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Chlorinated Pre-design Investigation and Pilot Study (Site Characterization/Feasibility Study Work Plan) Quality Assurance Project Plan

24 Seneca Avenue, Site No. 828132 Rochester, New York

January 29, 2019

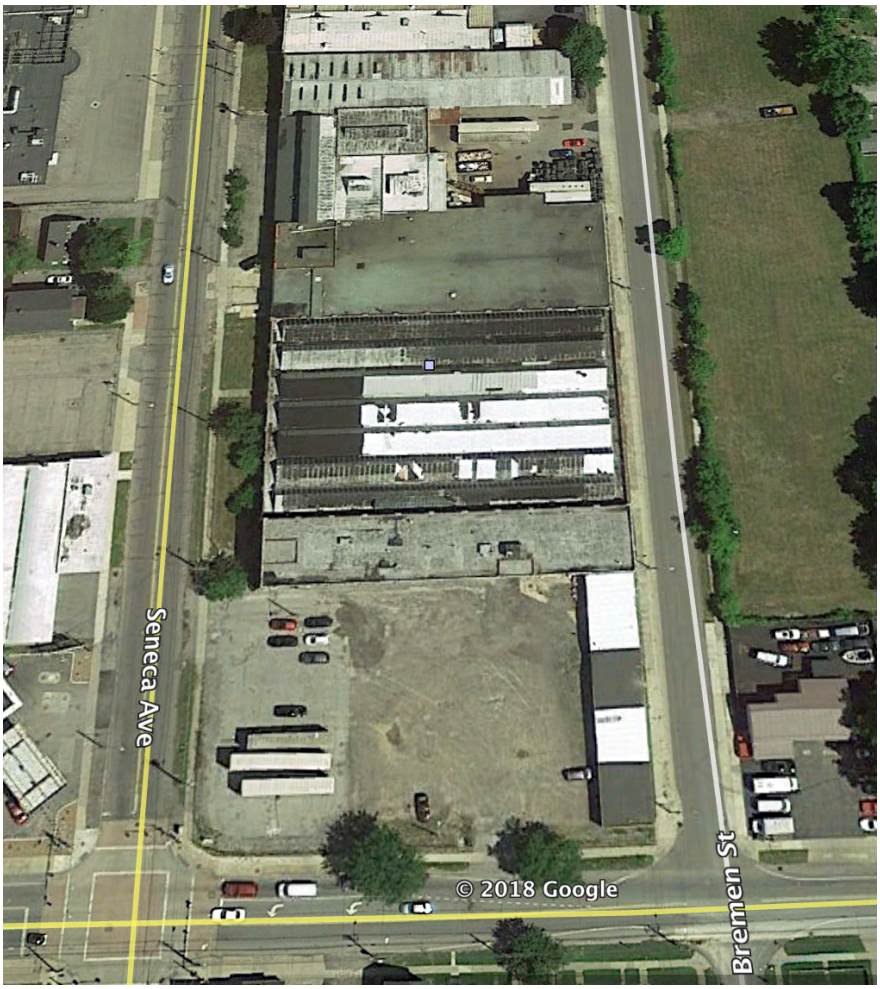


Table of Contents

1. Introduction and Project Definition

Nathan Associates Inc. (Nathan), on behalf of Stanley Black & Decker, Inc. for Sargent & Greenleaf, plans to implement a focused chlorinated VOC pre-design investigation (PDI) and pilot scale study work plan at a site located at 24 Seneca Avenue in Rochester, New York. Briefly, the PDI will involve conducting delineation activities using high resolution site characterization methods that involve sophisticated field data collection, adaptive management of the investigation scope, and off-site laboratory verification. The pilot scale study will involve injecting a treatment amendment to promote in situ contaminant degradation and measuring the effect on the site geochemistry and contaminant concentrations over time. Nathan Associates prepared this Quality Assurance Project Plan (QAPP) for the implementation of the PDI and pilot scale study work plan.

In general, the project will involve the following activities:

- Conduct field screening using a direct push rig equipped with a membrane interface probe (MIP) with various field screening detectors and a hydraulic push tool (HPT).
- Collect soil samples from direct push cores for VOC, ferrous iron, total iron, and fraction organic carbon analyses.
- Collect groundwater samples from direct push sampling points for VOC analysis.
- Collect groundwater samples from temporary wells and one monitoring wells for analysis of: VOCs, nitrate, sulfate, sulfide, ferrous iron, total iron, manganese, total organic carbon, dissolved organic carbon, volatile fatty acids, and bacteria and functional genes.
- Collect groundwater samples for field analysis of dissolved oxygen (DO), oxidation-reduction potential (ORP), turbidity, specific conductivity, and temperature.
- Oversight of the pilot scale study field activities.
- Utility locating.
- Surveying sample locations.

The activities listed above are described in the *Pre-design Investigation and Pilot Scale Study Work Plan* and will be conducted in accordance with applicable NYSDEC guidance and regulations.

This QAPP sets forth the quality assurance/quality control (QA/QC) procedures to be followed during the execution of the PDI and pilot scale study pre, including procedures for sampling, chain of custody, laboratory analysis, data reduction and reporting, internal quality control, preventive maintenance, and corrective action. The purpose of the QAPP is to ensure the generation of valid data or, if the data are not valid, to identify the validity issues and determine appropriate corrective actions.

2. Project Organization

A flowchart depicting the project organization, including the flow of information from the client, project management team, field team, and laboratory, is provided in Figure 1.

Project Participants

The personnel responsible for the quality assurance of the field sampling and analysis portion of the project are as follows:

- Stanley Black & Decker Project Representative – Kathryn Hinckley
- Project Director/Manager – John Simon, Nathan Associates, Inc.
- Project Hydrogeologist and Site-Specific Health and Safety Officer – Anton Heitger, EHS Support
- Pilot Scale Study Oversight – Anton Heitger, EHS Support
- Project Health and Safety Director – Aaron Leff, EHS Support
- Sampling and Oversight Personnel – Anton Heitger (or designee), EHS Support
- Quality Assurance Chemist – Jodi Zimmerman, Vali-Data of WNY, LLC
- ALS Global Laboratory Project Manager – Meghan Pedro
- ALS Global Laboratory Custodian – Greg LaForce or designee
- Microbial Insights Laboratory Project Manager – Kate Clark
- Microbial Insights Laboratory Project Manager – Casey Brown
- HRSC Project Manager – Brian McCann, Columbia Technologies

2.1 Participant Responsibilities

The following subsection describes the relationship among the project participants.

Stanley Black & Decker Project Representative

Kathyrn Hinckley is the Stanley Black & Decker Project Representative for the PDI and pilot scale study activities. Ms. Hinckley will review documents and provide comments to the project team. She also is responsible for coordinating the field activities with the project director and ensuring that the work area is available for the necessary field activities.

Project Director/Manager

John Simon will serve as the Project Director/Manager and, as such, will work with the project team to develop the overall project strategy. Mr. Simon will also serve as the primary point of contact with the client. He will be responsible for ensuring the field activities are conducted in accordance with the work plan and that the appropriate personnel are assigned to complete the project tasks. Mr. Simon will ensure the waste classification is assigned in accordance with applicable laws and regulations. In addition, Mr. Simon will be responsible for the quality of documents submitted to the NYSDEC.

