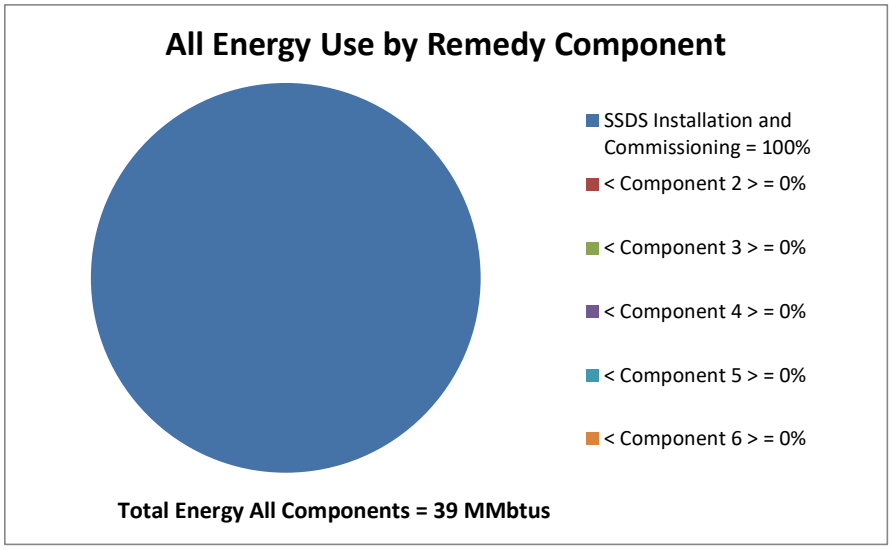
| Core Element | Metric | | Unit of Measure | Footprint | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | SSDS Installation and Commissioning | < Component 2 > | < Component 3 > | < Component 4 > | < Component 5 > | < Component 6 > | Total |
| Materials & Waste | M&W-1 | Refined materials used on-site | Tons | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | M&W-2 | % of refined materials from recycled or reused material | % | | | | | | | |
| | M&W-3 | Unrefined materials used on-site | Tons | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.0 |
| | M&W-4 | % of unrefined materials from recycled or reused material | % | | | | | | | |
| | M&W-5 | On-site hazardous waste disposed of off-site | Tons | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | M&W-6 | On-site non-hazardous waste disposed of off-site | Tons | 4.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4.5 |
| | M&W-7 | Recycled or reused waste | Tons | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | M&W-8 | % of total potential waste recycled or reused | % | 0.0% | | | | | | 0.0% |
| Water (used on-site) | W-1 | Public water use | MG | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | W-2 | Groundwater use | MG | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | W-3 | Surface water use | MG | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | W-4 | Reclaimed water use | MG | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | W-5 | Storm water use | MG | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | W-6 | User-defined water resource #1 | MG | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | W-7 | User-defined water resource #2 | MG | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | W-8 | Wastewater generated | MG | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Energy | E-1 | Total energy used (on-site and off-site) | MMBtu | 39.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 39.0 |
| | E-2 | Energy voluntarily derived from renewable resources | | | | | | | | |
| | E-2A | On-site renewable energy generation or use + on-site biodiesel use + biodiesel and other renewable resource use for transportation | MMBtu | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | E-2B | Voluntary purchase of renewable electricity | MWh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | E-3 | Voluntary purchase of RECs | MWh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | E-4 | On-site grid electricity use | MWh | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.0 |
| Air | A-1 | On-site NOx, SOx, and PM emissions | Pounds | 4.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 |
| | A-2 | On-site HAP emissions | Pounds | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | A-3 | Total NOx, SOx, and PM emissions | Pounds | 21.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 21.4 |
| | A-3A | Total NOx emissions | Pounds | 11.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 11.3 |
| | A-3B | Total SOx emissions | Pounds | 7.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 7.2 |
| | A-3C | Total PM emissions | Pounds | 2.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.9 |
| | A-4 | Total HAP emissions | Pounds | 0.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.9 |
| | A-5 | Total greenhouse gas emissions | Tons CO2e* | 1.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.8 |
| Land & Ecosystems | Qualitative Description | | | | | | | | | |

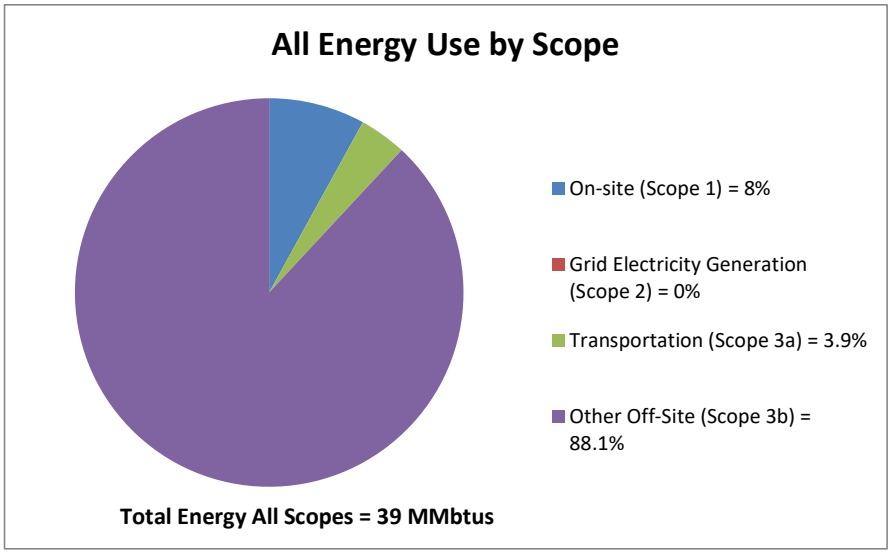
** Total greenhouse gases emissions (in CO2e) include consideration of CO2, CH4, and N2O (Nitrous oxide) emissions.*
*"MMBtu" = millions of Btus*
*"MG" = millions of gallons*
*"CO2e" = carbon dioxide equivalents of global warming potential*
*"MWh" = megawatt hours (i.e., thousands of kilowatt-hours or millions of Watt-hours)*
*"Tons" = short tons (2,000 pounds)*

*The above metrics are consistent with EPA's Methodology for Understanding and Reducing a Project's Environmental Footprint (EPA 542-R-12-002), February 2012*

Notes:


All Energy Use by Remedy Component and Scope
(in MMbtu)
45
40
35
30
25
20
15
10
5
0
SSDS Installation and...
< Component 2 >
< Component 3 >
< Component 4 >
< Component 5 >
< Component 6 >
Other Off-Site (Scope 3b)
Transportation (Scope 3a)
Grid Electricity Generation (Scope 2)
On-site (Scope 1)
Total Energy All Components = 39 MMbtus


All Energy Use by Remedy Component
SSDS Installation and Commissioning = 100%
< Component 2 > = 0%
< Component 3 > = 0%
< Component 4 > = 0%
< Component 5 > = 0%
< Component 6 > = 0%
Total Energy All Components = 39 MMbtus

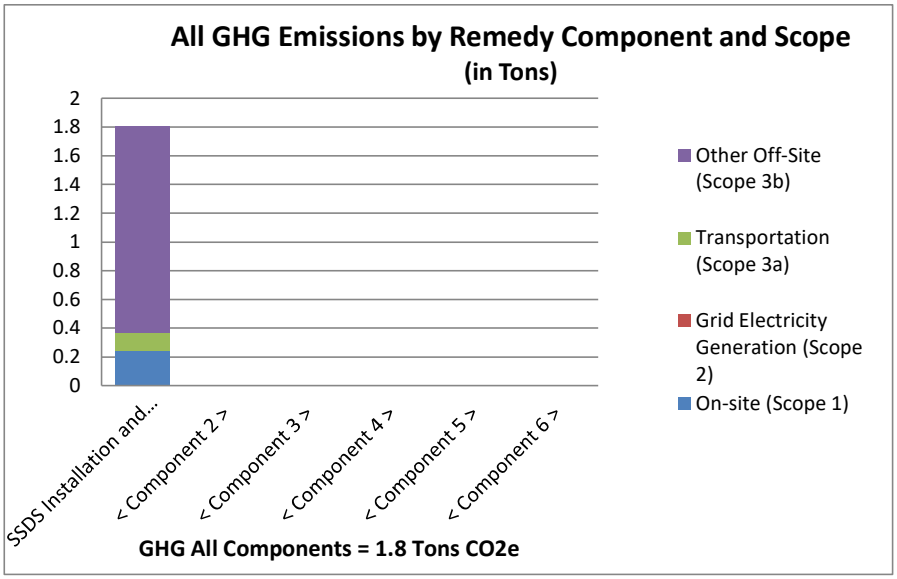

All Energy Use by Scope
On-site (Scope 1) = 8%
Grid Electricity Generation (Scope 2) = 0%
Transportation (Scope 3a) = 3.9%
Other Off-Site (Scope 3b) = 88.1%
Total Energy All Scopes = 39 MMbtus

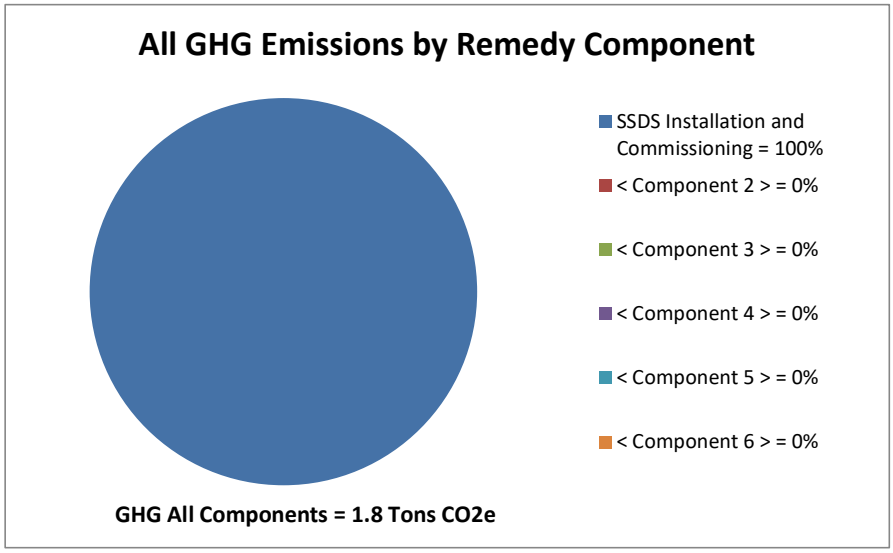
| Total Energy MMbtus | SSDS Instal | < Compone | < Compone | < Compone | < Compone | < Compone | Total | |
|---|---|---|---|---|---|---|---|---|
| On-site (Scope 1) | 3.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.1 | |
| Generation (Scope 2) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | d Electricity |
| nsportation (Scope 3a) | 1.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.5 | Trar |
| ner Off-Site (Scope 3b) | 34.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 34.4 | Oth |
| Total | 39.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 39.0 | |

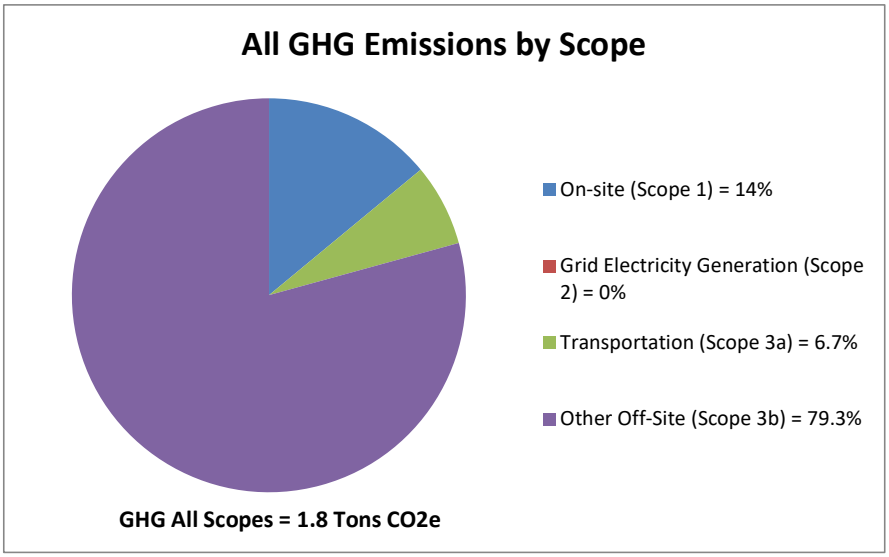
SSDS Installation and Commissioning = 100%
< Component 2 > = 0%
< Component 3 > = 0%
< Component 4 > = 0%
< Component 5 > = 0%
< Component 6 > = 0%

On-site (Scope 1) = 8%
Grid Electricity Generation (Scope 2) = 0%
Transportation (Scope 3a) = 3.9%
Other Off-Site (Scope 3b) = 88.1%

Total Energy All Components = 39 MMbtus
Total Energy All Scopes = 39 MMbtus


All GHG Emissions by Remedy Component and Scope
(in Tons)
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
SSDS Installation and...
< Component 2 >
< Component 3 >
< Component 4 >
< Component 5 >
< Component 6 >
Other Off-Site (Scope 3b)
Transportation (Scope 3a)
Grid Electricity Generation (Scope 2)
On-site (Scope 1)
GHG All Components = 1.8 Tons CO2e


All GHG Emissions by Remedy Component
SSDS Installation and Commissioning = 100%
< Component 2 > = 0%
< Component 3 > = 0%
< Component 4 > = 0%
< Component 5 > = 0%
< Component 6 > = 0%
GHG All Components = 1.8 Tons CO2e

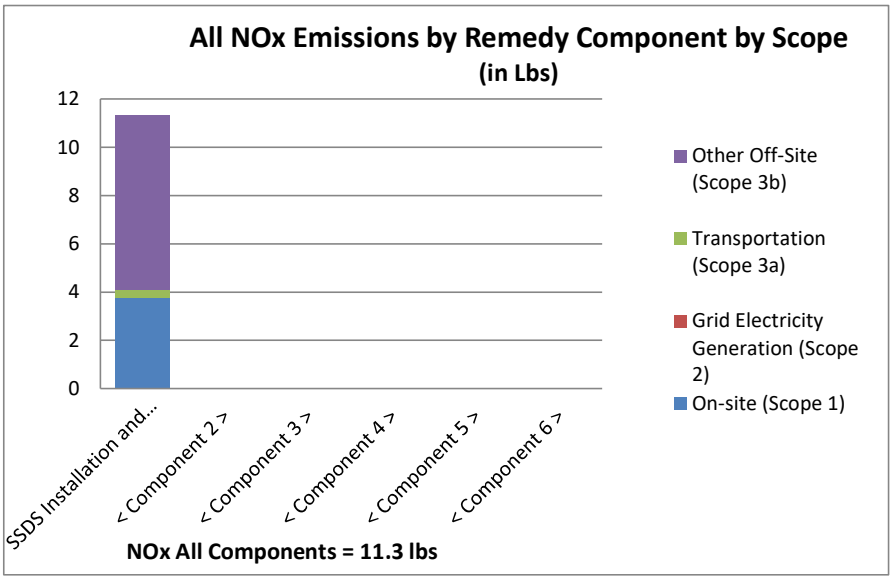

All GHG Emissions by Scope
On-site (Scope 1) = 14%
Grid Electricity Generation (Scope 2) = 0%
Transportation (Scope 3a) = 6.7%
Other Off-Site (Scope 3b) = 79.3%
GHG All Scopes = 1.8 Tons CO2e

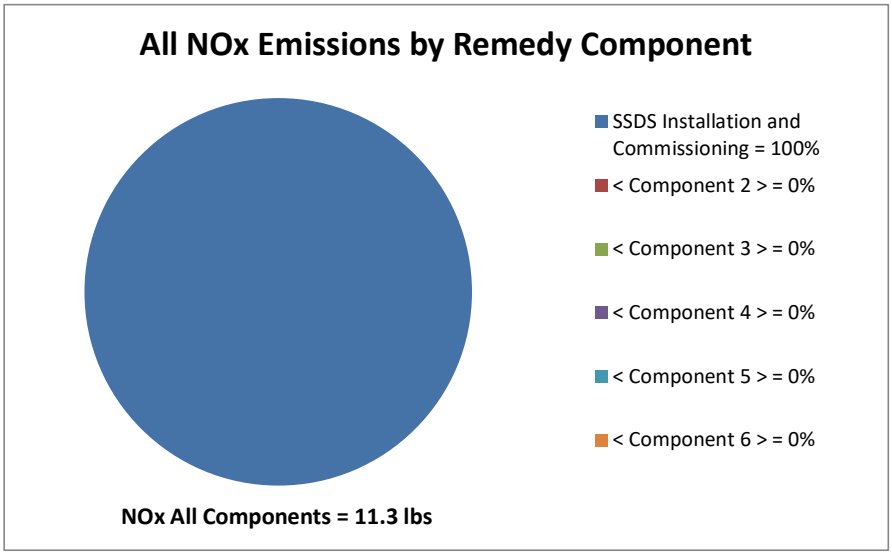
| GHG Tons CO2e | SSDS Instal | < Compone | < Compone | < Compone | < Compone | < Compone | Total | |
|---|---|---|---|---|---|---|---|---|
| On-site (Scope 1) | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | |
| Generation (Scope 2) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | d Electricity |
| nsportation (Scope 3a) | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | Trar |
| ner Off-Site (Scope 3b) | 1.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.4 | Oth |
| Total | 1.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.8 | |

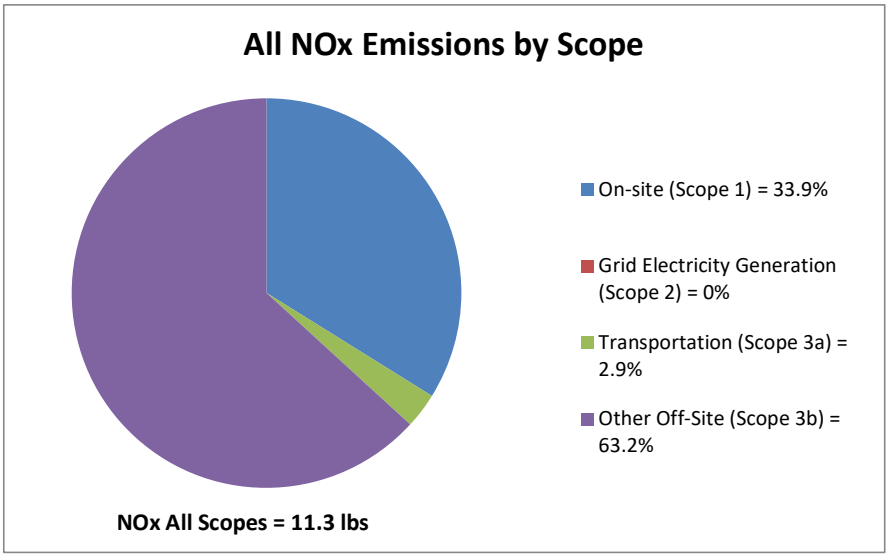
SSDS Installation and Commissioning = 100%
< Component 2 > = 0%
< Component 3 > = 0%
< Component 4 > = 0%
< Component 5 > = 0%
< Component 6 > = 0%

On-site (Scope 1) = 14%
Grid Electricity Generation (Scope 2) = 0%
Transportation (Scope 3a) = 6.7%
Other Off-Site (Scope 3b) = 79.3%

GHG All Components = 1.8 Tons CO2e
GHG All Scopes = 1.8 Tons CO2e


All NOx Emissions by Remedy Component by Scope
(in Lbs)
12
10
8
6
4
2
0
SSDS Installation and...
< Component 2 >
< Component 3 >
< Component 4 >
< Component 5 >
< Component 6 >
Other Off-Site (Scope 3b)
Transportation (Scope 3a)
Grid Electricity Generation (Scope 2)
On-site (Scope 1)
NOx All Components = 11.3 lbs


All NOx Emissions by Remedy Component
SSDS Installation and Commissioning = 100%
< Component 2 > = 0%
< Component 3 > = 0%
< Component 4 > = 0%
< Component 5 > = 0%
< Component 6 > = 0%
NOx All Components = 11.3 lbs

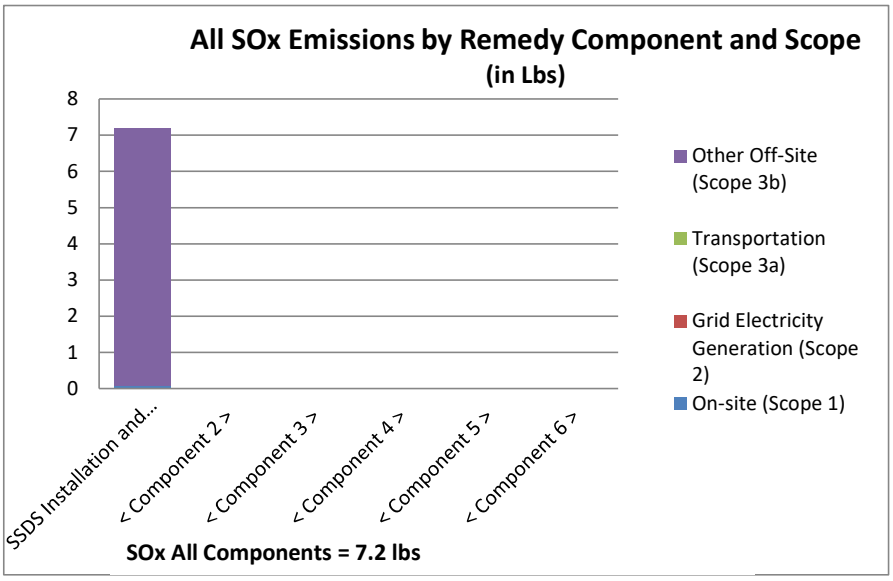

All NOx Emissions by Scope
On-site (Scope 1) = 33.9%
Grid Electricity Generation (Scope 2) = 0%
Transportation (Scope 3a) = 2.9%
Other Off-Site (Scope 3b) = 63.2%
NOx All Scopes = 11.3 lbs

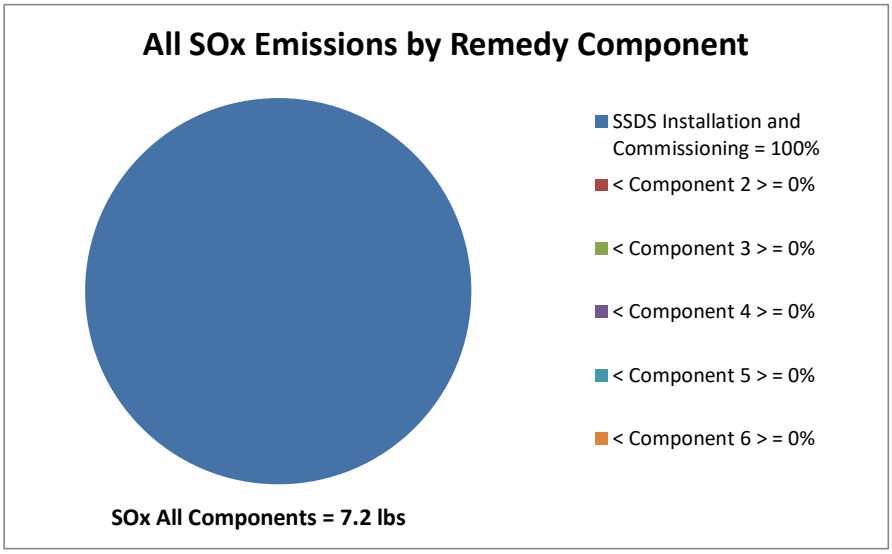
| NOx lbs | SSDS Instal | < Compone | < Compone | < Compone | < Compone | < Compone | Total | |
|---|---|---|---|---|---|---|---|---|
| On-site (Scope 1) | 3.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.8 | |
| ' Generation (Scope 2) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | d Electricity |
| ısportation (Scope 3a) | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | Trar |
| ıer Off-Site (Scope 3b) | 7.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 7.1 | Oth |
| Total | 11.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 11.3 | |

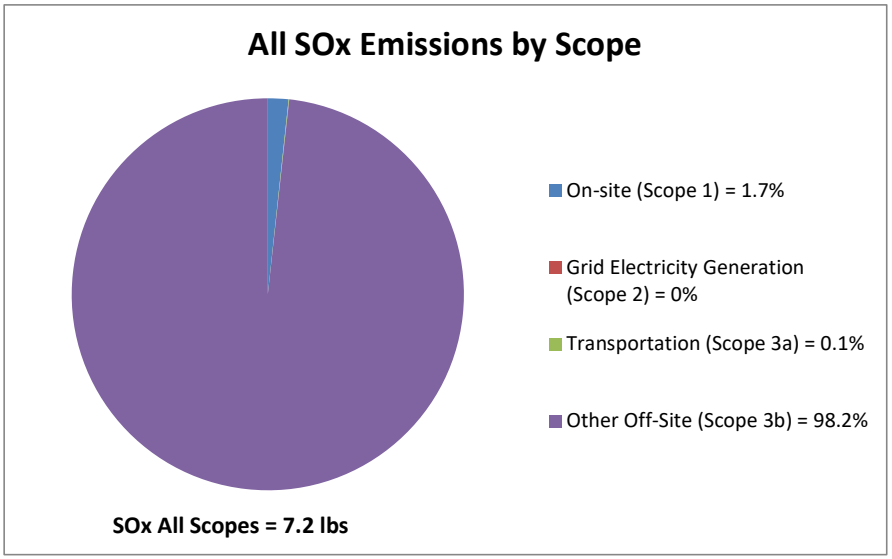
SSDS Installation and Commissioning = 100%
< Component 2 > = 0%
< Component 3 > = 0%
< Component 4 > = 0%
< Component 5 > = 0%
< Component 6 > = 0%

On-site (Scope 1) = 33.9%
Grid Electricity Generation (Scope 2) = 0%
Transportation (Scope 3a) = 2.9%
Other Off-Site (Scope 3b) = 63.2%

NOx All Components = 11.3 lbs
NOx All Scopes = 11.3 lbs


All SOx Emissions by Remedy Component and Scope
(in Lbs)
8
7
6
5
4
3
2
1
0
SSDS Installation and...
< Component 2 >
< Component 3 >
< Component 4 >
< Component 5 >
< Component 6 >
Other Off-Site (Scope 3b)
Transportation (Scope 3a)
Grid Electricity Generation (Scope 2)
On-site (Scope 1)
SOx All Components = 7.2 lbs


All SOx Emissions by Remedy Component
SSDS Installation and Commissioning = 100%
< Component 2 > = 0%
< Component 3 > = 0%
< Component 4 > = 0%
< Component 5 > = 0%
< Component 6 > = 0%
SOx All Components = 7.2 lbs

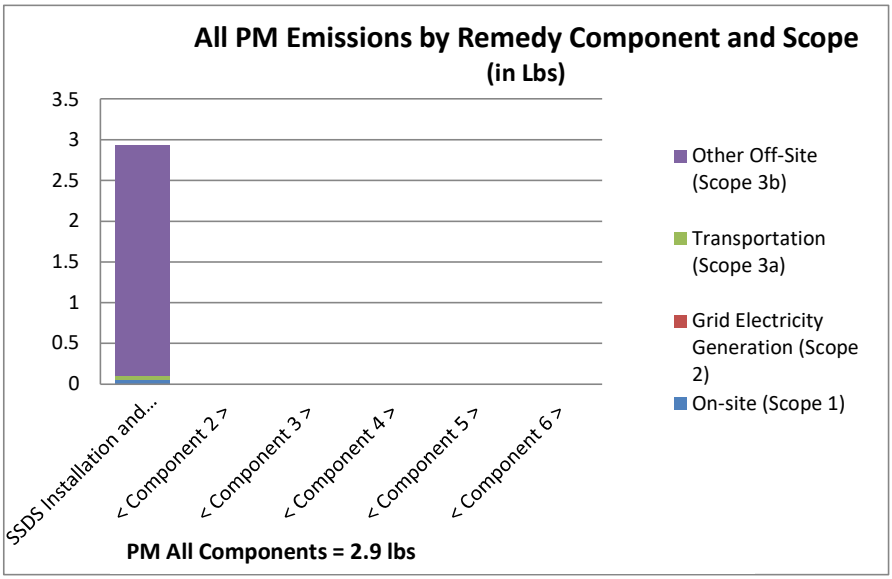

All SOx Emissions by Scope
On-site (Scope 1) = 1.7%
Grid Electricity Generation (Scope 2) = 0%
Transportation (Scope 3a) = 0.1%
Other Off-Site (Scope 3b) = 98.2%
SOx All Scopes = 7.2 lbs

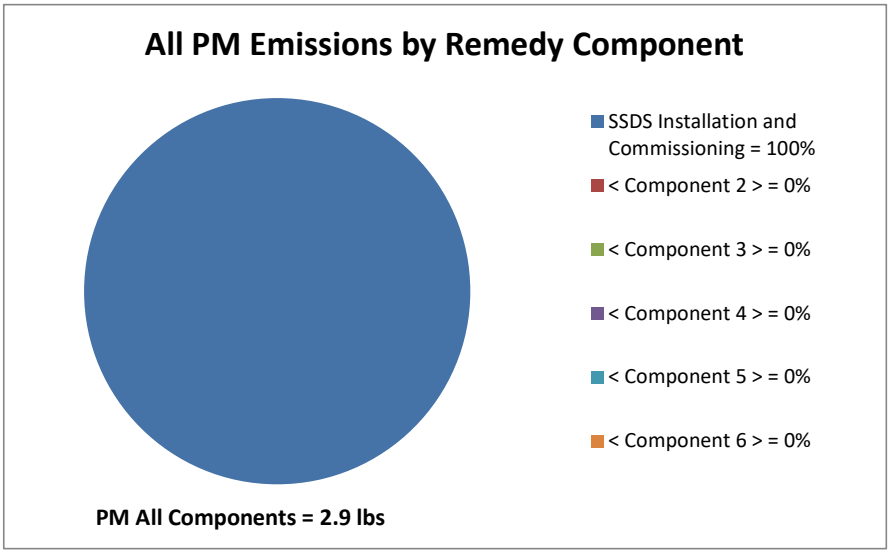
| SOx lbs | SSDS Instal | < Compone | < Compone | < Compone | < Compone | < Compone | Total | |
|---|---|---|---|---|---|---|---|---|
| On-site (Scope 1) | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | |
| Generation (Scope 2) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | d Electricity |
| nsportation (Scope 3a) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Trar |
| ner Off-Site (Scope 3b) | 7.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 7.1 | Oth |
| Total | 7.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 7.2 | |

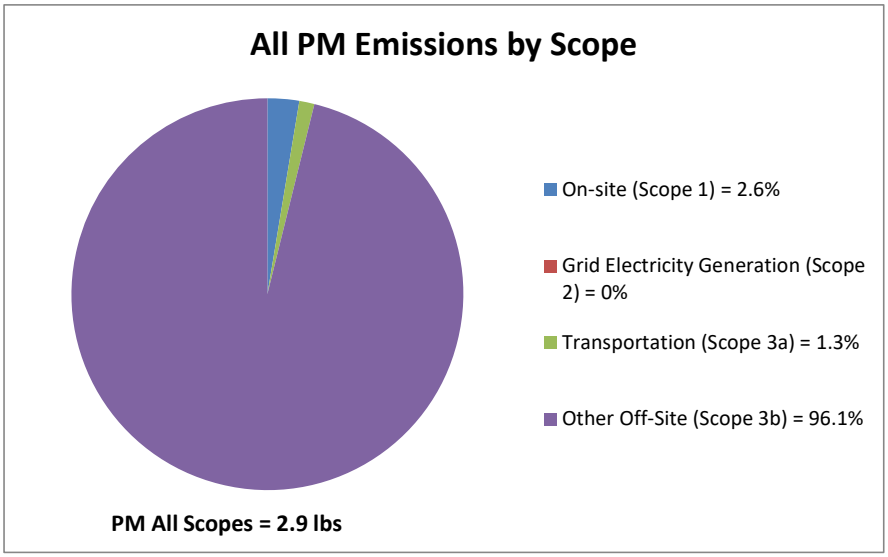
SSDS Installation and Commissioning = 100%
< Component 2 > = 0%
< Component 3 > = 0%
< Component 4 > = 0%
< Component 5 > = 0%
< Component 6 > = 0%

On-site (Scope 1) = 1.7%
Grid Electricity Generation (Scope 2) = 0%
Transportation (Scope 3a) = 0.1%
Other Off-Site (Scope 3b) = 98.2%

SOx All Components = 7.2 lbs
SOx All Scopes = 7.2 lbs


All PM Emissions by Remedy Component and Scope
(in Lbs)
3.5
3
2.5
2
1.5
1
0.5
0
SSDS Installation and...
< Component 2 >
< Component 3 >
< Component 4 >
< Component 5 >
< Component 6 >
Other Off-Site (Scope 3b)
Transportation (Scope 3a)
Grid Electricity Generation (Scope 2)
On-site (Scope 1)
PM All Components = 2.9 lbs


All PM Emissions by Remedy Component
SSDS Installation and Commissioning = 100%
< Component 2 > = 0%
< Component 3 > = 0%
< Component 4 > = 0%
< Component 5 > = 0%
< Component 6 > = 0%
PM All Components = 2.9 lbs

