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Report

Interim Remedial Measure Work Plan

Batavia Former MGP Site
NYSDEC Site No. 819019

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Section 1.0 Introduction

The New York State Department of Environmental Conservation (NYSDEC) conducted a Site Characterization (SC) investigation in 2012 of the Batavia Former MGP Site (Site). On the basis of the SC, the Site was listed in the Registry of Inactive Hazardous Waste Disposal Sites (Registry) in New York State as a Class 2 site (Site Number 819019). An Order on Consent, dated March 5, 2014, was executed between NYSDEC and the Site owner, R&J Enterprises of Batavia, LLC (R&J), regarding actions to be taken regarding the Site due to its listing on the Registry. Under the terms of the Consent Order, a Work Plan to conduct a Remedial Investigation and Feasibility Study (RI/FS) was due to be submitted by R&J no later than April 14, 2014; however, due to the need to further evaluate certain off-site considerations, R&J was granted a 1-week extension until April 21, 2014. The RI/FS Work Plan was submitted to the NYSDEC on April 21, 2014. The NYSDEC requested modifications to the RI/FS Work Plan in a letter dated June 17, 2014. Based on the requested modifications and changes in financial circumstances of R&J, a request was made to the NYSDEC to expedite remediation through an Interim Remedial Measure (IRM) in an effort to limit the scope of work and focus on addressing known areas of impact and long term monitoring as the remedy for the Site.

The IRM Work Plan provides details of the activities planned for the implementation of the IRM, including the delineation of grossly contaminated media at, and in the vicinity of, the Site associated with the Site's former operations. This IRM Work Plan has been prepared in accordance with the NYSDEC document DER-10, "Technical Guidance for Site Investigation and Remediation," dated May 2010 (DER-10).

The Work Plan is organized as follows:

- Section 1.0 - Introduction: The introduction presents an overview of the project to date.
- Section 2.0 - Site Description and History: Descriptions of the Site location, physical conditions, and current and historic use are presented in Section 2.0.
- Section 3.0 - Objective: Definition of the objective for the work to be conducted is presented in Section 3.0.
- Section 4.0 - Proposed IRM Activities: The Work Plan for the proposed IRM is presented in Section 4.0.
- Section 5.0 - Schedule: A preliminary project schedule is presented in Section 6.0.

A Citizen Participation Plan (CPP) was previously submitted to the NYSDEC as a stand-alone document. The Health and Safety Plan (HASP) and Quality Assurance Project Plan (QAPP) for the Site were previously prepared and submitted with the RI/FS Work Plan in April 2014. The HASP and QAPP are provided as Appendices A and B, respectively.

Section 2.0 Site Description and History

2.1 Site Description

The Site is located at 11 Evans Street in the City of Batavia, Genesee County, New York. Figure 1 depicts the location of the Site. The Site encompasses approximately 1.14 acres of land, and is bordered to the north by commercial property and Ellicott Street further to the north, to the northeast and east by vacant commercial property, to the south by vacant property and railroad tracks, and to the west by a commercial parking lot and Evans Street.

The Site is developed with an asphalt paved parking lot and a 2,800-square foot, single story structure, leased for commercial purposes. The on-site structure is the shell of the former MGP gas holder, which was renovated in the past by previous owners to allow for other uses.

2.2 Physical Setting

The Site is located in an urban area, and is immediately surrounded by commercial property and businesses. Beyond the commercial zone to the south and west are residential neighborhoods. Tonawanda Creek is located approximately 750 feet to the northwest.

2.2.1 Geology

Based on a review of the soil boring logs in the SC report, fill is present at varying thicknesses ranging from 4 to 12 feet, underlain by sandy to clayey silt and a sand and gravel water bearing unit. According to the NYSDEC Site Record, the silt/sand/ gravel layer is underlain by a thin till layer and Karst bedrock. The SC Report soil boring logs indicate that bedrock was encountered at approximately 30 feet below ground surface (bgs). Based on the soil and well logs in the SC report, groundwater was observed between 5 and 10 feet bgs.

2.2.2 Topography/Hydrology

The topography at the Site and surrounding area is generally flat. Based on the limited number of soil borings and monitoring wells installed during the SC, the groundwater flow appears to be to the east. Based on the proximity and location of Tonawanda Creek, it would be expected that groundwater would have a westerly flow direction. As part of the IRM, additional monitoring wells will be installed. Water level data will be collected from all available locations to confirm the groundwater flow direction.

2.2.3 Utilities

Underground electric, natural gas, water, and sanitary and storm sewers are present at the Site. According to the SC report, public water is supplied to the Site by the City of Batavia, which receives its water from groundwater drawn from the Tonawanda Creek Watershed by two public water supply wells located along Cedar Street, approximately 1 mile southeast of the Site, and surface water drawn directly from Tonawanda Creek. The surface water source is reportedly used to supplement the water supply wells and serves as a back-up water supply in the event of an emergency. The SC report states that "A 2002 Source Water Assessment (SWA) conducted by the New York State Department of Health (NYSDOH) has rated these two sources as highly susceptible to industrial contaminants such as petroleum products and industrial solvents due to permitted industrial activities and discharges in the area and the potential for high mobility of contaminants through the subsurface."

2.3 Site History

Based on a review of the SC report, and the NYSDEC Site Record, the Site history dates back to June 1855, when the Batavia Gas Light Company (BGLC) was incorporated and first occupied the site. That same year, BGLC constructed the original gasholder (total capacity of 13,500 cubic feet). The new gasholder was constructed in approximately 1878 under a new business entity named Batavia Gas and Electric Company (BGEC). The second gasholder is believed to have been 35,000 cubic feet in capacity. Less than 10 years later, BGEC constructed a new gas works infrastructure, and began manufacturing gas from crude petroleum. In 1890, Consolidated Gas and Electric Company acquired the assets of BGEC. However, Sanborn Maps indicate that BGEC continued to reside on the property, or at least remained the recognized owner of record until approximately 1909, at which time Roberts Brothers Flouring Mills took over control of the Site. The 1931 Sanborn Map shows the Site being occupied by Lang's Bakery, Inc, Genesee County Auto and Misc. Storage, and Granger & Company Wholesale Grocery, who maintained operations on-site for multiple decades.

The current owner acquired the Site in 2000, at which time only the former gas holder structure remained. The remainder of the Site was paved parking lot. A number of upgrades to the structure had already been completed at the time of purchase to allow for commercial use.

The NYSDEC conducted a Site Characterization (SC) investigation in 2012. Boreholes, test pits, and groundwater monitoring wells were installed as part of this investigation, and soil and groundwater samples were collected. Sampling locations are shown on Figure 2.