Project Hydrogeologist and Site-Specific Health and Safety Officer

Anton Heitger will have the responsibility of managing the contractors to ensure that the field work is performed in accordance with the work plan and QAPP. Mr. Heitger or his designee will be responsible for the following activities:

- PDI sampling tasks
- Coordinating and supervising the drilling and sampling activities, including the contractors retained to conduct the field screening and to install the soil borings and temporary monitoring wells
- Coordinating with the laboratory project manager prior to shipping sample coolers and containers from and to the laboratory
- Either directly collecting or overseeing the collection of the soil and groundwater samples
- Supervising or serving as the field sample custodian
- Ensuring that field measurements and sample collection follow the PDI and pilot scale study work plan and this QAPP
- Identifying and resolving problems occurring during the field work

As the Site-specific Health and Safety Officer, Mr. Heitger is responsible for ensuring that the site-specific health and safety plan (HASP) is adhered to by all field personnel under his direction (the contractor will have its own HASP and designated health and safety officer). In addition, Mr. Heitger is responsible for overall compliance with the OSHA Hazardous Site Worker Regulations (40 CFR 1910.126) and other applicable regulations.

Each day of field activities must begin with a "tailgate" meeting to discuss the planned activities, the job safety risks involved, and precautions to be taken. The Site-specific Health and Safety Officer or an appropriate designee must record the time of the tailgate meeting and attendees in the field notebook.

Project Health and Safety Director

Aaron Leff will serve as the project health and safety director and will be responsible for developing the HASP, reviewing and approving the contractors' health and safety programs, and directing EHS Support's health and safety program.

Sampling and Oversight Personnel

Experienced engineers, geologists, hydrogeologists, environmental scientists, and/or environmental technicians employed by EHS Support will conduct the contractor oversight and sampling tasks set forth in the PDI and pilot scale study work plan and QAPP. Their responsibilities will include following sample collection, documentation, shipment, chain of custody, and health and safety procedures during all aspects of the field activities. The sampling personnel will report to the Project Hydrogeologist. In addition, the *Sampling and Oversight Personnel* will oversee as aspects of the pilot scale study, which will include working with Mr. Simon and the contractor to select sample locations.

Quality Assurance Chemist

Jodi Zimmerman, Vali-Data of WNY, LLC, will serve as an independent third party consultant, specializing in evaluating the quality of laboratory data, and will be retained to review the data packages produced by the laboratory and validate the data. Ms. Zimmerman will prepare a validation report discussing the usability of the data, identify any concerns or issues, and, if warranted, corrective measures.

Laboratory Project Manager

Meghan Pedro of ALS Global Laboratory (Rochester, New York), will serve as the laboratory project manager. Ms. Pedro will be responsible for the laboratory's adherence to this QAPP (which will be provided to the laboratory). She will coordinate the shipment, acceptance, and laboratory analyses with Mr. Heitger. The laboratory project manager or her designee will be responsible for ensuring the laboratory conducts an assessment of the data and prepares the required analytical data package.

In addition, Microbial Insights (Knoxville, Tennessee) will be retained to analyze groundwater samples for quantitative polymerase chain reaction analysis to quantify the number of *Dehalococcoides* cells are present in groundwater. The Microbial Insights project manager will be Kate Clark and will have the same responsibilities as the ALS Global project manager.

Laboratory Custodian

Greg LaForce will designate an individual to be responsible for properly logging and handling the samples delivered to the ALS Global laboratory.

The Microbial Insights custodian manager will be Casey Brown. Ms. Brown will report to the laboratory project manager.

HRSC Project Manager

Brian McCann of Columbia Technologies will be responsible for ensuring that the HSRC equipment arrives on-site in working order and is functioning as designed throughout the PDI activities.

Direct Push and Pilot Scale Contractor

The direct push and pilot scale contractor may consist of one or two firms (the same firm may conduct both phases of the work. The contractor has not yet been selected. The contractor will designate a field project manager who will be responsible for ensuring that the HSRC equipment arrives on-site in working order and is functioning as designed throughout the field activities and that the work is performed in accordance with this QAPP. In addition, the field project manager will oversee the HASP implementation for the contractor and its employees.

3. Data Quality Objectives

The data quality objectives and data assessment techniques will follow relevant US Environmental Protection Agency (EPA) guidance: *Guidance on Systematic Planning Using the Data Quality Objectives Process* (EPA QA/G-4) (US EPA, 2005). This guidance outlines seven steps for developing data quality objectives. Each step is provided below with a description of how the step will be applied to the PDI and pilot scale study work plan implementation.

1. State the Problem – soil and groundwater in this area contain VOCs at concentrations above the NYSDEC Commercial SCOs and the TOGS.

2. Identify the Goal of the Study (Project) – for PDI, delineate the extent of soil and groundwater that warrant removal, treatment, or management in place. In addition, collect baseline data on geochemistry and microbial ecology. For pilot scale study, collect data and information to determine the effectiveness of in situ reductive dichlorination and inform the project design.

3. Identify Information Inputs – for PDI, the work plan scope of work prescribes an appropriate number of samples to provide the delineation and is intended to provide the information necessary to prepare the remedial design. Based on the delineation, the ability to excavate or treat soil, including the extent of affected soil, will be assessed as well as the treatment extent for groundwater.

   For pilot scale study, the information inputs include the site groundwater geochemistry, microbial ecology, and VOC distribution; aquifer geochemistry and VOC reduction in response to treatment amendments; ability to inject fluids and the associated radius of influence; and accessibility of injection rigs and equipment relative to the VOC plume.

4. Define the Boundaries of the Study (Project) – the project boundaries extend from the northern portion of the southern parking lot to approximately 60 feet downgradient of soil boring SB-33; however, due to the adaptive management approach of the PDI, the project boundaries for both the PDI and pilot scale study are subject to adjustment based on the PDI findings.

5. Develop the Analytical Approach – samples will be collected in accordance with industry guidance, as described in this QAPP, and will be analyzed by an ELAP-certified laboratory for VOCs and industry-accepted methods for parameters that do not have ELAP certifications.

6. Specify Performance or Acceptance Criteria – acceptance criteria will be satisfied by the development of valid data that can be used to compare to the commercial and industrial SCOs (soil) and TOGS (groundwater) to evaluate the extent of remediation warranted within the study boundaries (although not all groundwater with VOCs exceeding TOGS will be treated).

7. Develop Plan for Obtaining Data – The procedures for field sampling, sample management, laboratory analysis, documenting field activities, and reporting, consistent with NYSDEC guidance, are specified in this QAPP.

4. Boring Installation, Well Installation and Sampling Procedures

4.1 Pre-Design Soil Samples

The soil borings will be advanced from the surface to the designated sample depth, which will be at or above the bedrock surface. The borings will be advanced using a small format (i.e., track-mounted) direct-push drill rig (e.g., Geoprobe® 7822DT or similar) equipped with 5-foot-long macro-core soil samplers. Continuous soil samples will be collected for soil classification and headspace screening (using a photoionization detector [PID]) during the boring installation. The sample depth or number of samples may be adjusted based on the PID screening or other indications of potential impact (i.e., visual staining and olfactory evidence). Upon recovery, the liner will be removed from the sampler and split open using a utility knife.

The drilling equipment will be decontaminated prior to drilling, between boring locations, and following drilling activities to minimize the risk of cross contamination. Reusable soil sampling equipment will be decontaminated with a liquinox detergent wash, or equivalent, and analyte-free water rinse before collecting each groundwater sample. Decontamination fluids will be containerized and managed as investigation-derived waste.