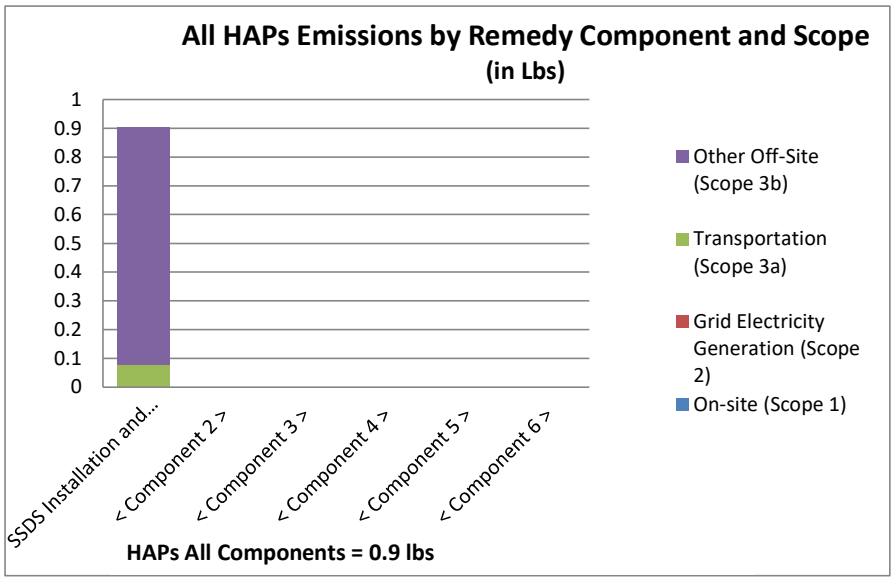

All PM Emissions by Scope
On-site (Scope 1) = 2.6%
Grid Electricity Generation (Scope 2) = 0%
Transportation (Scope 3a) = 1.3%
Other Off-Site (Scope 3b) = 96.1%
PM All Scopes = 2.9 lbs

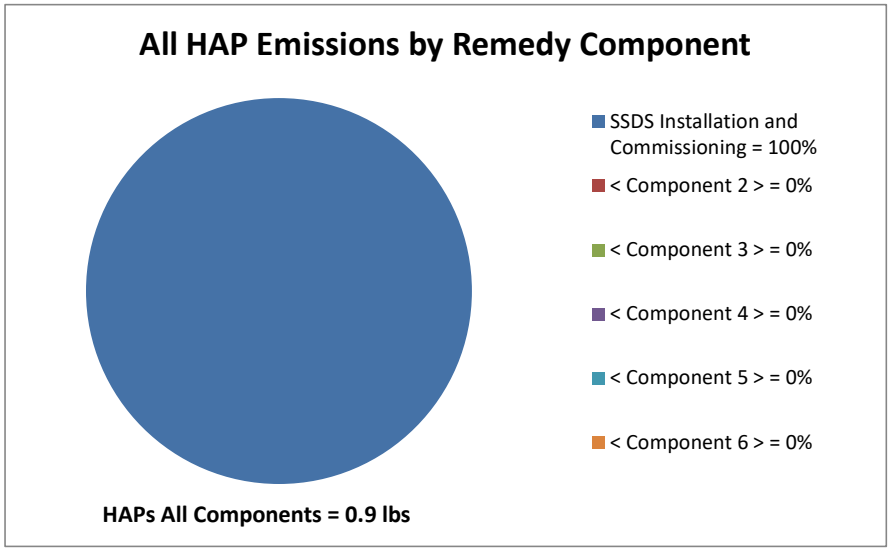
| PM lbs | SSDS Instal | < Compone | < Compone | < Compone | < Compone | < Compone | Total | |
|---|---|---|---|---|---|---|---|---|
| On-site (Scope 1) | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | |
| Generation (Scope 2) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | d Electricity |
| nsportation (Scope 3a) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Trar |
| ner Off-Site (Scope 3b) | 2.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.8 | Oth |
| Total | 2.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.9 | |

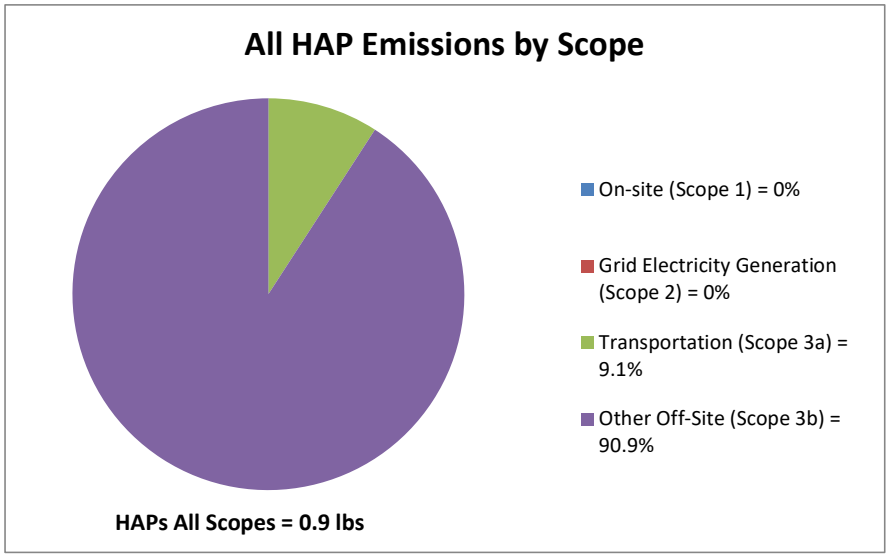
SSDS Installation and Commissioning = 100%
< Component 2 > = 0%
< Component 3 > = 0%
< Component 4 > = 0%
< Component 5 > = 0%
< Component 6 > = 0%

On-site (Scope 1) = 2.6%
Grid Electricity Generation (Scope 2) = 0%
Transportation (Scope 3a) = 1.3%
Other Off-Site (Scope 3b) = 96.1%

PM All Components = 2.9 lbs
PM All Scopes = 2.9 lbs


All HAPs Emissions by Remedy Component and Scope
(in Lbs)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
SSDS Installation and...
< Component 2 >
< Component 3 >
< Component 4 >
< Component 5 >
< Component 6 >
Other Off-Site (Scope 3b)
Transportation (Scope 3a)
Grid Electricity Generation (Scope 2)
On-site (Scope 1)
HAPs All Components = 0.9 lbs


All HAP Emissions by Remedy Component
SSDS Installation and Commissioning = 100%
< Component 2 > = 0%
< Component 3 > = 0%
< Component 4 > = 0%
< Component 5 > = 0%
< Component 6 > = 0%
HAPs All Components = 0.9 lbs


All HAP Emissions by Scope
On-site (Scope 1) = 0%
Grid Electricity Generation (Scope 2) = 0%
Transportation (Scope 3a) = 9.1%
Other Off-Site (Scope 3b) = 90.9%
HAPs All Scopes = 0.9 lbs

HAPs
lbs

| | SSDS Instal | < Compone | < Compone | < Compone | < Compone | < Compone | Total |
|---|---|---|---|---|---|---|---|
| On-site (Scope 1) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Generation (Scope 2) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| nsportation (Scope 3a) | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 |
| ner Off-Site (Scope 3b) | 0.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.8 |
| Total | 0.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.9 |

SSDS Installation and Commissioning = 100%
< Component 2 > = 0%
< Component 3 > = 0%
< Component 4 > = 0%
< Component 5 > = 0%
< Component 6 > = 0%

On-site (Scope 1) = 0%
Grid Electricity Generation (Scope 2) = 0%
Transportation (Scope 3a) = 9.1%
Other Off-Site (Scope 3b) = 90.9%

HAPs All Components = 0.9 lbs
HAPs All Scopes = 0.9 lbs

# SSDS Installation and Commissioning - Energy & Air Compiled Results

| Category | Total Energy | GHG | NOx | SOx | PM | NOx + SOx + PM | HAPs |
|---|---|---|---|---|---|---|---|
| | MMbtus | lbs CO2e | lbs | lbs | lbs | lbs | lbs |
| | | | | | | | |
| **On-site (Scope 1)** | **3** | **506** | **4** | **0** | **0** | **4** | **0** |
| **Grid Electricity Generation (Scope 2)** | **0.000** | **0** | **0** | **0** | **0** | **0** | **0** |
| **Transportation (Scope 3a)** | **2** | **243** | **0** | **0** | **0** | **0** | **0** |
| **Other Off-Site (Scope 3b)** | **34** | **2,865** | **7** | **7** | **3** | **17** | **1** |
| **Remedy Totals** | **39** | **3,614** | **11** | **7** | **3** | **21** | **1** |

*Values that are forwarded to the "Summary" tab are indicated in orange.*

| Voluntary Renewable Energy Use | Unit | Quantity | |
|---|---|---|---|
| On-site renewable energy generation or use | MMBtu | **0** | |
| On-site biodiesel use | MMBtu | **0** | |
| Biodiesel and other renewable resource use for transportation | MMBtu | **0** | |
| On-site renewable energy generation or use + on-site biodiesel use + biodiesel and other renewable resource use for transportation | MMBtu | **0** | *(This value is the sum of the three rows above)* |
| Voluntary purchase of renewable electricity | MWh | **0** | |
| Voluntary purchase of RECs | MWh | **0** | |

*This worksheet is not intended for user input. Values on this worksheet are obtained from the following file: SEFA_calculations_RAWP.xlsx*

# APPENDIX E

# *QUALITY ASSURANCE PROJECT PLAN*

5 Westchester Plaza
Elmsford, New York, 10523



***November 12, 2021***

**Peak Project # 2847**

**NYSDEC# C360205**

**Prepared for:**
Mack-Cali CW Realty Associates L.L.C.
210 Hudson St., Suite 400
Jersey City, NJ 07311

**Prepared By:**
Peak Environmental, LLC
26 Kennedy Blvd, Suite A,
East Brunswick, NJ 08816

## Title and Approval Page

Quality Assurance Project Plan (QAPP) of the 5 Westchester Plaza site located at 5 Westchester Plaza, Elmsford, New York, 10523 dated 11/12/2021.

**Senior Project Manager**

Signature:_____Date:_____.
Matthew Bruno, Peak Environmental LLC

**Quality Assurance Coordinator**

Signature:_____Date:_____.
Matthew Bruno, Peak Environmental LLC

**Site Specific Health and Safety Officer**

Signature:_____Date:_____.
Michael Stopen Peak Environmental LLC

**Distribution List**

Upon approval and implementation of this Quality Assurance Project Plan (QAPP) for the 5 Westchester Plaza, the original shall be kept with the Quality Assurance (QA) Coordinator; with a copy placed with the Project Manager.

The control version of this document is the electronic version viewed online only. If this is a printed copy of the document, or any part of the document (e.g. text, standard operating procedures, etcetera), it is an uncontrolled version and may or may not be the version currently in use.

The following people will be notified of the location of the official (most current) version of the QAPP by email:

| Name | Title | Organization | Contact Information |
|---|---|---|---|
| Michael Stopen | Project Manager | Peak Environmental LLC | 732-326-1010 |
| Matthew Bruno | Senior Project Manager | Peak Environmental LLC | 732-326-1010 |
| Robert Edgar | Qualified Environmental Professional | Peak Environmental LLC | 732-326-1010 |

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DRAFT

This Quality Assurance Project Plan (QAPP) was prepared for 5 Westchester Plaza located in Westchester County, Elmsford, New York, 10523. The QAPP details the specific policies, organizations, objectives, functional activities, and quality assurance/quality control (QA/QC) activities that were implemented.

# 1 INTRODUCTION

This document represents the Quality Assurance Project Plan (QAPP) for investigating the vapor intrusion and migration pathway at the Site located at 5 Westchester Plaza, Elmsford, New York, 10523 (hereinafter referred to as "the Site"). This QAPP describes the field and laboratory Quality Assurance (QA) and Quality Control (QC) measures to be implemented during the project.

## 1.1 Project Scope and Complexity

The scope of the project to be conducted under this QAPP is the investigation of one area of concern (AOC): the main building at 5 Westchester Plaza with vapor intrusion and potential soil impacts from hazardous waste generation with historic release of chlorinated solvent waste. The scope of work involves the investigation of chlorinated solvents, referred as contaminants of concern (COC), hereinafter, in soils, soil vapor, and groundwater beneath the Site within the property boundary. The approach to the investigation involves:

- Installing soil borings for the collection of soil samples to delineate observed residual concentrations of COCs in soils;
- Collecting soil samples and submitting them to a National Environmental Laboratory Accreditation Program (NELAP) accredited laboratory for analysis; and,
- Colleting soil gas and indoor air samples onsite to delineate observed residential concentrations of COC in soil gas and indoor air.
- Installation and sampling of onsite monitoring wells to investigate groundwater.

## 1.2 Project Schedule

Project schedules are site-specific and will be presented in the site-specific work plan or other individual report submittal.

# 2 NAMES AND CONTACT INFORMATION OF PROJECT SPECIFIC PERSONNEL

## 2.1 Qualified Environmental Professional (QEP)

The QEP for this site is:

Robert M. Edgar / Peak Environmental LLC, (732) 326-1010.

## 2.2 Project Manager

The Project Manager is responsible for the overall project coordination and day-to-day management of the project team. The Senior Project Manager will review reports and all correspondence prior to submission and will act as overall technical coordinator. The Project Manager and Senior Project Manager for this site are:

Michael Stopen / Environmental LLC, (732) 326-1010.

Matthew Bruno / Environmental LLC, (732) 326-1010.

## 2.3 Quality assurance coordinator

The Quality Assurance Coordinator is responsible for the quality assurance of the project data. The Quality Assurance Coordinator for this site is:

Matthew Bruno / Peak Environmental LLC, (732) 326-1010.

## 2.4 Corporate Health and Safety Manager

The Corporate Health and Safety Manager is responsible for the overall coordination of the health and safety of the Peak employees working on this project. The Corporate Health and Safety Manager for this site is:

Robert Barnes / Peak Environmental LLC, 732-326-1010

## 2.5 Site Specific Health and Safety Officer

The Site Specific Health and Safety Officer is responsible for direct oversight and coordination of health and safety issues on-site. The Site Specific Health and Safety Officer is:

Michael Stopen / Peak Environmental LLC, (732) 326-1010.

## 2.6 Field Personnel

The field personnel will be responsible for implementing sampling procedures as described in the work plan and in this QAPP. The field personnel consist of:

Marco Michanowicz / Peak Environmental LLC, (732) 326-1010.

Charles Podesta / Peak Environmnetal LLC, (732) 326-1010.

## 2.7 Laboratory and Laboratory Contact

Soil, soil vapor, and groundwater samples collected by Peak as part of this investigation will be analyzed by Alpha Analytical, 35 Whitney Rd, Suite 5, Mahwah, New Jersey, 07430, a NYDOH Certified Analytical Laboratory (NY Cert. # MA935). Alpha Analyticalwill provide New York Standard Laboratory Deliverables, including Quality Assurance/Quality Control (QA/QC) data, the laboratory's discussion of the reliability of the data, ability to meet holding times, and certifications.

## 2.8 Special Training Needs/Certification

Peak personnel and subcontractors working on this site will be properly trained and qualified individuals.

# 3 DATA QUALITY OBJECTIVES

Data Quality Objectives (DQO) are based on the concept that various uses of data collected during the remedial activities require varying degrees of data quality. Data quality is defined as the degree of certainty of a data set with respect to precision, accuracy, representativeness, completeness and comparability (PARCC). DQOs are qualitative and quantitative statements specifying the required quality of data necessary to support remedial activities. These activities include confirmation and delineation sampling. A description of PARCC parameters is presented below.

***Precision*** is a measure of mutual agreement among individual measurements of the same property, usually under prescribed similar conditions. Precision is best expressed in terms of the standard deviation. Various measures of precision exist depending upon the "prescribed similar conditions".

***Accuracy*** is the degree of agreement of a measurement (or an average of measurements) with an accepted reference or "true value". Accuracy is one estimate of the bias in a system.

***Representativeness*** expresses the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition.

***Completeness*** is a measure of the amount of valid data obtained from a measurement system compared to the amount expected to be obtained under normal conditions.

***Comparability*** expresses the confidence with which one data set can be compared to another data set. It is the responsibility of the field team to collect representative and complete samples. It is the responsibility of the analytical laboratory to analyze these samples using accepted protocols resulting in data that meet PARCC standards.

***Sensitivity*** is the ability of an analytical procedure to quantify an analyte at a given concentration.

## 3.1 Precision

### *3.1.1 Field Precision Objectives*

Field precision will not be evaluated, and field duplicate samples will not be collected.

### *3.1.2 Laboratory Precision Objectives*

Laboratory precision will be evaluated as specified in the method or laboratory Standard Operating Procedure. This may include laboratory Matrix Spike/Matrix Spike Duplicate (MS/MSD) samples or laboratory duplicates as well as blank spike and/or blank spike duplicate samples to assess laboratory precision. The precision objectives will be those specified in the method. For method specific measurement performance criteria and QC samples please see Appendix A.

## 3.2 Accuracy

### *3.2.1 Field Accuracy Objectives*

The attainment of accurate data in the field will be determined through proper sampling procedures that minimize bias, defined to be "the constant or systematic distortion of a measurement process, different from random error, which manifests itself as a persistent positive or negative deviation from the known or true value". The sampling procedures will include calibration of field instruments, and adherence to sample holding times and preservation requirements. Accuracy in the field will be evaluated through the use of trip blanks and/or field blanks. These blanks should contain no target analytes above the reporting limit.

### *3.2.2 Laboratory Accuracy Objectives*

Laboratory accuracy will be expressed as percent recovery and will be determined through the analysis of matrix spike recoveries, surrogates and laboratory control recoveries samples, and reference material recoveries. Laboratory accuracy objectives limits will be those specified in the method. For method specific measurement performance criteria and QC samples please see Appendix A.

## 3.3 Representativeness

Representativeness is dependent upon the proper design of a sampling program and proper laboratory protocol. The rationale behind the sampling program is discussed in the site-specific work plan. Representativeness will be determined by ensuring that the work plan, proper sampling techniques and analytical procedures are followed, samples are appropriately preserved, and sample holding times are not exceeded.

Sampling procedures have been established to assure that samples collected are representative of the sampled media. Field handling protocols (e.g., sample storage and handling in the field, and shipping) have also been designed to protect the representativeness of the samples. Proper field documentation will be used to demonstrate that procedures have been followed and that sample identification and integrity have been maintained. For method specific measurement performance criteria and QC samples please see Appendix A.

## 3.4 Completeness

### *3.4.1 Field Completeness Objective*

Field completeness will be measured on the basis of the number of valid field and sample measurements relative to the number of samples planned to be collected.

### *3.4.2 Laboratory Completeness Objectives*

Laboratory completeness will be measured by the number of valid measurements obtained compared to the number of valid samples submitted/collected. For method specific measurement performance criteria and QC samples please see Appendix A.

## 3.5 Comparability

The degree to which existing and planned analytical data can be comparable depends on the similarity of sampling and analytical methods. The procedures used to obtain the planned analytical data, as

documented in this QAPP, are expected to provide comparable data. However, any modification in protocol or Quality Assurance objectives may affect data comparability.

When comparing data, it is important to compare data under the same set of conditions. In order to ensure comparability of data the following will be adhered to: (1) using Standard Operating Procedures; (2) using standard laboratory methods; (3) recording data in a consistent manner; (4) reporting data in appropriate and consistent units, (5) using confirmatory sampling and analysis when using alternative sampling and analysis methodologies; and, (6) ensuring holding times and preservation requirements are adhered.

For method specific measurement performance criteria and QC samples please see Appendix A.

## 3.6 Sensitivity

The laboratory will monitor the data quality through constant instrument performance and that instrument sensitivity will be monitored through the use of method blanks, calibration check samples, etc. in accordance with the methods listed in Table 5.1. The sensitivity requirements mandate that the method used has the adequate sensitivity to accurately measure and whose reporting limit is at or below the relevant and applicable regulatory limits for each contaminant of concern for the site. For method specific measurement performance criteria and QC samples please see Appendix A.

## 3.7 Site-Specific DQOs

The categories of data quality to be utilized during the activities at the site are consistent with those outlined in the USEPA DQO Guidance (USEPA, 2000), a multi-step process that ensures the quality, type and quantity of environmental data used is appropriate for its intended use, and are described below.

- DQO Level 1 – Field Screening Utilizing Portable Instrumentation: Data used for site health and safety monitoring and field screening during site characterization activities. The data generally determines the presence or absence of certain constituents and is generally qualitative rather than quantitative. Field screening data provides the lowest data quality.

- DQO Level 2 – Field Laboratory Analysis: Data used for field screening during site characterization activities, evaluation of remedial alternatives, engineering design and monitoring during implementation of alternatives. The data generally determines levels of certain constituents relative to a calibration standard and is generally qualitative or quantitative.

- DQO Level 3 – Engineering Level Data: Data used for site characterization, risk assessment, evaluation of alternatives, engineering design and monitoring during implementation of alternatives. The data is quantitative and is generated using EPA analytical laboratory procedures, however, it does not include full Contract Laboratory Protocol (CLP) documentation.

- DQO Level 4 – Laboratory Analysis: Data used for risk assessment, evaluation or alternatives and engineering design. The data is quantitative and is generated using EPA analytical laboratory procedures. All analyses require full Analytical Services Protocol (ASP)/CLP analytical protocols including Data Usability Summary Reports. The majority of the data generated during the Site Investigation will be DQO Level 4.

- DQO Level 5 – Non-Standard Special Analytical Services: Data for use when analysis by non-standard procedures is required to obtain specific or lower detection limits or analyses are not of a nature typically performed under the CLP Routine Analytical Service Program.

DQOs have been developed for the tasks outlined in the Work Plan. During the Site Remediation process it is anticipated that the following DQO Levels will be utilized.

| DQO Level | Type of Activity |
|---|---|
| DQO Level 1 data (field screening) | Generated during the screening of vapor intrusion samples, soil samples, and health and safety monitoring. |
| DQO Level 4 data (laboratory analysis) | Generated during activities related soil, soil gas, ambient air and indoor air sampling. |
| DQO Level 2 data (field analysis) | Not expected to be generated as part of the remedial investigation activities. However, this type of data may be generated during activities relating to a supplemental remediation, if required. |
| DQO Level 3 data (engineering data) | Not expected to be generated as part of the remedial investigation activities. However, this type of data may be generated during activities relating to a supplemental remediation, if required. |
| DQO Level 5 data (non-standard special analytical services) | Not expected to be generated as part of the remedial investigation activities. However, this type of data may be generated during activities relating to a supplemental remediation, if required. |

# 4 SAMPLE DESIGN AND RATIONALE

Soil sampling and vapor intrusion sampling will take place on Site to confirm contamination levels from previous sampled locations. Eight soil samples will be collected from a maximum depth of 15 feet. Six soil gas samples will be collected throughout the building location with two indoor air samples and one ambient air samples on hold.

This section describes the components of the sampling procedures that will be performed to meet the quality assurance objectives for the project.

## 4.1 Sampling Protocols

Detailed sampling protocols are provided and discussed in the workplan. Prior to beginning each sampling event, the field manager will ensure that the field personnel understand the purpose and objectives of the event. Topics to review and discuss with the team may include sampling locations, types of samples to be collected, number of samples collected, sample numbering, preservation requirements, parameter(s) to be analyzed, sampling procedures, equipment decontamination procedures, and chain-of-custody requirements.

## 4.2 Sample Handling

The project manager is responsible for ensuring that samples are collected with properly decontaminated equipment and containerized in properly cleaned sample bottles. A summary of the recommended sample containers, volume, and preservation for each analytical method is provided in Table 5.1.

## 4.3 Sampling Equipment Decontamination

Pre-cleaned equipment will be used for all soil sampling. All reusable or non-dedicated field equipment (e.g., sampling spoons, mixing bowls, spade/trowel) will be decontaminated prior to reuse. Equipment will be cleaned in the following manner:

- Nitrile gloves (or equivalent) well be worn during decontamination
- Excess soil will be removed using paper towels or by dry brushing
- The equipment will be rinsed with potable water, rinse water will be collected in one of the decontamination buckets
- A spray bottle containing LiquinoxTM (or equivalent non-phosphate detergent) and water will be used and clean with the stiff-bristle brush until all evidence of soil or other material has been removed
- Rinse with deionized or distilled water three times, ensuring that all detergent from the previous step has been removed
- Place the equipment on a piece of aluminum foil to air dry
- A trash bag should be provided for waste paper towels, aluminum foil, and used nitrile gloves.

Incidental trash generated during this investigation (including discarded nitrile gloves, aluminum foil, paper towels, and disposable equipment) will be placed in plastic trash bags and disposed of as solid waste.

Equipment decontamination is an integral part of the data collection and QA process. The implementation of proper decontamination practices and procedures will begin in the field prior to use of sample collection equipment. All field sampling equipment will be decontaminated before use and after each sample location.

Disposable sampling equipment will be used to the extent practicable, to reduce the chances for cross-contamination. Any reusable sampling equipment will be decontaminated after each use. The field decontamination procedure for sampling equipment will include, at a minimum, washing equipment in each of the following solutions:

- Solution #1 – Tap water rinse
- Solution #2 – Non-ionic detergent (i.e., Alconox) and tap water scrub
- Solution #3 – Tap water rinse

# 5 ANALYTICAL METHODS / QUALITY ASSURANCE SUMMARY TABLE

The following table 5.1 presents information related to the environmental, performance evaluation, and quality control samples to be collected.

Quality Assurance Project Plan
**5 Westchester Plaza - 2847**
Revision: 0
Date: 4/2/2021

**Quality Assurance Sample Summary Table 5.1**

| Parameter | Matrix | Purpose | Number of Samples | Frequency | Field/Trip Blanks | Duplicates | Analytical Method | Container | Preservation | Maximum Holding Times |
|---|---|---|---|---|---|---|---|---|---|---|
| Volatile Organics | Soil | Remedial Investigation | 24 | One Time Only | 1 | 2 | 8260B | (1) to (3) Encore Samplers or (3) 40 mL Glass, Teflon-lined septum | Cool 4°C, Sodium Bisulfate and Methanol if 40-mL Glass used | 48 hours to lab prep. / 14 days |
| Volatile Organics (Air) | Air | Remedial Investigation | 15 | One Time Only | 0 | 0 | TO-15 | Summa Canister (6-Liter or 1-Liter) | Ambient | 30 days |
| Volatile Organics | Aqueous | Remedial Investigation | 3 | One Time Only | 2 | 1 | 624 | (3) 40 mL Glass, Teflon-lined septum per sample | Cool 4°C; HCl <2 | 14 days |
| Semi-Volatile Organics | Soil | Remedial Investigation | 24 | One Time Only | 1 | 2 | 8270C | 50 g - Glass with Teflon-lined cap | Cool 4°C | 14 days |
| Semi-Volatile Organics | Aqueous | Remedial Investigation | 3 | One Time Only | 1 | 1 | 625 | 1 L - Glass with Teflon-lined cap | None | 7 days |
| PCBs | Soil | Remedial Investigation | 24 | One Time Only | 1 | 1 | 8082 | 50 g - Glass with Teflon-lined cap | Cool 4°C | 14 days |
| PCBs | Aqueous | Remedial Investigation | 3 | One Time Only | 1 | 1 | 608 | 1 L - Glass with Teflon-lined cap | None | 7 days |
| Pesticides | Soil | Remedial Investigation | 24 | One Time Only | 1 | 1 | 8081 | 50 g - Glass with Teflon-lined cap | Cool 4°C | 14 days |
| Pesticides | Aqueous | Remedial Investigation | 3 | One Time Only | 1 | 1 | 608 | 1 L - Glass with Teflon-lined cap | None | 7 days |
| Metals | Soil | Remedial Investigation | 24 | One Time Only | 1 | 1 | SW 6010 / SW 6020 | 10 g - Polyethylene | Cool 4°C | 6 months |
| Metals | Aqueous | Remedial Investigation | 3 | One Time Only | 1 | 1 | 200.7 or 200.8 | 200 ml - Polypropylene | HNO3 < 2 | 6 months |
| PFAS | Soil | Remedial Investigation | 24 | One Time Only | 1 | 1 | 537.1 | Provided by Laboratory | Provided by Laboratory | 14 Days |
| PFAS | Aqueous | Remedial Investigation | 3 | One Time Only | 1 | 1 | 537.1 | Provided by Laboratory | Provided by Laboratory | 14 Days |

## 5.1 Quality Control Requirements

### *5.1.1 Field Quality Control*

A cooler (temperature) blank will be placed in a cooler so that the temperature of each cooler can be measured accurately upon receipt at the laboratory without compromising sample integrity. Thus, the cooler blank is a surrogate sample: the cooler blank for water and soil/sediment samples is deionized water. The cooler blanks lid should be clearly labeled so the laboratory custodian will recognize and use it to measure temperatures upon receipts. Cooler blanks are not assigned a unique field sample identification number.

No field duplicates and sample blanks will be collected for this study**.**

### *5.1.2 Analytical Laboratory Quality Control*

The QC samples are intended to assess the major components of total study error, which facilitates the final evaluation of whether environmental data are of sufficient quality to support the related decisions. The QC sample requirements are designed to provide measurement error information that can be used to initiate corrective actions with the goal of limiting the total measurement error.

QC samples and frequency applicable to analytical chemistry laboratories are detailed in Appendix B. If matrix spikes and duplicate matrix spikes are being collected then it must be an authentic field sample, not one of the field duplicates. If there is insufficient field sample for a matrix spike or matrix spike duplicate, a laboratory control sample duplicate will be prepared to assess laboratory precision. Appendix C defines the general required accuracy and precision for QC samples, along with corrective actions that must be implemented if QC criteria are not met.

All QC sample failures and associated corrective actions will be documented. If data must be reported with failing QC results, then data qualifiers will be assigned to the QC sample data. Appendix D defines data qualifiers that will be applied by the laboratories.

# 6 DESCRIPTION OF SAMPLING METHODOLOGIES

In accordance DER-10, sampling methods, sample preservation requirements, sample handling time, decontamination procedure for field equipment, and frequency for field blanks, field duplicates and trip blanks will conform to applicable industry methods. Following is a detailed description of sampling methodologies for each matrix tested along with standard operating procedures references.

## 6.1 Soil Sampling

Pre-cleaned equipment will be used for all soil sampling. All reusable or non-dedicated field equipment (e.g., sampling spoons, mixing bowls, spade/trowel) will be decontaminated prior to reuse. Equipment will be cleaned in the following manner:

- Nitrile gloves (or equivalent) well be worn during decontamination
- Excess soil will be removed using paper towels or by dry brushing
- The equipment will be rinsed with potable water, rinse water will be collected in one of the decontamination buckets
- A spray bottle containing LiquinoxTM (or equivalent non-phosphate detergent) and water will be used and clean with the stiff-bristle brush until all evidence of soil or other material has been removed
- Rinse with deionized or distilled water three times, ensuring that all detergent from the previous step has been removed
- Place the equipment on a piece of aluminum foil to air dry
- A trash bag should be provided for waste paper towels, aluminum foil, and used nitrile gloves.

Incidental trash generated during this investigation (including discarded nitrile gloves, aluminum foil, paper towels, and disposable equipment) will be placed in plastic trash bags and disposed of as solid waste.

## 6.2 Groundwater Sampling

Water level probes will be decontaminated between each sampling location in accordance with Section 4.3. Prior to well purging or sampling the initial static water levels will be measured and recorded to the nearest 0.01-foot from the surveyed reference point for all wells as identified in the workplan. Water level measurements will be collected at all applicable site monitoring wells within the same day. Well depth will be recorded, at the end of sample collection, as well as the general physical condition of the well during each sampling event on the sampling form.

If free product is suspected or if strong odors are present in a well, free product thickness will be measured using an interface probe or a clean disposable bailer lowered slowly into the well. A tape measure will be used to determine the thickness in the bailer. Any well containing free product will not be sampled, unless a fingerprint analysis will be required. The groundwater monitoring wells will be sampled in order from historically lowest concentration to highest. Sample order will be based on previous analytical results.

A minimum of three well volumes will be purged and the purged volume will be recorded on the sampling form. Groundwater samples will be collected using a pump or bailer.

The use of bailers when samples are being collected for VOCs analysis is not permitted due to the likelihood of analyte losses. Use of bailers should be limited to those situations where use of a pump is not possible. The rationale for use of bailers will be documented in the field notes.
Groundwater monitoring wells will be sampled in accordance with the NJDEP FSPM. Disposable single-use 3/8-inch high density polyethylene (HDPE) tubing will be inserted into the screened interval at each well and positioned opposite the screen. Water samples will be collected with a peristaltic pump at a low flow rate. Prior to collecting groundwater samples, wells will be developed, then purged using a peristaltic pump until water quality parameters have stabilized, per the stabilization criteria shown in the table below. Water quality parameters to be measured in the field are temperature, pH, dissolved oxygen (DO), specific electrical conductance (SEC), turbidity, and oxidation/reduction potential (ORP). Field parameters are primarily used to determine stability of recharge of the well and to ensure a groundwater sample is representative of the formation. Purge water will be containerized and sored on-site, then disposed of at an appropriate facility once characterized.
Recommended bottle types and preservatives for each COC are listed in Table 5.1.