The primary contaminant of concern (COC) for the Batavia Former MGP Site is coal tar. Coal tar contains both volatile and semi-volatile organic compounds and is often present as Non-Aqueous Phase Liquid (NAPL). Specific volatile organic compounds (VOCs) of concern are

benzene, toluene, ethylbenzene, and xylenes (BTEX). Specific semi-volatile organic compounds (SVOCs) of concern are polycyclic aromatic hydrocarbons (PAHs).

Coal tar was observed in a soil boring adjacent to the former tar house structure. Coal tar also entered a monitoring well installed adjacent to the former tar house, indicating the potential presence of mobile NAPL in the subsurface. Elevated levels of Site COCs were detected in Site soil and groundwater samples taken in certain locations. The SC Report indentifies that contaminated soils were found at 10 feet to 14 feet below ground surface (bgs), with concentrations of naphthalene and BTEX as high as 3,800,000 parts per billion (ppb) and 150,000 ppb, respectively, in the vicinity of the former tar house, and less than 5 ppb and 1,400 ppb, respectively, in sampling locations across the Site. Groundwater samples collected from MW-2, located near the historic oil tank, showed the highest number of VOC detections. Concentrations of 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, m,p-xylene, total xylene, and naphthalene exceed New York State Water Quality Standards for groundwater in MW-2. The concentration of benzene in MW-3 in the center of the Site slightly exceeds the standard. The monitoring well adjacent to the former tar house structure was not sampled due to coal tar infiltrating the well. Based on the SC investigation, groundwater impacts appear to be limited to the area directly around the former tar house and historic oil tank structures.

The Site was listed in the Registry of Inactive Hazardous Waste Disposal Sites in New York State as Site Number 819019. R&J entered into a Consent Order with the NYSDEC on March 5, 2014, to investigate and remediate the Site.

Section 3.0 Objective

The primary objective of the IRM is to complete a limited delineation program and remove grossly contaminated media to reduce potential exposures and risks to human health and the environment. The IRM will be focused in specific areas where gross contamination was observed or exceedances of concentrations of Site contaminants of concern (COCs) were identified as a result of historic Site use based on the data in the SC Report. The scope of the IRM includes targeted delineation of the coal tar observed in and around MW-1/SB-8 and Test Pit TP-3 and the petroleum impacts observed in and around MW-2/SB-9 and Test Pit TP-1, removal and off-Site disposal of grossly contaminated media, site restoration, groundwater monitoring well installation for long term groundwater monitoring, directional borings beneath the Site building, sub slab soil vapor and indoor air sampling within the Site building, and preparation of an Interim Site Management Plan (SMP).

Section 4.0 Proposed IRM Activities

The proposed IRM activities include negotiating off-Site access agreements, subsurface imaging to locate underground utilities and structures, Geoprobe® point installation, waste characterization sampling, excavation and off-Site disposal of grossly contaminated media, Site restoration, monitoring well installation, directional borings, groundwater sampling, and sub-slab soil vapor and indoor air sampling, and preparation of the Interim SMP.

A Site-Specific Heath and Safety Plan (HASP) and a Quality Assurance Project Plan (QAPP) have been prepared for the Site and are provided as Appendices A and B, respectively. The HASP includes a Community Air Monitoring Plan (CAMP) prepared in accordance with the New York State Department of Health (NYSDOH) generic community air monitoring plan for chemical and particulate monitoring.

4.1 Negotiate Off-Site Access Agreements

The two areas to be addressed by this IRM are adjacent to the property line shared with 40-52 Ellicott Street. This property is currently owned by the City of Batavia. The access agreement will allow R&J to enter the property to conduct utility locating and survey activities, install additional borings and/or conduct excavation and restoration activities if grossly contaminated media from the Site are found to extend beyond the Site property boundary. The agreement will be drafted and negotiated with the City of Batavia by legal representatives for R&J.

4.2 Utility Locates and Site Surveying Activities

A private utility locator will be hired to identify and mark out any utilities at the Site and general area. An access agreement will need to be in place before any work can be conducted on off-Site properties. The SC Report identifies the presence of underground natural gas, water, and electric lines. The presence and locations of these utilities will be confirmed and marked along with any other utilities that may exist on the Site. Proposed Geoprobe® point and excavation locations will be cleared for the presence of underground utilities prior to conducting any intrusive activity.

Ground penetrating radar (GPR) or other appropriate detection/imaging technology will be used to locate and identify any underground structures that may be related to the product observed in MW-1, and the extent of the void space identified at Test Pit TP-3, which was installed during the SC investigation. The technology will also be used in the area of the historic oil UST in the southeast portion of the Site in an effort to locate the extent of the tank grave or associated features, and to identify whether historic underground piping associated with the former MGP is present.

Multiple rounds of location/elevation survey activity will take place. Survey will be conducted upon completion of:

- Excavation and confirmatory sampling; and
- Monitoring well installation.

For each round of survey, the locations and elevations of excavation limits, monitoring wells, as well as any other pertinent locations, will be surveyed.

The top of each monitoring well riser will be surveyed to the nearest 0.01 foot relative to the National Geodetic Vertical Datum (NGVD), and a survey reference point will be marked on the well riser. The survey will include the ground elevation at each well to the nearest 0.10 foot relative to the NGVD. The well location will be surveyed to the nearest 1.0 foot.

4.3 Delineation of Gross Contamination

Direct-push drilling (Geoprobe®) will be conducted to delineate the horizontal and vertical extent of gross contamination, characterize impacted soil for proper treatment and/or disposal, and allow for planning of excavation activities (estimates of volumes, required transport loads, and estimated field days for completion). Geoprobe® points will be installed radially from the known source areas (MW-1/SB-8 and test pit TP-3, and MW-2/SB-9 and test pit TP-1) until gross contamination (coal tar, LNAPL) is no longer present. Geoprobe® points will be advanced to 5 feet beyond the observed vertical extent of impacts or to a maximum depth of 30 feet below ground surface (bgs).

Soils will be collected using a 2-inch outside diameter by 4-foot long Geoprobe® stainless steel sampler (macro core) lined with a disposable acetate liner. A new liner will be used for each 4-foot interval. The macro core will be decontaminated between each Geoprobe® point location using Alconox and water. Upon retrieval, soils will be logged in accordance with the Unified Soil Classification System (USCS). Soils will be observed for visual and olfactory evidence of impact.

The excavation area will be based on the limits of the grossly contaminated material. No investigative or confirmatory sampling will be completed as part of the Geoprobe® point installation.