The soil samples will be described for lithology and the description will be recorded in a field notebook. The horizontal location of each soil boring will be measured using a tape measure from two fixed points and recorded in the field notebook.

The Project Hydrogeologist or Sampling Personnel will collect the soil samples for the parameters listed in the PDI and pilot scale study work plan and placed into the containers specified in Table 1. Samples designated for VOC analysis will be using preservation techniques established by the US EPA in SW 846 Method 5035 and following NYSDEC guidance issued on October 17, 2012 (NYSDEC, 2012). The samples will be analyzed for low-level VOCs (detection limits below 200 µg/kg) following US EPA Method 8260 and, unless there are issues with interferences, the laboratory will use sodium bisulfite as a preservative. Samples for other the analytes listed in Table 1 will be placed in laboratory provided sample containers as listed in the table. All samples will be placed into a laboratory cooler chilled with ice.

The soil borings will be designated by the letters “SP” and then a two-digit number beginning with soil boring number 01 (SP01 will be the first boring).

The soil samples will be numbered by boring location and the sample depth interval in feet within parenthesis. Thus, a sample collected from boring SP42 from a depth of 1 to 1.5 feet will be designated as sample number “SP42 (1-1.5)”.

The samples will be handled and shipped in accordance with the QA protocol provided in Section 5, including trip blanks and equipment blanks, and analyzed for the parameters following the methods listed in Table 1.

4.2 Direct Push Groundwater Sampling Procedures

Groundwater samples from direct push locations will be collected using a Geoprobe® Screen Point (SP) groundwater sampler or equivalent direct push groundwater sampler utilizing a retractable screen. At each groundwater monitoring point location, the retractable screen will be pushed into the ground until the screen can be exposed to the water-bearing sediments at the desired sample depth interval.

Reusable groundwater sampling equipment will be decontaminated with a liquinox detergent wash, or equivalent, and analyte-free water rinse before collecting each groundwater sample. Decontamination fluids will be containerized and managed as investigation-derived waste.

Before collecting each groundwater sample, if possible, groundwater will be pumped from the temporary monitoring point using a peristaltic pump and clean 1/4-inch nominal diameter low-density polyethylene (LDPE) tubing. The purpose of the pumping is two-fold. First, pumping will help "develop" the temporary monitoring point by removing sediment and enhancing good hydraulic communication with the water-bearing sediments. Second, pumping will "purge" the temporary monitoring point and will ensure fresh groundwater from the water-bearing sediments is used for sampling and analysis. Purge water will be containerized with decontamination fluids for management as investigation-derived waste. After the gross solids are removed, the turbidity will be measured using a nephelometer and recorded in the field notebook. Thus, the samples will be collected after minimal purging that will be sufficient to clear the screen of excess turbidity and ensure that stagnant water is not sampled, but that will not cause the well point to become over pumped (a dry well with lack of water). Also, the well is likely to produce groundwater with some solids due to the lack of a well screen.

After collecting each groundwater sample, the borehole will be sealed with clean sand and a minimum of 6 inches of hydrated bentonite. Then, the ground surface will be repaired to match the surrounding material, thickness, and grade.

4.3 Well Installation Procedures

Three monitoring wells will be installed within the injection area and one well will be located in the VOC-affected but outside the pilot scale study area, as described in the PDI and pilot scales study work plan. The wells will be installed by advancing borings using a direct-push rig to the top of bedrock using a 3.25- or 3.5-inch diameter probe. Then, the well screening will be installed in each borehole using a 1-inch diameter PVC casing with a 5-foot long 2.5-inch diameter pre-packed screen (see Appendix A for a cutout of the pre-packed well screen and assembly). The screen will be set at the bedrock interface, unless the Project Hydrogeologist ascertains that the entire screen will be submerged. In this case, the well screen will be moved closer to the ground surface, until approximately 1 foot of screen is above the water table (with 4 feet submerged). The wells will be set into the floor with a flush mounted well cover.

The wells will be developed by removing a minimum of three well volumes (including the casing diameter) of groundwater. Field parameters for dissolved oxygen (DO), oxidation-reduction potential (ORP), specific conductance, turbidity, and temperature will be measured

using a YSI Model 600XL multi-parameter monitoring device (or similar) and recorded in the field notebook following each purge volume. However, because the wells are 1-inch in diameter, it may not be possible to purge the wells until all the field parameters stabilize.

MW-10 has not been sampled since August 2011. Before developing the newly installed wells, the Project Hydrogeologist will purge well MW-10 and measure the well turbidity using a YSI Model 600XL multi-parameter monitoring device (or similar). If the Project Hydrogeologist determines that the well has become turbid in the intervening years since it was last sampled, the Project Hydrogeologist will direct the drilling subcontractor to redevelop the well in accordance with well development procedures outlined above, except the development will continue until the well field parameters stabilize.

The monitoring wells used for the pilot scale study will be designated with "PSW" designations and will be sequential based on the most recent boring drilled.

Following the pilot scale study, if it determined the monitoring wells are no longer necessary, the wells will be decommissioned and abandoned in accordance with NYSDEC guidelines described in CP-43: Groundwater Monitoring Well Decommissioning Policy (NYSDEC, 2009). The surface will be restored using material to match the surrounding grade.

4.4 Groundwater Sampling Procedures

After development, groundwater samples will be collected from the newly installed wells and existing monitoring well MW-10. The Project Hydrogeologist or Sampling Personnel will collect groundwater samples from each well using low flow sampling techniques. This process will begin by removing the well cap and measuring the organic vapor levels in the top of the well casing using a PID. This level will be recorded in the field notebook and appropriate health and safety precautions taken following the HASP. The low flow technique then entails first measuring and recording the static water level measurement, which will be compared to the well installation records for reference to well construction and screen depth. Next, 0.25-inch polyethylene tubing will be cut to length for purging. Groundwater purging involves using a peristaltic pump for temporary wells and collecting water quality measurements using a field meter to measure temperature, pH, specific conductivity, ORP, DO, and turbidity. Groundwater purging will continue until simultaneous readings are observed to be within the following limits:

- Turbidity (+/- 10% for values >10 NTUs)
- DO (+/- 10% for values greater than 0.5 milligram per liter (mg/L). (If three dissolved oxygen values are < 0.5 mg/L, consider the values stabilized.)
- Specific conductivity (+/- 3%)
- Temperature (+/- 3%)
- pH (± 0.1 unit)
- ORP (± 10 millivolts)

If the parameters have not stabilized within five volumes, it is at the discretion of the Project Hydrogeologist or Sampling Personnel whether or not to collect a sample or to continue purging. If, after five well volumes, pH and conductivity have stabilized and the turbidity is

still decreasing and approaching an acceptable level, additional purging should be considered to obtain the best sample possible, with respect to turbidity. The sample clarity and any other visual observations during sampling shall be described in the field log.

After purging, the groundwater samples will be collected by slowly filling the sample containers. For VOC samples, the 40-ml vials will be filled until full, capped, and then inspected for air bubbles by inverting the sample container and inspecting the bottom of the vial, which will be facing upward. If an air bubble(s) is present, the water will be discarded with the other investigation-derived waste and the sample recollected. A minimum of three vials will be filled for each VOC sample. For samples other than VOCs (except for qPCR), the sample containers will be filled to close to the top of the container, but not all the way to the brim. qPCR samples will be collected using a Microbial Insights Bio-Flo apparatus following the protocol in Appendix B.