## 6.3 Vapor Intrusion Sampling

Pre-cleaned equipment will be used for all soil sampling. All reusable or non-dedicated field equipment (e.g., sampling spoons, mixing bowls, spade/trowel) will be decontaminated prior to reuse. Equipment will be cleaned in the following manner:

- Nitrile gloves (or equivalent) well be worn during decontamination
- Excess soil will be removed using paper towels or by dry brushing
- The equipment will be rinsed with potable water, rinse water will be collected in one of the decontamination buckets
- A spray bottle containing LiquinoxTM (or equivalent non-phosphate detergent) and water will be used and clean with the stiff-bristle brush until all evidence of soil or other material has been removed
- Rinse with deionized or distilled water three times, ensuring that all detergent from the previous step has been removed
- Place the equipment on a piece of aluminum foil to air dry
- A trash bag should be provided for waste paper towels, aluminum foil, and used nitrile gloves.

Incidental trash generated during this investigation (including discarded nitrile gloves, aluminum foil, paper towels, and disposable equipment) will be placed in plastic trash bags and disposed of as solid waste.

## 6.4 Sediment Sampling

Sediment sampling will not be conducted as part of this investigation.

## 6.5 Surface Water Sampling

Surface water sampling will not be conducted as part of this investigation.

# 7 SAMPLE CUSTODY

## 7.1 Sample collection

Based on the fact that invasive, subsurface work is necessary for implementing this phase of the project, appropriate sampling technologies will be utilized that are consistent with the subsurface conditions at the site. The use of mechanized drilling equipment to advance boreholes will be used. The specific groundwater sampling techniques will be dictated by findings of the soil boring and monitoring well installation activities, such as depth to groundwater and subsurface characteristics, as well as the resultant effects of said findings, such as the depth at which a screen was installed within a groundwater monitoring point. A multitude of industry standard techniques may be employed, including but not limited to the use of discrete samplers on drilling equipment of the use of centrifugal, submersible, or bladder pumps. Regardless of sampling techniques, the following general procedures will be followed.

## 7.2 Containers

The containers, sample volumes, number of samples, sample preservation and holding times are shown in Table 5.1. But in general, soil samples collected for VOC analysis will be collected either by use of EnCore™ samplers and submitted to the laboratory for extraction within 48 hours of sampling, or by using a coring device to collect and transfer a weighted aliquot of soil into pre-weighted 40-milliliter (ml) glass vials with Teflon padded lids, that contain sodium bisulfate or methanol.

Groundwater samples for VOC analysis will be collected in 40 ml-glass vials that have lids fitted with a Teflon pad for sealing the cap. The groundwater samples will be taken without air space or bubbles at the top of the vial that may cause volatilization. The groundwater samples for BNAs will be collected in clean 1-liter (L) amber glass bottles provided by the laboratory. The number of bottles required for the analysis will be determined by the laboratory.

Dependent on the required sampling methodologies, samples to monitor field parameters will be collected and in-line from a flow-through cell.

## 7.3 Labeling

Samples will be labeled in accordance with the tracking requirements for the site. After a sample container has been filled, the container will be sealed and labeled with an identification number and permit information.

The ID number is the minimal information that must be written on the sample containers. Other pertinent information typically includes the date and time of sample collection, the analytical method to be applied, the chain-of-custody recorder, and the initials of the person that collected the sample.

All containers will be properly labeled by using a permanent marker or a ballpoint pen. Samples for a certified fixed-based laboratory will be labeled for proposer identification. Sample labels will accompany the physical samples to the laboratory. The sample label will be disposed of with samples.

## 7.4 Sample Storage in the Field

All samples collected under the investigation proposed in this section will be placed in a shuttle cooled and maintained at 4°Celsius, and shipped under chain-of-custody to a NYDOH-certified laboratory for analysis.

## 7.5 Sample Holding Times

The sample holding time starts as soon as the sample has been collected. Consequently, all samples will be shipped in a shuttle cooled to 4°Celsius (where applicable, such as soils and groundwater) and delivered to a NYDOH-certified fixed-base laboratory as expeditiously as possible within the handling time allotted by the laboratory based on parameter specific constraints.

## 7.6 Sample Delivery

Samples for NYDOH-certified fixed-based laboratory analysis will be shipped to a fixed-based laboratory within 24 hours under proper chain-of-custody. For the fixed-based laboratory, either a commercial shipping company will deliver the samples or project personnel will deliver them.

# 8 FIELD INSTRUMENTATION CALIBRATION AND PREVENTATIVE MAINTENANCE

## 8.1 Field Equipment

All required equipment will be provided by Peak and its subcontractors in order to conduct the field work for this site.

## 8.2 Laboratory Equipment

All analytical instruments and equipment will be maintained according to the laboratory Standard Operating Procedures (SOP) and the manufacturers' requirements. Laboratory equipment and instrument maintenance is defined in the laboratory SOPs. All routine maintenance and nonroutine repairs are to be documented in a bound logbook. The information recorded should include analyst initials, date maintenance was performed, a description of maintenance activity, and result of any retesting.

## 8.3 Instrument/Equipment Calibration and Frequency

Laboratory and field equipment will be calibrated in accordance with U.S. EPA guidance or the manufacturers' recommendations. Field equipment refers to articles used for on-site monitoring, testing and sampling, whereas laboratory equipment refers to articles used in the laboratory in support of data collection.

### *8.3.1 Field Equipment*

A maintenance, calibration, and operation program will be implemented to ensure that routine calibration and maintenance is performed on all field instruments. Trained team members will perform scheduled calibration, field calibrations, checks, and instrument maintenance prior to use each day. Additionally, calibration will be checked as necessary to ascertain that proper measurements are being taken.

Team members are familiar with field calibration, operation, and maintenance of the equipment, and will perform the prescribed field operating procedures outlined in the operation and field manuals accompanying the respective instrument. Field personnel will keep records of all field instruments calibrations and field checks in the field logbooks or in Instrument Calibration Forms (Appendix E). Calibration information recorded in field logbooks will include date, time, instrument model and serial number, a description of calibration or field check procedure, and any instrument deviations.

If onsite monitoring equipment should fail, the Field Supervisor will be contacted immediately. Replacement equipment will be provided or the malfunction will be repaired in a timely fashion.

### *8.3.2 Laboratory Equipment and Instruments*

Laboratory equipment and instrument calibration procedures will be completed by the laboratory in accordance with the laboratory SOPs, Appendix F.

# 9 SAMPLE CUSTODY

Once the samples have been collected, sealed, labeled, and placed in a shuttle cooled to 4°C Celsius, they are placed in the custody of the person who collected the samples. The person assuming custody of the samples is responsible for ensuring that the samples are protected and are not tampered with or altered in any way. When the samples are transferred to the custody of another person, that person assumes responsibility for the samples. The samples must be in the possession of control of the "responsible person" (i.e., the person having custody of the samples) at all times.

## 9.1 Field Operations

The section describes field procedures for maintaining sample custody. Other information describing field operations may be found in the workplan and its appendices. A summary of the recommended sample containers, volume, preservation, and hold times for each analytical method is provided in Table 5.1.

## 9.2 Field Records

Field personnel will be required to keep accurate written records of their daily activities in a bound logbook or with field forms. All entries will be legible, written in waterproof ink, and contain accurate and inclusive documentation of the team's activities, including instrument calibration, samples collected, field data and observations, any problems encountered, and actions taken to solve problems. Entry errors or changes will be crossed out with a single line and initialed by the person making the correction. Field logbooks of field forms will be available for review by the QA coordinator during systems audits or at any other time for QC checks by the field manager. This documentation provides verification of sampling procedures.

## 9.3 Sample Custody

The custody of the sample is maintained by:

- The sample is in the sampler's possession;
- The sample is in the sampler's view after being in possession;
- The sample was in the sampler's possession and then was locked up to prevent tampering; and,
- The sample is in a designated secure area.

## 9.4 Sample Labels and Identification

Samples will be labeled in accordance with the tracking requirements for the site. After a sample container has been filled, the container will be sealed and labeled with an identification number and permit information.

The ID number is the minimal information that must be written on the sample containers. Other pertinent information typically includes the date and time of sample collection, the analytical method to be applied, the chain-of-custody recorder, and the initials of the person that collected the sample.

All containers will be properly labeled by using a permanent marker or a ballpoint pen. Samples for a certified fixed-based laboratory will be labeled for proposer identification. Sample labels will accompany the physical samples to the laboratory. The sample label will be disposed of with samples.

## 9.5 Chain-of-Custody Record

As indicated above, once samples have been collected, sealed, labeled, and placed in a shuttle cooled to 4°C Celsius, they are placed in the custody of the person who collected the samples. The information typically included on a chain-of-custody (C-O-C) record is sample identification, the date and time the sample was collected, the type and volume of the sample container, the type of matrix (soil, groundwater, or air), the number of samples, and the analyses to be performed on each sample. Each time responsibility for the samples is transferred from one person to another, the person relinquishing responsibility and the person accepting responsibility for the samples are required to sign the chain-of-custody and note the date and time that the transfer occurred. The C-O-C record remains with the samples listed on the record at all times until a fixed-based laboratory accepts the samples. Control of the samples is maintained by placing custody seals on the sample container. When shipping samples in a shuttle, the chain-of-custody is placed inside the chest along with the samples, the chest is taped closed with duct tape or boxing take, and custody seals are placed across the opening and the tape.

All sample ice chests will be accompanied by the C-O-C record, which identifies their contents. The original record plus one copy will accompany the ice chest; the other copy will be retained in the project file. One copy will be returned to the project team with the analytical results and the original is retained in the laboratory files with the analytical data.

All ice chests will be secured with custody seals for transportation to the off-site laboratory. Custody seals are not required for onsite analysis with the provision that the samples are delivered shortly after collection and that they will not be left unattended. Custody seals must be applied to all ice chests left unattended that contain samples.

The method of shipment, courier name(s), and other pertinent information is entered in the “Remarks” section when the samples are to be shipped (i.e., Federal Express, Express Mail, etc.) instead of hand delivered.

Upon receipt by the fixed-base laboratory, the laboratory assumes responsibility for the samples. The laboratory logs in the samples and assigns unique laboratory identification to each sample submitted under the chain-of-custody. The original chain-of-custody remains with the samples until such time that the analytical data package for the samples compiled, at which time the original chain-of-custody is included in the laboratory deliverable.

## 9.6 Shipping Procedures

The objective of sample handling procedures is to ensure that samples arrive at the laboratory intact, at the proper temperature, and free of external contamination. For all samples which will be shipped to the

analytical service laboratory via overnight carriers (or delivered), C-O-C procedures will be followed during transport.

When samples are required to be stored at 4° C or less, generous amounts of ice will be packed with the samples. The ice will be of sufficient volume and will be distributed in the coolers so that the proper storage temperature will be maintained until the samples reach the laboratory.

The following procedures will be used to prevent bottle breakage and cross contamination:

- All samples will be transported inside hard plastic coolers;
- All glass bottles will be protected to prevent glass to glass contact;
- The coolers will be taped shut and sealed with custody seals to indicate unauthorized opening of the cooler; and,
- Samples that are known or suspected to contain high levels of chemical constituents (based on past monitoring data or observation) will be packaged and transported separately from other samples.

# 10 LABORATORY SAMPLE STORAGE PROCEDURES

Upon receipt of coolers containing samples, an initial inspection of the sample shuttle and associated samples will be performed for signs of damage; the presence of custody seals, airbills or air bill stickers; and a chain-of-custody. Laboratory personnel will check sample containers for damage and appropriate volume, container type, and preservation for the proposed analysis, and will record broken or damaged containers, or samples that are not in the proper container on a sample receipt log. Laboratory personnel will then measure the temperature of the incoming samples, record the temperature on the chain-of-custody, and document any samples outside of the acceptable temperature range. Once an initial inspection of the coolers has been completed, samples will be logged into the laboratory's LIMS system. To mitigate sample cross contamination, laboratory personnel will tighten the lid on every sample bottle and remove any sample residue from the exterior surface. If the sample bottle has residue that is not removable, it will be placed in a sealable bag to eliminate any potential contact with other samples. Samples will be maintained in sample storage refrigerators, where the temperature is maintained at 4°Celsius and both monitored and recorded daily.

## 10.1 Sample Handling

The following section describes the activities related to sample receipt, storage, and tracking.

- Upon receipt, the sample custodian will inspect all sample containers for integrity. The presence of leaking or broken containers or custody seals will be noted on the C-O-C form. The sample custodian will sign the C-O-C form (with date and time of receipt), thus assuming custody of samples.

- The information on the C-O-C from will be compared with that on the sample tags and labels to verify sample identity. Any inconsistencies will be resolved with the project chemist before sample analysis proceeds.

- The temperature of incoming coolers of samples will be checked and the temperature recorded on the internal C-O-C record.

- Preserved samples (i.e., those requiring pH adjustments) will be checked and any improperly preserved samples noted on the C-O-C.

- Samples will be moved to a controlled sample storage refrigerator for storage prior to analysis.

- Document control will retain a legible cope of the original C-O-C form.

- Samples will be maintained in storage refrigerators prior to sample preparation and analysis.

## 10.2 Sample Identification

As samples are logged into the laboratory sample tracking system each sample is assigned a unique sample control number and is correlated with the field sample numbers obtained from the field C-O-C forms, as both numbers are entered into the system for a given job. Analytical requirements for each sample are entered into the computer. A hard copy of the work order and other information is printed and filed with

the received documentation. Labels are printed with sample information and secured to each sample. Data sheets and work sheets are printed for each batch of samples and are distributed to the appropriate laboratory managers.

## 10.3 Sample Custody Records

Sample custody and documentation in analytical laboratories are organized around sample and analysis management systems. For example, these systems are computer software systems specifically designed for tracking and handling the large amount of information required for the efficient management of an analytical chemistry laboratory.

Following sample log in, the samples are placed in a designated secured storage area. Samples are maintained at the appropriate temperature from the time of receipt until the analyses are complete. Samples in freezers are maintained at 0°C from the time of receipt until the analyses are complete. Subsequent sample custody and all transactions are documented. Sample custody is documented according to the laboratory SOP, Appendix F.

The analyst receives the samples from sample control and completes the sample work sheets or custody sheet. After analysis, the sample is returned to the designated storage location in sample control. The sample is stored until the assigned time or written permission is given to either properly dispose of the sample. All sample documentation is maintained in secure storage in a controlled access area.

# 11 DATA MANAGEMENT

Data management (e.g., paper flow, data tracking, data entry, etc.) and data assessment (e.g., verification, validation and data quality assessment) activities require adequate QC procedures to ensure that the SOPs are being followed and result in records/reports that are accurate and appropriate. The laboratory must document its data management procedures in an SOP. Data verification and review is described in Section 13.

## 12 LABORATORY QA/QC

The NYDOH approved laboratory has developed a system of SOPs, report formats, and review mechanisms for all areas of the laboratory. The SOPs are available for all laboratory functions including but not limited to:

- Laboratory Policies and Procedures
- Purchasing
- Sample Receiving and Log-In Procedures
- Maintenance and Security of samples throughout the Laboratory System
- Performing all Analytical Methods of Analysis
- Instrument Maintenance
- Document Control Procedures
- Data Management and Handling, including data security and archiving
- Method Compliance, Report Preparation and Data Validation

In addition, data validation is an integral part of the QA/QC program. All organic analyses meet specific requirements for surrogate spiking recoveries, as well as spike/spike duplicate recoveries. Shewhart curves are continuously reviewed and updated in order to set upper and lower control limits for each analyte, as well as maintain instrument accuracy, precision, and MDL integrity. A copy of the Laboratory SOP is included in Appendix F.

# 13 DATA REVIEW AND USABILITY

This section of the QAPP provides a description of the data review activities that will occur after the data collection phase of the project is completed. The requirements and methods for data review, verification, and validation, as well as the process for reconciling data generated with the DQOs are discussed. This section provides a process to evaluate data, identify usability of data and address various data assessment issues performed by the laboratory, samplers and independent reviewer(s), lists of criteria for rejecting, accepting and qualifying data. Implementation of these methods will determine whether or not the data conform to the specified performance criteria, thus satisfying the project objectives.

## 13.1 Data Review, Validation, and Oversight

Data review includes data verification, validation, and oversight, as well as reconciliation of the data quality with user requirements. The data verification process includes the initial review of the data packages to ensure that the analyses requested have been provided. Data validation is the process of reviewing data and accepting, qualifying or rejecting data on the basis of sound criteria using established U.S. EPA guidelines. Final technical data review of analytical data occurs after independent data validation has been completed. It provides an indication of overall trends in data quality and usability. These procedures are detailed below.

### *13.1.1 Data Review and Usability*

All phases of the project (e.g., field monitoring and sampling activities and laboratory activities) will be inspected to identify if any issues were encountered that may designate the data unusable. The data quality assessment will follow the process outlined in the Data Quality Process (DQA) outline provided in Appendix G. The DQA and Data Usability Evaluation (DUE) forms will be used to document the data review. A copy of the DQA and DUE forms is included as Appendices H and I, respectively.

### *13.1.2 Data Verification and Usability*

The analytical data generated during field investigations will be assembled in packages by sample delivery group, processing batch or analytical batch. The analytical chemistry data packages will contain supporting QC data for the associated field samples and will be validated.

Each analytical laboratory is responsible for reviewing each data package prior to release for validation. At a minimum, the following reviews must be performed:

- Peer review of the data by a qualified analyst;
- Review of the reported data and deviations by a technical supervisor or data coordinator; and,
- QA office review of 10% of the data

Implementation of these procedures is defined in laboratory SOPs (Appendix F). Reviews must ensure the following:

- All data for project samples are reported accurately and completely;

- Sample analysis was conducted in accordance with required laboratory procedures and analytical methods specified in the QAPP;
- Criteria for data quality have been met or deviations are documented in the package narrative and data flags have been appropriately applied;
- Each data set is appropriately reviewed; and,
- All project requirements have been met.

### *13.1.3 Laboratory Data Validation*

Data validation is conducted to assess the compliance of chemistry data with the DQOs defined in this QAPP. Data are assessed for completeness and compliance with the requirements of the analytical methods. Validation is conducted on each data package to determine the adequacy of the data to meet the DQOs.

### *13.1.4 Field Data Validation*

Validation of objective field and technical data will be performed at two different levels. On the first level, data will be validated at the time of collection by following standard procedures and quality control checks. At the second level, data will be validated by the PM or his designee who will review the data to ensure that the correct codes and units have been included. After data reduction into tables the PM will review data sets for anomalous values. Any inconsistencies or anomalies but the PM will be resolved immediately, if possible, by seeking clarification from the field personnel response for collecting the data.

Subjective field and technical data will be validated by the PM, who will review field reports for reasonableness and completeness. In addition, random checks of sampling and field conditions will be made to confirm the recorded observations. Whenever possible, peer review will also be incorporated into the data validation process, particularly for subjective data, to maximize consistency among field personnel. In addition, for field analyses and tests, an independent review of applicable items described previously for laboratory data validation will be conducted (e.g., calibration methods, control limits, instrument checks, etc.). A record of field data validation will be made using the data validation/review forms in Appendices H and I.

### *13.1.5 Reconciliation with User Requirements*

Once the data evaluation results have been compiled the PM will review to ensure that all of the QC criteria fall within the acceptable limits as defined in this QAPP. Data validation will be conducted by filling in the information in

If however, problems are encountered in the field or laboratory, then the PM will evaluate the cause of failure (if possible) and make a decision to discard the data and re-sample. If the failure is associated with an analysis, then equipment maintenance and calibration methodologies will be reassessed as identified by the laboratory. If the failure is associated with sample collection and re-sampling is required, the field personnel will be retrained. The table in Appendix J lists some typical data verification and validation issues as well as provides potential suggestions for action items and identifies implications for data usability.

# APPENDIX A

**Table 1 QAPP Worksheet All Matrices – Metals (ICP) USEPA SW-846 6010B**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy | A | Linear Dynamic Range (LDR) | At a minimum the LDR should be check every 6 months | A minimum of 3 different concentration standards across the ICP range; one should be near the upper limit of the range. | NA | Analyst |
| Accuracy | A | Initial Calibration | Daily prior to sample analysis | Minimum of a calibration blank plus a standard per manufacturing recommended procedures; RL standard may be included in multi-point calibration curve; linear curve fit with correlation coefficient $\geq$0.995. | Re-optimize instrument and re-calibrate, repeat until successful | Analyst |
| Accuracy | A | Initial Calibration Verification (ICV) | Daily after calibration | Separate-source from calibration standards; must contain all target analytes ICV: 90-110% recovery | Re-analyze; if still out,<br>Re-calibrate as required by method; suspend all analysis until ICV meets criteria | Analyst |
| Accuracy | A | Initial Calibration Blanks (ICB) | After ICV | Must be matrix-matched (and same concentration of acid found in standards and samples);<br>ICB: < ± RL | Re-analyze ; if still out,<br>Re-calibrate and reanalyze. | Analyst |
| Accuracy | A | Continuing Calibration Verification (CCV) | 1 of every 10 samples and at end of run | Same source as calibration standards; conc. near mid-point of calibration curve; must contain all target analytes CCV: 90 - 110% recovery | Re-analyze; if still out,<br>Re-calibrate and reanalyze. all samples since last acceptable CCV | Analyst |

**Table 1 QAPP Worksheet All Matrices – Metals (ICP) USEPA SW-846 6010B**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Sensitivity | A | Continuing Calibration Blanks (CCB) | After each CCV | Must be matrix-matched (and same conc. of acid found in standards and samples);<br>CCB: < ± RL | Re-calibrate, if still out,<br>Re-calibrate and reanalyze. | Analyst |
| Accuracy & Sensitivity (Contamination) | A | Method Blank (MB) | 1 per digestion batch - not to exceed 20 field samples | Must be digested with samples using same preparation method and amount of acids; MB: < RL | Re-analyze; if still out redigest & re-analyze all samples unless all detected results > 10x MB level | Analyst |
| Accuracy | A | Interference Check Standards (ICSA and ICSAB) | Daily after calibration | ICSA & ICSB: 80-120% recovery<br>ICSA: non-spiked analytes ≤ 2x RL | Re-analyze; if still out; adjust interference and background correction, and/or linear ranges as needed & recalibrate and reanalyze all field samples since last complaint ICSA & ICSB | Analyst/Data Reviewer |
| Accuracy | A | Laboratory Control Sample (LCS) | 1 per digestion batch - not to exceed 20 field samples | Must contain all target analytes and be matrix-specific; Aq. LCS: 80-120% recovery; Soil/Sediment/solid LCS: vendor control limits (95% confidence limits) | Re-analyze, if still out; redigest & Re-analyze LCS & all field samples in batch | Analyst/Data Reviewer |
| Precision | A | Sample Duplicate (DUP) | 1 per ≤ 20 field samples if an MS/MSD was not performed | Must be performed on a Site field sample. For soil and aqueous samples: Results ≥ 5xRL, RPD ≤ 20% aqueous, 35% solids; Results < 5xRL: absolute difference between results ≤ RL. | Re-analyze, qualify data | Analyst/Data Reviewer |

**Table 1 QAPP Worksheet All Matrices – Metals (ICP) USEPA SW-846 6010B**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy | S & A | Matrix Spike (MS) [Site-specific QC] | 1 per ≤ 20 field samples | Must be performed on a Site field sample; MS: 75-125% recovery; professional judgment if sample concentration > 4x spike level | Evaluate LCS, unspiked sample and qualify data | Analyst/Data Reviewer |
| Precision | S & A | Matrix Spike Duplicate (MSD) [Site-specific QC] | 1 per ≤ 20 field samples | Must be performed on a Site field sample. For soil and aqueous samples: Results ≥ 5xRL, RPD ≤ 20% aqueous, 35% solids; Results < 5xRL: absolute difference between results ≤ RL. | Lab narrates outlier; qualify data | Analyst/Data Reviewer |
| Accuracy | A | Post digestion spike | 1 per ≤ 20 field samples if less than acceptable accuracy and precision data are generated | Should be performed if MS/MSD recoveries were unacceptable: 80-120% recovery | Lab narrates outlier; qualify data | Analyst/Data Reviewer |
| Accuracy | A | Serial Dilution | 1 per ≤ 20 field samples if less than acceptable accuracy and precision data are generated | Perform 5x dilution on same sample used for MS. % Difference ≤ 10% for results >50x IDL (which will most likely equate to 10X RL). | Lab narrates outlier qualify data | Analyst/Data Reviewer |
| Accuracy | A | Quantitation | Not applicable | RL ≤ results ≤ linear calibration range on a sample-specific basis. Report all Aq. results in µg/L or mg/L and all Soil/Sediment results in mg/Kg on a dry-weight basis. | Perform dilution to bring analyte within linear range; report from diluted analysis | Analyst/Data Reviewer |
| Overall Precision & Represent-ativeness | S & A | Field Duplicate Sample [Site-specific QC] | 1 per 20 field samples | Aq.: Results ≥ 5xRL: RPD ≤ 30%; Results < 5xRL: professional judgment; Soil/Sediment: Results ≥ 5xRL: RPD ≤ 50%; Results < 5xRL: professional judgment | Potential data usability issue; indication of sample heterogeneity | Data Reviewer |

**Table 1 QAPP Worksheet All Matrices – Metals (ICP) USEPA SW-846 6010B**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy (preservation) | S & A | Sample preservation | every field sample | Aq.: Total Metals: $HNO_3$ pH < 2; (Dissolved Metals: filter on site or at the lab then $HNO_3$ pH < 2 but cannot be used for regulatory compliance) Soil/Sediment: collect unpreserved per SW-846 Chapter 3 Table 3-2 | Lab narrates outlier. Potential data usability issue | Data Reviewer |
| Data Completeness | S & A | Calculate from valid/usable data collected | Not applicable | Minimum $\geq$ 90% Overall | Potential data usability / data gap issue | Data Reviewer/ Investigator |
| Accuracy/ Sensitivity | S & A | Holding Time (HT) | every field sample | For aqueous and soil samples six months. If Soil/Sediment samples are frozen, HT arrested and HT begins when thawed. Samples can be maintained frozen for 1 year from collection. | Lab narrates outlier. Potential data usability issue | Data Reviewer |
| Accuracy & Sensitivity (Contamination) | S & A | Equipment Rinsate Blank (EB) | Not Required if using dedicated sampling equipment. If performing decontamination of equipment, collect 1 EB per 20 field samples collected by the same method | Aqueous EB: < RL Soil/Sediment EB <RL on solid equivalent basis | Aqueous Potential data usability issue, Soil/Sediment: non-matrix matched aqueous EB use professional judgment | Data Reviewer |
| Comparability | S & A | Based on Method (SOP) and QAPP/FSP protocols | Not applicable | Comparison between historical data for qualitative integrity of the data. Comparison between spatially similar samples. | Potential data usability issue | Data Reviewer/ Investigator |

**NOTES:**
1. This table was prepared by NJDEP, April 2014 to be compliant with EPA Region 2 guidance and meet the data quality needs of the Department.

2. Method References = USEPA SW-846 Method 6010B (*Inductively Coupled Plasma-Mass Spectrometry*, December 1996 and February 2007) and (*Quality Assurance and Quality Control Requirements and Performance Standards for SW846 Method 6010B, Trace Metals by Inductively Coupled Plasma Atomic Emission Spectrometry (ICP)*).

**Table 2 QAPP Worksheet All Matrices – Metals (ICP) USEPA SW-846 6010C**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy | A | Linear Dynamic Range (LDR) | At a minimum the LDR should be check every 6 months | A minimum of 3 different concentration standards across the ICP range one should be near the upper limit of the range. | NA | Analyst |
| Accuracy | A | Initial Calibration | Daily prior to sample analysis | Minimum of a calibration blank plus a standard per manufacturing recommended procedures; RL standard may be included in multi-point calibration curve; linear curve fit with correlation coefficient $\geq$0.998. | Re-optimize instrument and re-calibrate, repeat until successful | Analyst |
| Accuracy | A | Initial Calibration Verification (ICV) | Daily after calibration | Separate-source from calibration standards; must contain all target analytes ICV: 90-110% recovery | Re-analyze; if still out, Re-calibrate as required by method; suspend all analysis until ICV meets criteria | Analyst |
| Sensitivity | A | Low Level Initial Calibration Verification | For method 6010C, LLICV must be analyzed at the beginning of the run before any samples and at the end of the run. | Same source as calibration standards; must contain all target analytes at the RL 70-130% recovery | Re-analyze. If still out, Re-calibrate/re-analyze. Suspend all analyses until LLICV meets criteria unless all results > 10x RL | Analyst |
| Accuracy | A | Initial Calibration Blanks (ICB) | After ICV | Must be matrix-matched (and same conc. of acid found in standards and samples); ICB: < ± RL | Re-analyze ; if still out, Re-calibrate and reanalyze. | Analyst |

**Table 2 QAPP Worksheet All Matrices – Metals (ICP) USEPA SW-846 6010C**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy | A | Continuing Calibration Verification (CCV) | 1 every 10 samples and at end of run | Same source as calibration standards; conc. near mid-point of calibration curve; must contain all target analytes CCV: 90 - 110% recovery | Re-analyze; if still out, Re-calibrate and reanalyze. All samples since last acceptable CCV | Analyst |
| Sensitivity | A | Low Level Continuing Calibration Verification | For method 6010C, LLCCV must be analyzed at the beginning of the run before any samples and at the end of the run. | Same source as initial calibration standards; must contain all target analytes at the RL 70-130% recovery | Re-analyze. If still out, Re-calibrate/re-analyze. Suspend all analyses until LLICV meets criteria unless all results > 10x RL | Analyst |
| Sensitivity | A | Continuing Calibration Blanks (CCB) | After each CCV | Must be matrix-matched (and same conc. of acid found in standards and samples); CCB: < ± RL | Re-analyze ; if still out, Re-calibrate and reanalyze. | Analyst |
| Accuracy & Sensitivity (Contamination ) | A | Method Blank (MB) | 1 per digestion batch - not to exceed 20 field samples | Must be digested with samples using same preparation method and amount of acids; MB: < RL | Re-analyze; if still out redigest & re-analyze all samples unless all detected results > 10x MB level | Analyst |

**Table 2 QAPP Worksheet All Matrices – Metals (ICP) USEPA SW-846 6010C**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy | A | Interference Check Standards (ICSA and ICSAB) | Daily after calibration | ICSA & ICSB: 80-120% recovery<br>ICSA: non-spiked analytes ≤ 2x RL | Re-analyze; if still out, adjust interference and background correction, and/or linear ranges as needed & recalibrate and reanalyze all field samples since last complaint ICSA & ICSB | Analyst/Data Reviewer |
| Accuracy | A | Laboratory Control Sample (LCS) | 1 per digestion batch - not to exceed 20 field samples | Must contain all target analytes and be matrix-specific; Aq. LCS: 80-120% recovery; Soil/Sediment/sol-id LCS: vendor control limits (95% confidence limits) | Re-analyze, if still out' redigest & Re-analyze LCS & all field samples in batch | Analyst/Data Reviewer |
| Precision | A | Sample Duplicate (DUP) | 1 per ≤ 20 field samples if an MS/MSD was not performed | Must be performed on a Site field sample. For soil and aqueous samples: Results ≥ 5xRL, RPD ≤ 20% aqueous, 35% solids; Results < 5xRL: absolute difference between results ≤ RL. | Re-analyze, qualify data | Analyst/Data Reviewer |
| Accuracy | S & A | Matrix Spike (MS) [Site-specific QC] | 1 per ≤ 20 field samples | Must be performed on a Site field sample; MS: 75-125% recovery; professional judgment if sample concentration > 4x spike level | Evaluate LCS, unspiked sample and qualify data | Analyst/Data Reviewer |
| Precision | S & A | Matrix Spike Duplicate (MSD) [Site-specific QC] | 1 per ≤ 20 field samples | Must be performed on a Site field sample. For soil and aqueous samples: Results ≥ 5xRL, RPD ≤ 20% aqueous, 35% solids; Results < 5xRL: absolute difference between results ≤ RL. | Lab narrates outlier; qualify data | Analyst/Data Reviewer |

**Table 2 QAPP Worksheet All Matrices – Metals (ICP) USEPA SW-846 6010C**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy | A | Post digestion spike | 1 per ≤ 20 field samples if less than acceptable accuracy and precision data are generated | Should be performed if MS/MSD recoveries were unacceptable: 80-120% recovery | Lab narrates outlier; qualify data | Analyst/Data Reviewer |
| Accuracy | A | Serial Dilution | 1 per ≤ 20 field samples if less than acceptable accuracy and precision data are generated | Perform 5x dilution on same sample used for MS % Difference ≤ 10% for results >10x RL. | Lab narrates outlier qualify data | Analyst/Data Reviewer |
| Accuracy | A | Quantitation | Not applicable | RL ≤ results ≤ linear calibration range on a sample-specific basis. Report all Aq. results in µg/L or mg/L and all Soil/Sediment results in mg/Kg on a dry-weight basis. | Perform dilution to bring analyte within linear range; report from diluted analysis | Analyst/Data Reviewer |
| Overall Precision & Representative-ness | S & A | Field Duplicate Sample [Site-specific QC] | 1 per 20 field samples | Aq.: Results ≥ 5xRL: RPD ≤ 30%; Results < 5xRL: professional judgment; Soil/Sediment: Results ≥ 5xRL: RPD ≤ 50%; Results < 5xRL: professional judgment | Potential data usability issue; indication of sample heterogeneity | Data Reviewer |
| Accuracy (preservation) | S & A | Sample preservation | every field sample | Aq.: Total Metals: $HNO_3$ pH < 2; (Dissolved Metals: filter on site or at the lab then $HNO_3$ pH < 2 but cannot be used for regulatory compliance) Soil/Sediment: collect unpreserved per SW-846 Chapter 3 Table 3-2 | Lab narrates outlier. Potential data usability issue | Data Reviewer |

**Table 2 QAPP Worksheet All Matrices – Metals (ICP) USEPA SW-846 6010C**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Data Completeness | S & A | Calculate from valid/usable data collected | Not applicable | Minimum ≥ 90% Overall | Potential data usability / data gap issue | Data Reviewer/ Investigator |
| Accuracy/ Sensitivity | S & A | Holding Time (HT) | every field sample | For aqueous and soil samples six months. If Soil/Sediment samples are frozen, HT arrested and HT begins when thawed. Samples can be maintained frozen for 1 year from collection. | Lab narrates outlier. Potential data usability issue | Data Reviewer |
| Accuracy & Sensitivity (Contamination) | S & A | Equipment Rinsate Blank (EB) | Not Required if using dedicated sampling equipment. If performing decontamination of equipment, collect 1 EB per 20 field samples collected by the same method | Aqueous EB: < RL Soil/Sediment EB <RL on solid equivalent basis | Aqueous Potential data usability issue, Soil/Sediment: non-matrix matched aqueous EB use professional judgment | Data Reviewer |
| Comparability | S & A | Based on Method (SOP) and QAPP/FSP protocols | Not applicable | Comparison between historical data for qualitative integrity of the data. Comparison between spatially similar samples. | Potential data usability issue | Data Reviewer/ Investigator |

**NOTES:**
1. This table was prepared by NJDEP, January 2012 to be compliant with EPA Region 2 guidance and meet the data quality needs of the Department.