It is anticipated that at least 12 Geoprobe® points will be installed, six locations at each source area. The proposed locations are shown on Figure 3. Additional step-out points may be added to define the limits of grossly contaminated media.

4.4 Waste Characterization Sampling

During the delineation work around MW-1/SB-8 and TP-3 and MW-2/SB-9 and TP-1 samples of the grossly contaminated material will be collected for waste characterization. One sample will be collected from each area. The samples will be analyzed for the following parameters:

- Total Petroleum Hydrocarbons (TPH) by method 8015 for Gasoline Range Organics (GRO) and Diesel Range Organics (DRO)
- Total VOCs by method 8260B
- Total SVOCs by method 8270C
- Total polychlorinated biphenyls (PCBs) by method 8082
- Total Resource Conservation and Recovery Act (RCRA) metals by method 6010B
- Total cyanide by method 9010
- Percent sulfur by Environmental Protection Agency (EPA) method D129-64
- BTU by American Society for Testing and Materials (ASTM) method ASTM D240-87

The data obtained from the waste characterization sampling will allow for determination of the off-Site disposal options for the excavated materials. Additional sample volume will be held by the lab for Toxicity Characteristic Leachate Procedure (TCLP) analysis should the total results warrant the additional analysis.

4.5 Excavation and Off-Site Disposal

Once the area of gross contamination is delineated and the waste is characterized, the waste will be profiled for off-Site disposal. A brief excavation and disposal plan will be prepared to supplement this IRM Work Plan. The excavation and disposal work plan will provide the details of the excavation area, means and methods of excavation, identification of disposal facilities, schedule, etc.

No excavation activities will be started until all necessary approvals are in place for transportation and disposal.

Any excavated material that is not grossly contaminated will be stockpiled onsite to be used as backfill without sampling. The material will be placed on and covered by poly sheeting.

Grossly contaminated material will be live-loaded into properly licensed transport trailers or dump trucks.

4.5.1 Odor Control/Vapor Management

Odor control and vapor management practices will be implemented during the excavation and loading of impacted materials. A response plan is included as part of the CAMP to identify actions that may be implemented in response to elevated levels of target compounds or odor, as well as a list of routine procedures to be used on-site to minimize the chance of potential issues occurring.

4.5.1.1 Odor Dissemination and Mitigation Measures

As seen on the wind rose data[1] provided as Appendix C, the predominant wind direction is from the west southwest. Work will be conducted in the winter/early spring months. The cooler, wetter weather will help to suppress volatilization and odors.

The Site is surrounded in all directions by commercial establishments. As shown on Figure 4, there are four buildings immediately adjacent to the work area; a doctor's office, an occupied multi-tenant commercial building, and a vacant commercial property with two structures. The vacant property is in general disrepair, and currently not suitable for use. These locations would be the most potentially impacted receptors. The closest residential property is approximately 375 feet up wind to the south.

Odor control and vapor management practices will be implemented during the excavation and loading of impacted materials. The odor control and vapor management practices will include:

- Minimizing areas of open excavation (e.g., two and one half excavator bucket widths wide by approximately five feet long (actual dimensions will be determined in the field based on the actual area to be excavated)
- Backfilling excavations immediately upon completion
- If an excavation has to stay open and volatilization and odors are a concern, then the area would be covered
- Direct loading of impacted materials into transport containers for off-Site disposal to minimize staging/stockpiling impacted material
- If transportation logistics require material to be staged or stockpiled on-Site, the material will be covered with plastic sheeting
- BioSolve® Pinkwater® will be available on-Site in a 55-gallon drum along with misting units to be used in-situ or on stockpiles as needed

[1] http://www.wcc.nrcs.usda.gov/ftpref/downloads/climate/windrose/new_york/buffalo/

Odor control methods will be employed any time there is an exceedance of the VOC response levels specified in the CAMP (Attachment C of the HASP) at the perimeter of the Site or if there are odor complaints from neighboring properties.

4.5.1.2 Potential Receptors

A list of both upwind and downwind potential receptors was developed for the Site. The list is based on the proximity to the Site (generally, 500 feet as a reasonable distance) in an unobstructed downwind direction, and proximity to the construction entrance to the Site for trucks and equipment. The business name, address, and phone number are shown on Figure 4, and listed on Table 1. The response levels and actions that will be taken to protect the receptors are presented in the CAMP. If a building owner is listed as the potential contact, confirmation will be received from the building owner as to whether they would prefer to contact their tenants directly, or if preferred, have CRA contact the necessary businesses or parties directly should any questions exist.

4.5.1.3 Communication Plan

A letter will be sent to each receptor listed in Table 1 explaining the work to be done and providing the work schedule and the phone number for the CRA field manager and the CRA project manager. Businesses will be able to contact the CRA personnel with any odor complaints.

If a complaint is received from the public or if CAMP monitoring identifies a release of VOCs beyond the Site boundary, CRA will notify NYSDEC, NYSDOH, and R&J Enterprises promptly. CRA will investigate the potential cause of the complaint, and if determined to be valid, will address the issue promptly through on-site action. The actions taken to address the complaint will then be communicated to the NYSDEC, NYSDOH, and R&J Enterprises.

4.6 Post Excavation Sampling

Post excavation soil samples will be collected from the sidewalls and bottom of the excavation to document the residual concentrations of Site COCs remaining in place. As the goal of the IRM is to remove only grossly contaminated material, the data will not be used to guide any additional excavation activities.

The number of samples collected will be based on the size of the excavation and in accordance with DER-10. Soil samples will be analyzed for Target Compound List (TCL) VOCs, TCL SVOCs, Target Analyte List (TAL) total metals, and total cyanide. Soil samples for VOC analysis will be collected using TerraCore collection kits.

4.7 Site Restoration

The excavations will be backfilled with any excavated material that was not grossly contaminated (i.e., visually clean soils) and stone and/or gravel compacted to support vehicle traffic. The surface will be paved with asphalt suitable for vehicle traffic. The details of Site restoration will be provided in the excavation and disposal work plan.

4.8 Directional Boreholes

Three directional boreholes will be installed around and beneath the existing Site building as shown on Figure 3 using a conventional drill rig and hollow-stem augers (HSA). The purpose of the points is to determine if coal tar contamination is present beneath the building.

Soil samples from each directional boring will be field screened for visual evidence of impact and with a photoionization detector (PID) to document the presence of undifferentiated volatile organic vapors. If grossly contaminated soil is not observed (e.g., coal tar, LNAPL), one soil sample from each borehole from the area of highest PID readings will be selected for characterization analysis. The soil samples will be analyzed for TCL VOCs, TCL SVOCs, Target Analyte List (TAL) total metals, and total cyanide. The soil samples for VOC analysis will be collected using TerraCore collection kits.