The groundwater samples will be numbered by temporary well location and the sample date within parenthesis. Thus, a groundwater sample collected from pilot scale well 2 on December 4, 2019 will be designated as sample number "PSW2 (120419)". Following sample collection, ensure all field data are properly recorded in the notebook and a groundwater monitoring field form.

4.5 Waste Characterization Samples

The PDI and pilot scale study work plan specifies collecting waste characterization samples. For soil, two types of waste characterization samples will be collected: composite samples and discrete samples (for VOC analysis only). The composite soil samples will be comprised of a 2-inch portion from the acetate liner of a representative number of the soil boring sleeves (six minimum) placed into a new stainless steel mixing bowl. The sample aliquots will be thoroughly mixed with a new stainless steel spoon. The composite sample will be designated as "WC-SOIL 01". In addition, a sample from the interval deemed to have the highest VOC concentration, as determined using the MIP, will be submitted for VOC analysis for waste characterization purposes (it is not appropriate to composite samples for VOC analysis). This sample will be designated as "WC-SOIL 02 (VOCs)".

For groundwater, a single waste characterization sample will be collected from a drum of investigation-derived waste using a disposable bailer. The collected water will be placed into laboratory-supplied containers, as with the other samples. These samples will be designated "WC-GW 01".

ß*ƒ*4.6 Particulate Air Monitoring

As part of the generic community air monitoring program (CAMP), real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size will be used (Appendix C). As required by New York State guidance, the equipment must be equipped with an audible alarm to indicate exceedance of the action level set forth in the generic CAMP. The CAMP sampling will be conducted immediately downgradient of the drilling area.

5. Sample Custody and Management

5.1 Sample Containers, Preservation, and Holding Times

The sample containers, preservation methods, and laboratory holdings times for soil and groundwater samples are provided in Tables 1 and 2.

The holding times begin when the sample is received at the laboratory.

The laboratory will provide pre-cleaned sample containers, including preservative when necessary, sent in the same coolers used for the samples. The coolers will be chilled with a minimum of one gallon of ice placed into double-bagged Zip-lock bags to prevent leakage.

After sampling, each sample container shall be wiped clean with a disposable paper towel. Then, each sample container will be labeled with the following information:

- Project name
- Sample number (described above)
- Analysis
- Date
- Time
- Sampler's name
- Preservative

5.2 Chain of Custody Procedures

A person will be deemed to have custody of samples when the samples are in their possession or control. The sampling crew will retain the chain of custody forms until the samples are shipped or hand delivered to the laboratory. If the person leaves the samples from their sight, the samples must be stored in a closed cooler, and placed in a secured area, such as a locked vehicle, to prevent tampering by third parties.

A chain of custody form will be completed for each sample shipment. At a minimum, the chain of custody form will include the following information in the title block:

- Project name
- Project number
- Contact person and telephone number

In addition, the chain of custody form will include the following information:

- Environmental media sampled
- Sample identification number
- Sample time
- Sample date
- Analytical procedure
- Sample preservative

Entries on the chain of custody form must be made in indelible ink and not pencil or other erasable marking. If an incorrect entry is made, the information will be crossed out with a single strike mark with initials and the date next to the marked out text.

A signature block with the sample custodian's signature, printed name, and date must be included on the form. In addition, the chain of custody form will include signature blocks for subsequent custodians.

Before shipping from the project site, a copy of the chain of custody form will be made and placed in the project files. Then the original form will be placed into a zip-lock bag and taped to the top of the inside of the cooler. The cooler will then be sealed with a chain-of-custody seal, which will be signed and dated. Finally, the cooler will be taped shut.

Examples of ALS Global and Microbial Insights chain of custody forms are provided in Appendix D.

The sample coolers will be delivered to the analytical laboratory by hand delivery, ground courier, or overnight shipping service. The receiving party must sign the chain of custody form and provide a copy of the signed form with the laboratory report.

The Project Hydrogeologist will develop a project-specific database of anticipated sample collection as COCs are prepared at the end of each day in which samples are shipped. The Project Hydrogeologist will communicate with the Laboratory Custodian during the sampling event to verify that each group of samples that are shipped are received at the laboratory. Immediately after sample receipt, the laboratory will provide the Project Hydrogeologist a summary of samples received at the laboratory and assigned analytical methods. The Project Hydrogeologist will review the sample receipt documentation to verify that all samples and analytical methods were identified by the laboratory. Missing samples or incorrect information will be conveyed to the Laboratory Custodian by the Project Hydrogeologist.

5.3 Field Documentation

The purpose of field documentation is to record the activities and site conditions to enable a third party who is not present to understand both the site conditions, such as weather and other nearby activities, and the PDI and pilot scale study activities that took place on-site. The overall objective of field documentation is to avoid relying on a person's memory to be able to retrospectively understand the field activities.

Each field supervisor or technician will make notes on a daily basis in the individual's own field notebook dedicated to the project. Entries must be made in indelible ink and not pencil or other erasable marking. If an incorrect entry is made, the information will be crossed out with a single strike mark with initials and the date next to the marked out text.

The field notebook must be stored in a secured, locked location when not in use and should be placed in the project files at the end of that stage of the field activities. In addition, pdf copies of each page used should be made and stored in secure, redundant computer files (such as a cloud-based file system or corporate server with an off-site backup).

The cover or the first page of the field notebook should contain the following information:

- Professional's name
- Professional's employer
- Project name
- Project number
- Contact information (in case the field notebook is lost and recovered)

The notes made for each day must begin on a fresh page and include the following information:

- Date
- Weather conditions (temperature, cloud cover, and precipitation)
- Personnel present on-site, including name and affiliation
- Nearby activities (such as construction)
- Time log of the field activities as the day progresses with new entries as locations or activities move from one location or activity to another
- Sample information, including: location, sample identification, time, type, field measurements, and physical characteristics
- Field duplicate designations
- Equipment used to make field measurements, along with the date and time of calibration, if required

- Information related to sample documentation, including:
  - Dates and method of sample shipments
  - Chain-of-custody record numbers
  - Courier air bill number
  - Other pertinent information and activities

6. Laboratory Analytical Methods

For the chemical analyses (those not involving qPCR testing), the laboratory will follow the October 2016 NYSDEC Analytical Services Protocol document, including the required method detection limits (NYSDEC, 2016). Tables 1 and 2 provide laboratory methods for soil and groundwater analyses.

If difficulties arise in achieving the specified method detection limits due to a particular sample matrix, the Laboratory Manager must notify the Project Manager. In order to achieve those detection limits, the laboratory must utilize all appropriate cleanup procedures in an attempt to retain the project required detection limits. If a sample requires dilution due to high levels of target analytes or interferences, the laboratory must document all initial analyses (if possible) and secondary dilution results. Dilution will be permitted only to bring target analytes within the linear range of calibration; however, in the case of metals analysis, dilution may be required for non-target analytes that interfere with target analytes.

The qPCR test results are not addressed in the NYSDEC Analytical Services Protocol document. The results of these analyses will not compared to a regulatory standard (no such standards exist). Therefore, it is not deemed critical to have an analytical protocol other than what the Microbial Insights laboratory typically follows. As such, the next section, Quality Control Requirements, does not pertain to the qPCR analyses.

7. Quality Control Requirements

7.1 Quality Assurance Indicators

The acceptance/performance criteria for laboratory analyses are assessed by evaluating the precision, accuracy, representativeness, completeness, and comparability of the laboratory data. The definition of each of these terms is provided below.