2. Method References = USEPA SW-846 Method 6010C (*Inductively Coupled Plasma-Mass Spectrometry*, Revision 3 February 2007).

**Table 3 QAPP Worksheet All Matrices – Metals (ICP-MS) USEPA SW-846 6020**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy | A | Tuning | Daily prior to calibration | Manufacturer's Recommendation & SW-846 Method 6020A Tuning Criteria | Re-optimize instrument and re-tune, suspend all analysis until tuning is successful | Analyst |
| Accuracy | A | Initial Calibration | Daily following tuning prior to sample analysis | Minimum of a calibration blank plus a standard per manufacturing recommended procedures | Re-optimize instrument and re-calibrate, repeat until successful | Analyst |
| Accuracy | A | Initial Calibration Verification (ICV) | Daily after calibration | Separate-source from calibration standards and at the midpoint of the linear range. Must contain all target analytes ICV: 90-110% recovery. | Re-analyze; if still out, Re-calibrate as required by method; suspend all analysis until ICV meets criteria | Analyst |
| Accuracy | A | Continuing Calibration Verification (CCV) | 1 every 10 samples and after the last sample | CCV: 90 - 110% recovery | Re-analyze; if still out, Re-calibrate and reanalyze. All samples since last acceptable CCV | Analyst |
| Sensitivity | A | Initial and Continuing Calibration Blanks (ICB and CCB) | After ICV and after each CCV | Must be matrix-matched (and same conc. of acid found in standards and samples); ICB/CCB: < ± RL | Re-calibrate, if still out, Re-calibrate and reanalyze. | Analyst |
| Accuracy & Sensitivity (Contamination) | A | Method Blank (MB) | 1 per digestion batch - not to exceed 20 field samples | Must be digested with samples using same preparation method and amount of acids; MB: < RL | Re-analyze; if still out redigest & re-analyze all samples unless all detected results > 10x MB level | Analyst |

**Table 3 QAPP Worksheet All Matrices – Metals (ICP-MS) USEPA SW-846 6020**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy | A | Interference Check Standards (ICSA and ICSAB) | Daily after calibration | ICSA & ICSAB: 80-120% recovery | This is a method requirement of SW-846 6020. If the ICSA or ICSAB are out of specifications, it indicates that the instrument is not running properly. Retune and reanalyze the associated samples. | Analyst/Data Reviewer |
| Accuracy | A | Laboratory Control Sample (LCS) | 1 per digestion batch - not to exceed 20 field samples | Must contain all target analytes and be matrix-specific; Aq. LCS: 80-120% recovery; Soil/Sediment/solid LCS: vendor control limits (95% confidence limits) | Re-analyze if still out re-analyze & redigest with all samples in a batch unless site specific MS is in control Lab narrates outlier. | Analyst/Data Reviewer |
| Precision | A | Sample Duplicate (DUP) | 1 per $\leq$ 20 field samples if an MS/MSD was not performed | Must be performed on a Site field sample.<br>Results ≥ 5xRL, RPD ≤ 20 aqueous, 35% solids%; Results < 5xRL: absolute difference between results ≤ RL. | Qualify data | Analyst/Data Reviewer |
| Accuracy | S & A | Matrix Spike (MS) [Site-specific QC] | 1 per $\leq$ 20 field samples | Must be performed on a Site field sample; & must contain all target analytes; MS: 75-125% recovery; professional judgment if sample concentration > 4x spike level | Lab narrates outlier Evaluate LCS, unspiked sample and qualify data | Analyst/Data Reviewer |

**Table 3 QAPP Worksheet All Matrices – Metals (ICP-MS) USEPA SW-846 6020**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Precision | S & A | Matrix Spike Duplicate (MSD) [Site-specific QC] | 1 per ≤ 20 field samples | Must be performed on a Site field sample. Results ≥ 5xRL, RPD ≤ 20% aqueous, 35% solids; Results < 5xRL: absolute difference between results ≤ RL. | Lab narrates outlier qualify data | Analyst/Data Reviewer |
| Accuracy | A | Post digestion spike | Not applicable | Should be performed if MS/MSD recoveries were unacceptable: 80-120% recovery | Lab narrates outlier qualify data | Analyst/Data Reviewer |
| Accuracy | A | Serial Dilution | 1 per ≤ 20 field samples if less than acceptable accuracy and precision data are generated | Perform 5x dilution on same sample used for MS % Difference ≤ 10% for results >50x RL. | Lab narrates outlier qualify data | Analyst/Data Reviewer |
| Accuracy | A | Internal Standards (IS) | Every field sample and QC sample | For all analysis the intensity of any IS must fall between 30 and 120% of the IS in the initial calibration standard. | The sample must be diluted fivefold and reanalyzed with the appropriate amounts of IS. | Analyst/Data Reviewer |
| Accuracy | A | Quantitation | Not applicable | RL ≤ results ≤ upper calibration range on a sample-specific basis. Report all Aq. results in µg/L or mg/L and all Soil/Sediment results in mg/Kg on a dry-weight basis. | Perform dilution to bring analyte within linear range; report from diluted analysis | Analyst/Data Reviewer |
| Overall Precision & Representativeness | S & A | Field Duplicate Samples [Site-specific QC] | 1 per 20 field samples | Aq.: Results ≥ 5xRL: RPD ≤ 30%; Results < 5xRL: professional judgment Soil/Sediment: Results ≥ 5xRL: RPD ≤ 50%; Results < 5xRL: professional judgment | Potential data usability issue; indication of sample heterogeneity | Data Reviewer |

**Table 3 QAPP Worksheet All Matrices – Metals (ICP-MS) USEPA SW-846 6020**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy (preservation) | S & A | Sample preservation | every field sample | Aq.: Total Metals: $HNO_3$ pH < 2; (Dissolved Metals: filter on site or at the lab then $HNO_3$ pH < 2 but cannot be used for regulatory purposes) Soil/Sediment: collect unpreserved per SW-846 Chapter 3 Table 3-2 | Lab narrates outlier. Potential data usability issue | Data Reviewer |
| Accuracy/ Sensitivity | S & A | Holding Time (HT) | every field sample | For aqueous and soil samples six months. If Soil/Sediment samples are frozen, HT arrested and HT begins when thawed. Samples can be maintained frozen for 1 year from collection. | Lab narrates outlier. Potential data usability issue | Data Reviewer |
| Accuracy & Sensitivity (Contamination) | S & A | Equipment Rinsate Blank (EB) | Not Required if using dedicated sampling equipment. If performing decontamination of equipment, collect 1 EB per 20 field samples collected by the same method | Aqueous EB: < RL Soil/Sediment EB <RL on solid equivalent basis | Aqueous Potential data usability issue, Soil/Sediment: non-matrix matched aqueous EB use professional judgment | Data Reviewer |
| Data Completeness | S & A | Calculate from valid/usable data collected | Not applicable | Minimum $\geq$ 90% Overall | Potential data usability / data gap issue | Data Reviewer/ Investigator |
| Comparability | S & A | Based on Method (SOP) and QAPP/FSP protocols | Not applicable | Comparison between historical data for qualitative integrity of the data. Comparison between spatially similar samples. | Potential data usability issue | Data Reviewer/ Investigator |

**NOTES:**
1. This table was prepared by NJDEP, April 2014 to be compliant with EPA Region 2 guidance, and meet the data quality needs of the Department.

2. Method References = USEPA SW-846 Method 6020 (*Inductively Coupled Plasma-Mass Spectrometry*, September 1994).

**Table 4 QAPP Worksheet All Matrices – Metals (ICP-MS) USEPA SW-846 6020A**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy | A | Tuning | Daily prior to calibration | Manufacturer's Recommendation & SW-846 Method 6020A Tuning Criteria | Re-optimize instrument and re-tune, suspend all analysis until tuning is successful | Analyst |
| Accuracy | A | Initial Calibration | Daily following tuning prior to sample analysis | Minimum of 3 calibration levels plus blank; RL and Linear Range (LR) standards may be included in calibration levels; minimum of 3 integrations for each QC and field sample; linear curve fit $r \leq 0.998$; if not including RL and LR standards then LLCV and HLCV check standards need to be analyzed (see below). | Re-optimize instrument and re-calibrate, repeat until successful | Analyst |
| Accuracy | A | Initial Calibration Verification (ICV) | Daily after calibration | Separate-source from calibration standards; Must contain all target analytes at the mid-range of the calibration curve ICV: 90-110% recovery | Re-analyze; if still out, Re-calibrate as required by method; suspend all analysis until ICV meets criteria | Analyst |
| Sensitivity | A | Low Level Initial Calibration Check Verification (LLICV) | Daily standard at the RL or lower limit of quantitation | Same source as calibration standards; must contain all target analytes at level of the RL LLCV: 70-130% recovery | Re-analyze. If still out, Recalibrate/ reanalyze unless all results > 10x RL | Analyst |
| Accuracy | A | Continuing Calibration Verification (CCV) | 1 every 10 samples and at end of run | Same source as initial calibration standards; Must contain all target analytes at the mid-range of the calibration curve CCV: 90 - 110% recovery | Re-analyze; if still out, Re-calibrate and reanalyze. all samples since last acceptable CCV | Analyst |

**Table 4 QAPP Worksheet All Matrices – Metals (ICP-MS) USEPA SW-846 6020A**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Sensitivity | A | Initial and Continuing Calibration Blanks (ICB and CCB) | After ICV and after each CCV | Must be matrix-matched (and same conc. of acid found in standards and samples);<br>ICB/CCB: < ± RL | Re-analyze ; if still out,<br>Re-calibrate and reanalyze | Analyst |
| Sensitivity | A | Low Level Continuing Calibration Verification Standard (LLCCV) | Daily only if RL standard not included in initial calibration | Same source as initial calibration standards; must contain all target analytes at level of the RL LLCV: 70-130% recovery | Re-analyze. If still out, Recalibrate/ reanalyze unless all results > 10x RL | Analyst |
| Accuracy | A | Linear Dynamic Range (LDR) | At a minimum the LDR should be checked every 6 months | A minimum of 3 different concentration standards across the ICP range. One should be near the upper limit of the range. | NA | Analyst |
| Accuracy | A | Interference Check Standards (ICSA and ICSAB) | Daily after calibration | ICSA & ICSAB: 80-120% recovery | This is a method requirement of SW-846 6020. If the ICSA or ICSAB are out of specifications, it indicates that the instrument is not running properly. Retune and reanalyze the associated samples. | Analyst/Data Reviewer |
| Accuracy & Sensitivity (Contamination) | A | Method Blank (MB) | 1 per digestion batch - not to exceed 20 field samples | Must be digested with samples using same preparation method and amount of acids; MB: < RL | Re-analyze; if still out redigest & re-analyze all samples unless all detected results > 10x MB level. | Analyst |

**Table 4 QAPP Worksheet All Matrices – Metals (ICP-MS) USEPA SW-846 6020A**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy | A | Laboratory Control Sample (LCS) | 1 per digestion batch - not to exceed 20 field samples | Must contain all target analytes and be matrix-specific; Aq. LCS: 80-120% recovery; Soil/Sediment/ solid LCS: vendor control limits (95% confidence limits) | Re-analyze, if still out' redigest & Re-analyze LCS & all field samples in batch unless site specific MS is in control Lab narrates outlier. | Analyst/Data Reviewer |
| Precision | A | Sample Duplicate (DUP) | 1 per ≤ 20 field samples if an MS/MSD was not performed | Must be performed on a Site field sample. Results ≥ 5xRL, RPD ≤ 20% aqueous, 35% solids; Results < 5xRL: absolute difference between results ≤ RL. | Qualify data | Analyst/Data Reviewer |
| Accuracy | S & A | Matrix Spike (MS) [Site-specific QC] | 1 per ≤ 20 field samples | Must be performed on a Site field sample; & must contain all target analytes; MS: 75-125% recovery; professional judgment if sample concentration > 4x spike level | Lab narrates outlier Evaluate LCS, unspiked sample and qualify data | Analyst/Data Reviewer |
| Precision | S & A | Matrix Spike Duplicate (MSD) [Site-specific QC] | 1 per ≤ 20 field samples | Must be performed on a Site field sample. Results ≥ 5xRL, RPD ≤ 20% aqueous, 35% solids; Results < 5xRL: absolute difference between results ≤ RL. | Lab narrates outlier qualify data | Analyst/Data Reviewer |
| Accuracy | A | Post digestion spike | Not applicable | Should be performed if MS/MSD recoveries were unacceptable: 80-120% recovery | Lab narrates outlier qualify data | Analyst/Data Reviewer |
| Accuracy | A | Serial Dilution | 1 per ≤ 20 field samples if less than acceptable accuracy and precision data are generated | Perform 5x dilution on same sample used for MS. Serial Dilution % Difference ≤ 10% for results >50x RL. | Lab narrates outlier qualify data | Analyst/Data Reviewer |

**Table 4 QAPP Worksheet All Matrices – Metals (ICP-MS) USEPA SW-846 6020A**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy | A | Internal Standards (IS) | Every field sample and QC sample | 70% ≥ IS for QC samples ≤ 130%<br>70% ≥ IS for field samples ≤ 130%<br>relative intensity % of IS compared to the intensity of the IS in the ICAL. | The sample must be diluted fivefold and reanalyzed with the appropriate amounts of IS. | Analyst/Data Reviewer |
| Overall Precision & Representativeness | S & A | Field Duplicate Samples [Site-specific QC] | 1 per 20 field samples | Aq.: Results ≥ 5xRL: RPD ≤ 30%; Results < 5xRL: professional judgment<br>Soil/Sediment: Results ≥ 5xRL: RPD ≤ 50%; Results < 5xRL: professional judgment | Potential data usability issue; indication of sample heterogeneity | Data Reviewer |
| Accuracy | A | Quantitation | Not applicable | RL ≤ results ≤ upper calibration range on a sample-specific basis. Report all Aq. results in µg/L or mg/L and all Soil/Sediment results in mg/Kg on a dry-weight basis. | Perform dilution to bring analyte within calibration range; report from diluted analysis | Analyst/Data Reviewer |
| Accuracy (preservation) | S & A | Sample preservation | Every field sample | Aq.: Total Metals: $HNO_3$ pH < 2; (Dissolved Metals: filter on site or at the lab then $HNO_3$ pH < 2 but cannot be used for regulatory compliance)<br>Soil/Sediment: collect unpreserved per SW-846 Chapter 3 Table 3-2 | Lab narrates outlier Potential data usability issue | Data Reviewer |
| Accuracy/ Sensitivity | S & A | Holding Time (HT) | Every field sample | For aqueous and soil samples six months.<br>If Soil/Sediment samples are frozen, HT arrested and HT begins when thawed. Samples can be maintained frozen for 1 year from collection. | Lab narrates outlier. Potential data usability issue | Data Reviewer |

**Table 4 QAPP Worksheet All Matrices – Metals (ICP-MS) USEPA SW-846 6020A**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy & Sensitivity (Contamination) | S & A | Equipment Rinsate Blank (EB) | Not Required if using dedicated sampling equipment. If performing decontamination of equipment, collect 1 EB per 20 field samples collected by the same method | Aqueous EB: < RL Soil/Sediment EB <RL on solid equivalent basis | Aqueous Potential data usability issue, Soil/Sediment: non-matrix matched aqueous EB use professional judgment | Data Reviewer |
| Data Completeness | S & A | Calculate from valid/usable data collected | Not applicable | Minimum $\geq$ 90% Overall | Potential data usability / data gap issue | Data Reviewer/ Investigator |
| Comparability | S & A | Based on Method (SOP) and QAPP/FSP protocols | Not applicable | Comparison between historical data for qualitative integrity of the data. Comparison between spatially similar samples. | Potential data usability issue | Data Reviewer/ Investigator |

**NOTES:**
1. This table was prepared by NJDEP, April 2014 to be compliant with EPA Region 2 guidance, and meet the data quality needs of the Department.

2. Method References = USEPA SW-846 Method 6020A (*Inductively Coupled Plasma-Mass Spectrometry*, February 2007).

**Table 5 QAPP Worksheet All Matrices - Pesticides USEPA SW-846 8081A & B**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy/ Sensitivity | A | Method Blank | 1 per extraction batch of up to 20 field samples (matrix-specific) | All Target compounds < RL, surrogates in criteria | Reanalyze and, if necessary, re-extract. Report non-conformance in narrative; compounds present in blank should be flagged "B" in samples, if detected. | Analyst |
| Accuracy | A | Matrix Spike/ Matrix Spike Duplicate [Site-specific QC] | 1 per ≤ 20 field samples | Must contain all single-component target analytes, performed on Site field sample; 30-150% recovery for all compounds. | Evaluate LCS, unspiked sample, reanalyze, if necessary, and qualify data and narrate issue | Analyst/Data Reviewer |
| Precision | A | Matrix Spike/ Matrix Spike Duplicate [Site-specific QC] | 1 per ≤ 20 field samples | Must contain all single-component target analytes, performed on Site field sample; 30-150% recovery for all compounds; RPD ≤ 30% for solids and RPD ≤ 20% for waters | Reanalyze, if necessary, qualify data and narrate issues of non-conformance | Analyst/Data Reviewer |
| Accuracy | A | Laboratory Control Sample (LCS) | 1 per extraction batch of up to 20 samples | Must contain all single-component target analytes, concentration should be the same as MS if appropriate, be matrix-matched, 40-140% recovery for all target analytes. | Reanalyze, if necessary, qualify data and narrate issues of non-conformance | Analyst/Data Reviewer |
| Precision | A | Sample Duplicate (DUP) | 1 per ≤ 20 field samples if an MS/MSD was not performed | Must be performed on a site sample, RPD ≤ 30% for solids and RPD ≤ 20% for waters for results > 2x RL | Reanalyze, if necessary, qualify data and narrate issues of non-conformance | Analyst/Data Reviewer |
| Accuracy | A | Surrogates | Every sample including QC | Minimum of 2 (recommend TCMX and DCB); 30-150% recovery on both GC columns | Reanalyze, if necessary, qualify data | Analyst/Data Reviewer |

**Table 5 QAPP Worksheet All Matrices - Pesticides USEPA SW-846 8081A & B**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy | A | Internal Standards (IS) (optional) | Every sample including QC (optional) | Minimum of 1 IS , Areas 50-200% of CCV; RTs ± 30 sec from ICAL | Reanalyze and qualify data | Analyst/Data Reviewer |
| Accuracy | A | Endrin/DDT Breakdown | Before samples are analyzed and at the beginning of each 12 hour shift | % Breakdown ≤ 15% based on peak areas | Perform instrument maintenance; reanalyze until acceptable | Analyst |
| Accuracy | A | Initial Calibration (ICAL) | Initially and when CCV fails | Minimum 5-levels for single-component analytes and single-level for multi-component analytes using peak height or peak area; must contain all targets and lowest level ≤ RL; %RSD ≤ 20% or "r" ≥ 0.99 for all compounds;<br>regression analysis, if used, must not be forced through the origin | Recalibrate as required by method; analysis cannot proceed without a valid initial calibration | Analyst |
| Accuracy | A | Continuing Calibration Verification(CCV) | Prior to samples, every 12 hours or every 20 samples, whichever is more frequent, and at the end of the analytical sequence | Concentration level near mid-point of ICAL curve containing all single-component target compounds; %D ≤ 20% and analytes fall within expected retention time windows; Multi-component analytes must be verified within 12 hours of being detected in a sample | Recalibrate as required by method; note outliers in narrative. | Analyst |

**Table 5 QAPP Worksheet All Matrices - Pesticides USEPA SW-846 8081A & B**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy | A | Quantitation | Every sample | RL ≤ results ≤ upper calibration range on a sample-specific basis; average response factors or curve-statistics generated from the ICAL must be used for quantitation and peak height or peak area, as used for ICAL, must be used for sample. Report the highest concentration from the two GC columns and results reported between the MDL and RL qualified "J" | Perform dilution to bring analyte within linear range, qualify data | Analyst/Data Reviewer |
| Precision | A | Quantitation | Every sample | RPD or %D ≤ 40% between two dissimilar GC Columns | Qualify result and narrate issue except if %D > 100%, then analyze sample at a secondary dilution and qualify data as necessary. | Analyst and Data Reviewer |
| Sensitivity | A | Reporting of Non-Detects | Every sample | Reported at the sample-specific RL which must be ≤ PRL | Potential data usability issue | Data Reviewer |
| Overall Precision & Representative-ness | S & A | Field Duplicate Samples [Site-specific QC] | 1 per 20 field samples | RPD ≤ 30% for waters or RPD ≤ 50% for solids w/results > 2x RL; Professional judgment for results < 2xRL | Potential data usability issue | Data Reviewer |
| Accuracy (preservation) | S | Temperature Blank or other Cooler Temperature Reading | 1 Temperature reading per cooler to be recorded upon receipt at lab | Cool to ≤ 6º C; allow for < 2º C if samples intact | Potential data usability issue | Data Reviewer |

**Table 5 QAPP Worksheet All Matrices - Pesticides USEPA SW-846 8081A & B**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy/ Sensitivity | S & A | Holding Time (HT) | Every field sample | Aqueous samples extracted within 7 days of collection; extract analyzed within 40 days of extraction. Soil/Sediment samples extracted within 14 days of collection; extract analyzed within 40 days of extraction. If Soil/Sediment samples are frozen, HT arrested and extraction HT continues when thawed. Solid samples can be maintained frozen for 1 year from collection. | Potential data usability issue | Data Reviewer |
| Accuracy/ Sensitivity | S | Equipment Blank [Site-specific QC] | Not Required if using dedicated sampling equipment. If performing decon, collect 1 EB per 20 field samples collected by the same method | Target analytes < RL | Potential data usability issue | Data Reviewer |
| Data Completeness | S & A | Calculate from valid/usable data collected | Not applicable | ≥ 90% Overall | Potential data usability / data gap issue | Data Reviewer/ Investigator |
| Comparability | S & A | Based on Method (SOP) and QAPP/FSP protocols | Not applicable | Comparison between historical data for qualitative integrity of the data. Comparison between spatially similar samples. | Potential data usability issue | Data Reviewer/ Investigator |

**NOTES:**
1. This table was prepared by NJDEP, April 2014 to be compliant with EPA Region 2 guidance, and meet the data quality needs of the Department.

2. Pesticide Compound analyses via USEPA SW-846 Method 8081A&B (*Quality Assurance and Quality Control Requirements for SW-846 Method 8081A and 8081B Chlorinated Pesticides by Gas Chromatography [GC])*.

**Table 6 QAPP Worksheet All Matrices (combined) - PCB Aroclors USEPA SW-846 8082 and 8082A**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy/ Sensitivity | A | Method Blank | 1 per extraction batch of up to 20 field samples (matrix-specific) | All Target compounds < RL, surrogates in criteria | Reanalyze and, if necessary, re-extract. Report non-conformance in narrative; compounds present in blank should be flagged "B" in samples, if detected. | Analyst |
| Accuracy | A | Matrix Spike/ Matrix Spike Duplicate [Site-specific QC] | 1 per ≤ 20 field samples | Must contain Aroclors 1016 and 1260, performed on Site field sample, 40-140% recovery | Evaluate LCS, unspiked sample, reanalyze, if necessary, and qualify data and narrate issue | Analyst/Data Reviewer |
| Precision | A | Matrix Spike/ Matrix Spike Duplicate [Site-specific QC] | 1 per ≤ 20 field samples | Must contain Aroclors 1016 and 1260, performed on Site field sample; 40-140% recovery; RPD ≤ 30% for solids and RPD ≤ 20% for waters | Reanalyze, if necessary, qualify data and narrate issues of non-conformance | Analyst/Data Reviewer |
| Accuracy | A | Laboratory Control Sample (LCS) | 1 per extraction batch of up to 20 samples | Must contain Aroclors 1016 and 1260, be matrix-matched, 40-140% recovery | Reanalyze, if necessary, qualify data and narrate issues of non-conformance | Analyst/Data Reviewer |
| Precision | A | Sample Duplicate (DUP) | 1 per ≤ 20 field samples if an MS/MSD was not performed | Must be performed on a Site samples;, RPD ≤ 30% for solids and RPD ≤ 20% for waters for results > 2x RL | Reanalyze, if necessary, qualify data and narrate issues of non-conformance | Analyst/Data Reviewer |

**Table 6 QAPP Worksheet All Matrices (combined) - PCB Aroclors USEPA SW-846 8082 and 8082A**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy | A | Surrogates | Every sample including QC | Minimum of 2 (recommend TCMX and DCB); 30-150% recovery on both GC columns | Reanalyze, if necessary, qualify data | Analyst/Data Reviewer |
| Accuracy | A | Initial Calibration (ICAL) | Initially and when CCV fails | Minimum 5-levels for Aroclors 1016 and 1260 and single-level at mid-point concentration for other Aroclors; 3-5 peaks of each Aroclor evaluated using peak height or peak area; lowest level ≤ RL; other Aroclors may be warranted for 5 point calibration if PCB contamination is known. %RSD ≤ 20% or "r" ≥ 0.99 for Aroclors 1016 and 1260; regression analysis, if used, must not be forced through the origin. | Recalibrate as required by method; analysis cannot proceed without a valid initial calibration | Analyst |
| Accuracy | A | Continuing Calibration Verification (CCV) | Prior to samples, every 12 hours or every 20 samples, whichever is more frequent, and at the end of the analytical sequence | Concentration level near mid-point of ICAL curve containing Aroclors 1016 and 1260; %D ≤ ± 20% and analytes fall within expected retention time windows; Aroclors other than 1016 and 1260 must be verified within 12 hours of being detected in a sample (unless I.S. quant technique is used) | Recalibrate as required by method; note outliers in narrative. | Analyst |

**Table 6 QAPP Worksheet All Matrices (combined) - PCB Aroclors USEPA SW-846 8082 and 8082A**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy | A | Quantitation | Every sample | RL ≤ results ≤ upper calibration range on a sample-specific basis; average response factors or curve-statistics generated from the ICAL must be used for quantitation and peak height or peak area, as used for ICAL, must be used for sample. Report the highest concentration from the two GC columns and results reported between the MDL and RL qualified "J" | Perform dilution to bring analyte within linear range, qualify data | Analyst/Data Reviewer |
| Precision | A | Quantitation | Every sample | RPD or %D ≤ 40% between two dissimilar GC Columns | Qualify result and narrate issue except if %D > 100% then analyze sample at a secondary dilution and qualify data as necessary. | Analyst and Data Reviewer |
| Sensitivity | A | Reporting of Non-Detects | Every sample | Reported at the sample-specific RL which must be ≤ PRL | Potential data usability issue | Data Reviewer |
| Overall Precision & Representative-ness | S & A | Field Duplicate Samples [Site-specific QC] | 1 per 20 field samples | RPD ≤ 30% for waters or RPD ≤ 50% for solids w/results > 2x RL; Professional judgment for results < 2xRL | Potential data usability issue | Data Reviewer |
| Accuracy (preservation) | S | Temperature Blank or other Cooler Temperature Reading | 1 Temperature reading per cooler to be recorded upon receipt at lab | Cool to ≤ 6º C; allow for < 2º C if samples intact | Potential data usability issue | Data Reviewer |

**Table 6 QAPP Worksheet All Matrices (combined) - PCB Aroclors USEPA SW-846 8082 and 8082A**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy/ Sensitivity | S & A | Holding Time (HT) | Every field sample | Aqueous samples extracted within 7 days of collection; extract analyzed within 40 days of extraction. Soil/Sediment samples extracted within 14 days of collection; extract analyzed within 40 days of extraction. If Soil/Sediment samples are frozen, HT arrested and extraction HT continues when thawed. Samples can be maintained frozen for 1 year from collection. | Potential data usability issue | Data Reviewer |
| Accuracy/ Sensitivity | S | Equipment Blank [Site-specific QC] | Not Required if using dedicated sampling equipment. If performing decontamination of equipment, collect 1 EB per 20 field samples collected by the same method. | Target analytes < RL | Potential data usability issue | Data Reviewer |
| Data Completeness | S & A | Calculate from valid/usable data collected | Not applicable | $\geq$ 90% Overall | Potential data usability / data gap issue | Data Reviewer/ Investigator |
| Comparability | S & A | Based on Method (SOP) and QAPP/FSP protocols | Not applicable | Comparison between historical data for qualitative integrity of the data. Comparison between spatially similar samples. | Potential data usability issue | Data Reviewer/ Investigator |

**NOTES:**
1. This table was prepared by NJDEP, April 2014 to be compliant with EPA Region 2 guidance, and meet the data quality needs of the Department

2. PCB Aroclor Compound analysis via USEPA SW-846 Method 8082 and 8082A (*Quality Assurance and Quality Control Requirements for SW-846, Polychlorinated Biphenyls (PCBs) by Gas Chromatography [GC]).*

**Table 7 QAPP Worksheet All Matrices – Total Cyanide SW-846 9010C, 9013. 9014, and 9012B**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy | A | Initial Calibration | Daily prior to sample analysis (unless daily CCV passes 90-110 % recover) | Minimum of 5 calibration levels plus blank; low level standard at level of RL; linear regression with a correlation coefficient r $\geq$ 0.995 | Perform instrument maintenance and re-calibrate, repeat until successful | Analyst |
| Accuracy | A | Initial Calibration/ Initial Calibration Verification (ICV) | Daily after calibration | Separate-source from calibration standards; ICV: 85-115% recovery | Re-analyze; if still out, Re-calibrate as required by method; suspend all analysis until ICV meets criteria | Analyst |
| Accuracy | A | Continuing Calibration Verification (CCV) | 1 every 20 samples and at the end of run | Same source as calibration standards; conc. near mid-point of calibration curve; CCV: 85 - 115% recovery | Re-analyze and, if still out, Re-calibrate and Re-analyze all samples since last acceptable CCV | Analyst |
| Sensitivity | A | Initial and Continuing Calibration Blanks (ICB and CCB) | After ICV and after each CCV | Must be matrix-matched ( and same conc. of acid found in standards and samples); ICB/CCB: < ± RL | Re-analyze; if still out, Re-calibrate, reanalyze. | Analyst |
| Sensitivity | A | Low Level Calibration Check Standard | Daily only if RL standard not included in initial calibration | Low Level Check Standard: 70-130% recovery | Recalibrate/re-analyze unless all results > 10x RL | Analyst |
| Accuracy & Sensitivity (Contamination ) | A | Method Blank (MB) | 1 per analytical batch - not to exceed 20 field samples | Must be distilled/extracted with samples using same preparation method; MB: < RL | Re-analyze; if still out redistill & re-analyze all samples unless all detected results > 10x MB level | Analyst |