If contamination is present, additional engineering controls may be warranted and would be developed and implemented as a separate IRM.

4.9 Monitoring Well Installation and Development

Five monitoring wells will be installed after Site restoration is complete. Proposed monitoring well locations are shown on Figure 3. Monitoring wells will be installed using approximately 4-inch inside diameter (ID) (8-inch outside diameter [OD]) HSA from ground surface to the desired depth of installation based on the soil boring. Monitoring wells will be constructed with 2-inch diameter flush-threaded PVC pipe. The well screens will be a maximum of 10 feet and will be installed to straddle the water table (i.e., approximately 3 feet above and 7 feet below the water table elevation).

The monitoring wells will be developed no sooner than 48 hours following installation. Well development will be accomplished by either pumping or bailing accompanied by surging. Well development will continue until the purged water exhibits a turbidity of 50 nephelometric turbidity units (NTUs) or lower or for a maximum of 1 hour. Groundwater removed from the wells will be collected for waste characterization and disposal.

4.10 Annual Groundwater Sampling Program

Annual groundwater sampling will be conducted to monitor the groundwater conditions at the perimeter of the Site. The monitoring well network will consist of the five perimeter wells to be installed as part of this IRM.

Groundwater monitoring wells will be purged and sampled using low flow techniques. During low flow purging (LFP), the pumping rate should be between 100 and 500 milliliters per minute (mL/min). During LFP, stabilization of the purged groundwater is required to ensure the collection of representative groundwater samples from the formation and not from the stagnant water in the well casing. Field parameters including pH, temperature, specific conductance, ORP, dissolved oxygen (DO), and turbidity will be monitored during LFP. The measurement of these field parameters is used to evaluate if stabilization of the purged groundwater has occurred prior to the collection of groundwater samples. The field measurements will be measured and recorded at 5-minute intervals. Groundwater stabilization is considered achieved when three consecutive readings for each of the field parameters, taken at 5-minute intervals, are within the following limits:

- pH ±0.1 pH units of the average value of the three readings
- temperature ±3 percent of the average value of the three readings
- conductivity ±0.005 milliSiemen per centimeter (mS/cm) of the average value of the three readings for conductivity <1 mS/cm and ±0.01 mS/cm of the average value of the three readings for conductivity >1 mS/cm
- ORP ±10 millivolts (mV) of the average value of the three readings
- DO ±10 percent of the average value of the three readings
- turbidity ±10 percent of the average value of the three readings, or a final value of less than 5 nephelometric turbidity units (NTU)

Wells will be sampled as soon after purging as possible. In the case of slow recovery, sampling will be conducted as soon as the recovered volume of water is adequate to provide the full sample volume. Groundwater samples will be analyzed for TCL VOCs, TCL SVOCs, TAL total metals, and total cyanide.

4.11 Soil Vapor Intrusion Evaluation

During the SC investigation, a significant number of VOC compounds that were detected in the soil vapor and ambient air samples were the same as those found in soil samples. As part of the

IRM, sub-slab soil vapor (SSV) samples, indoor air samples, and an outdoor ambient air sample will be collected to evaluate the potential for soil vapor intrusion (SVI) into the former gas holder building now used as doctor's office. Sampling will be conducted during the heating season.

The SSV and indoor air samples will be collected at the two general areas shown on Figure 3. The location of the outdoor ambient air sample location will be determined at the time of sampling based on wind direction.

In consideration of the business operation located in the former gasholder, the SSV sample point installation and sampling will be done over a weekend.

All SVI samples will be analyzed using the United States Environmental Protection Agency's (USEPA's) TO-15 gas chromatograph/mass spectrometer (GC/MS) methodology. This analysis will provide results for the full list of TO-15 VOCs.

4.11.1 Sub-Slab Soil Vapor Sample Port Installation

Prior to installing the sub-slab soil vapor (SSV) ports, a building assessment will be conducted in accordance with the NYSDOH SVI Guidance to determine the proper sampling location within the building structure.

Each SSV sample port will consist of one shallow soil gas port installed in a central location away from foundation footings, just below the surface of the slab.

Each SSV sample port will be installed by drilling a 1/2- to 1-inch hole through the slab with a drill and spline bit. Before drilling, the location of all sub-slab utilities, both public and building specific, will be identified and marked. A public utility locator, such as DigSafe, will be contacted prior to commencing field activities. No water will be used during the installation of the port. If dust prevention is necessary, the location may be covered by a towel or cloth, and drilling will proceed through a pre-cut hole in the cloth.

After drilling though the slab, the slab thickness will be measured and recorded. A 1/8-inch diameter nylon sampling tube of sufficient length extending from the base of the slab to the ground surface will be installed. After installation of the sampling tube, the drill hole annular space will be filled with pre-hydrated granular bentonite to the floor surface. The tubing at floor surface will be terminated with a valve connection.

Drilling and sampling equipment will be decontaminated, as required, by washing with an Alconox detergent solution and rinsing with distilled water.

4.11.2 SSV Sampling

The SSV sampling will be conducted no sooner than 72 hours following the installation of the soil gas probes. In addition, sampling will not be performed during or within 24 hours of a significant rain event (i.e., ≥0.5 inch after "Advisory Active Soil Gas Investigations," California Environmental Protection Agency, Department of Toxic Substances Control, April 2012).

Written documentation of all field activities, conditions, and sampling processes, including names of field personnel, dates and times, and weather conditions (temperature, barometric pressure, wind direction, wind speed, and humidity), will be documented in a field logbook during sampling.

The SSV samples will be collected using 6-liter capacity Summa™ canisters fitted with a laboratory calibrated critical orifice flow regulation device sized to allow the collection of the soil gas samples over a 24-hour sample collection time. Only canisters that have been batch certified as clean at the 100-percent level by the laboratory will be used for sub-slab sampling. The 24-hour sample collection time for a 6-liter capacity Summa™ canister corresponds to a maximum soil gas sample collection flow rate of approximately 0.0042 liter per minute (L/min). The 0.0042 L/min flow rate is well below the maximum flow rate of 0.2 L/min recommended by the NYSDOH (SVI Guidance, 2006) for vapor intrusion sampling.

Quality control/quality assurance (QC/QA) measures implemented during the SVI sampling event will include maintaining a minimum residual negative pressure in the Summa™ canisters of approximately 1 to 5 inches of mercury following sample collection. In addition, one field duplicate SSV sample will be collected from one of the two locations.