Precision

Precision is the measure of reproducibility of sample results. The goal is to maintain a level of analytical precision consistent with the project objectives. To maximize precision, sampling and analytical procedures will be followed. All work for this project will adhere to protocols presented in the PDI and pilot scale study work plan and this QAPP. Checks for analytical precision will include the analysis of matrix spikes (MSs), MS duplicates (MSDs), laboratory duplicates, and field duplicates. Checks for field measurement precision will include obtaining duplicate field measurements.

Accuracy

Accuracy is the deviation of a measurement from the true value of a known standard. Both field and analytical accuracy will be monitored through initial and continuing calibration of instruments. In addition, internal standards, MSs, MSDs, blank spikes, and surrogates (system monitoring compounds) will be used to assess the accuracy of the laboratory analytical data.

Representativeness

Representativeness is the degree to which sampling data accurately and precisely represent site conditions, and is dependent on sampling and analytical variability and the variability of environmental media at the Site. The PDI and pilot scale study work plan discusses the sample locations and frequency and, this information combined with this QAPP, will ensure that representative samples are collected.

Completeness

Completeness is defined as a measure of the amount of valid data obtained from an event and/or investigation compared to the total amount that was obtained. This will be determined upon final assessment of the analytical results.

Comparability

Comparability is the degree of confidence with which one data set can be compared to another. Comparability between the PDI and pilot scale study results, and, to the extent possible, with existing data will be maintained through consistent field and laboratory methods as described in this QAPP and referenced documents.

8. Field and Laboratory Quality Control Checks

8.1 Field Quality Control Samples

The field analytical equipment will be calibrated immediately prior to each day's use. The calibration procedures will conform to manufacturer's standard instructions. This calibration will ensure that the equipment is functioning within the allowable tolerances established by the manufacturer and required by the project. The Project Hydrogeologist or Sampling Personnel will maintain records of all instrument calibration in the field notebook.

Calibration procedures for instruments used for monitoring health and safety hazards (e.g., photoionization detector [PID] and explosimeter) will be provided in the HASP. More frequent calibration may be needed depending on conditions encountered in the field.

The generic CAMP requires the use of a real-time particulate monitoring instrument capable of measuring 10-micron particulate matter. This equipment is factory-calibrated and, thus, does not require calibration in the field.

Field Duplicates

A field duplicate will be collected at a minimum frequency of one for every 20 samples (5%).

Equipment Rinse Blanks

An equipment blank will be collected from decontaminated equipment by rinsing the equipment with analyte-free water and collecting a sample of the rinsate. One rinsate sample will be collected each day that soil or groundwater samples are collected.

Trip Blanks

The laboratory will place a VOC trip blank in the sample cooler with the other VOC sample containers before being sent to the site. The trip blank will consist of 40-ml vials containing distilled, deionized water, which accompanies the other water sample bottles into the field and back to the laboratory. A trip blank will be included with each shipment of water samples for VOC analysis. The trip blank will be analyzed for VOCs to assess any contamination from sampling, transport, storage, and internal laboratory procedures. The trip blank samples will be analyzed at a frequency of one per each shipment of VOC samples.

8.2 Analytical Laboratory Quality Control Checks

Internal laboratory quality control checks will be used to monitor data integrity. These checks will include method blanks, MS/MSDs, spike blanks, internal standards, surrogate samples, calibration standards, and reference standards. Laboratory control charts will be used to determine long-term instrument trends.

Method Blanks

Method blanks will be used to assess potential sources of contamination in the analytical process. The method blank is prepared at the start of the analytical process and includes all phases of the laboratory analysis. One method blank will be analyzed with each analytical series associated with no more than 20 samples.

MS/MSDs

MS/MSDs will be used to measure the accuracy of analyte recovery from the sample matrices and will be site-specific. MS/MSD pairs will be analyzed by the laboratory at a minimum frequency of one MS/MSD for every 20 samples or once per week, whichever is more frequent.

If the laboratory results indicate that the MS recoveries are outside of the quality control limits, the control sample and surrogate spike recoveries will be evaluated to identify the reason for the deviation and assess the effect on the reported sample results.

Surrogate Spikes

In the analytical chemistry field, a surrogate is considered a chemical that is not naturally occurring (or rarely occurs in nature), but also has properties similar to the analytes of interest. Surrogates are principally used as an internal check for samples analyzed by gas chromatography/mass spectrometry (GC/MS) and GC methods. The surrogate spike is added to the samples prior to purging or extraction. The surrogate spike provides information related to the accuracy of an analytical method on a sample-specific basis.

If the laboratory results indicate that the surrogate spike recoveries are outside of specified quality control limits, the recoveries will be evaluated to identify the potential sources of the deviation, possibly considering other control information. Surrogate spike compounds will be determined based on information provided by the US EPA analytical methods for the chemicals specified for analysis.

Laboratory Duplicates

Laboratory duplicates will be run for the soil samples to assess laboratory precision. The duplicates will be prepared as a separate aliquot of a sample that will then be analyzed as a separate sample.

Calibration Standards

The laboratory will use calibration standards to assess the instruments' stability and to provide information regarding the instrumentations' capability to provide valid quantification results. The laboratory will analyze calibration standards at the beginning and end of each analytical series, as well as throughout a series containing a large number of samples.

In general, the need for calibration standards analysis is specified by the analytical method. In analyses where internal standards are used, a calibration check standard will only be analyzed at the beginning of an analytical series. If results of the calibration check standard exceed specified tolerances, then all samples analyzed since the last acceptable calibration check standard will be reanalyzed.

Laboratory instrument calibration standards will be determined utilizing the guidance provided in the analytical methods.

Internal Standards

The laboratory will monitor internal standard areas and retention times for organic analyses performed by GC/MS and GC methods. Method-specified internal standard compounds will be spiked into all field samples, calibration standards, and quality control samples after preparation and prior to analysis.

If internal standard areas in one or more samples exceed the tolerances specified in the analytical method, the cause will be investigated and, if warranted, the instrument will be recalibrated. In this case, all affected samples will be reanalyzed.

Reference Standards

Reference standards are standards of known concentration and independent in origin from the calibration standards. The intent of reference standard analysis is to provide insight into the analytical proficiency within an analytical series. This includes preparation of calibration standards, validity of calibration, sample preparation, instrument set-up, and the premises inherent in quantitation. Reference standards will be analyzed at the frequencies specified within the analytical methods.

9. Data Precision Assessment Procedures

9.1 Field Precision

Field precision is difficult to measure because of temporal variations in field parameters. However, precision will be controlled through the use of experienced field personnel, properly calibrated meters, and duplicate field measurements. Field duplicates will be used to assess precision for the measurement system.

9.2 Laboratory Precision

Laboratory data precision for organic analyses will be monitored through the use of MS/MSD and laboratory duplicates. The precision of data will be measured by calculating the relative percent difference (RPD) by the following equation:

RPD = 100*(A-B) /((A+B)/2)

Where:

A = Analytical result from one of two duplicate measurements
B = Analytical result from the second measurement

Precision objectives for MSD and laboratory duplicate analyses are identified in the NYSDEC ASP Revision 2016.

9.3 Data Accuracy Assessment Procedures

Experienced field personnel, properly calibrated field meters, and adherence to established protocols will control the accuracy of field measurements. The accuracy of field meters will be assessed by review of calibration and maintenance logs.