**Table 7 QAPP Worksheet All Matrices – Total Cyanide SW-846 9010C, 9013. 9014, and 9012B**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy | A | Laboratory Control Sample (LCS) | 1 per digestion batch - not to exceed 20 field samples | Must be matrix-matched; aqueous LCS: 80-120% recovery; Soil/Sediment LCS within vendor control limits (95% confidence) | Re-analyze, if still out; redigest (soil/sed.) & Re-analyze LCS & all field samples in batch | Analyst/ Data Reviewer |
| Precision | A | Sample Duplicate (DUP) | 1 per ≤ 20 field samples if an MS/MSD was not performed | Must be performed on a Site field sample. Aq.: Results RPD ≤ 20%; Soil/Sediment: Results, RPD ≤ 35%; | Re-analyze, qualify data | Analyst/ Data Reviewer |
| Accuracy | S & A | Matrix Spike (MS) [Site-specific QC] | 1 per ≤ 20 field samples | Must be performed on a Site field sample; MS: 75-125% recovery; professional judgment if sample concentration > 4x spike level | Evaluate LCS, unspiked sample, re-analyze, if necessary, and qualify data | Analyst/ Data Reviewer |
| Overall Precision & Representative-ness | S & A | Field Duplicate Samples [Site-specific QC] | 1 per 20 field samples | Aq.: Results ≥ 5xRL: RPD ≤ 30%; Results < 5xRL: professional judgment; Soil/Sediment: Results ≥ 5xRL: RPD ≤ 50%; Results < 5xRL: professional judgment | Potential data usability issue; indication of sample heterogeneity | Data Reviewer |
| Accuracy | A | Quantitation | Not applicable | RL ≤ results ≤ upper calibration range on a sample-specific basis. Report all Aq. results in µg/L or mg/L and all Soil/Sediment results in mg/Kg on a dry-weight basis. | Perform dilution to bring analyte within linear range, report from diluted analysis | Analyst/ Data Reviewer |
| Accuracy (preservation) | S & A | Temperature Blank or other Cooler Temperature Reading | 1 Temperature reading per cooler to be recorded upon receipt at lab | ≤ 6º C per SW-846 Chapter 3 Table 3-2 but allow for Soil/Sediment: < 2º C if freezing samples are intact | Lab narrates outlier; Potential data usability issue | Data Reviewer |
| Accuracy (preservation) | S & A | Sample Preservation | Every field sample | Aqueous samples are preserved by adding sodium hydroxide until pH is ≥12 at time of sampling. Preserved samples can be stored up to 14 days. | Lab narrates outlier; potential data usability issue | Data Reviewer |

**Table 7 QAPP Worksheet All Matrices – Total Cyanide SW-846 9010C, 9013. 9014, and 9012B**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy/ Sensitivity | S & A | Holding Time (HT) | Every field sample | Aqueous and Soil/Sediment: HT = 14 days from collection to analysis If Soil/Sediment samples are frozen, HT arrested and HT begins when thawed. Samples can be maintained frozen for 1 year from collection. | Lab narrates outlier; potential data usability issue | Data Reviewer |
| Data Completeness | S & A | Calculate from valid/usable data collected | Not applicable | Minimum $\geq$ 90% Overall | Potential data usability / data gap issue | Data Reviewer/ Investigator |
| Accuracy & Sensitivity (Contamination ) | S & A | Equipment Rinsate Blank (EB) | Not Required if using dedicated sampling equipment. If performing decontamination of equipment, collect 1 EB per 20 field samples collected by the same method | Aqueous EB: < RL Soil/Sediment EB <RL on solid equivalent basis | Aqueous Potential data usability issue, Soil/Sediment: non=matrix matched aqueous EB use professional judgment | Data Reviewer |
| Comparability | S & A | Based on Method (SOP) and QAPP/FSP protocols | Not applicable | Comparison between historical data for qualitative integrity of the data. Comparison between spatially similar samples. | Potential data usability issue | Data Reviewer/ Investigator |

**NOTES:**
1. This table was prepared by NJDEP, April 2014 to be compliant with EPA Region 2 guidance and meet the data quality needs of the Department.
2. Method References: USEPA SW-846 Method 9010C (*Total and Amenable Cyanide: Distillation, November, 2004*); USEPA SW-846 Method 9013 (*Cyanide Extraction Procedure for Solids and Oils, July 1992);* USEPA SW-846 Method 9014 (Titrimetric and manual spectrophotometric Determinative Methods for *Cyanide, December 1996) and* USEPA SW-846 Method 9012B (Total and Amenable Cyanide *(Automated Colorimetric with offline Distillation), November 2004 Revision 2).*

**Table 8 QAPP Worksheet All Matrices – Hexavalent Chromium SW-846 846 7196A and 7199**
**Measurement Performance Criteria & QC Samples Table– Hexavalent Chromium**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy | A | Initial Calibration | Daily prior to sample analysis | Minimum of 3 calibration levels plus blank; low-level standard at level of RL linear regression with a correlation coefficient r $\geq$ 0..995 | Re-optimize instrument and re-calibrate, repeat until successful | Analyst |
| Accuracy | A | Initial Calibration Verification (ICV) | Daily after calibration | Separate-source from calibration standards; ICV: 90-110% recovery | Re-analyze ; if still out,<br>Re-calibrate as required by method; suspend all analysis until ICV meets criteria | Analyst |
| Accuracy | A | Continuing Calibration Verification (CCV) | 1 every 10 samples and at end of run | Concentration level near midpoint of calibration curve; same source from ICV;<br>CCV: 90-110% recovery | Re-analyze if still out,<br>Re-calibrate and reanalyze all samples since last acceptable CCV | Analyst |
| Sensitivity | A | Initial and Continuing Calibration Blanks (ICB and CCB) | After ICV and after each CCV | Must be matrix-matched (conc. of solution to match standards and samples); ICB/CCB: < ± RL | Re-analyze ; if still out,<br>Re-calibrate and reanalyze. | Analyst |
| Accuracy & Sensitivity (Contamination ) | A | Method Blank (MB) | 1 per digestion batch - not to exceed 20 field samples | Must be prepared/digested with samples in batch; MB: < RL | Re-analyze; if still out redigest & re-analyze all samples unless all detected results > 10x MB level | Analyst |

**Table 8 QAPP Worksheet All Matrices – Hexavalent Chromium SW-846 846 7196A and 7199**
**Measurement Performance Criteria & QC Samples Table– Hexavalent Chromium**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy | A | Laboratory Control Sample (LCS) | 1 per digestion batch - not to exceed 20 field samples | Must be matrix-matched; aqueous LCS: 80-120% recovery; Soil/Sediment/ solid LCS: NIST Standard Reference Material (SRM) 2701; within control limits | Re-analyze; if still out redigest & re-analyze all samples in the batch qualify data | Analyst/Data Reviewer |
| Precision | A | Sample Matrix Duplicate (DUP) | 1 per ≤ 20 field samples | Must be performed on a Site field sample. Aqueous/ Soil/Sediment: RPD ≤ 20%; a control limit of ± RL if original or duplicate is < 4 times the RL. | Lab narrates outlier; Qualify data | Analyst/Data Reviewer |
| Accuracy | S & A | Matrix Spike Aqueous samples | 1 per ≤ 20 aqueous field samples | Must be performed on a Site field sample; MS: 75-125% recovery; professional judgment if sample concentration > 4x spike level | Re-analyze[1], Lab narrates outliers; possible usability issue. | Analyst/Data Reviewer |
| Accuracy | S & A | Matrix Spike (MS) soluble [Site-specific QC] | 1 per ≤ 20 soil/sediment field samples | Must be performed on a Site field sample; MS: 75-125% recovery; professional judgment if sample concentration > 4x spike level | Re-analyze[2]; Lab narrates outliers; possible usability issue. | Analyst/Data Reviewer |
| Accuracy | S & A | Matrix Spike (MS) insoluble [Site-specific QC] | 1 per ≤ 20 soil/sediment field samples | Must be performed on a Site field sample; MS: 75-125% recovery; professional judgment if sample concentration > 4x spike level | Re-analyze[2], Lab narrates outliers; possible usability issue. | Analyst/Data Reviewer |
| Accuracy | A | Quantitation | Not applicable | RL ≤ results ≤ upper calibration range on a sample-specific basis. Report all Aq. results in µg/L or mg/L and all Soil/Sediment results in mg/Kg on a dry-weight basis. | Perform dilution to bring analyte within linear range; report from diluted analysis | Analyst/Data Reviewer |
| Overall Precision & Representative-ness | S & A | Field Duplicate Samples [Site-specific QC] | 1 per 20 field samples | Aq.: Results ≥ 5xRL: RPD ≤ 30%; Results < 5xRL: professional judgment; Soil/Sediment: Results ≥ 5xRL: RPD ≤ 50%; Results < 5xRL: professional judgment | Potential data usability issue; indication of sample heterogeneity | Data Reviewer |

**Table 8 QAPP Worksheet All Matrices – Hexavalent Chromium SW-846 846 7196A and 7199**
**Measurement Performance Criteria & QC Samples Table– Hexavalent Chromium**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy (preservation) | S & A | Temperature Blank or other Cooler Temperature Reading | 1 Temperature reading per cooler to be recorded upon receipt at lab | ≤ 6º C per SW-846 Chapter 3 Table 3-2 but allow for Soil/Sediment: < 2º C if freezing samples are intact | Potential data usability issue | Data Reviewer |
| Accuracy (preservation) | S & A | Sample preservation | every field sample | Aqueous /Soil/Sediment: collect unpreserved and keep cold (see above) | Potential data usability issue | Data Reviewer |
| Data Completeness | S & A | Calculate from valid/usable data collected | Not applicable | ≥ 90% Overall Minimum ≥ 90% Overall | Potential data usability / data gap issue | Data Reviewer/ Investigator |
| Accuracy/ Sensitivity | S & A | Holding Time (HT) | every field sample | Soil/Sediment: HT = 30 days from collection to digestion and 7 days after digestion to analysis. For aqueous samples HT = 24 hours from collection. | Potential data usability issue | Data Reviewer |
| Accuracy & Representative-ness | S & A | Preparation of samples and additional measurements | Soil/Sediment samples must be digested prior to analysis. See SW-846 Method 3060A for alkaline digestion. Additional measurements of pH and Eh are required for soil/sediment samples. | Aqueous samples are not digested. Sample preparation: follow procedures in Method 7196A or Method 7199 for Soil/Sediment: Alkaline digestion required as per Method 3060A. pH of alkaline digestates must be maintained at method requirements. For 7196A it is 7.5 ±0.5; 7199 9.0±0.5 Then follow procedures for analysis by either method 7196A or 7199. pH & Eh (oxidation reduction potential) measurements give indication of reducing or oxidizing conditions in field sample to assist in interpretation of soluble and insoluble MS results. See Method 3060A for further details. | Re-digest if sample pH is outside the QC limits. | Analyst/Data Reviewer |

**Table 8 QAPP Worksheet All Matrices – Hexavalent Chromium SW-846 846 7196A and 7199**
**Measurement Performance Criteria & QC Samples Table– Hexavalent Chromium**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Comparability | S & A | Based on Method (SOP) and QAPP/FSP protocols | Not applicable | Comparison between historical data for qualitative integrity of the data. Comparison between spatially similar samples. | Potential data usability issue | Data Reviewer/ Investigator |

**NOTES:**
1. This table was prepared by NJDEP, April 2014 to be compliant with EPA Region 2 guidance and meet the data quality needs of the Department.

2. Method References = USEPA SW-846 Method 7196A *Hexavalent Chromium Colorimetric* and USEPA SW-846 Method 7199 (*Hexavalent Chromium by Ion Chromatography).*

[1] After reanalysis, if recovery is <30% SRP would reject associated non-detect data.

[2] After reanalysis if recovery, is 50-74% or 126-150% SRP would qualify associated data. If recoveries are<50% or >150% for both insoluble AND soluble spikes, SRP would reject associated data; otherwise would qualify associated data if one of the spikes was outside the <50% or >150% limits.

**Table 9 QAPP Worksheet All Matrices - Mercury SW-846 Method 7471B and 7470A**
**Measurement Performance Criteria & QC Samples Table– Mercury**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy | A | Initial Calibration | Daily prior to sample analysis | Minimum of 5 calibration levels plus blank; low level standard at level of RL; linear regression with a correlation coefficient r $\geq$ 0.995 | Re-optimize instrument and re-calibrate, repeat until successful | Analyst |
| Accuracy | A | Initial Calibration/ Initial Calibration Verification (ICV) | Daily after calibration | Separate-source from calibration standards; ICV: 90-110% recovery | Re-analyze; if still out, Re-calibrate as required by method; suspend all analysis until ICV meets criteria | Analyst |
| Accuracy | A | Continuing Calibration Verification (CCV) | 1 of every 10 samples and at end of run | Same source as calibration standards; conc. near mid-point of calibration curve; CCV: –80 - 120% recovery | Re-analyze and, if still out, Re-calibrate and Re-analyze all samples since last acceptable CCV | Analyst |
| Sensitivity | A | Initial and Continuing Calibration Blanks (ICB and CCB) | After ICV and after each CCV | Must be matrix-matched ( and same conc. of acid found in standards and samples); CCB: < ± RL | Re-analyze; if still out, Re-calibrate, reanalyze. | Analyst |
| Sensitivity | A | Low Level Calibration Check Standard | Daily only if RL standard is not included in initial calibration | Low Level Check Standard: 70-130% recovery | Recalibrate/reanalyze unless all results > 10x RL | Analyst |
| Accuracy & Sensitivity (Contamination) | A | Method Blank (MB) | 1 per digestion batch - not to exceed 20 field samples | Must be digested with samples using same preparation method and amount of acids; MB: < RL | Re-analyze; if still out redigest & re-analyze all samples unless all detected results > 10x MB level | Analyst |

**Table 9 QAPP Worksheet All Matrices - Mercury SW-846 Method 7471B and 7470A**
**Measurement Performance Criteria & QC Samples Table– Mercury**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy | A | Laboratory Control Sample (LCS) | 1 per digestion batch - not to exceed 20 field samples | Must be matrix-specific; aqueous LCS: 80-120% recovery; Soil/Sediment LCS vendor control limits (95% confidence) | Re-analyze, if still out; redigest (soil/sed.) & Re-analyze LCS & all field samples in batch | Analyst/ Data Reviewer |
| Precision | A | Sample Duplicate (DUP) | 1 per ≤ 20 field samples if an MS/MSD was not performed | Must be performed on a Site field sample. Aq.: Results RPD ≤ 20%; Soil/Sediment: Results, RPD ≤ 35%; | Re-analyze, qualify data | Analyst/ Data Reviewer |
| Accuracy | S & A | Matrix Spike (MS) [Site-specific QC] | 1 per ≤ 20 field samples | Must be performed on a Site field sample; MS: 75-125% recovery; professional judgment if sample concentration > 4x spike level | Evaluate LCS, unspiked sample, re-analyze, if necessary, and qualify data | Analyst/ Data Reviewer |
| Precision | S & A | Matrix Spike Duplicate (MSD) [Site-specific QC] | 1 per ≤ 20 field samples | Must be performed on a Site field sample Aq.: Results ≥ 5xRL, RPD ≤ 20%; Results < 5xRL: absolute difference between results ≤ RL. Soil/Sediment: Results ≥ 5xRL, RPD ≤ 35%; Results < 5xRL: absolute difference between results ≤ 2xRL | Lab narrates outlier; Re-analyze, qualify data | Analyst/ Data Reviewer |
| Accuracy | A | Quantitation | Not applicable | RL ≤ results ≤ upper calibration range on a sample-specific basis. Report all Aq. results in µg/L or mg/L and all Soil/Sediment results in mg/Kg on a dry-weight basis. | Perform dilution to bring analyte within linear range, report from diluted analysis | Analyst/ Data Reviewer |
| Overall Precision & Representative ness | S & A | Field Duplicate Samples [Site-specific QC] | 1 per 20 field samples | Aq.: Results ≥ 5xRL: RPD ≤ 30%; Results < 5xRL: professional judgment; Soil/Sediment: Results ≥ 5xRL: RPD ≤ 50%; Results < 5xRL: professional judgment | Potential data usability issue; indication of sample heterogeneity | Data Reviewer |

**Table 9 QAPP Worksheet All Matrices - Mercury SW-846 Method 7471B and 7470A**
**Measurement Performance Criteria & QC Samples Table– Mercury**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy (preservation) | S & A | Temperature Blank or other Cooler Temperature Reading | 1 Temperature reading per cooler to be recorded upon receipt at lab | Soil/Sediment: $\leq$ 6º C per SW-846 Chapter 3 Table 3-2 but allow for < 2º C if freezing samples are intact | Lab narrates outlier; Potential data usability issue | Data Reviewer |
| Accuracy (preservation) | S & A | Sample preservation | Every field sample | Aq.: Total Metals: $HNO_3$ pH < 2; (Dissolved Metals: filter on site or at the lab then $HNO_3$ pH < 2 but cannot be used for regulatory compliance) Soil/Sediment: collect unpreserved and keep cold (see above) | Potential data usability issue | Data Reviewer |
| Accuracy/ Sensitivity | S & A | Holding Time (HT) | Every field sample | Aqueous and Soil/Sediment: HT = 28 days from collection to analysis If Soil/Sediment samples are frozen, HT arrested and HT begins when thawed. Samples can be maintained frozen for 1 year from collection. | Lab narrates outlier; Potential data usability issue | Data Reviewer |
| Accuracy & Sensitivity (Contamination ) | S & A | Equipment Rinsate Blank (EB) | Not Required if using dedicated sampling equipment. If performing decontamination of equipment, collect 1 EB per 20 field samples collected by the same method | Aqueous EB: < RL Soil/Sediment EB <RL on solid equivalent basis | Aqueous potential data usability issue, Soil/Sediment: non-matrix matched aqueous EB use professional judgment | Data Reviewer |
| Data Completeness | S & A | Calculate from valid/usable data collected | Not applicable | Minimum $\geq$ 90% Overall | Potential data usability / data gap issue | Data Reviewer/ Investigator |

**Table 9 QAPP Worksheet All Matrices - Mercury SW-846 Method 7471B and 7470A**
**Measurement Performance Criteria & QC Samples Table– Mercury**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Comparability | S & A | Based on Method (SOP) and QAPP/FSP protocols | Not applicable | Comparison between historical data for qualitative integrity of the data. Comparison between spatially similar samples. | Potential data usability issue | Data Reviewer/ Investigator |

**NOTES:**
1. This table was prepared by NJDEP, April 2014 to be compliant with EPA Region 2 guidance and meet the data quality needs of the Department.

2. Method References = USEPA SW-846 Method 7471B (*Mercury in Solid or Semisolid Waste by Manual Cold Vapor Technique*, February 2007) and USEPA SW-846 Method 7470A (*Mercury in Aqueous Samples by Manual Cold Vapor Technique*, September 1994).

**Table 10 QAPP Worksheet Aqueous – VOAs USEPA 524.2**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy/ Sensitivity | A | Laboratory Reagent Blank (LRB) or Method Blank | 1 per batch of up to 20 field samples (matrix-specific) | Target analytes must be < RL, Except for common laboratory contaminates (acetone, methylene chloride and MEK) which must be < 5x RL, surrogates in criteria | Reanalyze. Report non-conformance in narrative; compounds present in blank should be flagged "B" in samples, if detected. | Analyst |
| Accuracy | A | Laboratory Fortified Matrix (LFM) [Site-specific QC] | Performed at least quarterly and if criteria in Section 9.4 of 524.2 are not met. | Must contain all target analytes, performed on Site field sample, 70-130%; difficult analytes ** must exhibit percent recoveries between 40-160%. | Evaluate LFM, unspiked sample, and qualify data and narrate issue | Analyst/Data Reviewer |
| Accuracy | A | Quality Control Sample (QCS) | Performed at least quarterly | Must contain all target analytes, performed on Site field sample, 70-130%; difficult analytes ** must exhibit percent recoveries between 40-160%. | Reanalyze, if necessary, qualify data and narrate issues of non-conformance | Analyst/Data Reviewer |
| Accuracy | A | Laboratory Fortified Blank (LFB) | 1 per batch of up to 20 samples | Must contain all target analytes, spiked into a blank matrix, acceptable recoveries of 70-130%; difficult analytes ** must exhibit percent recoveries between 40-160%. | Reanalyze, if necessary, qualify data and narrate issues of non-conformance | Analyst/Data Reviewer |
| Precision | A | Sample Duplicate (DUP) | 1 per $\leq$ 20 field samples performed | Must be performed on a Site field sample. RPDs $\leq$ 20% | Qualify data and narrate issues of non-conformance | Analyst/Data Reviewer |

**Table 10 QAPP Worksheet Aqueous – VOAs USEPA 524.2**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy | A | Surrogates | Every sample including QC | 2 surrogates 1,2-dichlorobenzene-$d_4$ and Bromofluorobenzene (BFB); area recoveries 70-130% of CCAL or 50-150% of ICAL | Reanalyze, if necessary, qualify data | Analyst/Data Reviewer |
| Accuracy | A | Internal Standards (IS) | Every sample including QC | Fluorobenzene; Areas 70-130% of CCV or 50-150% of ICAL | Reanalyze, if necessary, qualify data | Analyst/Data Reviewer |
| Accuracy | A | BFB Tune | Every 12 hours | Method tune criteria based on criteria in Table 3 of USEPA-524.2 | Perform instrument maintenance; reanalyze until acceptable | Analyst |
| Accuracy | A | Initial Calibration (ICAL) | Initially and when CCV fails | Minimum 3-standards; must contain all targets and lowest standard ≤ RL; average RRF $\geq$ 0.05;%RSD ≤ 20% for all compounds | Recalibrate as required by method; analysis cannot proceed without a valid initial calibration | Analyst |
| Accuracy | A | Continuing Calibration Verification (CCV) | 1 every 12 hours prior to analysis of samples | Concentration level near mid-point of ICAL curve containing all target compounds; %D ≤ 30% | Recalibrate as required by method; note outliers in narrative. | Analyst |
| Accuracy | A | Quantitation | Every sample | RL $\leq$results ≤ upper calibration range on a sample-specific basis; IS must be used; and average response factors or curve-statistics generated from the ICAL must be used for quantitation. Results reported between the MDL and RL qualified "J" | Perform dilution to bring analyte within linear range, qualify data | Analyst/Data Reviewer |

**Table 10 QAPP Worksheet Aqueous – VOAs USEPA 524.2**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Sensitivity | A | Reporting of Non-Detects | Every sample | Reported at the sample-specific RL which must be ≤ PRL | Potential data usability issue | Data Reviewer |
| Overall Precision & Representative-ness | S & A | Field Duplicate Samples [Site-specific QC] | 1 per 20 field samples | RPD ≤ 30% for waters or RPD ≤ 50% for solids w/results > 2x RL; Professional judgment for results < 2xRL | Potential data usability issue | Data Reviewer |
| Accuracy (preservation) | S | Temperature Blank or other Cooler Temperature Reading | 1 Temperature reading per cooler to be recorded upon receipt at lab | 4º C ± 2º C; allow for < 2º C if samples intact sample preservation per USEPA 524.2 Section 8.2. | Potential data usability issue | Data Reviewer |
| Accuracy/ Sensitivity | S & A | Holding Time (HT) | Every field sample | Analyses within 14 days of collection (24 hours if unpreserved); sample preservation per Section 8.0 of Method 524.2 | Potential data usability issue | Data Reviewer |

**Table 10 QAPP Worksheet Aqueous – VOAs USEPA 524.2**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy/ Sensitivity | S | Equipment Blank [Site-specific QC] | Not required if using dedicated sampling equipment. If performing decontamination of equipment, collect 1 EB per 20 field samples collected by the same method | Target analytes < RL | Potential data usability issue | Data Reviewer |
| Data Completeness | S & A | Calculate from valid/usable data collected | Not applicable | ≥ 90% Overall | Potential data usability / data gap issue | Data Reviewer/ Investigator |
| Comparability | S & A | Based on Method (SOP) and QAPP/FSP protocols | Not applicable | Comparison between historical data for qualitative integrity of the data. Comparison between spatially similar samples. | Potential data usability issue | Data Reviewer/ Investigator |

**NOTES:**
1. This table was prepared by NJDEP April 2014; to be compliant with EPA Region 2 guidance, and meet the data quality needs of the Department.

2. Volatile Organic Compound analyses via USEPA 524.2 (*Measurement of Purgeable Organic Compounds in water by Capillary Column Gas Chromatography/Mass Spectroscopy [GC/MS]).*

** Potentially "difficult" analytes include: acetone, methyl ethyl ketone, 4-methyl-2-pentanone, 2-hexanone, dichlorodifluoromethane, bromomethane, chloromethane, and 1, 4-dioxane.

**Table 11 QAPP Worksheet All Matrices – VOAs by USEPA SW-846 8260B**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy | A | BFB Tune | Every 12 hours | Method tune criteria based on criteria in Table 4 of USEPA-SW846 Method 8260B | Perform instrument maintenance; reanalyze until acceptable | Analyst |
| Accuracy | A | Initial Calibration (ICAL) | Initially and when CCV fails | Minimum 5-standards; must contain all targets and lowest standard ≤ RL; Full Scan: RF for SPCCs Section 7.3.5.4; %RSD ≤ 15% for all compounds except CCC's which must be ≤30% RSD or "r" ≥ 0.99; SIM: %RSD ≤ 20% or "r" ≥ 0.99 for all compounds; regression analysis, if used, must not be forced through the origin | Recalibrate as required by method; analysis cannot proceed without a valid initial calibration | Analyst |
| Accuracy/ Sensitivity | A | Method Blank | 1 per preparatory batch of up to 20 field samples (matrix-specific) | Targets analytes must be < RL except for common laboratory contaminates (acetone, methylene chloride and MEK) which must be < 5x RL, surrogates in criteria | Reanalyze and, if necessary, re-extract. Report non-conformance in narrative; compounds present in blank should be flagged "B" in samples, if detected. | Analyst |
| Accuracy | A | Matrix Spike/ Matrix Spike Duplicate [Site-specific QC] | 1 per ≤ 20 field samples per matrix | Must contain all target analytes, performed on Site field sample, % recovery 70-130% except for difficult analytes** which must exhibit % recovery between 40-160% | Evaluate LCS, unspiked sample, reanalyze, if necessary, and qualify data and narrate issue | Analyst/Data Reviewer |

**Table 11 QAPP Worksheet All Matrices – VOAs by USEPA SW-846 8260B**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Precision | A | Matrix Spike/ Matrix Spike Duplicate [Site-specific QC] | 1 per ≤ 20 field samples per matrix | Must contain all target analytes, performed on Site field sample, recovery criteria same as MS; RPDs ≤ 20% for waters and ≤ 30% for solids | Reanalyze, if necessary, qualify data and narrate issues of non-conformance | Analyst/Data Reviewer |
| Accuracy | A | Laboratory Control Sample (LCS) | 1 per preparatory batch of up to 20 samples | Must contain all target analytes, be matrix-matched; % Recovery 70-130% except for difficult analytes ** must exhibit percent recoveries between 40-160%. | Reanalyze, if necessary, qualify data and narrate issues of non-conformance | Analyst/Data Reviewer |
| Precision | A | Sample Duplicate (DUP) | 1 per ≤ 20 field samples if a MS/MSD was not performed | Must be performed on a Site field sample. RPDs ≤ 20% for waters and ≤ 30% for solids for results > 2x RL | Reanalyze, if necessary, qualify data and narrate issues of non-conformance | Analyst/Data Reviewer |
| Accuracy | A | Surrogates | Every sample including QC | Minimum of 3 surrogates at retention times across GC run for all matrices; surrogates must be between 70-130% for all compounds. | Reanalyze, if necessary, qualify data | Analyst/Data Reviewer |
| Accuracy | A | Internal Standards (IS) | 3 per sample including QC | Minimum of 3 IS , Areas 50-200% of the most recent CCV; RTs ±30 sec. from midpoint ICAL standard | Reanalyze and qualify data | Analyst/Data Reviewer |
| Accuracy | A | Continuing Calibration Verification (CCV) | 1 every 12 hours prior to analysis of samples | Concentration level near mid-point of ICAL curve containing all target compounds; *Full Scan and SIM*: min RRF criteria met; %D or % Drift ≤ 20% for all compounds | Recalibrate as required by method; note outliers in narrative. | Analyst |

**Table 11 QAPP Worksheet All Matrices – VOAs by USEPA SW-846 8260B**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy | A | Quantitation | Every sample | RL ≤results ≤ upper calibration range on a sample-specific basis; IS must be used; and average response factors or curve-statistics generated from the ICAL must be used for quantitation. Results reported between the MDL and RL qualified "J" | Perform dilution to bring analyte within linear range, qualify data | Analyst/Data Reviewer |
| Sensitivity | A | Reporting of Non-Detects | Every sample | Reported at the sample-specific RL which must be ≤ PRL | Potential data usability issue | Data Reviewer |
| Overall Precision & Representative-ness | S & A | Field Duplicate Samples [Site-specific QC] | 1 per 20 field samples | RPD ≤ 30% for waters or RPD ≤ 50% for solids w/results > 2x RL; Professional judgment for results < 2xRL | Potential data usability issue | Data Reviewer |
| Accuracy (preservation) | S | Temperature Blank or other Cooler Temperature Reading | 1 Temperature reading per cooler to be recorded upon receipt at lab | ≤ 6º C; allow for < 2º C if samples intact sample preservation per SW-846 Chapter 4 Table 4-1 | Potential data usability issue | Data Reviewer |
| Accuracy/ Sensitivity | S & A | Holding Time (HT) | Every field sample | Analyses within 14 days of collection (7 days if unpreserved). Aqueous samples adjust pH to < 2 with HCL or per SW-846 Table 4-1 preservatives. | Potential data usability issue | Data Reviewer |

**Table 11 QAPP Worksheet All Matrices – VOAs by USEPA SW-846 8260B**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy/ Sensitivity | S | Equipment Blank [Site-specific QC] | Not Required if using dedicated sampling equipment. If performing decontamination of equipment, collect 1 EB per 20 field samples collected by the same method. | Target analytes < RL | Potential data usability issue | Data Reviewer |
| Data Completeness | S & A | Calculate from valid/usable data collected | Not applicable | ≥ 90% Overall | Potential data usability / data gap issue | Data Reviewer/ Investigator |
| Comparability | S & A | Based on Method (SOP) and QAPP/FSP protocols | Not applicable | Comparison between historical data for qualitative integrity of the data. Comparison between spatially similar samples. | Potential data usability issue | Data Reviewer/ Investigator |

**NOTES:**
1. This table was prepared by NJDEP, April 2014, to be compliant with EPA Region 2 guidance and meets the data quality needs of the Department.

2. Volatile Organic Compound analyses via USEPA SW-846 Method 8260B (*Quality Assurance and Quality Control Requirements for SW-846 Method 8260B* or 8260C *Volatile Organic Compounds by Gas Chromatography/Mass Spectroscopy [GC/MS]).*

** Potentially "difficult" analytes include: acetone, methyl ethyl ketone, 4-methyl-2-pentanone, 2-hexanone, dichlorodifluoromethane, bromomethane, chloromethane, carbon disulfide, 1,2-Dibromo-3-chloropropane, chloroethane, naphthalene, trichlorofluoromethane, and 1, 4-dioxane.

**Table 12 QAPP Worksheet All Matrices – VOAs by USEPA SW-846 8260C**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy | A | BFB Tune | Every 12 hours | Method tune criteria based on criteria in Table 3 of USEPA-SW846 Method 8260C | Perform instrument maintenance; reanalyze until acceptable | Analyst |
| Accuracy | A | Initial Calibration (ICAL) | Initially and when CCV fails | Minimum 5-standards; must contain all targets and lowest standard ≤ RL; Full Scan: %RSD ≤ 20% for all compounds and minimum RF found in Table 4 or "r" ≥ 0.99; SIM: %RSD ≤ 20% and minimum RF found in Table 4 or "r" ≥ 0.99 for all compounds; | Recalibrate as required by method; analysis cannot proceed without a valid initial calibration | Analyst |
| Accuracy/ Sensitivity | A | Method Blank | 1 per preparatory batch of up to 20 field samples (matrix-specific) | Targets analytes must be < RL except for common laboratory contaminates (acetone, methylene chloride and MEK) which must be < 5x RL, surrogates in criteria | Reanalyze and, if necessary, re-extract. Report non-conformance in narrative; compounds present in blank should be flagged "B" in samples, if detected. | Analyst |
| Accuracy | A | Matrix Spike/ Matrix Spike Duplicate [Site-specific QC] | 1 per ≤ 20 field samples per matrix | Must contain all target analytes, performed on Site field sample, % recovery 70-130% except for difficult analytes** which must exhibit % recovery between 40-160% | Evaluate LCS, unspiked sample, reanalyze, if necessary, and qualify data and narrate issue | Analyst/Data Reviewer |

**Table 12 QAPP Worksheet All Matrices – VOAs by USEPA SW-846 8260C**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Precision | A | Matrix Spike/ Matrix Spike Duplicate [Site-specific QC] | 1 per ≤ 20 field samples per matrix | Must contain all target analytes, performed on Site field sample, recovery criteria same as MS; RPDs ≤ 20% for waters and ≤ 30% for solids | Reanalyze, if necessary, qualify data and narrate issues of non-conformance | Analyst/Data Reviewer |
| Accuracy | A | Laboratory Control Sample (LCS) | 1 per preparatory batch of up to 20 samples | Must contain all target analytes, be matrix-matched; % Recovery 70-130% except for difficult analytes ** must exhibit percent recoveries between 40-160%. | Reanalyze, if necessary, qualify data and narrate issues of non-conformance | Analyst/Data Reviewer |
| Precision | A | Sample Duplicate (DUP) | 1 per ≤ 20 field samples if a MS/MSD was not performed | Must be performed on a Site field sample. RPDs ≤ 20% for waters and ≤ 30% for solids for results > 2x RL | Reanalyze, if necessary, qualify data and narrate issues of non-conformance | Analyst/Data Reviewer |
| Accuracy | A | Surrogates | Every sample including QC | Minimum of 3 surrogates at retention times across GC run for all matrices; surrogates must be between 70-130% for all compounds. | Reanalyze, if necessary, qualify data | Analyst/Data Reviewer |
| Accuracy | A | Internal Standards (IS) | 3 per sample including QC | Minimum of 3 IS , Areas 50-200% of the most recent midpoint CCV standard; RTs ± 30 sec. from midpoint ICAL standard | Reanalyze and qualify data | Analyst/Data Reviewer |
| Accuracy | A | Continuing Calibration Verification (CCV) | 1 every 12 hour prior to analysis of samples | Concentration level near mid-point of ICAL curve containing all target compounds; *Full Scan and SIM*: min RRF criteria met; %D or % Drift ≤ 20% for all compounds | Recalibrate as required by method; note outliers in narrative. | Analyst |

**Table 12 QAPP Worksheet All Matrices – VOAs by USEPA SW-846 8260C**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy | A | Quantitation | Every sample | RL ≤results ≤ upper calibration range on a sample-specific basis; IS must be used; and average response factors or curve-statistics generated from the ICAL must be used for quantitation. Results reported between the MDL and RL qualified "J" | Perform dilution to bring analyte within linear range, qualify data | Analyst/Data Reviewer |
| Sensitivity | A | Reporting of Non-Detects | Every sample | Reported at the sample-specific RL which must be ≤ PRL | Potential data usability issue | Data Reviewer |
| Overall Precision & Representative-ness | S & A | Field Duplicate Samples [Site-specific QC] | 1 per 20 field samples | RPD ≤ 30% for waters or RPD ≤ 50% for solids w/results > 2x RL; Professional judgment for results < 2xRL | Potential data usability issue | Data Reviewer |
| Accuracy (preservation) | S | Temperature Blank or other Cooler Temperature Reading | 1 Temperature reading per cooler to be recorded upon receipt at lab | ≤ 6º C; allow for < 2º C if samples intact sample preservation per SW-846 Chapter 4 Table 4-1 | Potential data usability issue | Data Reviewer |
| Accuracy/ Sensitivity | S & A | Holding Time (HT) | Every field sample | Analyses within 14 days of collection (7 days if unpreserved). Aqueous samples adjust pH to < 2 with HCL or per SW-846 Table 4-1 preservatives. | Potential data usability issue | Data Reviewer |

**Table 12 QAPP Worksheet All Matrices – VOAs by USEPA SW-846 8260C**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy/ Sensitivity | S | Equipment Blank [Site-specific QC] | Not required if using dedicated sampling equipment. If performing decontamination of equipment, collect 1 EB per 20 field samples collected by the same method | Target analytes < RL | Potential data usability issue | Data Reviewer |
| Data Completeness | S & A | Calculate from valid/usable data collected | Not applicable | ≥ 90% Overall | Potential data usability / data gap issue | Data Reviewer/ Investigator |
| Comparability | S & A | Based on Method (SOP) and QAPP/FSP protocols | Not applicable | Comparison between historical data for qualitative integrity of the data. Comparison between spatially similar samples. | Potential data usability issue | Data Reviewer/ Investigator |

**NOTES:**
1. This table was prepared by NJDEP, April 2014, to be compliant with EPA Region 2 guidance and meets the data quality needs of the Department.