4.11.2.1 Leak Testing

Prior to sample collection, both leak testing and purging of the soil gas probe will be performed. Leak testing is performed as a quality control check when collecting soil vapor intrusion samples. The leak testing setup ensures that no ambient air has leaked into the soil gas probe or sampling assembly, which may affect (i.e., dilute) the analytical results. Constituents in ambient air can leak into the sampling system and result in a "false positive." The use of a leak testing setup is applicable to sub-slab and soil vapor samples, not indoor air and ambient outdoor air samples. The leak testing will be conducted by completing the following two steps:

- ***Step 1 - Vacuum Test:*** used to ensure that the tubing and fittings/valves that make up the sampling assembly are airtight

- ***Step 2 - Tracer Test:*** used to ensure that ambient air is not drawn down through the SSV sample probe annulus during SSV sample collection due to an incomplete seal between the slab and the SSV sample probe casing

The vacuum and tracer tests are detailed below.

Step 1 Vacuum Test

- The sampling assembly will be connected to the SSV sample probe valve at the surface casing. Once connected, the sampling assembly will consist of the SSV sample probe, the vacuum gauge supplied by the laboratory, personal sampling pump, and Summa™ canister, all connected in series (i.e., in the order of SSV sample probe, vacuum gauge, pump, and canister), using tee connectors or tee valves.
- The personal sampling pump will be used to conduct the vacuum test. The vacuum test will consist of opening the valve to the personal sampling pump while leaving closed the valves to the Summa™ canister and the SSV sample probe. The pump will then be operated to ensure that it draws no air from the sampling assembly (i.e., creates a negative pressure or vacuum within the sampling assembly), thus establishing that all assembly connections are airtight. The sampling pump low flow detect switch will likely activate within 10 to 15 seconds, turning the pump off. A negative pressure, or vacuum, should be established within the sampling assembly and should be sustained for at least 1 minute.
- If the pump is capable of drawing flow, or if the vacuum is not sustained for at least 1 minute, all fittings and tubing will be checked for tightness (or replaced), and the vacuum test will be repeated.
- The readings from the vacuum gauge pressure indicator will be recorded in the field logbook to retain a record that the pump was able to create a vacuum within the sampling assembly (it will also be noted whether the low flow detect switch on the pump was activated) and that the vacuum was sustained for at least 1 minute.

Step 2 Tracer Test

During a tracer test, a tracer compound is released at ground surface immediately around the soil gas probe surface casing and is used to test for ambient air leakage down through the annulus of the SSV sample probe and into the soil gas sample. Helium will be used as the tracer compound.

- The presence of helium within the sampling assembly will be monitored during purging and soil gas sample collection using a helium meter installed in line with the sampling assembly just before the personnel sampling pump.

- Helium was selected as the tracer compound since it is readily available at a variety of retail businesses, is safe to use, and does not interfere with laboratory analytical method detection limits.
- A containment unit will be constructed to cover the SSV sample probe surface casing. The containment unit will consist of an overturned plastic pail. A seal will be created a seal between the ground surface and the rim of the pail. The pail will have two holes: one to allow for the introduction of helium, and the other to allow for air trapped inside the pail to escape while introducing the helium. The second hole will also allow insertion of the helium meter to measure helium content under the pail.
- Prior to SSV sample probe purging, helium will be introduced into the containment unit to obtain a minimum 50-percent helium content level. The helium content within the containment unit will be confirmed using the helium meter and recorded in the field logbook. Helium will continue to be introduced into the containment unit during soil gas probe purging and sampling, but care will be taken not to increase the pressure within the containment unit beyond that of atmospheric pressure.
- During SSV sample probe purging and a portion of the sampling, the helium meter will be connected in line with the sampling assembly. In the event that the helium meter measures a helium content within the sampling assembly of greater than 10 percent of the source concentration (i.e., 10 percent of the helium content measured within the containment unit), the soil gas probe will be judged to permit significant leakage such that the collected soil gas sample will not be considered reliable and representative of soil gas concentrations within the formation (ITRC 2007). If a probe is determined to be unreliable or unrepresentative, the probe and/or sampling assembly will be repaired and retested, and only after it has passed the leak tests will it be allowed to be used for sample collection.

Upon completion of the leak testing activities and prior to sample collection, SSV sample probe purging will be conducted at a maximum flow rate of 0.1 L/min. A maximum of three soil gas probe "dead volumes" will be purged to remove potentially stagnant air from the internal volume of the soil gas probe and ensure that soil gas representative of the porous media beneath the sub-slab is drawn into the Summa™ canister. The soil gas probe "dead volumes" will be calculated based on field measurements of probe construction (i.e., tubing length and tubing inner diameter) and aboveground sampling equipment.

4.11.3 Indoor Air and Outdoor Ambient Air Sampling

Indoor air samples will be collected in the breathing zone between 3 and 5 feet above the floor in the same areas as the SSV samples. The ambient outdoor air sample will be collected in the breathing zone between 3 and 5 feet above the ground at a location upwind of the building. The samples will be collected for a 24-hour duration using 6-liter capacity Summa™ canisters.

The 24-hour sample collection time for a 6-liter capacity Summa™ canister corresponds to a maximum soil gas sample collection flow rate of approximately 0.0042 L/min.

4.11.4 Remedial Action

The need for remedial action such as continued monitoring or mitigation will be determined based on the results of the SSV and indoor air sampling in accordance with the NYSDOH guidance.

4.12 Analytical Sample Collection

Waste characterization, post excavation, soil characterization from beneath the existing structure, and soil vapor/indoor air samples will be collected, as described in the previous sections, and summarized on Table 2.

Sample bottles and preservation requirements are detailed in the QAPP. Samples will be placed on ice in laboratory-supplied coolers immediately after collection and labeling. Samples will be delivered to the laboratory by courier under approved Chain of Custody procedures.

A unique sample numbering system will be used to identify each collected sample. This system will provide a tracking number to allow retrieval and cross-referencing of sample information. The sample numbering system to be used is described as follows:

Example: SO-84144-mmddyy-XXX

Where: SO: Designates Sample Type (SO = Soil)
84144: CRA Project Number
mmddyy: Date of Collection (e.g. 08/04/14)
XXX: Unique Sample Number

Quality control (QC) samples will also be numbered with a unique sample number.