Laboratory accuracy will be assessed via the use of MSs, surrogate spikes, internal standards, and reference standards. Where available and appropriate, quality assurance performance standards will be analyzed periodically to assess laboratory accuracy.

Accuracy will be calculated in terms of percent recovery as follows:
% Recovery = 100*(A-X)/B

Where:

A = Value measured in spiked sample or standard
X = Value measured in original sample
B = True value of amount added to sample or true value of standard

This formula is derived under the assumption of constant accuracy over the original and spiked measurements. If any accuracy calculated by this formula is outside of the acceptable levels, data will be evaluated to determine whether the deviation represents unacceptable accuracy, or variable, but acceptable accuracy. Accuracy objectives for MS recoveries and surrogate recovery objectives are identified in the NYSDEC ASP 2016 Revision.

9.4 Data Completeness Assessment Procedures

The laboratory will calculate the completeness of laboratory data sets by comparing the number of valid sample results generated to the total number of results generated.

Completeness = 100*(Number valid results/Total number of results generated)

As a general guideline, overall project completeness is expected to be at least 90%.

9.5 Corrective Action

The corrective actions typically taken by the laboratory are described below. If the calibration, instrument performance, or blank criteria are not met, the cause of the problem will be investigated and corrected. The analytical system then will be recalibrated. As part of the laboratory's operating protocol, sample analysis does not begin until calibration, instrument performance, and blank criteria are met. If matrix spike, reference standard, or duplicate analyses are found to be out of acceptable limits, the cause of the issue must be researched. Then, depending on the results of the overall QC program for the sample set, the data may be accepted, accepted with qualification, or determined to be unusable. If deemed unusable, the samples either must be reanalyzed or a new set of samples collected and analyzed.

9.6 Preventive Maintenance

Preventative maintenance procedures must be performed by the laboratory on all equipment used for the sample analyses. The maintenance activities must be documented in the laboratory's records.

10. Data Reduction, Assessment, and Reporting

10.1 Data Reduction

The laboratory will reduce the data produced in accordance with SW-846 protocols. The criteria used to reduce the data are specified in the analytical methods.

10.2 Data Quality Assessment

The laboratory deliverables will be NYSDEC ASP Category B. Data for this investigation will be evaluated and qualified in accordance with the USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review, USEPA-540-R-07-003, July 2007 and USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, EPA-540-R-04-004, October 2004, as appropriate for the analytical methods employed.

The validated analytical results reported by the laboratory and validated by the third party validator will be assigned one of the following USEPA-defined data usability qualifiers:

- U – Not detected at given value
- UJ – Estimated not detected at given value (applied by third party validator)
- J – Estimated value
- N – Presumptive evidence at the value given (applied by third party validator)
- R – Result not useable (applied by third party validator)
- No Flag – Result accepted without qualification

10.3 Data Usability Summary Report

The analytical data review will be summarized by a third party validator in a Data Usability Summary Report, which will include a review and evaluation of all the analytical results. The following parameters will be reviewed to ensure compliance with the analytical method protocols:

- Initial and continuing calibrations
- Blanks
- Laboratory control standards and matrix spikes
- Surrogate recoveries
- Matrix interference checks
- Field and laboratory duplicates
- Sample data
- Chain-of-custody forms
- Holding times

The report will describe the samples and parameters reviewed. Any deficiencies identified during the review will be noted and the effect on the generated data will be discussed. If warranted, the report will include recommendations for re-sampling or re-analysis. The validated data deliverable and the data usability summary report will be included as appendices to the PDI and pilot scale study reports.

10.4 Data Validation

An independent third party quality assurance chemist will review the laboratory data package and prepare a data validation report. The validation will conform to the USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review, USEPA-540-R-07-003, July 2007 and USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, EPA-540-R-04-004, October 2004, as appropriate for the analytical methods employed.

The data validation report will present the results of data validation, including a summary assessment of laboratory data packages, sample preservation, and a summary assessment of precision, accuracy, representativeness, comparability, and completeness for each analytical method. A detailed assessment of each sample delivery group will be presented in the data validation report.

10.5 Data Reporting

The data package provided by the laboratory will contain all of the items discussed above. Data quality issues will be discussed in a case narrative included with the data report. A photocopy of the completed chain of custody forms accompanying each sample shipment will be included with the data package. The analytical data package will be accompanied by an electronic data deliverable (EDD).

Data generated during the pilot scale study will be uploaded to the NYSDEC's Environmental Information Management System in accordance with the NYSDEC Electronic Data Deliverable Manual, V. 4 (NYSDEC, 2018). The EDD format required is current format Earthsoft EQuIS® Environmental Data Management Software. Each EDD must be formatted and copied using an MS-DOS operating system. To avoid transcription errors, data will be loaded directly into the ASCII format from the laboratory information management system (LIMS). The laboratory will perform a QC check on the EDD before delivery. The original data, tabulations, and electronic media must be stored in a secure and retrievable fashion.

11. References

New York State Department of Environmental Conservation (NYSDEC). (2009, November 11). CP-43: Groundwater Monitoring Well Decommissioning Policy.

New York State Department of Environmental Conservation (NYSDEC). (2012, October 17). New York State (NYS) Environmental Laboratory Approval Program (ELAP) accreditation for EPA 5035 and 5035A Guidance.

New York State Department of Environmental Conservation (NYSDEC). (2016, October). Analytical Services Protocol.

New York State Department of Environmental Conservation (NYSDEC). (2018, November). Electronic Data Deliverable Manual, V. 4.

U.S. Environmental Protection Agency (US EPA). (2005). Guidance on Systematic Planning Using the Data Quality Objectives Process (EPA QA/G-4).

U.S. Environmental Protection Agency (US EPA). (1996). Test Methods for Evaluating Solid Waste. SW-846 3rd Edition, Update 3. Office of Solid Waste. December.

U.S. Environmental Protection Agency (US EPA). (1996a). Method 5035: Closed-System Purge-and-Trap and Extraction for Volatile Organics in Soil and Waste Samples. Test Methods for Evaluating Solid Waste: Physical/Chemical Methods (SW-846), Volume 1B.