2. Volatile Organic Compound analyses via USEPA SW-846 Method 8260C (*Quality Assurance and Quality Control Requirements for SW-846 Method 8260C* or 8260C *Volatile Organic Compounds by Gas Chromatography/Mass Spectroscopy [GC/MS]).*

** Potentially "difficult" analytes include: acetone, methyl ethyl ketone, 4-methyl-2-pentanone, 2-hexanone, dichlorodifluoromethane, bromomethane, chloromethane, carbon disulfide, 1,2-Dibromo-3-chloropropane, chloroethane, naphthalene, trichlorofluoromethane, and 1, 4-dioxane.

**Table 13 QAPP Worksheet All Matrices – - SVOAs by USEPA SW-846 8270C**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy | A | DFTPP Tune | Every 12 hours | Method tune criteria based on criteria in Table 3 of USEPA-SW846 Method 8270C | Perform instrument maintenance; reanalyze until acceptable | Analyst |
| Accuracy | A | Initial Calibration (ICAL) | Initially and when CCAL fails | Minimum 5-standards; must contain all targets and lowest standard ≤ RL; *Full Scan*: RF ≥ 0.05 for SPCCs; %RSD ≤ 15% for all compounds except CCCs which must be ≤20% RSD or "r" ≥ 0.99; *SIM*: %RSD ≤ 20% or "r" ≥ 0.99 for all compounds | Recalibrate as required by method; analysis cannot proceed without a valid initial calibration | Analyst |
| Accuracy/ Sensitivity | A | Method Blank | 1 per extraction batch of up to 20 field samples | Must be matrix matched; Phthalates < 5xRL; All other Targets < RL, surrogates in criteria | Reanalyze and, if necessary, re-extract. Report non-conformance in narrative; compounds present in blank should be flagged "B" in samples, if detected. | Analyst |
| Accuracy | A | Matrix Spike/ Matrix Spike Duplicate [Site-specific QC] | 1 per ≤ 20 field per matrix samples | Must contain all target analytes, performed on Site field sample, % recovery 70-130% except for difficult analytes** which must exhibit % recovery between 20-160% | Evaluate LCS, unspiked sample, reanalyze, if necessary, and qualify data and narrate issue | Analyst/Data Reviewer |

**Table 13 QAPP Worksheet All Matrices – - SVOAs by USEPA SW-846 8270C**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Precision | A | Matrix Spike/ Matrix Spike Duplicate [Site-specific QC] | 1 per ≤ 20 field per matrix samples | Must contain all target analytes, performed on Site field sample, % recovery criteria same as MS. RPDs ≤ 20% for waters and ≤ 30% for solids | Reanalyze, if necessary, qualify data and narrate issues of non-conformance | Analyst/Data Reviewer |
| Accuracy | A | Laboratory Control Sample (LCS) | 1 per extraction batch of up to 20 samples | Must contain all target analytes, be matrix-matched; % Recovery 70-130% except for difficult analytes ** must exhibit percent recoveries between 20-160%. | Reanalyze, if necessary, qualify data and narrate issues of non-conformance | Analyst/Data Reviewer |
| Precision | A | Sample Duplicate (DUP) | 1 per ≤ 20 field samples if an MS/MSD was not performed | Must be performed on a Site field sample. RPD ≤ 20% for waters and ≤ 30% for solids for results > 2x RL | Reanalyze, if necessary, qualify data and narrate issues of non-conformance | Analyst/Data Reviewer |
| Accuracy | A | Surrogates | Every sample including QC | Minimum of 3 base-neutral and 3 acid surrogates at RTs across GC run; for solids matrices must be between 30-130% for all compounds; for water matrices 30-130% for BN surrogates and 15-110% for Acid surrogates | Reanalyze, if necessary, qualify data | Analyst/Data Reviewer |
| Accuracy | A | Internal Standards (IS) | 6 per sample including QC | Minimum of 6 IS , Areas 50-200% of the most recent CCV standard; RTs ± 30 sec. from midpoint ICAL standard | Reanalyze and qualify data | Analyst/Data Reviewer |
| Accuracy | A | Continuing Calibration Verification (CCV) | 1 every 12 hour prior to analysis of samples | Concentration level near mid-point of ICAL curve containing all target compounds; *Full Scan*: %D or %Drift ≤ 20% for CCCs and ≤ 30% for all other compounds<br>*SIM*: %D or %Drift ≤ 30% | Recalibrate as required by method; note outliers in narrative. | Analyst |

**Table 13 QAPP Worksheet All Matrices – - SVOAs by USEPA SW-846 8270C**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy | A | Quantitation | Every sample | RL ≤results ≤ upper calibration range on a sample-specific basis; IS must be used; and average response factors or curve-statistics generated from the ICAL must be used for quantitation. Results reported between the MDL and RL qualified "J" | Perform dilution to bring analyte within linear range, qualify data | Analyst/Data Reviewer |
| Sensitivity | A | Reporting of Non-Detects | Every sample | Reported at the sample-specific RL which must be ≤ PRL | Potential data usability issue | Data Reviewer |
| Overall Precision & Representative-ness | S & A | Field Duplicate Samples [Site-specific QC] | 1 per 20 field samples | RPD ≤ 30% for waters or RPD ≤ 50% for solids w/results > 2x RL; Professional judgment for results < 2xRL | Potential data usability issue | Data Reviewer |
| Accuracy (preservation) | S | Temperature Blank or other Cooler Temperature Reading | 1 Temperature reading per cooler to be recorded upon receipt at lab | ≤ 6º C; allow for < 2º C if samples intact sample preservation per SW-846 Chapter 4 Table 4-1 | Potential data usability issue | Data Reviewer |
| Accuracy/ Sensitivity | S & A | Holding Time (HT) | Every field sample | Aqueous samples extracted within 7 days of collection; extract analyzed within 40 days of extraction. Soil/Sediment samples extracted within 14 days of collection; extract analyzed within 40 days of extraction. If Soil/Sediment samples are frozen, HT arrested and extraction HT continues when thawed. Solid samples can be maintained frozen for 1 year from collection. | Potential data usability issue | Data Reviewer |

**Table 13 QAPP Worksheet All Matrices – - SVOAs by USEPA SW-846 8270C**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy/ Sensitivity | S | Equipment Blank [Site-specific QC] | Not Required if using dedicated sampling equipment. If performing decontamination of equipment, Collect 1 EB per 20 field samples collected by the same method | Target analytes < RL | Potential data usability issue | Data Reviewer |
| Data Completeness | S & A | Calculate from valid/usable data collected | Not applicable | ≥ 90% Overall | Potential data usability / data gap issue | Data Reviewer/ Investigator |
| Comparability | S & A | Based on Method (SOP) and QAPP/FSP protocols | Not applicable | Comparison between historical data for qualitative integrity of the data. Comparison between spatially similar samples. | Potential data usability issue | Data Reviewer/ Investigator |

**NOTES:**

1. This table was prepared by NJDEP, January 2011 to be compliant with EPA Region 2 guidance and meet the data quality needs of the Department.
2. Semivolatile Organic Compound analyses via USEPA SW-846 Method 8270D (*Quality Assurance and Quality Control Requirements for SW-846 Method* 8270D *Semivolatile Organic Compounds by Gas Chromatography/Mass Spectroscopy [GC/MS]).* 8270D:

** Potentially "difficult" analytes include: benzenthiol, benzoic Acid, 2,4-dintrophenol, 3&4 – methylphenol, 4-nitrophenol, pentachlorophenol, phenol, aniline, aramite, A,A-dimethylphenethylamine, benzidine, benzaldehyde, benzyl Alcohol, caprolactam, chlorobenzilate, 3,3'-Dimethylbenzidine, 1,4-Dioxane, 7,12-Dimethylbenz(a)anthracene, Diallate, Dibenz(a,j)acridine, Diphenylamine, Disulfoton, p-(dimethylamine)azobenzene, decane, famphur, hexachlorocyclopentadiene, hexachloroethane, hexachlorophene, hexachloropropene, kepone, 4,4'-methylenebis(2-chloroaniline), methapyrilene, methyl methanesulfonate, methyl parathion, n-nitrosodimethylamine, 4-nitroquinoline-1-oxide, 2-Picoline, parathion, pentachloroethane, pentachlorobenzene, pentachloronitrobenzene, phorate, pronamide, pyridine, p-phenylenediamine, o-tricresyl phosphate and Tetraethyl. Please note that many of the surrogates may fall outside of the 15 – 110% range 2-Fluorophenol, Phenol-d5, 2,4,6-tribromophenol and terphenyl-d14.

**Table 14 QAPP Worksheet All Matrices – - SVOAs by USEPA SW-846 8270D**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy | A | DFTPP Tune | Every 12 hours | Method tune criteria based on criteria in Table 3 of USEPA-SW846 Method 8270D | Perform instrument maintenance; reanalyze until acceptable | Analyst |
| Accuracy | A | Initial Calibration (ICAL) | Initially and when CCAL fails | Minimum 5-standards; must contain all targets and lowest standard ≤ RL;<br>*Full Scan*: RF see Table 4 for minimum RF; %RSD ≤ 20% for all compounds or "r" ≥ 0.99;<br>*SIM*: %RSD ≤ 20% or "r" ≥ 0.99 for all compounds | Recalibrate as required by method; analysis cannot proceed without a valid initial calibration | Analyst |
| Accuracy/ Sensitivity | A | Method Blank | 1 per extraction batch of up to 20 field samples | Must be matrix matched;<br>Phthalates < 5xRL;<br>All other Targets < RL,<br>surrogates in criteria | Reanalyze and, if necessary, re-extract. Report non-conformance in narrative; compounds present in blank should be flagged "B" in samples, if detected. | Analyst |
| Accuracy | A | Matrix Spike/ Matrix Spike Duplicate [Site-specific QC] | 1 per ≤ 20 field per matrix samples | Must contain all target analytes, performed on Site field sample,<br>% recovery 70-130% except for difficult analytes** which must exhibit % recovery between 20-160% | Evaluate LCS, unspiked sample, reanalyze, if necessary, and qualify data and Narrate issue | Analyst/Data Reviewer |

**Table 14 QAPP Worksheet All Matrices – - SVOAs by USEPA SW-846 8270D**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Precision | A | Matrix Spike/ Matrix Spike Duplicate [Site-specific QC] | 1 per ≤ 20 field per matrix samples | Must contain all target analytes, performed on Site field sample, % recovery criteria same as MS. RPDs ≤ 20% for waters and ≤ 30% for solids | Reanalyze, if necessary, qualify data and narrate issues of non-conformance | Analyst/Data Reviewer |
| Accuracy | A | Laboratory Control Sample (LCS) | 1 per extraction batch of up to 20 samples | Must contain all target analytes, be matrix-matched; % Recovery 70-130% except for difficult analytes ** must exhibit percent recoveries between 20-160%. | Reanalyze, if necessary, qualify data and narrate issues of non-conformance | Analyst/Data Reviewer |
| Precision | A | Sample Duplicate (DUP) | 1 per ≤ 20 field samples if an MS/MSD was not performed | Must be performed on a Site field sample. RPD ≤ 20% for waters and ≤ 30% for solids for results > 2x RL | Reanalyze, if necessary, qualify data and narrate issues of non-conformance | Analyst/Data Reviewer |
| Accuracy | A | Surrogates | Every sample including QC | Minimum of 3 base-neutral and 3 acid surrogates at RTs across GC run; for solids Matrices must be between 30-130% for all compounds; for water matrices 30-130% for BN surrogates and 15-110% for acid surrogates | Reanalyze, if necessary, qualify data | Analyst/Data Reviewer |
| Accuracy | A | Internal Standards (IS) | 6 per sample including QC | Minimum of 6 IS, Areas 50-200% of the most recent t CCV standard; RTs ± 30 sec. from midpoint ICAL standard | Reanalyze and qualify data | Analyst/Data Reviewer |

**Table 14 QAPP Worksheet All Matrices – - SVOAs by USEPA SW-846 8270D**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy | A | Continuing Calibration Verification (CCV) | 1 every 12 hour prior to analysis of samples | Concentration level near mid-point of ICAL curve containing all target compounds; *Full Scan*: %D or %Drift ≤ 20% for CCCs and ≤ 30% for all other compounds; *SIM*: %D or %Drift ≤ 30% | Recalibrate as required by method; note outliers in narrative. | Analyst |
| Accuracy | A | Quantitation | Every sample | RL ≤results ≤ upper calibration range on a sample-specific basis; IS must be used; and<br>RL ≤results ≤ upper calibration range on a sample-specific basis; IS must be used; and average response factors or curve-statistics generated from the ICAL must be used for quantitation. Results reported between the MDL and RL qualified "J" | Perform dilution to bring analyte within linear range, qualify data | Analyst/Data Reviewer |
| Sensitivity | A | Reporting of Non-Detects | Every sample | Reported at the sample-specific RL which must be ≤ PRL | Potential data usability issue | Data Reviewer |
| Overall Precision & Representative-ness | S & A | Field Duplicate Samples [Site-specific QC] | 1 per 20 field samples | RPD ≤ 30% for waters or RPD ≤ 50% for solids w/results > 2x RL; Professional judgment for results < 2xRL | Potential data usability issue | Data Reviewer |
| Accuracy (preservation) | S | Temperature Blank or other Cooler Temperature Reading | 1 Temperature reading per cooler to be recorded upon receipt at lab | ≤ 6º C; allow for < 2º C if samples intact sample preservation per SW-846 Chapter 4 Table 4-1 | Potential data usability issue | Data Reviewer |

**Table 14 QAPP Worksheet All Matrices – - SVOAs by USEPA SW-846 8270D**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy/ Sensitivity | S & A | Holding Time (HT) | Every field sample | Aqueous samples extracted within 7 days of collection; extract analyzed within 40 days of extraction. Soil/Sediment samples extracted within 14 days of collection; extract analyzed within 40 days of extraction. If Soil/Sediment samples are frozen, HT arrested and extraction HT continues when thawed. Solid samples can be maintained frozen for 1 year from collection. | Potential data usability issue | Data Reviewer |
| Accuracy/ Sensitivity | S | Equipment Blank [Site-specific QC] | Not Required if using dedicated sampling equipment. If performing decontamination of equipment, collect 1 EB per 20 field samples collected by the same method | Target analytes < RL | Potential data usability issue | Data Reviewer |
| Data Completeness | S & A | Calculate from valid/usable data collected | Not applicable | $\geq$ 90% Overall | Potential data usability / data gap issue | Data Reviewer/ Investigator |
| Comparability | S & A | Based on Method (SOP) and QAPP/FSP protocols | Not applicable | Comparison between historical data for qualitative integrity of the data. Comparison between spatially similar samples. | Potential data usability issue | Data Reviewer/ Investigator |

**NOTES:**

1. This table was prepared by NJDEP, January 2011 to be compliant with EPA Region 2 guidance and meet the data quality needs of the Department.

2. Semivolatile Organic Compound analyses via USEPA SW-846 Method 8270D (*Quality Assurance and Quality Control Requirements for SW-846 Method* 8270D *Semivolatile Organic Compounds by Gas Chromatography/Mass Spectroscopy [GC/MS]).* 8270D:

** Potentially "difficult" analytes include: Benzenthiol, Benzoic Acid, 2,4-Dintrophenol, 3&4 – Methylphenol, 4-Nitrophenol, Pentachlorophenol, Phenol, Aniline, Aramite, A,A-Dimethylphenethylamine, Benzidine, Benzaldehyde, Benzyl Alcohol, Caprolactam, Chlorobenzilate, 3,3'-Dimethylbenzidine, 1,4-Dioxane, 7,12-Dimethylbenz(a)anthracene, Diallate, Dibenz(a,j)acridine, Diphenylamine, Disulfoton, p-(dimethylamine)azobenzene, Decane, Famphur, Hexachlorocyclopentadiene, Hexachloroethane, Hexachlorophene, Hexachloropropene, Kepone, 4,4'-methylenebis(2-chloroaniline), Methapyrilene, Methyl methanesulfonate, Methyl parathion, n-Nitrosodimethylamine, 4-Nitroquinoline-1-oxide, 2-Picoline, Parathion, Pentachloroethane, Pentachlorobenzene, Pentachloronitrobenzene, Phorate, Pronamide, Pyridine, p-Phenylenediamine, o-tricresyl phosphate and Tetraethyl. Please note that many of the surrogates fall outside or the 15 – 110% range 2-Fluorophenol, Phenol-d5, 2,4, 6-Tribromophenol and Terphenyl-d14.

**Table 15 QAPP Worksheet Air – VOAs USEPA TO-15 (and NJDEP LLTO-15)**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy | A | BFB Tune | Every 24 hours | Method tune criteria based on criteria in Table 3 of USEPA- Method TO-15 | Perform instrument maintenance; reanalyze until acceptable | Analyst |
| Accuracy | A | Initial Calibration (ICAL) | Initially and when CCAL fails | Minimum 5-standards; must contain all targets and lowest standard ≤ RL; Full Scan: %RSD ≤ 30% for all compounds (allowance for 2 compounds up to ≤ 40% ) | Recalibrate as required by method; analysis cannot proceed without a valid initial calibration | Analyst |
| Accuracy | A | Initial Calibration Verification Sample NJDEP TO-15 ONLY | Immediately after last ICAL std. and before any field sample. | Must contain all target; 30% recovery for all compounds (allowance for 2 compounds up to ≤ 40% ) | Re-analyze; if failure still observed then take corrective action: re-calibration may be necessary | Analyst |
| Accuracy | A | Internal Standards (IS) | Minimum of 3 IS recommend Bromochloromethane, 1,4-Difluorobenzene and Chlorobenzene-$d_5$ | Areas 60-140% of CCAL; Areas; RTs $\pm$ 0.33 minutes from CCAL RTs | Reanalyze and qualify data | Analyst/Data Reviewer |
| Precision | A | Sample Duplicate (DUP) | Every 24 hours | Must be performed on a Site field sample. RPDs ≤ 25% for results > 5x the RL. | Qualify data and narrate issues of non-conformance | Analyst/Data Reviewer |

**Table 15 QAPP Worksheet Air – VOAs USEPA TO-15 (and NJDEP LLTO-15)**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy | A | Calibration Verification (CCV) | 1 every 24 hours prior to analysis of samples | Concentration level near mid-point of ICAL curve using a concentration in the ICAL) containing all target compounds; *Full Scan and SIM*: min RRF criteria met; %D or % Drift ≤ 30% for all compounds | Recalibrate as required by method; note outliers in narrative. | Analyst |
| Accuracy | A | Laboratory Control Sample (LCS) | 1 per preparatory batch of up to 20 samples | Must contain all target analytes, be matrix-matched; % Recovery 70-130% except for difficult analytes ** must exhibit percent recoveries between 40-160%. | Reanalyze, if necessary, qualify data and narrate issues of non-conformance | Analyst/Data Reviewer |
| Accuracy | A | Reporting Limit Laboratory Control Sample (RLLCS) – NJDEP TO-15 ONLY | 1per 24 hours Instrument Performance Check/ calibration sequence | Must contain all compounds; % recovery within 60-140 % of the known value for 90 % of the compounds | Reanalyze, if necessary, qualify data and narrate issues of non-conformance | Analyst/Data Reviewer |
| Accuracy | A | Quantitation | Every sample | RL ≤ results ≤ upper calibration range on a sample-specific basis; IS must be used; and average response factors or curve-statistics generated from the ICAL must be used for quantitation. | Perform dilution to bring analyte within linear range, qualify data | Analyst/Data Reviewer |
| Sensitivity | A | Reporting of Non-Detects | Every sample | Report up to the 15 TICs that have the highest estimated concentration | Potential data usability issue | Data Reviewer |

**Table 15 QAPP Worksheet Air – VOAs USEPA TO-15 (and NJDEP LLTO-15)**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy/ Sensitivity | S & A | Canister Certification | Batch or individual canister certification must be performed as directed by data user | Canister certifications target analytes must be < RL. | Reclean canisters until certification pass the acceptance criteria. | Analyst |
| Accuracy | S & A | Flow Controller Certification | Every Flow Controller | Pre-sampling and Post-sampling Flow Controller calibration checks RPD $\leq$ 20% | Narrate flow controller RPD non-conformance | Analyst |
| Overall Precision & Representative-ness | S & A | Field Duplicate Samples [Site-specific QC] | 1 per 20 field samples | RPD ≤ 25% for results > 5x RL; Professional judgment for results < 5xRL | Potential data usability issue | Data Reviewer |
| Accuracy (preservation) | S & A | Temperature, atmospheric pressure and canister pressure | Every Canister | Lab must evacuate to -27 to -30 inches of Hg prior to shipment to site. Sampler must document the canister initial vacuum at the site, date/time sampling starts, ambient pressure and temperature; the sampling stop date and time and canister final vacuum. If vacuum is -27 to -30 inches of Hg upon receipt at the site, the canister may be used for sample collection. (allowances are given for vacuum down to -24 inched Hg with notification given to the investigator)The laboratory must document the canister receipt vacuum. | Potential data usability issue if initial field vacuum is too low or the final field and laboratory receipt vacuums differ significantly (e.g. by 6 inches Hg) | Data Reviewer |

**Table 15 QAPP Worksheet Air – VOAs USEPA TO-15 (and NJDEP LLTO-15)**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy (preservation) | S & A | Canister pressure | Every Canister | Sampler must check vacuum prior to taking samples. If the vacuum is -27 to -30 inches of Hg when it left the lab, then the vacuum should be -24 to -30 inches of Hg for samples to be taken. If the vacuum is less, then the canister should not be used. | Notify the laboratory and request a new canister or seek guidance. | Sampler |
| Accuracy/ Sensitivity | S & A | Holding Time (HT) | Every field sample | Analyses within 30 days of collection. | Potential data usability issue | Data Reviewer |
| Data Completeness | S & A | Calculate from valid/usable data collected | Not applicable | $\geq$ 90% Overall | Potential data usability / data gap issue | Data Reviewer/ Investigator |
| Accuracy/ Sensitivity | A | Method Blank | 1 every 24 hour prior to analysis of samples | Target analytes < RL | NA | Data Reviewer |
| Comparability | S & A | Based on Method (SOP) and QAPP/FSP protocols | Not applicable | Comparison between historical data for qualitative integrity of the data. Comparison between spatially similar samples. | Potential data usability issue | Data Reviewer/ Investigator |

**NOTES:**

1. This table was prepared by NJDEP, April 2014 to be compliant with and the SRP VITG and meet the data quality needs of the Department.

2. Volatile Organic Compound analyses via USEPA Method TO-15 (*Determination of Volatile Organic Compounds (VOCs) In Air Collected In Specially-Prepared Canisters And Analyzed by Gas Chromatography/Mass Spectroscopy [GC/MS]).*

** Potentially "difficult" analytes include: hexachlorobutadiene, 1, 2, 4-trichlorobenzene, naphthalene, acetone and 1, 4-dioxane.

[1] Please note that trip blanks, field blanks and MS/MSDs are not usually included in sampling activities associated with canister based air sampling.

**Table 16 QAPP Worksheet Air – VOAs USEPA TO-17**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy/ Sensitivity Accuracy | A | BFB Tune | Every 24 hours | Method tune criteria based on criteria in Table 3 of USEPA- Method TO-15 | Perform instrument maintenance; reanalyze until acceptable | Analyst |
| Accuracy | A | Initial Calibration (ICAL) | Initially and when CCAL fails | Minimum 5-standards; must contain all targets and lowest standard ≤ RL; for all compounds: %RSD ≤ 30% except naphthalene ≤ 40% or "r" ≥ 0.99 regression analysis, if used, must not be forced through the origin | Method allows for 2 exceptions up to a limit of 40% RSD. Recalibrate, note outliers in narrative | Analyst |
| Accuracy | A | Daily Calibration | 1 every 24 hours prior to analysis of samples | Concentration level near mid-point of ICAL containing all target compounds; %D ≤ ± 30% IS % Recovery of CCV 50-200% of IS response in the ICAL | Recalibrate if > 10% target compounds exceed criteria or %D > 40%; note outliers in narrative. | Analyst |
| Accuracy | A | Laboratory Control Sample or Audit Standard | 1 every 24 hours prior to analysis of samples | % Recovery 70-130% | Reanalyze, if necessary, qualify data and narrate issues of non-conformance | Analyst/ Data Reviewer |
| Accuracy | A | Internal Standards (IS) | Minimum of 3 IS recommend Fluorobenzene, 1,4-Dichlorobenzene-$d_4$, and Chlorobenzene-$d_5$ | Areas 60-140% of CCAL; Areas; RTs ± 0.33 minutes from CCAL RTs | Reanalyze and qualify data | Analyst/ Data Reviewer |

**Table 16 QAPP Worksheet Air – VOAs USEPA TO-17**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Precision | A | Analytical Duplicate [optional] | Sample split after desorption onto GC/MS | RPDs ≤ 20% for results > 5x the RL. | Qualify data and narrate issues of non-conformance | Analyst/ Data Reviewer |
| Accuracy | A | Quantitation | Every sample | RL ≤ results ≤ upper calibration range on a sample-specific basis; IS must be used; and average response factors or curve-statistics generated from the ICAL must be used for quantitation. Results reported between the MDL and RL qualified "J". | Perform dilution to bring analyte within linear range, qualify data | Analyst/ Data Reviewer |
| Sensitivity | A | Reporting of Non-Detects | Every sample | RL ≤ 0.5 ppb (equivalent concentration) | Potential data usability issue | Data Reviewer |
| Accuracy/ Sensitivity | S & A | Safe Sampling Volume (SSV) Check | Each sorbent tube checked annually or once every 20 uses, whichever is more frequent | One-half the retention volume or two-thirds of the break-through volume on a compound-specific basis | Re-condition sorbent tube and re-check | Analyst |
| Accuracy | S & A | Flow Rate | Checked before and after each sampling | RPD > 10% for initial versus final flow rate, collection invalid | New collection of samples required | Sampler |

**Table 16 QAPP Worksheet Air – VOAs USEPA TO-17**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy | S & A | Sampling Time | Every Sample | 1 hour at 16.7 mL/min and 66.7 mL/min for 1L and 4L sampling volumes, respectively | Narrate sampling pump RPD non-conformance | Analyst |
| Overall Precision & Representativeness | A | Distributed Duplicates | Recommended Duplicates collected in parallel with different sampling volumes (e.g., 1L and 4L) | RPDs ≤ 25% for results > 5x the RL. | Potential data usability issue | Data Reviewer |
| Accuracy (preservation) | S & A | Conditioning of Sorbent Tubes | Every Sorbent Tube | Packed sorbent tubes must be conditioned and properly sealed prior to initial use as specified in Method TO-17. Target compounds should be ≤ RLs. | Potential data usability issue if conditioning insufficient | Data Reviewer |
| Accuracy/ Sensitivity | S & A | Holding Time (HT) | Every field sample | Analyses within 30 days of collection. | Potential data usability issue | Data Reviewer |
| Data Completeness | S & A | Calculate from valid/usable data collected | Not applicable | ≥ 90% Overall | Potential data usability / data gap issue | Data Reviewer/ Investigator |

**Table 16 QAPP Worksheet Air – VOAs USEPA TO-17**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy/ Sensitivity | A | Method Blank | At least 2 per monitoring exercise using same lot of Sorbent tube as used for analysis | Target analytes < RL | NA | Data Reviewer |
| Accuracy/ Sensitivity | S | Field Blank | 1 for every 10 samples/ monitoring event | Target analytes < RL | NA | Data Reviewer |
| Comparability | S & A | Based on Method (SOP) and QAPP/FSP protocols | Not applicable | Comparison between historical data for qualitative integrity of the data. Comparison between spatially similar samples. | Potential data usability issue | Data Reviewer/ Investigator |

**NOTES:**
1. This table was prepared by NJDEP, April 2014 to be compliant with EPA Region 2 guidance and meet the data quality needs of the Department.

2. Volatile Organic Compound analyses via USEPA Method TO-17 (*Determination of Volatile Organic Compounds in Ambient Air Using Active Sampling onto Sorbent Tubes*) and Method TO-15 (*Determination of Volatile Organic Compounds (VOCs) In Air Collected In Specially-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectroscopy [GC/MS]).*

** Potentially "difficult" analytes include: hexachlorobutadiene, 1, 2, 4-trichlorobenzene, naphthalene, acetone and 1, 4-dioxane.