4.13 Waste Management

All wastes that are generated during the investigation will be stored, transported, and disposed in accordance with applicable state and federal regulations. Every effort will be made to minimize the amount of waste for disposal. It is anticipated that the following wastes will be generated during the IRM:

Soil Cuttings

Soil cuttings will be generated when advancing Geoprobe® points, soil borings, and/or monitoring well installation. Soil cuttings will be placed into Department of Transportation (DOT) approved 55-gallon open top drum or a covered roll-off box for storage prior to appropriate off-Site disposal. Geoprobe® points and soil borings will be filled with bentonite grout.

Well Development and Purge Water

Wastewater will be generated during well development and well purging. Well purging and sampling will be conducted using low flow techniques which minimize the quantity of purge water generated. Well development and purge water will be placed into DOT approved 55-gallon closed top drums for storage prior to appropriate off-Site disposal.

Decontamination Fluids

Decontamination fluids, primarily water, will be generated during delineation and monitoring well installation activities to assure equipment is free of potential contaminants between locations. Decontamination fluids will be placed into DOT approved 55-gallon closed top drums for storage prior to appropriate off-Site disposal.

Personal Protection Equipment

Personal protection equipment (PPE) will be generated during implementation field activities. PPE will be placed into DOT approved 55-gallon open top drums for storage prior to appropriate off-Site disposal.

Following completion of the IRM, soil cuttings, well development and purge water, and decontamination fluids will be characterized for appropriate off-Site disposal as hazardous or non-hazardous waste based on the analytical data generated. PPE will be disposed of off-Site as non hazardous waste. Domestic waste will be discarded in the appropriate on-Site municipal waste dumpster.

4.14 Reporting

A construction completion report (CCR) will be submitted to the NYSDEC upon completion of the elements of this IRM Work Plan in accordance with DER-10.

Section 5.0 Institutional and Engineering Controls

The implementation of institutional controls is intended to reduce potential exposure to the COCs. Evidence that institutional controls are in place shall be submitted to NYSDEC within 30 days of NYSDEC approval of the instrument. The institutional controls envisioned for the Site include the restriction of property use to commercial/industrial purposes and prohibition of groundwater use until such time that the soil and groundwater are restored to acceptable quality as determined by NYSDEC.

Engineering controls for the Site consist of the existing concrete floor slab that is currently in place in the Site building and the paved parking lot.

As part of the IRM, an environmental easement will be established for the Site that:

a) Requires the remedial party or Site owner to complete and submit to the NYSDEC a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3).

b) Allows the use and development of the Site for commercial/industrial use as defined by Part 375-1.8(g), though land use is subject to local zoning laws.

c) Restricts the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the Department, NYSDOH or County DOH.

d) Prohibits agriculture or vegetable gardens on the Site.

e) Requires compliance with a Department approved Site Management Plan (SMP).

NYSDEC guidance, DER-33 "Institutional Controls, A Guide to Drafting and Recording Institutional Controls," will be followed when drafting and recording the environmental easement.

Since residual contamination will remain at the Site that does not allow for unrestricted use, an Interim SMP is required, which includes the environmental easement and an Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the Site including:

- Existing cover systems (existing buildings, paved areas, and sidewalks, etc.)
- Future cover systems (future buildings, paved areas, and sidewalks, etc.)
- Any SSDS installed as part of this IRM or future Site development

It is anticipated that the Interim SMP will include:

a) A Soil Management Plan which details the provisions for management of future excavations in areas of remaining contamination.

b) Descriptions of the provisions of the environmental easement including any land use, and groundwater use restrictions.

c) Provisions for the management and inspection of the identified engineering controls.

d) Maintaining Site access controls and Department notification.

e) The steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.

f) An Operations, Maintenance & Monitoring (OM&M) Plan to ensure continued operation, maintenance, monitoring, inspection, and reporting for any mechanical or physical components of the engineering controls and to assess the performance and effectiveness including:

   1) Monitoring of groundwater.
   2) A schedule of monitoring and frequency of submittals to the NYSDEC.
   3) Future monitoring for vapor intrusion for any buildings occupied or developed on the Site, if necessary.
   4) Maintaining Site access controls and NYSDEC notification.
   5) Providing the NYSDEC access to the site and OM&M records.

Section 6.0 References

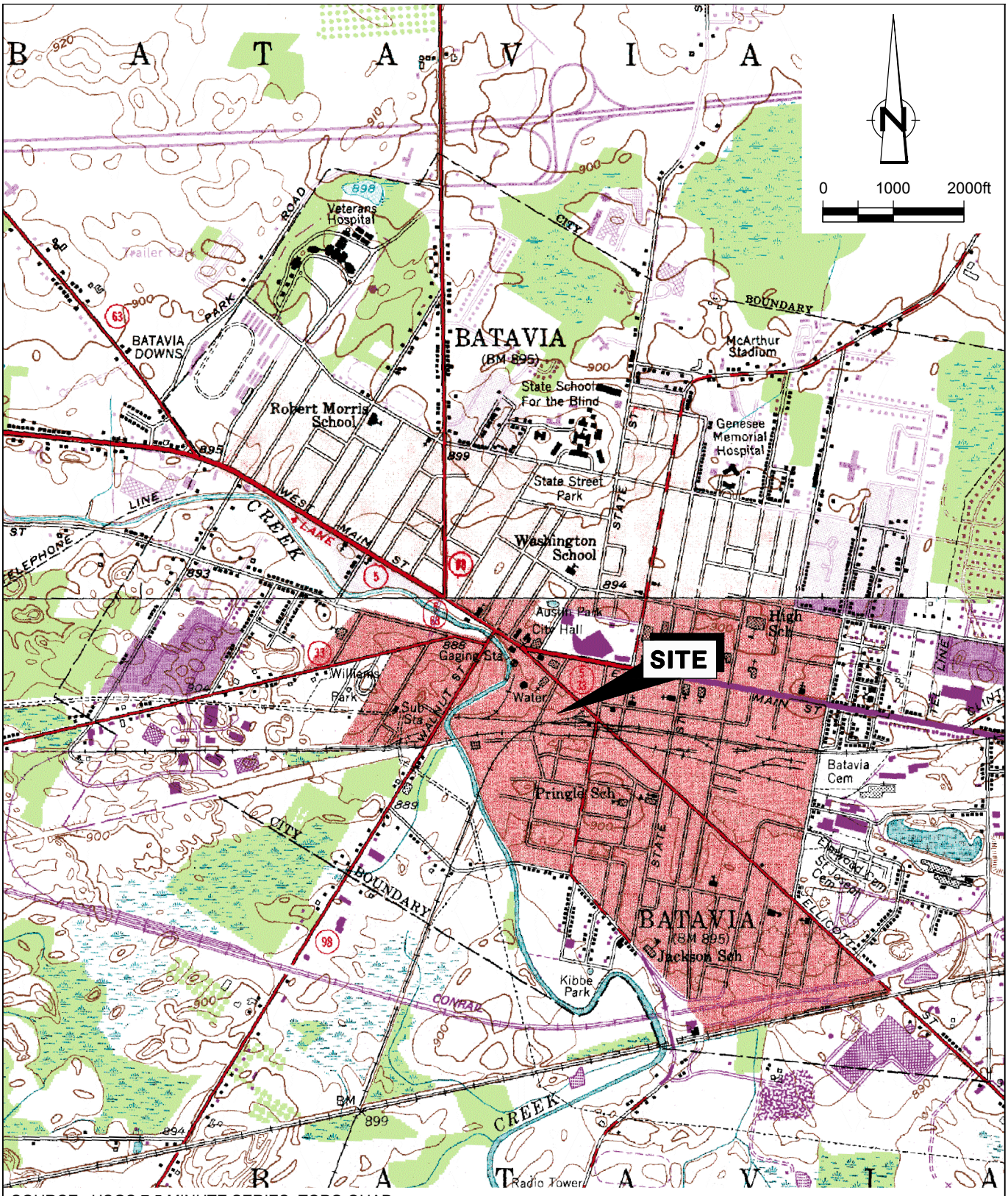
Shaw, 2012. Final Site Characterization Report, Batavia Former MGP Site, Shaw Environmental & Infrastructure Engineering of New York, P.C., November 2012.