Figures

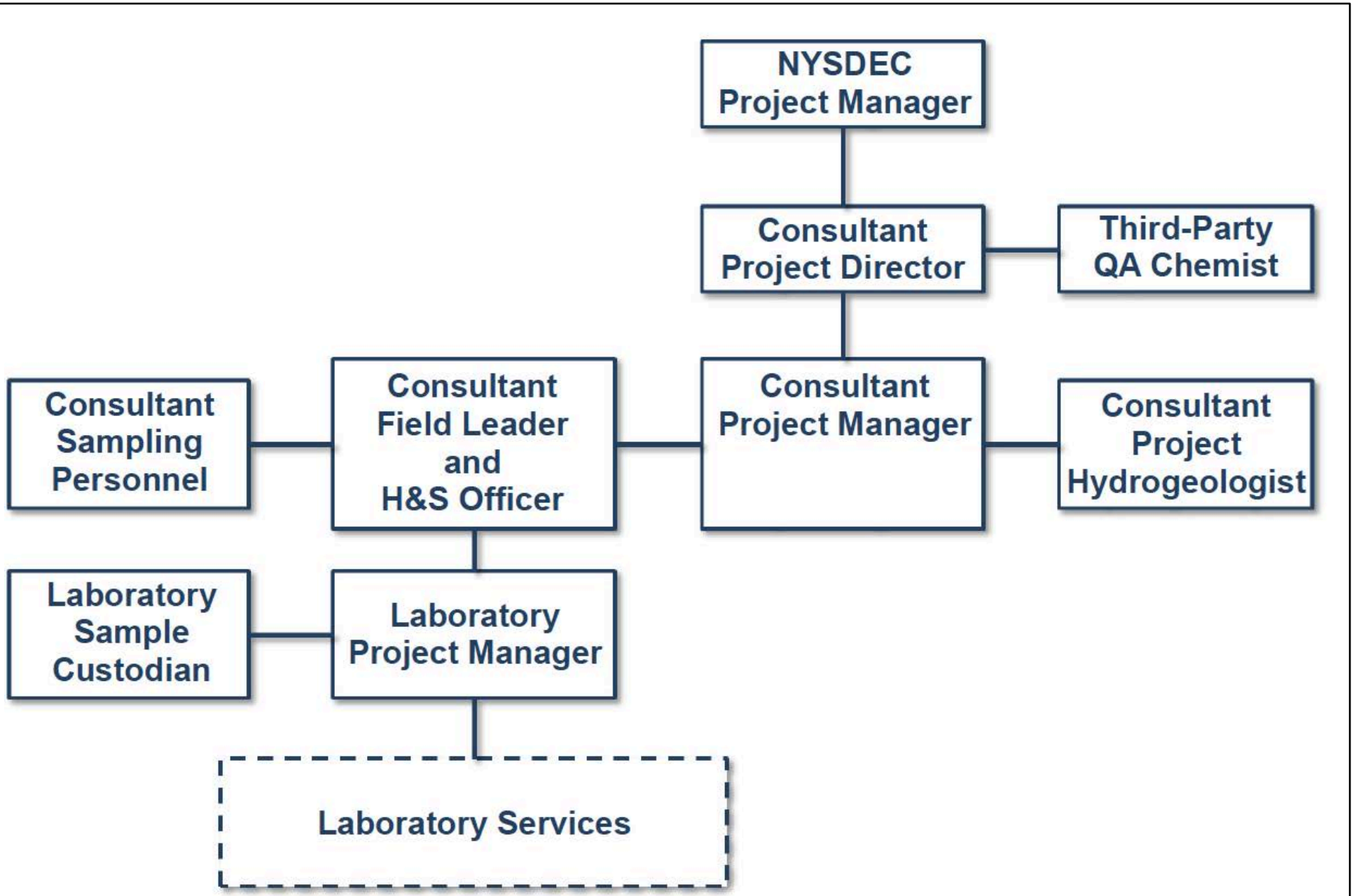


FIGURE 1

Quality Assurance Project Plan
Project Organization

NATHAN
Trusted for Excellence

Appendix A – Cutout of GeoProbe Pre-packed Well Screen and Assembly

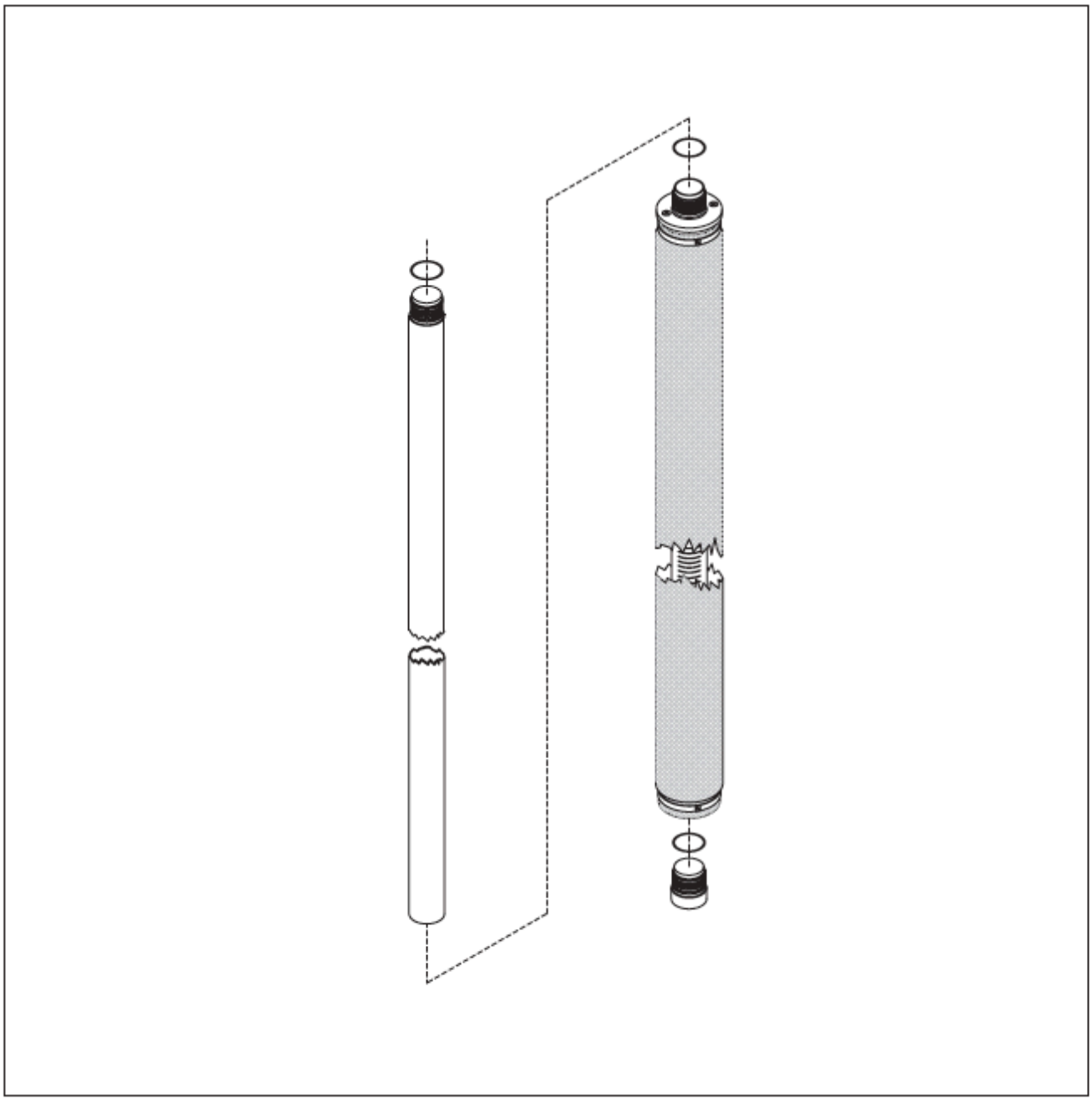
GEOPROBE® 1.0-IN. X 2.5-IN. OD AND 1.5-IN. X 2.5-IN. OD PREPACKED SCREEN MONITORING WELLS

STANDARD OPERATING PROCEDURE

Technical Bulletin No. 992500

PREPARED: August, 1999

REVISED: January, 2011

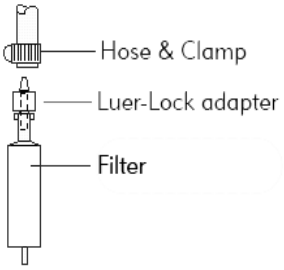


GEOPROBE® 1.0-in. x 2.5-in. O.D. PREPACKED SCREEN AND PVC RISER

Appendix B – Bio-Flo Sampling Protocol

Bio-Flo – DNA Sampling Protocol

Sampling Instructions



1. Purge the well.
2. Prepare the pump (Peristaltic preferred, Grundfos, or air bladder) as normal. Use the clamp provided to ensure a leak-proof connection.
3. Remove the filter from the Falcon tube.
4. Attach the inlet of the filter with a 1/4" - 5/16" inner diameter (I.D.) tubing using the clamp to secure.
5. Place the filter within a receiving container so that the amount of water filtered can be measured accurately.
6. The amount of water filtered will vary depending upon the turbidity of the water. We recommend filtering 1-2 L.
7. Record the volume of water that passed through the filter, and then submit the filter for analysis. The water may then be discarded. Please cap the filter on both ends. The thinner end should be closed with the red rubber cap and the thicker end should be closed with the clear luer plug.