**Table 17 QAPP Worksheet All Matrices – NJDEP EPH Methodology**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy/ Sensitivity | A | Method Blank | 1 per extraction batch of up to 20 field samples (matrix-specific) | Blank concentration < 5X value of the MDL (additional action noted in section 9.1.4 of the method) | Reanalyze and, if necessary, re-extract. Report non-conformance in narrative; compounds present in blank should be flagged "B" in samples, if detected. | Analyst |
| Accuracy | A | Matrix Spike(sample not fractionated) [Site-specific QC] | Minimum of 5% of samples for each matrix | Must contain all aliphatic and aromatic compounds defined in method section 6.8.6;<br>40 - 140% recovery for all compounds (only up to & including C28 for #2 fuel/diesel). | Reanalyze, if necessary, qualify data and narrate issues of non-conformance | Analyst/Data Reviewer |
| Accuracy | A | Matrix Spike/ (sample fractionated] | Minimum of 5% of samples for each matrix | Must contain all aliphatic and aromatic compounds defined in method section 6.8.6;<br>40 - 140% recovery for all compounds (only up to & including C28 for # 2 fuel/diesel). | Reanalyze, if necessary, qualify data and narrate issues of non-conformance | Analyst/Data Reviewer |
| Accuracy | A | Laboratory Control Sample/ Laboratory Control Sample Duplicate (LCS/LCSD) (#2 fuel/diesel) | 1 per extraction batch (up to 20 samples of similar matrix) | Must contain #2 fuel/diesel, 40-140% recovery for # 2 fuel/diesel. (continued below) | Reanalyze, or re-extract/re-analyze plus associated samples if necessary, qualify data and narrate issues of non-conformance | Analyst/Data Reviewer |

**Table 17 QAPP Worksheet All Matrices – NJDEP EPH Methodology**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Precision | A | Laboratory Control Sample/ Laboratory Control Sample Duplicate (LCS/LCSD) (#2 fuel/diesel) | | RPDs ≤ 25% | Reanalyze, or re-extract/re-analyze plus associated samples if necessary, qualify data and narrate issues of non-conformance | Analyst/Data Reviewer |
| Accuracy | A | Laboratory Control Sample/ Laboratory Control Sample Duplicate (LCS/LCSD) (non-#2 fuel/diesel) | 1 per extraction batch (up to 20 samples of similar matrix) | Must contain all aliphatic and aromatic compounds defined in method section 6.8.6;<br>40 - 140% recovery for all compounds except n-nonane @ > 25%<br>(continued below) | Reanalyze, or re-extract/re-analyze plus associated samples if necessary, qualify data and narrate issues of non-conformance | Analyst/Data Reviewer |
| Precision | A | Laboratory Control Sample/ Laboratory Control Sample Duplicate (LCS/LCSD) (non-#2 fuel/diesel) | | RPDs for the aliphatic and aromatic carbon range concentrations (the sum of the individual compounds' concentrations within a carbon range) must be ≤ 25% (continued below). | Reanalyze, or re-extract/re-analyze plus associated samples if necessary, qualify data and narrate issues of non-conformance | Analyst/Data Reviewer |

**Table 17 QAPP Worksheet All Matrices – NJDEP EPH Methodology**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy | A | Laboratory Control Sample/ Laboratory Control Sample Duplicate (LCS/LCSD) (fractionated samples) | | Naphthalene & 2-methyl-naphthalene: concentration or each in aliphatic fraction < 5 % of total concentration | Reanalyze, or re-fractionate/re-analyze plus associated samples if necessary, qualify data and narrate issues of non-conformance | Analyst/Data Reviewer |
| Precision | A | Sample Duplicate (DUP) | 5% of samples for each matrix from the site | Must be performed on a site sample, RPD ≤ 50% | Qualify data and narrate issues of non-conformance | Analyst/Data Reviewer |
| Accuracy | A | Surrogates | Every sample including QC | OTP and COD, 40 – 140 % recovery; samples undergoing fractionation: no COD in aromatic fraction and/or no OTP observed in aliphatic fraction | Reanalyze, if necessary or re-extract/re-analyze if necessary; re-fractionate and analyze if COD and/or OTP are in "wrong" fraction; qualify data | Analyst/Data Reviewer |
| Accuracy | A | Fractionating Surrogates | Every sample undergoing fractionation including QC | 2-bromonaphthalene & 2-fluorobiphenyl 40 – 140 % recovery | Re-fractionate and reanalyze; note in non-conformance summary | Analyst/Data Reviewer |
| Accuracy | A | Initial Calibration (ICAL) | Initially and when CCAL fails | 5-point calibration must contain all compounds and lowest standard ≤ RL; CFs established for each compound and, when fractionated, also for each aliphatic and aromatic carbon range; % RSD for all individual CFs ≤ 25% and when fractionated, also for each aliphatic and aromatic carbon range. | Recalibrate as required by method; analysis cannot proceed without a valid initial calibration | Analyst |

**Table 17 QAPP Worksheet All Matrices – NJDEP EPH Methodology**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy | A | Continuing Calibration (CCAL) | Prior to samples, every 20 samples or every 24 hours, whichever is more frequent, and at the end of the analytical sequence | Concentration level at mid-point of ICAL curve containing all compounds: %D ≤ 25% for total range, ≤ 30% any single compound; for samples undergoing fractionation: %D ≤ 25% for each carbon range, ≤ 30% any single compound in a range | Recalibrate as required by method; note outliers in narrative. | Analyst |
| Accuracy | A | Quantitation | Every sample | RL ≤ results ≤ upper calibration range on a sample-specific basis; average response factors generated from the ICAL must be used for quantitation and peak area, as used for ICAL, must be used for sample. Results reported between the MDL and RL qualified "J". | Perform dilution to bring analyte within linear range, qualify data | Analyst/Data Reviewer |
| Sensitivity | A | Reporting of Non-Detects | Every sample | Reported at the sample-specific RL which must meet site specific DQOs. | Potential data usability issue | Data Reviewer |
| Overall Precision & Representative-ness | S & A | Field Duplicate Samples [Site-specific QC] | 5% field for fractionated and 5% field samples for non-fractionated analyses per matrix | RPD ≤ 30% for waters or RPD ≤ 50% for solids w/results > 2x RL; Professional judgment for results < 2xRL | Potential data usability issue | Data Reviewer |
| Accuracy (preservation) | S | Temperature Blank or other Cooler Temperature Reading | 1 Temperature reading per cooler to be recorded upon receipt at lab | Cool to ≤ 6º C; allow for < 2º C if samples intact | Potential data usability issue | Data Reviewer |
| Accuracy (preservation) | S | pH for aqueous samples | Every field sample | pH < 2 | Adjust pH as soon as possible; note outliers in narrative | Analyst/Data Reviewer |

**Table 17 QAPP Worksheet All Matrices – NJDEP EPH Methodology**
**Measurement Performance Criteria & QC Samples**

| Data Quality Indicator (DQI) | QC Measure for Sampling (S), Analytical (A), or both (S&A) | QC Sample or Activity | Frequency / Number | QC Acceptance Limits (Measurement Performance Criteria) | Corrective Action (CA) | Person(s) Responsible for CA |
|---|---|---|---|---|---|---|
| Accuracy/ Sensitivity | S & A | Holding Time (HT) | Every field sample | Samples extracted within 14 days of collection; extract analyzed within 40 days of extraction. | Potential data usability issue | Data Reviewer |
| Accuracy/ Sensitivity | S | Equipment Blank [Site-specific QC] | Not Required if using dedicated sampling equipment. If performing de-con, collect 1 EB per 20 field samples collected by the same method | Compounds < RL | Potential data usability issue | Data Reviewer |
| Data Completeness | S & A | Calculate from valid/usable data collected | Not applicable | ≥ 90% Overall | Potential data usability / data gap issue | Data Reviewer/ Investigator |
| Comparability | S & A | Based on Method (SOP) and QAPP protocols/DQOs | Not applicable | Comparison between historical data for qualitative integrity of the data. Comparison between spatially similar samples. | Potential data usability issue | Data Reviewer/ Investigator |

**NOTES:**
1. This table was prepared by NJDEP, April 2014 to be compliant with EPA Region 2 guidance, and meet the data quality needs of the Department.

2. Method reference = NJDEP Analysis of Extractable Petroleum Hydrocarbon Compounds (EPH) in Aqueous and Soil/Sediment/Sludge.

# APPENDIX B

# APPENDIX B

## SUMMARY OF QUALITY CONTROL CHECKS AND SAMPLES

| QC Sample or Activity used to Assess Measurement Performance | Frequency* | Measurement Performance Criteria |
|---|---|---|
| Field Duplicate | One in 20 samples per matrix for each parameter | See Appendix D-4 |
| Site Specific Matrix Spike, Matrix Spike Duplicate (MS/MSD) Pair | One in 20 samples, one MS/MSD per matrix for each parameter | |
| Laboratory Control Sample, Laboratory Control Sample Duplicate (LCS/LCSD) Pair | One per batch of up to 20 samples per matrix | |
| Field Blank | Project specific | |
| Equipment Blank | One in 20 samples with non-dedicated equipment | |
| Trip Blank | One per cooler (VOCs only) per event for VOCs and volatile organic compounds | |
| Performance Evaluation Sample | Project specific | |
| Inter-Lab Split Samples | Project specific | |
| Methanol Trip Blank | Project specific | |

*Frequency determined by method and/or project-specific requirements

# APPENDIX C

# APPENDIX C
# TYPES OF INFORMATION USED TO EVALUATE PRECISION, ACCURACY, REPRESENTATIVENESS, COMPARABILITY, COMPLETENESS AND SENSITIVITY

| QC Element | Laboratory Measures | Field Measures |
|---|---|---|
| **Precision** | Laboratory Control Sample/ Laboratory Control Sample Duplicate Pair | Field Duplicates |
| | Matrix Spike Duplicates | Matrix Spike/Matrix Spike Duplicates pairs (collect samples for)<br>Matrix Duplicate (collect samples for) |
| | Historical Data Trends | Appropriate Sampling Procedure |
| **Accuracy** | Laboratory Control Samples | Matrix Spikes/Matrix Spike Duplicates (collect samples for) |
| | Matrix Spikes and Matrix Spike Duplicates | Inclusion of "Blind" Samples |
| | Internal Standards | Appropriate Sampling Procedures |
| | Surrogate Recovery | Appropriate Sample Containers |
| | Initial Calibration | Appropriate Sample Preservation |
| | Continuing Calibration | Handling & Holding Times |
| | Standard Reference Material | Equipment Blank/Field Blank |
| **Representativeness** | Laboratory Homogenization | Appropriate Sampling Procedures<br>Appropriate Sample Containers |
| | Appropriate Sub-sampling | Appropriate Sample Preservation |
| | Appropriate Dilutions | Incorporation of Field Screening Data |
| | "As Received" Sample Preservation Meeting Hold Times | Appropriate Number of Samples |
| **Comparability** | Gas Chromatography/Mass Spectrometry Tuning | Comparison to Previous Data Points |
| | Calibration | Comparison to Similar Data Points |
| | Analytical Method Followed | Similar Methods of Analysis used |
| **Completeness** | Percent Sample Per Batch Analyzed and Reported | Percent Planned Samples Collected |
| | All Critical Samples Reported and Unqualified | All Critical Samples Collected |
| **Sensitivity** | Method Blanks | Equipment Blank/Field Blanks |
| | Instrument Blanks | Appropriate Sample Volume or Weight |
| | Reporting Limit (Lowest Calibration Standard) | |
| | Appropriate Analytical Method | |

Adapted from Massachusetts Department of Environmental Protection, Bureau of Waste Site Cleanup, *MCP Representativeness Evaluations and Data Usability Assessments, Policy #WSC-07-350*, September 19, 2007.

# APPENDIX D

**Laboratory Data Qualifiers**

| Qualifier | Description |
|---|---|
| B | Indicates the analyte was found in the associated method blank as well as in the sample. |
| C | Indicates analyte is a common laboratory contaminant |
| D | Indicates analyte was reported from diluted analysis |
| E | Identifies a compound concentration that exceeds the upper level of the calibration range of the instrument. |
| J | Indicates an estimated value. This flag is used when the concentration in the sample is below the Reporting Limit but above the Method Detection Limit or for qualification of tentatively identified compounds. |
| N | Presumptive evidence of a compound from the sue of GC/MS library search |
| U | Analyte included in the analysis, but not detected |
| X | Indicates samples analyzed for total and dissolved metals differ at <= 20% RPD |
| Z | Indicates internal standard failure. Sample results are either biased high or biased low. |

# APPENDIX E

# Horiba U-52 Calibration Log

PEAK ENVIRONMENTAL LLC

Job Name: _____ Sampler / Analyst: _____

Date: _____

| pH CALIBRATION | | | | | |
|---|---|---|---|---|---|
| Time | Initial Calibration | | | pH 7 Buffer Check | Post Calibration Value |
| | pH 4 | pH 7 | pH 10 | | |
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| | | | | | |

Initial pH 7 check must be within ±0.10 standards units; and within ±0.20 standards units afterwards

| SPECIFIC CONDUCTANCE CALIBRATION | | |
|---|---|---|
| Time | Meter Reading | Post Calibration Value |
| | Conductivity Standard (1.413 mS/cm) | |
| | | |
| | | |
| | | |

| TURBIDITY CALIBRATION | | |
|---|---|---|
| Time | Meter Reading | Post Calibration Value |
| | Turbidity Standard (100 NTU) | |
| | | |
| | | |
| | | |

| DISSOLVED OXYGEN CALIBRATION | | | |
|---|---|---|---|
| Time | Meter Reading | Temperature (°C) | Post Calibration Value |
| | DO Standard (0.0 mg/L) | | |
| | | | |
| Time | Air Saturated Water Reading from Table | Temperature (°C) | Post Calibration Value |
| | | | |

| | |
|---|---|
| pH 4 Buffer Solution Lot # and Expiration Date: | |
| pH 7 Buffer Solution Lot # and Expiration Date: | |
| pH 10 Buffer Solution Lot # and Expiration Date: | |
| Conductivity Standard Solution Lot # and Expiration Date: | |
| Turbidity Standard Solution Lot # and Expiration Date: | |
| DO Standard Solution Lot # and Expiration Date: | |
| Horiba U-52 Sensor Serial #: | |
| Horiba U-52 Display Serial #: | |

Comments:

# APPENDIX F

# Quality Systems Manual

## Alpha Analytical, Inc.

D/B/A

Alpha Analytical
Eight Walkup Drive
Westborough, MA 01581-1019
Telephone: (508) 898-9220
Facsimile: (508) 898-9193

Alpha Analytical
Woods Hole Labs Facility
320 Forbes Blvd
Mansfield, MA 02048
Telephone: (508) 822-9300
Facsimile: (508) 822-3288

Email: info@alphalab.com
Web site: www.alphalab.com

President: Mark Woelfel, 508-439-5115
Quality Assurance Officer: James Todaro, Ext 508-439-5101
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*

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# 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 $\pm$ 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 4,165$^{th}$ 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 9$^{th}$ 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<br>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<br>'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)

Blanks include:

**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 (C6H14) 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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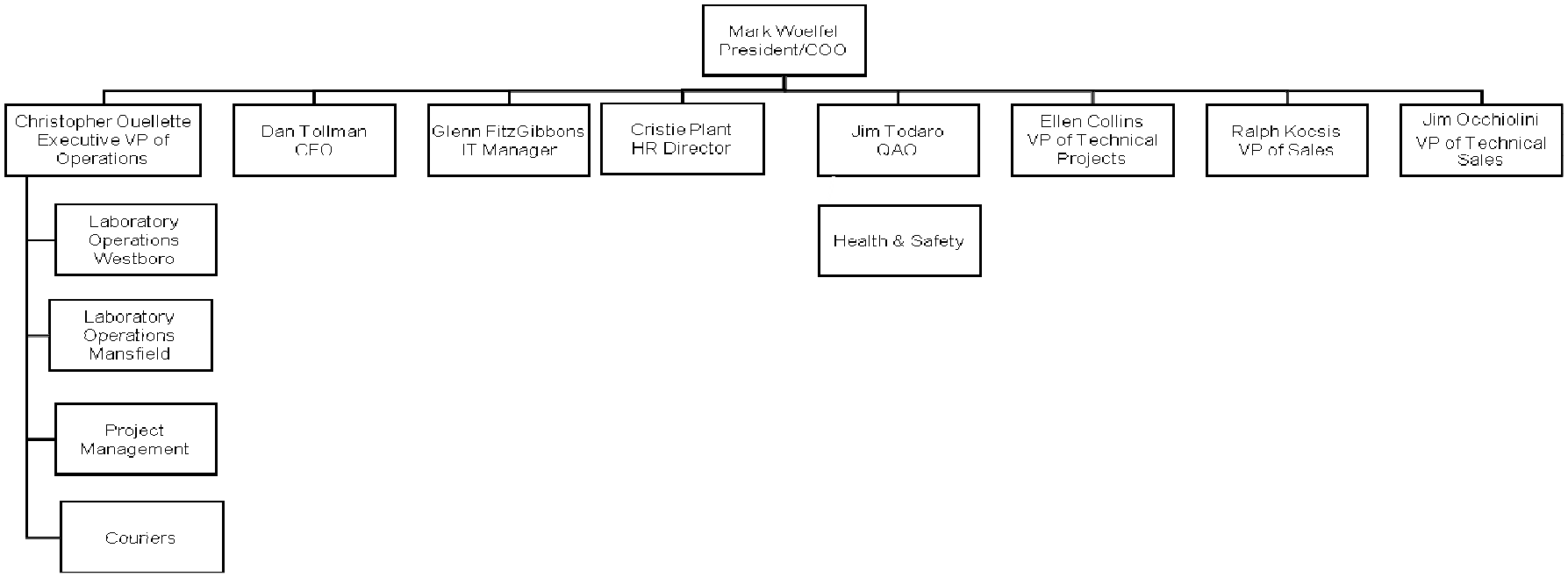
Department of Defense (DOD) Quality Systems Manual, Version 5.1, 2017

## 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

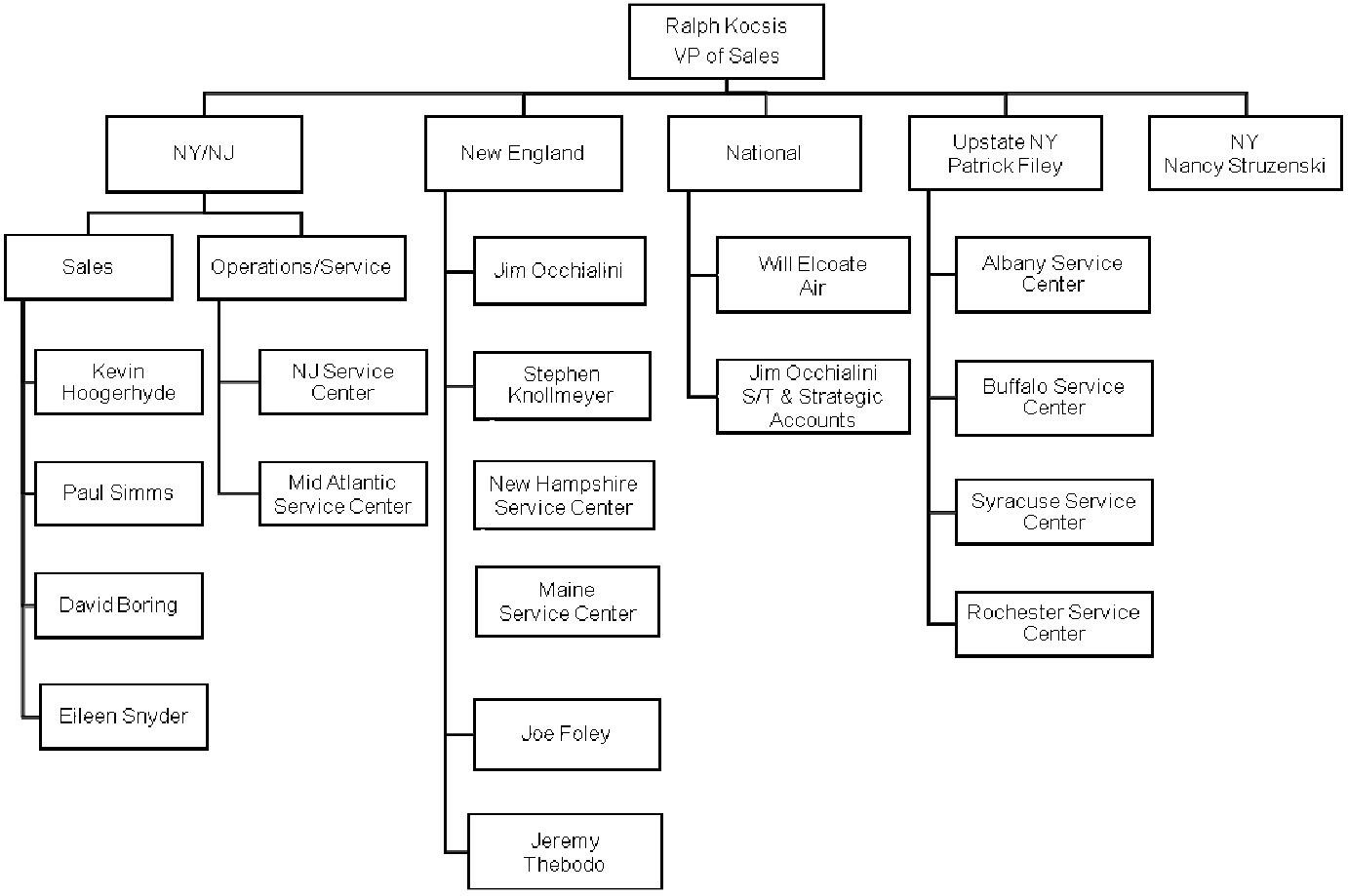
**Alpha Analytical**
**Company Organizational Chart**



**Updated** 09/28/2017

**Alpha Analytical**

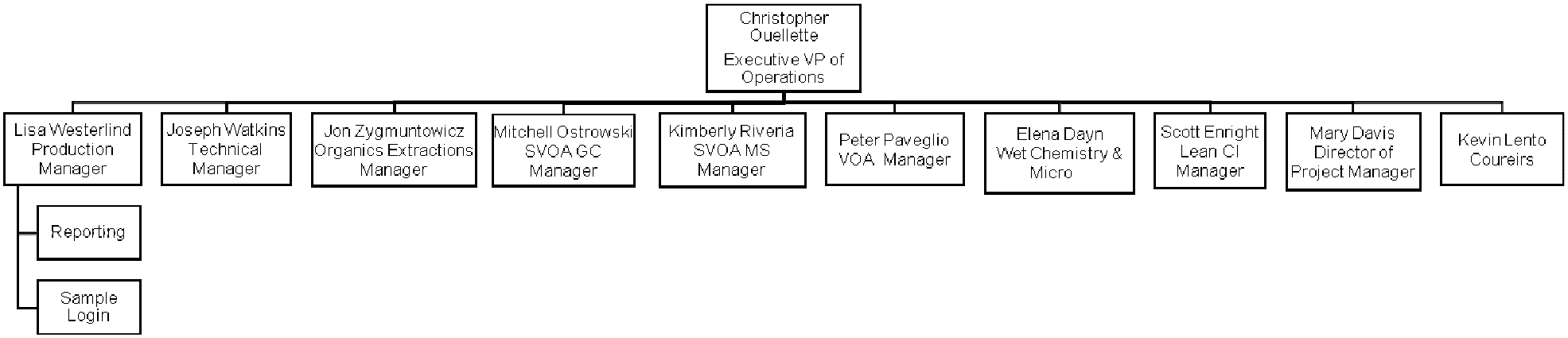
**Sales Organizational Chart**



**Updated 09/28/2017**

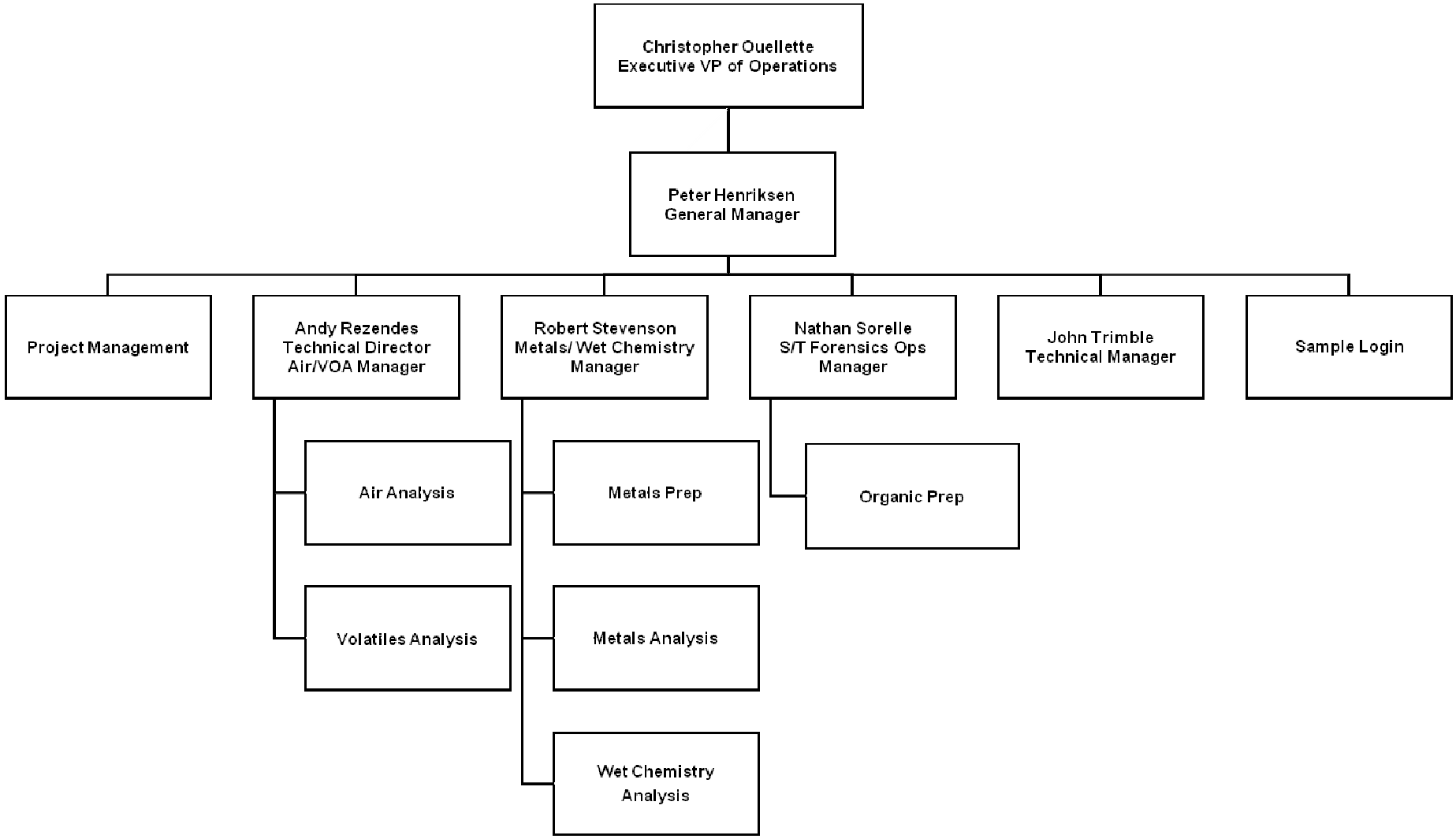
**Westboro Facility**

**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<br>daily | cleaning & operations check by service technician (external)<br>calibration verification using Class S-1 certified weights |
| COD Reactor | annually<br>annually | complete operations check by service technician (external)<br>reaction temperature verification |
| Conductivity Bridge | annually<br><br>each use | verification of cell constant<br>complete operations check by service technician (external)<br>calibration verification |
| DI Water System | as needed<br>monthly<br>annually<br>daily | complete operations check by service technician (external)<br>Residual Chlorine check<br>Biosuitability testing (external)<br>pH and Conductivity check |
| DO Meter | annually<br>each use | complete operations check by service technician (external)<br>calibration against air as specified by manufacturer |
| Emergency/Safety Equipment | annually<br>monthly | fire extinguishers and emergency exit lighting check<br>eye washes, showers, fire blanket and first aid kits checked |
| Freezers | daily | temperature verification |
| Gas Chromatographs | as needed<br>as needed<br>beginning and end of batch and 10 to 20 samples as per method | injection port preparation; cleaning of detectors<br>initial multi-point calibration<br>continuing calibration verification (CCV) against initial calibration |
| ICP | Every other day<br>Daily<br>Annually<br>Annually<br>As needed | Change pump tubing<br>Calibration, profile<br>Complete operations check by service technician (external),<br>Linear Dynamic Range determination<br>Clean torch, clean nebulizer, clean spray chamber |
| Lachat analyzer | Daily<br>As needed | Calibration, clean lines<br>Change tubing, change O-rings |
| Mass Spectrometers (GC & ICP) | bi-annually<br>as needed<br>12 hour or daily | change of mechanical pump oil by service technician (external)<br>cleaning of source<br>BFB, DFTPP or ICP-MS tune analysis followed by ICAL or CCV |
| Mercury Analyzer | monthly<br>each use | clean cell and change pump windings<br>calibration using multi-point curve |
| Auto-pipettes | Monthly<br>Annually | verification of accuracy<br>verification of precision |
| Microwave | Quarterly<br>Annually | power and temperature verification<br>RPM verification |
| Ovens | annually<br>daily | complete operations check by service technician (external)<br>temperature verification |
| pH Meters | annually<br>each use | complete operations check by service technician (external)<br>calibration using certified buffers |
| Refrigerators (General Use) | daily | temperature verification |
| Refrigerators (Sample Management) | daily | temperature verification |
| Spectrophotometer | Semi-annually<br>Semi-annually<br>daily | cleaning & operations check by service technician (external)<br>wavelength verification (external)<br>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<br>each use | cleaning & operations check by service technician (external)<br>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<br>2. Advanced technical instrumentation/lab systems knowledge<br>3. Knowledge of safe laboratory practices, OSHA regs and emergency protocols<br>4. Experience with and understanding of LIMS<br>5. Experience with method development and implementation<br>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<br>2. Advanced technical instrumentation/lab systems knowledge<br>3. Knowledge of safe laboratory practices, OSHA regs and emergency protocols<br>4. Experience with and understanding of LIMS<br>5. Experience with method development and implementation<br>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<br>2. Advanced technical instrumentation/lab systems knowledge<br>3. Knowledge of safe laboratory practices, OSHA regs and emergency protocols<br>4. Experience with and understanding of LIMS<br>5. Experience with method development and implementation<br>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<br>2. Knowledgeable in Federal, State Programs (THE NELAC INSTITUTE (TNI) STANDARDS, etc.)<br>3. Able to develop QA/QC policies and certification requirements<br>4. Able to develop training programs for quality procedures<br>5. Documented training and/or experience in QA and QA procedures<br>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<br>2. Proficient in all methods and SOP's within their department<br>3. Experience with and understanding of LIMS<br>4. Proven ability to meet TAT (turnaround times) |
| **Quality Systems Specialist** | BS/BA Chemistry | 2 years + | 1. General knowledge of laboratory methods<br>2. Experience with and understanding of LIMS<br>3. Strong attention to detail<br>4. Strong oral/written communication and organizational skills<br>5. Knowledge of QA/QC policies and certification requirements |
| **EH&S Coordinator** | High School or Equivalent | 2 years + | 1. General knowledge of lab operations<br>2. Detailed knowledge of safe lab practices and emergency protocols<br>3. Hazardous Waste Management and RCRA Regulation Training<br>4. DOT Hazardous Materials Regulations Training<br>5. OSHA Compliance Training<br>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<br>2. Able to follow direction and Standard Operating Procedures (SOP's)<br>3. Familiarity with standard and reagent preparation<br>4. Knowledgeable in using volumetric pipettes and glassware<br>5. Strong oral/written communication and organizational skills |
| **Lab Technician II** | HS or Equivalent | 2-4 years | 1. All skills of Lab Technician I<br>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<br>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<br>2. Able to follow direction and Standard Operating Procedures (SOP's)<br>3. Familiarity with standard and reagent preparation<br>4. Knowledgeable in using volumetric pipettes and glassware<br>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<br>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<br>2. Experienced in training staff |
| **Analyst I** | HS or Equivalent | 0-1 years | 1. Knowledge of safe laboratory practices<br>2. Able to follow direction and Standard Operating Procedures (SOP's)<br>3. Experienced with sample handling, preparation and/or extraction |
| **Analyst II** | HS or Equivalent | 2-4 years | 1. All skills of Analyst I<br>2. Experienced in machine operation, maintenance and troubleshooting |
| **Analyst III** | HS or Equivalent | 5 years + | 1. All skills of Analyst II<br>2. Experienced in data review and reporting<br>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<br>2. Able to follow direction and Standard Operating Procedures (SOP's)<br>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<br>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<br>2. Experienced in data review and reporting<br>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<br>2.Able to follow direction and Standard Operating Procedures (SOP's)<br>3. Working knowledge of Adobe Acrobat, Microsoft Word, Excel<br>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<br>2. General knowledge of laboratory methods<br>3. Understanding of data review/ data reporting process<br>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<br>2. Intermediate/advanced knowledge of laboratory methods<br>3. Able to perform report review<br>4. Experience with and understanding of LIMS and electronic data deliverables<br>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<br>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 4500$NO_3$-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 |

**APPENDIX G**

**Data Quality Assessment (DQA) Process**

| | Task | Comp. Y/N? | Initials |
|---|---|---|---|
| 1 | Review the DKQ conformance/nonconformance summary Questionnaire to determine if DKQP Status has been attained | | |
| | ○ Questions 1, 1A and 1B answered "No"? If so then DKQP Status not attained. (Data may still be usable depending on end result). | | |
| | ○ Question 4 most often answered as "No" – indicates nonconformances exist | | |
| 2 | Review QC nonconformers narrative | | |
| 3 | Review entire report for any QC failures that may not be documented in the narratives | | |
| | ○ Chain-of-Custody Evaluation | | |
| | ▪ Was handling time met?<br>▪ Were samples appropriately preserved/refrigerated/iced?<br>▪ Were samples received by the lab at an appropriate temperature (4°C±2)? | | |
| | ○ Sample Result Evaluation | | |
| | ▪ Determine that reporting limits were noted<br>▪ Verify that concentrations greater than RL were reported<br>▪ Verify that concentrations reported below the RLs are qualified "J"<br>▪ Verify soil and sediment results were reported in mg/kg on a dry weight basis<br>▪ Verify that aqueous results were reported in ug/L<br>▪ Verify that air vapor samples were reported in $ug/m^3$<br>▪ Check dilution factor to see if a dilution was performed and if so, the RL adjusted accordingly<br>▪ Determine that RLs are less than, or equal to the regulatory criteria<br>▪ Determine if sample results are provided for each requested analysis | | |
| | ○ Sample Preservation and Holding Times Evaluation | | |
| | ▪ Review Chain-of-Custody and or narratives to determine if the samples were preserved in accordance with the requirements of the DKQ Method reported<br>▪ Review Chain-of-Custody for other sample/method-specific QA (e.g. vacuum readings on vapor canisters)<br>▪ Review narrative to determine if holding time specified in the DKQ Method was met | | |
| | ○ Method, Field or Trip Blank Evaluation | | |
| | ▪ Review all blank data and narratives for possible contamination | | |
| | ○ Field Duplicates and Laboratory Duplicates | | |
| | ▪ Review all duplicate sample information | | |
| | ○ Laboratory Control Sample (LCS) Evaluation | | |

| | | | |
|---|---|---|---|
| | ▪ Review the narrative to determine if nonconformances were noted | | |
| | ○ Surrogate Results Evaluation | | |
| | ▪ Review the narrative to determine if nonconformances were noted | | |
| | ○ Matrix Spike/Matrix Spike Duplicate Results Evaluation | | |
| | ▪ Review narrative to determine if nonconformances were noted | | |
| 4 | ○ Document all nonconformances to be used to perform the Data Usability Evaluation (DUE), Worksheet 1 and 2 should be filled out. | | |
| 5 | ○ **Has the data attained a DKQP and free of nonconformances? No DUE necessary, data can be used to make decisions with no qualifications.** | | |
| 6 | ○ **If nonconformances have been identified perform the DUE** | | |