LaBella, 2013. Phase II Environmental Site Assessment, Della Penna Site, Labella Associates, P.C., June 2013

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

NYSDOH, 2006. Final Guidance for Evaluation Soil Vapor Intrusion on the State of New York, New York State Department of Health, October 2006.

Figures



SOURCE: USGS 7.5 MINUTE SERIES, TOPO QUAD:
BATAVIA SOUTH, NY 1978, BATAVIA NORTH, NY 1978

figure 1

SITE LOCATION MAP
IRM WORKPLAN
BATAVIA FORMER MGP SITE
Batavia, New York

CRA

84144-00(003)GN-BU001 AUG 14/2014

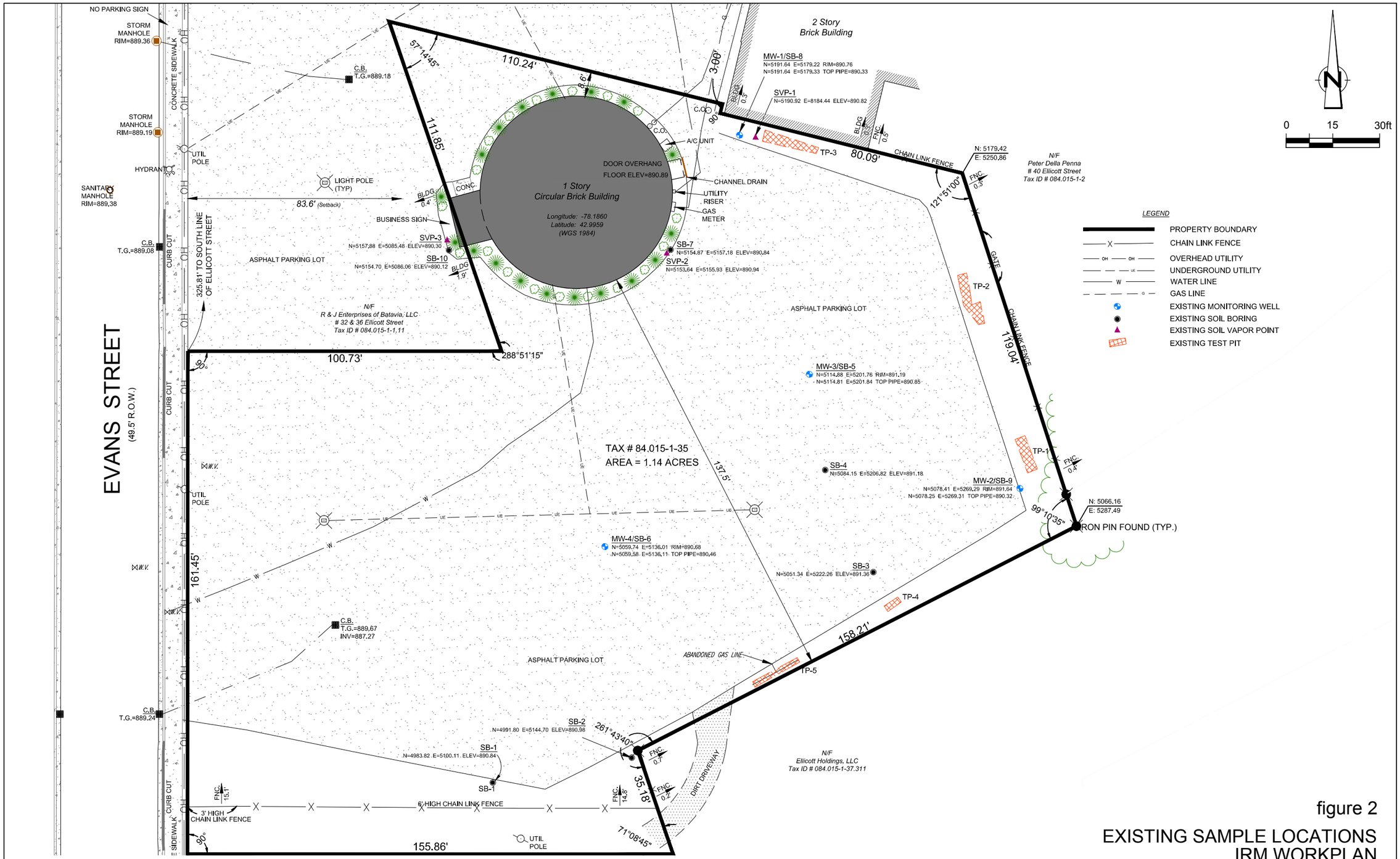


figure 2

EXISTING SAMPLE LOCATIONS
IRM WORKPLAN
BATAVIA FORMER MGP SITE
Batavia, New York

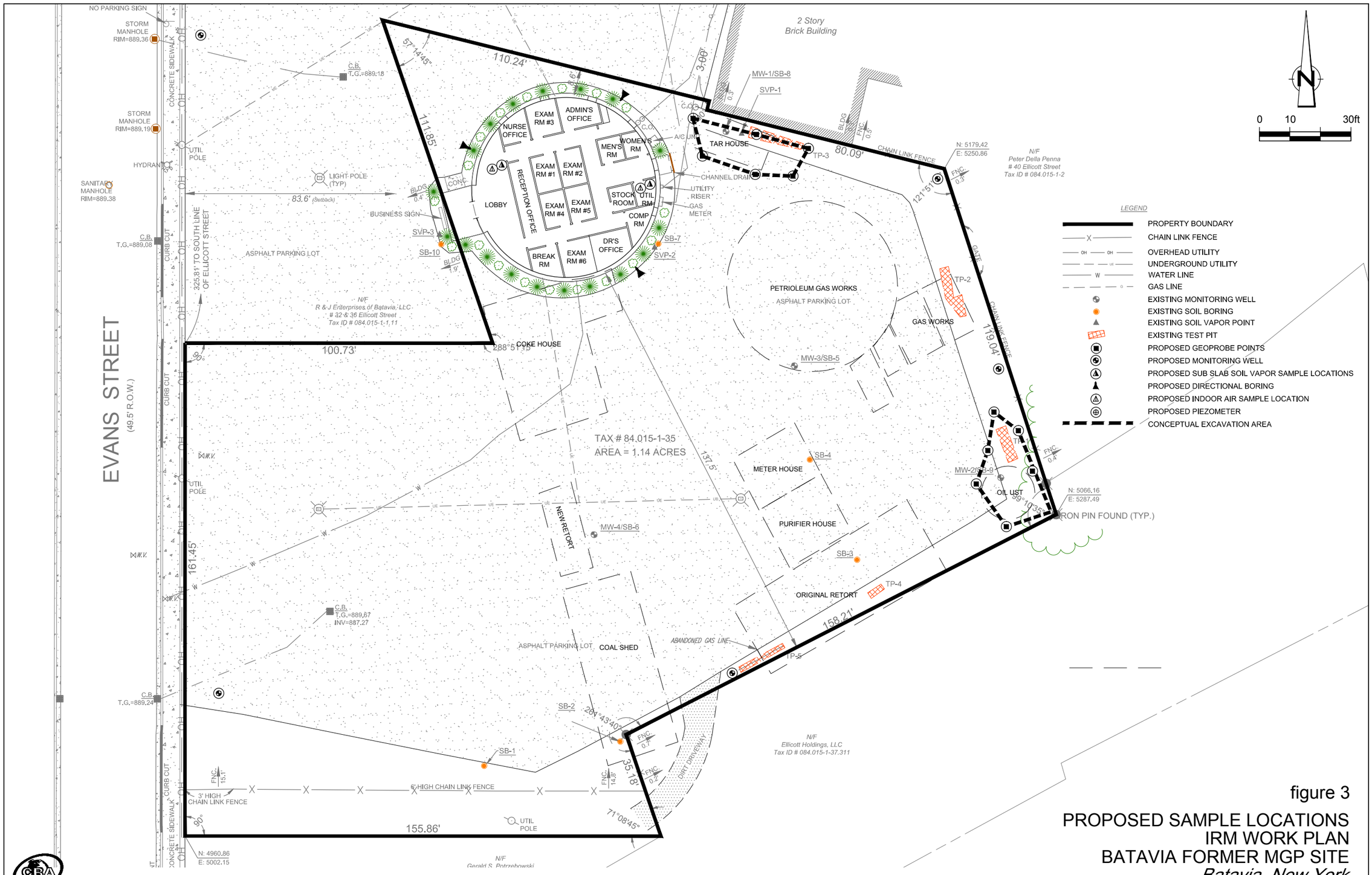


figure 3

PROPOSED SAMPLE LOCATIONS
IRM WORK PLAN
BATAVIA FORMER MGP SITE
Batavia, New York

figure 4

ODOR CONTROL PLAN POTENTIAL RECEPTORS
BATAVIA FORMER MGP SITE
Batavia, New York

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Tables

TABLE 1
ODOR CONTROL PLAN POTENTIAL RECEPTORS
BATAVIA FORMER MGP SITE
R & J ENTERPRISES, LLC
BATAVIA, NEW YORK

Business Name	Number	Street	Phone Number
Site Owner R&J Enterprises	11	Evans	585-993-0966
Site Owner R&J Enterprises	34	Ellicott	585-993-0966
Della Penna Site	40-52	Ellicott	Vacant
Resurrection Parish - St. Mary Worship Site	18	Ellicott	585-343-5400
Fire Department (Fire Chief)	18	Evans	585-345-6375
Falletti Ice Arena	22	Evans	585-344-3991
Kelly's Holland Inn	25	Evans	585-343-9726
IRR Supply Centers, Inc.	29	Evans	585-343-5085
Santy Tire Sales	56	Ellicott	585-343-1885
Learn Through Play Speech and Language Center	56	Ellicott	585-815-0327