Note: If the filter clogs before 1L has been filtered, record how much water was passed through the first filter, and then collect an additional filter, also recording the volume of water that went through the second filter. In this case, both filters are then submitted for testing. For each location there should be **no more than 2 filters** used and there is no need to filter more than 2L of water.

Hold time for this analysis is 24-48 hours.

To Submit Sample:

1. Place the filter in the Falcon tube provided.
2. Affix the label to the Falcon tube and note the amount of water that passed through the filter, the well location, sampling date, and the analyses requested.

Shipping Instructions

Packaging Samples:

1. Samples should be shipped in a cooler with ice or blue ice for next day delivery. If regular ice is used, the ice should be double bagged.
2. A chain of custody form must be included with each shipment of samples. Access our chain of custody at www.microbe.com

Shipment for Weekday Delivery:

Samples for weekday delivery should be shipped to:

Sample Custodian
Microbial Insights, Inc.
10515 Research Drive
Knoxville, TN 37932
(865) 573-8188

Shipment for Saturday Delivery:

Coolers to be delivered on Saturday must be sent to our FedEx Drop Location. To ensure proper handling the following steps must be taken:

1. FedEx shipping label should be marked under (6) Special Handling, check Hold Saturday.
2. The cooler must be taped with FedEx SATURDAY tape.
3. The shipping label must be filled out with the Drop Location address below. Our laboratory name must be on the address label.
4. You MUST ***notify by email*** customerservice@microbe.com with the tracking number of the package on Friday (prior to 4pm Eastern Time) to arrange for Saturday pickup. Please make sure you write "Saturday Delivery" in the subject line of the message. Without proper labeling and the tracking number, there is no guarantee that the samples will be collected.

Samples for Saturday delivery should be shipped to:

Microbial Insights, Inc.
FedEx Drop Location
10601 Murdock Drive
Knoxville, TN 37932
(865) 300-8053

Appendix C – Alpha Analytical and Microbial Insights Chain-of-Custody Forms

ALS Environmental

Field Chain-of-Custody Record

Page _____ of _____

Client Name & Address:	Project No.:	Preservation Code	Sample Matrix Code	Sample for Matrix QC	Analyses Requested								No. of Containers	Matrix Codes: W) Water B) Bulk L) Liquid F) Filter S) Soil G) Wipe C) Solid M) Media Preservation Codes: 1) Cool to 4°C 2) HCl to pH<2, 4°C 3) H_2SO_4 to pH<2, 4°C 4) HNO_3 to pH<2, 4°C 5) NaOH to pH>12, 4°C 6) ZnOAc/NaOH to pH>9, 4°C
	Project Name:													
Phone:														
FAX:	Sampler: *(Signature)*													
e-mail:														

Field Sample Number	Site ID	Date	Time	Depth	ALS Sample Number											Remarks

Possible Hazard Identification

☐ Non-Hazard ☐ Skin Irritant ☐ Rad
☐ Flammable ☐ Poison ☐ Unknown

Sample Disposal

☐ Return to Client ☐ Archive for _____ Months
☐ Disposal by Lab
(fees may be assessed if samples are retained longer than 3 months)

Requested Turn Around Time

☐ 2 Days (Rush) ☐ 7 Days (Rush) ☐ 21 Days
☐ 3 Days (Rush) ☐ 14 Days ☐ Other
(Rush = email data by COB on day due. Surcharges assessed.)

Carrier/Airbill #:

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date	Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date	Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date	Time

Shipped to:

ALS Environmental
960 West LeVoy Drive
Salt Lake City, UT 84123
Phone: (800) 356-9135
Phone: (801) 266-7700
FAX: (801) 268-9992

White - Laboratory Copy ***Yellow - Client Copy***

REPORT TO:

Name: _____
Company: _____
Address: _____
_____
_____
email: _____
Phone: _____
Fax: _____

INVOICE TO: (For Invoices paid by a third party it is imperative that all information be provided)

Name: _____
Company: _____
Address: _____
_____
_____
email: _____
Phone: _____
Fax: _____

10515 Research Dr
Knoxville, TN 37932
865-573-8188

www.microbe.com

Project Manager: _____
Project Name: _____
Project No.: _____

Purchase Order No. _____
Subcontract No. _____
MI Quote No. _____

Please Check One:
☐ More samples to follow
☐ No Additional Samples

Report Type: ☐ Standard (default) ☐ Microbial Insights Level III raw data(15% surcharge) ☐ Microbial Insights Level IV (25% surcharge) ☐ Comprehensive Interpretive(15%) ☐ Historical Interpretive (35%)

EDD type: ☐ Microbial Insights Standard (default) ☐ All other available EDDs (5% surcharge) Specify EDD Type: _____

Please contact us with any questions about the analyses or filling out the COC at (865) 573-8188 (9:00 am to 5:00 pm EST, M-F). After hours email: customerservice@microbe.com

Sample Information						Analyses				CENSUS: Please select the target organism/gene																							
MI ID (Laboratory Use Only)	Sample Name	Date Sampled	Time Sampled	Matrix	Total Number of Containers	**PLFA**	**NGS**	**QuantArray Chlor**	**QuantArray Petro**	**DHC (Dehalococcoides)**	DHC Functional genes (bvc, tce, vcr)	DHBt (Dehalobacter)	DHG (Dehalogenimonas)	DSM (Desulfuromonas)	DSB (Desulfitobacterium)	EBAC (Total)	SRB (Sulfate Reducing Bacteria-APS)	MGN (Methanogens)	MOB (Methanotrophs)	SMMO	DNF (Dentrifiers-nirS and nirK)	AMO (ammonia oxidizing bacteria)	PM1 (MTBE aerobic)	RMO (Toluene Monooxygenase)	RDEG (Toluene Monooxygenase)	PHE (Phenol Hydroxylase)	NAH (Napthalene-aerobic)	BSSA (Toluene/Xylene-Anaerobic)	add. qPCR:	**RNA (Expression Option)***	Other:	Other:	Other:

Relinquished by: **Date** **Received by:** **Date**

It is vital that chain of custody is filled out correctly & that all relative information is provided.
Failure to provide sufficient and/or correct information regarding reporting, invoicing & analyses requested information may result in delays for which MI will not be liable.

Appendix D – Community Air Monitoring Program

Appendix 1A
New York State Department of Health
Generic Community Air Monitoring Plan

Overview

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical- specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for VOCs and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate DEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. “Periodic” monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or

overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

4. All 15-minute readings must be recorded and be available for State (DEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

3. All readings must be recorded and be available for State (DEC and NYSDOH) and County Health personnel to review.

December 2009