**APPENDIX H**

| PAGE __ OF __ PROJECT: | | | | FILE NUMBER: | | |
|---|---|---|---|---|---|---|
| LABORATORYWORK ORDER: | | | | REVIEWER: | | DATE: |
| **BLANKS** | | **Compound** | **Compound** | **Compound** | **Compound** | **Notes** |
| Method Blank, VOCs | >RL? | | | | | |
| Method Blank, SVOCs | >RL? | | | | | |
| Method Blank, VPH | >RL? | | | | | |
| Method Blank, EPH | >RL? | | | | | |
| Method Blank, PCBS | >RL? | | | | | |
| Method Blank, Pest | >RL? | | | | | |
| Method Blank, Metals | >RL? | | | | | |
| Method Blank, Total Cyanide | >RL? | | | | | |
| Method Blank, ETPH | >RL? | | | | | |
| Method Blank Hex Chrome | >RL? | | | | | |
| Field Blank | >RL? | | | | | |
| Trip Blank | >RL? | | | | | |
| VPH Blank (methanol) | >RL? | | | | | |
| Blank Soil VOCs (methanol) | >RL? | | | | | |
| Blank Soil VOCs (water/bisulfate) circle | >RL? | | | | | |
| **LCS** | **SV** | **Low Bias** | **High Bias** | **Compound** | **Compound** | **Notes** |
| VOCs | <10% | > 10% & < LCL | >UCL | | | |
| SVOCs | <10% | > 10% & < LCL | >UCL | | | |
| VPH | <10% | > 10% & < LCL | >UCL | | | |
| EPH | <10% | > 10% & < LCL | >UCL | | | |
| PCB | <10% | > 10% & < LCL | >UCL | | | |
| PEST | <10% | > 10% & < LCL | >UCL | | | |
| Hex Chrome | <70% | > 70 % & <LCL | > UCL | | | |
| Metals | <10% | > 10% & < LCL | >UCL | | | |
| Total Cyanide | <10% | > 10% & < LCL | >UCL | | | |
| ETPH | <10% | > 10% & < LCL | >UCL | | | |
| **SURROGATES** | **SV** | **Low Bias** | **High Bias** | **Compound** | **Compound** | **Notes** |
| VOCs | <10% | > 10% & < LCL | >UCL | | | |
| SVOCs | <10% | > 10% & < LCL | >UCL | | | |
| VPH | <10% | > 10% & < LCL | >UCL | | | |
| EPH | <10% | > 10% & < LCL | >UCL | | | |
| PCB | <10% | > 10% & < LCL | >UCL | | | |
| PEST | <10% | > 10% & < LCL | >UCL | | | |
| **MS/MSDS** | **SV** | **Low Bias** | **High Bias** | **QC Source** | **RPDS** | **Notes** |
| VOCs | <10% | > 10% & < LCL | >UCL | Batch? Site? | | |
| SVOCs | <10% | > 10% & < LCL | >UCL | Batch? Site? | | |
| EPH | <10% | > 10% & < LCL | >UCL | Batch? Site? | | |
| PCB | <10% | > 10% & < LCL | >UCL | Batch? Site? | | |
| PEST | <10% | > 10% & < LCL | >UCL | Batch? Site? | | |
| Hex Chrome | <50% | > 50% & < LCL | >UCL | Batch? | | |
| Metals | <10% | > 10% & < LCL | >UCL | Batch? Site? | | |
| Total Cyanide | <10% | > 10% & < LCL | >UCL | Batch? Site? | | |
| ETPH | <10% | > 10% & < LCL | >UCL | Batch? Site? | | |
| **FIELD DUPLICATES RPDS** | | **Soil** | **Water** | **Compound** | **Compound** | **Notes** |
| VOCs | | RPD > 50% | RPD > 30% | | | |
| SVOCs | | RPD > 50% | RPD > 30% | | | |
| VPH | | RPD > 50% | RPD > 30% | | | |
| EPH | | RPD > 50% | RPD > 30% | | | |
| PCB | | RPD > 50% | RPD > 30% | | | |
| PEST | | RPD > 50% | RPD > 30% | | | |
| Metals | | RPD > 50% | RPD > 30% | | | |
| Total Cyanide | | RPD > 50% | RPD > 30% | | | |
| EPH | | RPD > 50% | RPD > 30% | | | |
| **LAB DUPLICATES RPDS** | | **Soil** | **Water** | **Compound** | **Compound** | **Notes** |
| | | RPD > 50% | RPD > 30% | Batch? Site? | | |
| Hex Chrome | | RPD >20% | RPD >20% | Batch | | |

Reasonable Confidence Achieved? Y/N  Significant QC Variances Noted? Y/N  Requested Reporting Limits Achieved? Y/N

Preservation Requirements Met? Y/N  Holding Time Requirements Met? Y/N

Abbreviations: RL = Reporting Limit; LCS = Laboratory Control Sample; SV = Significant QC Variance; LCL= RCP Lower Control Limit; UCL= RCP Upper Control Limit; RPD = Relative Percent Difference; VOCs = Volatile Organic Compounds; SVOCs = Semivolatile Organic Compounds; VPH = Volatile Petroleum Hydrocarbons; EPH = Extractable Petroleum Hydrocarbons; PCBs = Polychlorinated Biphenyls; Pest = Pesticides; ETPH Extractable Total Petroleum Hydrocarbons

# APPENDIX H

## SUMMARY OF DKQ ACCEPTANCE CRITERIA

| QC Parameter | Holding Time (1) | Method Blank | Site Specific Matrix Spike/Matrix Spike Duplicate | Laboratory Control Sample |
|---|---|---|---|---|
| **Method 6010 Trace Metals Inductively Coupled Plasma-Atomic Emission Spectrometry** | Aqueous soil, sediment, and high concentration waste samples, 180 days. Mercury 28 days. | Target analytes must be < RL. | Percent recovery limits must be between 75-125%.<br><br>If MS/MSD run,<br>for aqueous samples, if concentration > 5x the RL, RPD < 20%. If concentration < 5x RL, difference ± RL;<br>for solids, if concentration > 5x RL, RPD < 35%. If concentration < 5x RL, difference ± 2x RL. | LCS recoveries ± 20% for aqueous samples and within vendor control (95% confidence limits) for solids. |
| **Method 6020 Trace Metals Inductively Coupled Plasma-Mass Spectrometry** | Aqueous, soil, sediment, and high concentration waste samples, 180 days. Mercury 28 days. | Target analytes must be < RL. | Percent recovery limits must be between 75-125%.<br><br>If MS/MSD run,<br>for aqueous samples, if concentration > 5x the RL, RPD <20%. If concentration < 5x RL, difference ± RL;<br>for solids, if concentration > 5x RL, RPD < 35%. If concentration < 5x RL, difference ± 2x RL. | LCS recoveries ± 20% for aqueous samples and within vendor control (95% confidence limits) for solids. |
| **Method 7000 Series Metals (Flame and Graphite Furnace Atomic Absorption Spectroscopy)** | Aqueous, soil, sediment, and high concentration waste samples, 180 days. | Target analytes must be < RL. | Percent recovery limits must be between 75-125%.<br><br>If MS/MSD run,<br>for aqueous samples, if concentration > 5x the RL,<br>RPD ± 20%, if concentration < 5x RL, difference ± RL;<br>for solids, if concentration > 5x RL, RPD ±35%. If concentration < 5x RL, difference ± 2x RL. | LCS recoveries ± 20% for aqueous samples and within vendor control (95% confidence limits) for solids. |

# APPENDIX H

## SUMMARY OF DKQ ACCEPTANCE CRITERIA

| QC Parameter | Holding Time (1) | Method Blank | Site-Specific Matrix Spike/Matrix Spike Duplicate | Site-Specific Matrix Spike/ Matrix Spike Duplicate (Aqueous Only) | Site-Specific Sample Matrix Duplicate | Site-Specific Soluble and Insoluble Cr6+ Matrix Spike (Solid Only) | Laboratory Control Sample |
|---|---|---|---|---|---|---|---|
| **Method 7196 Hexavalent Chromium** | Aqueous 24 hours; Soil/sediment samples, digest within 30 days. Analyze digestate within 7 days of preparation.<br><br>High concentration waste samples Digest within 30 days. Analyze digestate within 7 days of preparation.<br><br>Soil/sediment pH and ORP<br>24 hours of sample preparation.<br><br>Soil/sediment, ferrous iron and sulfide 7 days | Cr6+ must be < RL | (Not Applicable | (Matrix spike only for Hexavalent Chromium, not MS/MSD pair)<br><br>Percent recovery limits must be between 75-125%. | Must be performed on a Site field sample. Aqueous/ Soil/Sediment: RPD ≤ 20%; a control limit of ± RL if original or duplicate is < 4 times the RL. | Percent recovery limits must be between 75-125%. | LCS recoveries ±20% for aqueous samples and within vendor control (95% confidence limits) for solids or the NIST 2701 control limits. |
| **Method 7470/7471 Mercury Cold Vapor Atomic Absorption Spectroscopy** | Aqueous, soil, sediment, and high concentration waste samples, 28 days. | Mercury must be <RL | Percent recovery limits must be between 75-125%. | Not applicable | For aqueous samples RPD ± 20% if conc. >5x the RL. If conc. < 5x RL, the limit is ± RL. For solids RPD ±35% if conc. >5x the RL. If conc. < 5x the RL, limit is ± the RL. | Not applicable | LCS recoveries ±20% for aqueous samples and within vendor control (95% confidence limits) for solids. |

# APPENDIX H

## SUMMARY OF DKQ ACCEPTANCE CRITERIA

| QC Parameter | Holding Time (1) | Method Blank | Surrogates | Site-Specific Matrix Spike/Matrix Spike Duplicate | Laboratory Control Sample | Endrin and DDT Breakdown Standard |
|---|---|---|---|---|---|---|
| **Method 8021 Volatile Organic Com-pounds** | Aqueous 14 days (2)<br><br>Soil/sediment, 14 days if preserved. 48 hours if unpreserved (Note 3).<br><br>High concentration waste samples, 14 days. | Target analytes must be < RL except for common lab contaminants which must be < 3x the RL (contaminants are acetone, methylene chloride, and 2-butanone). | Laboratory determined percent recoveries must be between 70-130% for individual surrogate compounds. Laboratory determined recovery limits may be outside 70-130 % limits for difficult matrices (e.g. waste, sludges, etc.). | Laboratory determined percent recoveries should be between 70-130 % for target compounds.<br><br>RPD's should be ≤ 30%. | Laboratory determined percent recoveries must be between 70-130% for target compounds. | Not applicable |
| **Method 8081 Pesticides** | Aqueous, 7 days to extraction. 40 days from extraction to analysis.<br><br>Soil/sediment samples, 14 days to extraction. 40 days from extraction to analysis. Up to one year for samples frozen within 48 hours of collection (Note 1).<br><br>High concentration waste samples 14 days to extraction. 40 days from extraction to analysis. | Target analytes must be < RL. | Recovery limits lab generated and within maximum range of 30-150% for both compounds on both columns.<br><br>Labs must develop own in-house limits, which fall within 30-150% limits. | Laboratory determined percent recovery limits must be between 30-150%<br><br>RPD's ≤ 20% for water and ≤ 30% for solids | Laboratory determined percent recovery limits must be between 40-140% except for difficult analytes, which must be between 30-140% recovery. | Breakdown must be ≤ 15% for each compound. |

# APPENDIX H

## SUMMARY OF DKQ ACCEPTANCE CRITERIA

| QC Parameter | Holding Time (1) | Method Blank | Surrogates | Site Specific Matrix Spike/Matrix Spike Duplicate | Laboratory Control Sample |
|---|---|---|---|---|---|
| **Method 8151 Chlorinated Herbicides** | Aqueous 7 days to extraction, 40 days from extraction to analysis<br><br>Soil/Sediment, 14 days to extraction. 40 days from extraction to analysis. Up to one year for samples frozen within 48 hours of collection. (Note 4)<br><br>High concentration waste samples, 14 days to extraction. 40 days from extraction to analysis | Target analytes must be <RL. | Recovery limits lab generated and within 30-150% for both compounds on both columns.<br><br>Labs must develop own in-house limits that fall within 30-150% limits.<br><br>If surrogate exceeds limits on one column and herbicide concentrations reported at > RL but dual column precision not acceptable (RPD > 40%), re-extract and reanalyze samples. | Laboratory determined percent recovery limits must be between 30-150%, RPDs ≤ 20% waters and ≤ 30% solids. | Laboratory determined percent recovery limits must be between 40-140% except in-house limits for Dinoseb.<br><br>Labs expected to develop own in-house control limits that meet or exceed limits listed above. |
| **Method 8082 Polychlori-nated Biphenyls** | Aqueous 7 days to extraction, 40 days from extraction to analysis.<br><br>Soil/Sediment 14 days to extraction. 40 days from extraction to analysis. Up to one year for samples frozen within 48 hours of collection. (Note 4)<br><br>High concentration waste samples, excluding transformer oils, 14 days to extraction. 40 days from extraction to analysis. Transformer/Waste Oils, 1 yr | Target analytes must be <RL. | Recovery limits lab generated and within maximum range of 30-150% for both compounds on both columns.<br><br>Labs must develop own in-house limits that fall within 30-150% limits. | Laboratory determined percent recovery limits for AR-1016/1260 must be between 40-140%. Recoveries for all Aroclors or Congeners 40-140%<br><br>Congeners must contain all target congeners.<br><br>RPD's ≤ 20% for waters and ≤ 30% for solids. | Laboratory determined percent recovery limits must be between 40-140%.<br><br>Labs are required to develop own in-house limits that meet or exceed limits listed above. |

# APPENDIX H

## SUMMARY OF DKQ ACCEPTANCE CRITERIA

| QC Parameter | Holding Time (1) | Method Blank | Surrogates | Site Specific Matrix Spike/Matrix Spike Duplicate | Laboratory Control Sample |
|---|---|---|---|---|---|
| **Method 8260 Volatile Organic Com-pounds** | Aqueous, 14 days, 7 days if unpreserved (2)<br><br>Soil/Sediment, 14 days if preserved. 48 hours if unpreserved. (Note 3).<br><br>High concentration waste samples, 14 days. | Target analytes must be <RL except for common lab contaminants which must be <3x the RL (Contaminants are acetone, methylene chloride, and 2-butanone). | Laboratory determined percent recoveries must be between 70-130% for individual surrogate compounds.<br><br>Laboratory determined recovery limits may be outside 70-130% limits for difficult matrices (e.g. waste, sludges, etc.). | Laboratory determined percent recoveries should be between 70-130% for target compounds.<br><br>RPDs should be ≤ 30% | Laboratory determined percent recoveries must be between 70-130% for target compounds.<br><br>Can also be used as CCAL.<br><br>Lab may have difficult compounds out of criteria as long as within 40-160% recovery. |

# APPENDIX H

## SUMMARY OF DKQ ACCEPTANCE CRITERIA

| QC Parameter | Holding Time (1) | Method Blank | Surrogates | Site Specific Matrix Spike/Matrix Spike Duplicate | Laboratory Control Sample |
|---|---|---|---|---|---|
| **Method 8270 Semivolatile Organic Compounds** | Aqueous, 7 days to extraction. 40 days from extraction to analysis<br><br>Soil/sediment, 14 days to extraction. 40 days from extraction to analysis. Up to one year for samples frozen within 48 hours of collection. (Note 4)<br><br>High concentration waste samples 14 days to extraction. 40 days from extraction to analysis. | Target analytes must be < RL except for common lab contaminants which must be < 5x the RL (Contaminants are phthalates). | Soil recovery limits lab generated and within 30-130%.<br><br>Water recovery limits lab generated and within 30-130% for base-neutrals, 15-110% for acid compounds. | Laboratory determined percent recovery limits must be between 70-130% except 20-160% for difficult compounds.<br><br>RPD's ≤ 20% for waters and ≤ 30% for soils. | Laboratory determined percent recovery limits must be between 70-130% except 20-160% for difficult compounds. |
| **Method 9010/9012/9014 Total Cyanide** | Aqueous, soil, sediment and high concentration waste samples: Cyanide 14 days from collection to analysis, (from date when thawed if solid samples frozen). Can maintain samples up to 1 year if frozen | Cyanide must be < RL. | Not applicable | Percent recovery limits must be between 75-125%.<br><br>For aqueous samples RPD ≤ 20%<br><br>For solids RPD ≤ 35% | LCS recoveries ±20% for aqueous samples and within vendor control (95% confidence limits) for solids. |

# APPENDIX H

## SUMMARY OF DKQ ACCEPTANCE CRITERIA

| QC Parameter | Holding Time (1) | Method Blank | Surrogates | Site Specific Matrix Spike/Matrix Spike Duplicate | Laboratory Control Sample | Fractionation Check Standard |
|---|---|---|---|---|---|---|
| **NJDEP Extractable Petroleum Hydrocarbons (EPH)** | Aqueous, soil, and sediments, samples must be extracted within 14 days of collection. Extracts must be analyzed within 40 days of extraction. | All components should be < 5 times their respective MDLs. | Labs develops own in-house limits which must be within 40-140% for each surrogate.<br><br>Sample recoveries and must be within 40-140%.<br><br>Conc. of fractionating surrogates naphthalene and 2-methylnaphthalene in aliphatic fraction < 5% total conc. of those 2 compounds (in the batch-related LCS or LCSD) | Lab develops own in-house recovery range but percent recoveries should be: Fractionated = between 40 and 140% for each carbon range. Non-Fractionated = between 40 and 140% for each compound<br><br>RPDs should be ≤ 50% for waters and soils/sediments if MSD is performed. | Percent recoveries between 40 and 140% for all compounds in the LCS; n-nonane must be between 25-140%.<br><br>If #2 fuel used as the LCS, percent recoveries must be between 40 and 140% for the #2-fuel<br><br>Retention times of surrogates in LCS must be within retention time windows | Every lot of silica gel/SPE cartridges checked. Percent recoveries between 40 and 140% for each compound, except for n-nonane which must be between 25-140%. |

# APPENDIX H

## SUMMARY OF DKQ ACCEPTANCE CRITERIA

Notes:

Not all method QA/QC deliverables are listed here. .

(1) See the Method for specific preservation requirement for each method.
(2) If aqueous samples effervesce upon addition of hydrochloric acid, samples must be collected unpreserved and stored at 4 ± 2º Celsius. Holding time is 7-days from collection.
(3) Samples should be collected and stored according to N.J.A.C. 7:26E-2.1(a)8.
(4) If the freezing option is selected, the sample must be frozen within 48 hours of collection. The holding time recommences when thawing begins. The total holding time is calculated from the time of collection to freezing plus the time allowed for thawing. The total elapsed time must be less than 14 days. Although the USEPA removed the holding time requirements for PCBs, NJDEP still requires the method – specified holding times to be followed.

Abbreviations:
CCAL Continuing Calibration
Cr Chromium
EPA United States Environmental Protection Agency
EPH Extractable Petroleum Hydrocarbons
LCS Laboratory Control Sample
LCSD Laboratory Control Sample Duplicate
ORP Oxidation Reduction Potential
RPD Relative Percent Difference
RL Reporting Limit
YR Year

# APPENDIX I

**DATA USABILITY EVALUATIONWORKSHEET**

**Project Name:** _____
**Laboratory:** _____
**Sample Delivery Group:** _____
**Sample Delivery Group Number:** _____
**Date Samples Collected:** _____
**Reviewer:** _____

| **Describe intended use of the data:** |
|---|
| |

| **Nonconformance DQA Review Elements** | **Briefly Summarize DQA Nonconformances** |
|---|---|
| **Laboratory Report Inspection** | |
| **Reasonable Confidence Evaluation** | |
| **Chain of Custody Evaluation** | |
| **Sample Result Evaluation** | |
| **Sample Preservation and Holding Time Evaluation** | |
| **Blank Evaluation** | |
| **Laboratory Control Samples** | |
| **Surrogates** | |
| **Site Specific Matrix Spikes and Matrix Spike Duplicates** | |
| **Tentatively Identified Compounds** | |
| **Other QC data** | |

**APPENDIX J**

# APPENDIX J

## DATA USABILITY OUTCOMES[1]

| Quality Control Element (Sample Type, Analysis, Condition or Characteristic) | Type of Nonconformance | Possible Causes | Major PARCCS Parameters Affected (Note 2) | Possible Effects on Data Usability (Note 3) |
|---|---|---|---|---|
| Chain of Custody | Chain broken, incomplete, or not kept | Missing signatures, missing seals, missing dates or times, type of analysis requested not listed | Completeness | If confirmed that sample set is complete and samples not compromised, data are usable. |
| Sample labeling | Sample labels unreadable, missing, or not attached to containers | Failure to protect label from moisture, failure to use appropriate marker or labels, improper standard operating procedure (SOP) | Representative-ness<br>Completeness | If the sample can be unambiguously identified, then samples are usable. |
| Sample labeling | Samples mislabeled or labeled incompletely | Sampler error<br>Improper SOP | Representative-ness | If the sample can be unambiguously identified, then samples are usable. |
| Sample containers | Plastic containers for organic analytes | Samplers unaware of container requirements, improper SOP, failure to read SOP, SOP incorrect, insufficient quantity of correct containers samplers used containers on-hand | Representative-ness<br>Accuracy<br>Completeness | Possible phthalate interference and/or volatile loss may be present. |
| Sample containers | Glass containers for metals | Samplers unaware of container requirements, improper SOP, failure to read SOP, SOP incorrect, insufficient containers | Representative-ness<br>Accuracy<br>Completeness | Possible inorganic contamination may be present. |
| Headspace | Bubbles in water inside volatile organic chemical (VOC) vial | Poor sampling technique, caps not sealed tightly, septum caps not used, water vials not completely filled, improper | Representative-ness<br>Accuracy<br>Completeness | Loss of volatiles may occur. |

## APPENDIX J (CONTINUED)

## RANGE OF DATA USABILITY OUTCOMES[1]

| Quality Control Element (Sample Type, Analysis, Condition or Characteristic) | Type of Nonconformance | Possible Causes | Major PARCCS Parameters Affected (Note 2) | Possible Effects on Data Usability (Note 3) |
|---|---|---|---|---|
| | | SOP | | |
| Preservation – soil and sediment samples | VOC soil or sediment samples not properly preserved | Varies | Accuracy<br>Representative-ness<br>Completeness<br>Comparability | Loss of volatiles may occur. |
| Preservation – aqueous samples | No preservative or wrong pH | No preservative added or improper amount of preservative added | Representative-ness<br>Accuracy<br>Completeness | This is an analyte- and method-dependent issue. Loss of analytes may occur. |
| Preservation – aqueous samples | Wrong preservative | Improper SOP, failure to read SOP, SOP incorrect, correct preservative unavailable | Representative-ness<br>Accuracy<br>Completeness | This is an analyte- and method-dependent issue. Loss of analytes may occur |
| Preservation | Improper temperature (temperature outside 4 ± 2° C Note (4) | Insufficient ice, samples too cold, shipping container inadequately insulated, samples adequately cooled at time of sampling and during shipping, transit time too long or too short for samples to reach temperature | Representative-ness<br>Accuracy<br>Completeness | Loss of analytes may occur if temperature is too high. If temperature is too low, check container for integrity. |

# APPENDIX J (CONTINUED)

## RANGE OF DATA USABILITY OUTCOMES[1]

| Quality Control Element (Sample Type, Analysis, Condition or Characteristic) | Type of Nonconformance | Possible Causes | Major PARCCS Parameters Affected (Note 2) | Possible Effects on Data Usability (Note 3) |
|---|---|---|---|---|
| NJDEP certification status | Laboratory not certified or approved for specific analytes by NJDEP. | Varies | All may be affected | Except in limited circumstances, data should not be used. |
| Handling or Holding times | Handling and/or Holding times exceeded | Excessive analysis time; tardy ship date; inappropriate shipping method; slow laboratory turn-around time. | Representative-ness<br>Accuracy<br>Completeness | Loss of analytes may occur.<br>(Note 5) |
| Analysis method | Wrong method used to analyze samples | Incorrect laboratory method specified on chain of custody form; laboratory/analyst unaware of requirement; failure to read SOP; SOP incorrect. | Representative-ness<br>Comparability<br>Completeness<br>Accuracy<br>Sensitivity | Except in limited circumstances, data should not be used. |
| Reporting Limit (RL) | RL too high | Insufficient measures to combat interferences (i.e., cleanup, background correction); insufficient sample; high dilution factor; wrong or inappropriate method. | Comparability<br>Completeness<br>Sensitivity | If the RL for site-specific compounds of concern > the standards/screening levels, then NDs cannot be used to determine compliance.<br>If a compound is detected and the RL is elevated, the data are usable. |
| Method blank (MB) | Method blank absent (Note 6) | Improper SOP | Representative-ness<br>Accuracy<br>Completeness | Data may contain false positives and in some circumstances, data should not be used. |
| Method blank (MB) | Contamination | Contaminated reagents, gases, glassware; ambient contamination; poor laboratory technique. | Representative-ness<br>Accuracy<br>Completeness | Data may contain false positives and/or high bias |
| Equipment blank (EB) or Rinsate blank | Contamination | Improper decontamination of field sampling equipment; contaminated rinsate water, | Representative-ness<br>Accuracy | Data may contain false positives and/or high bias |

## APPENDIX J (CONTINUED)

## RANGE OF DATA USABILITY OUTCOMES[1]

| Quality Control Element (Sample Type, Analysis, Condition or Characteristic) | Type of Nonconformance | Possible Causes | Major PARCCS Parameters Affected (Note 2) | Possible Effects on Data Usability (Note 3) |
|---|---|---|---|---|
| | | containers, or preservatives. | Completeness | |
| Trip blank (TB) for analysis of VOCs | Trip blank absent | TB not included; Improper SOP; TB broken during shipment; TB lost during shipment. | Representative-ness<br>Accuracy<br>Completeness | Data may contain false positives and/or high bias. |
| Trip blank for analysis of VOCs | Contamination | Cross-contamination during shipment or storage; contaminated reagent water, glassware, or preservatives | Representative-ness<br>Accuracy<br>Completeness | Data may contain false positives and/or high bias. |
| Laboratory Control Sample (LCS) | LCS absent (Note 7) | Improper laboratory SOP | Accuracy<br>Completeness<br>Comparability | Complete evaluation of the data may not be possible. |
| LCS, Laboratory Control Sample Duplicate (LCSD), blank spike (BS), blank spike duplicate (BSD) | Low recoveries | Method failure; improper spiking; degraded spiking solution; failed spiking device. | Accuracy<br>Completeness<br>Comparability | Data may contain false negatives and/or low bias |
| LCS, LCSD, BS, BSD | High recoveries | Method failure; improper spiking; degraded spiking solution; failed spiking device; contaminated reagents, gases, glassware, etc. | Accuracy<br>Completeness<br>Comparability | Data may contain false positives and/or high bias |
| LCS, LCSDs | High RPDs | Method failure; improper spiking; failed spiking device; contaminated reagents, gases, glassware, etc. | Representative-ness<br>Precision<br>Completeness.<br>Comparability | Poor precision exists in the analytical procedure. |
| Surrogates in MB, LCS, LCSD, BS, BSD | Low recoveries | Method failure; improper spiking; degraded spiking solution; failed spiking device. | Accuracy<br>Completeness | Laboratory performance should be questioned. |

## APPENDIX J (CONTINUED)

## RANGE OF DATA USABILITY OUTCOMES[1]

| Quality Control Element (Sample Type, Analysis, Condition or Characteristic) | Type of Nonconformance | Possible Causes | Major PARCCS Parameters Affected (Note 2) | Possible Effects on Data Usability (Note 3) |
|---|---|---|---|---|
| Surrogates in MB, LCS, LCSD, BS, BSD | High recoveries | Method failure; improper spiking; degraded spiking solution; failed spiking device; contaminated reagents, gases, glassware. etc. | Accuracy Completeness | Laboratory performance should be questioned |
| Surrogates in samples | Low recoveries | Matrix effects; inappropriate method; method failure; improper spiking; degraded spiking solution; failed spiking device. | Accuracy Completeness | Data may contain false negatives and/or low bias. |
| Surrogates in samples | High recoveries | Matrix effects; inappropriate method; method failure; improper spiking; degraded spiking solution; failed spiking device; contaminated reagents, gases, glassware, etc. | Accuracy Completeness | Data may contain false positives and/or high bias. |
| MS, MSD (Note 8) | Low recoveries (Note 9) | Matrix effects; inappropriate method; method failure; inadequate cleanup; inadequate background correction; failure to use method of standard additions; improper spiking; degraded spiking solution; failed spiking device. | Accuracy | Data may contain false negatives and/or low bias. |
| MS, MSD (Note 8) | High recoveries (Note 9) | Matrix effects; inappropriate method; method failure; inadequate cleanup; inadequate background correction; failure to use method of standard additions; improper spiking; degraded | Accuracy | Data may contain false positives and/or high bias. Qualify sample results greater than the RL (i.e., possible matrix effects). |

## APPENDIX J (CONTINUED)

## RANGE OF DATA USABILITY OUTCOMES[1]

| Quality Control Element (Sample Type, Analysis, Condition or Characteristic) | Type of Nonconformance | Possible Causes | Major PARCCS Parameters Affected (Note 2) | Possible Effects on Data Usability (Note 3) |
|---|---|---|---|---|
| | | spiking solution; failed spiking device; contaminated reagents, gases, glassware, etc. | | |
| MS, MSD (Note 8) | High Relative Percent Difference | Sample heterogeneity; inadequate sample mixing for non-voc samples in the laboratory or the field; samples misidentified; method failure; improper spiking; failed spiking device, duplicate spiking of a sample, contaminated reagents, gases, glassware, etc. | Representative-ness<br>Precision | The sample itself may be heterogeneous leading to poor precision (high variability). |
| Dilution factors | Extremely high dilution factors | High concentrations of interferences or analytes; inappropriate analytical method used or selected | Accuracy<br>Comparability<br>Completeness | Samples with high RLs may not meet DQO and RLs may become greater than regulatory criteria. |
| Field Duplicates | Field duplicates are not comparable within DQOs | Sample inhomogeneity; insufficient mixing in field; samples not split but collocated (Note 10); insufficient mixing in laboratory. | Representative-ness<br>Precision | The sample itself may be heterogeneous leading to poor precision (high variability). The sample may not be representative of site conditions. |
| | | | | |

# APPENDIX J (CONTINUED)

## RANGE OF DATA USABILITY OUTCOMES[1]

This table was adapted from US Army Corps of Engineers, Environmental Quality Assurance for HTRW Projects, Engineer Manual. October 10, 1997, EM 200 1-6, table 3-1.

# APPENDIX J (CONTINUED)

## RANGE OF DATA USABILITY OUTCOMES[1]

Notes:

(1) Entries in the Possible Causes, PARCCS Parameters Affected, Effect on Data, and Possible Data Evaluation columns assume only one type of failure occurring at any one time. The cumulative or synergistic effects of more than one failure type occurring simultaneously make data usability evaluation more complex. Data usability evaluations involving multiple failure types are beyond the scope of this table. Not all possible QC failures and outcomes are illustrated on this table.
(2) The PARCCS parameters most affected are listed. All of the PARCCS parameters may affected in some cases. Any failure that results in invalid data affects Completeness.
(3) All data usability evaluations are subject to discretion of the investigator taking into account project DQOs, and the intended use of the analytical data. The DQA and DUE thought process must be documented in the report using the data.
(4) Refrigeration not required for trace metals (excluding mercury).
(5) Exceeding holding times on some analyses can produce false positives (i.e., carbonates, dissolved oxygen, etc.) and high bias (i.e., pH, carbonates, dissolved oxygen, etc.). High bias and false positives can also occur when degradation products of contaminants are also themselves analytes, i.e., when 4,4'-DDT is present and holding times are exceeded, high bias and false positives for the degradation products 4,4 DDD, 4,4 DDE, 4,4 DDT, 2,4 DDD, 2,4 DDE, 4,4'-DDT can occur.
(6) Method blanks are not appropriate for all analyses, i.e. pH, conductivity, % solids, etc.
(7) Laboratory control samples are not appropriate for all analyses, i.e. pH, conductivity, % solids, etc.
(8) Matrix spike and matrix spike duplicates are performed at the request of the investigator and may not be present.
(9) Note that when the native sample concentrations are significantly greater than the effective spike concentration that the conclusion of the matrix effect is only tentative. As a general rule of thumb, the native sample concentration should be no more than four times higher than the effective matrix spike concentration of for the matrix effect to be considered probably present.
(10) Conventional sampling protocols for some analyte classes (i.e., VOCs) prohibit sample mixing and splitting because it results in the loss of analytes. Field and QC samples for these analytes are more appropriately collected as sample pairs.