Floral Fantasies	68	Jackson	585-343-6282
Salvation Army Store	96	Jackson	585-344-2262

TABLE 2
PROPOSED INTERIM REMEDIAL MEASURE SAMPLE MATRIX
BATAVIA FORMER MGP SITE
R J ENTERPRISES, LLC
BATAVIA, NEW YORK

	TCL VOCs	TCL SVOCs	TAL Total Metals	Total Cyanide	Full VOC List TO-15	Waste Characterization of material to be excavated (Total VOCs, Total SVOCs, Total RCRA Metals, TPH (GRO/DRO), Cyanide, % Sulfur, BTU)	Waste Characterization drummed soil cuttings and decon/purge water (Total VOCs, Total SVOCs, Total RCRA Metals)	Rationale / Comments
Delineation	-	-	-	-	-	2	-	An Initial 12 delineation Geoprobe® points (6 around MW-1/SB-8 and TP-3 and 6 around MW-2/SB-9 andTP-1 plus any necessary step out points to a maximum depth of 30' bgs will be installed. Soils will be screened observed for evidence of gross contamination. Samples of the grossly contaminated material from each area will be collected for waste characterization.
Post Excavation Sampling	6	6	6	6	-	-	-	Number of samples is estimated. The actual number of soil samples will be based on the size of the excavation
Soil Sampling Characterization Below Structure	3	3	3	3	-	-	-	One soil sample from each directional boring from the area of highest PID readings
Annual Groundwater Monitoring	5	5	5	5	-	-	-	Five perimeter
Sub Slab Soil Vapor Points - sub slab soil vapor samples		-	-	-	2	-	-	Two sub slab soil vapor sampling points will be installed. (batch certified clean summa canisters with 24 hour flow regulators)
Indoor Air Samples - Indoor air samples	-	-	-	-	2	-	-	Two indoor air samples will be collected concurrently with the sub-slab soil vapor samples. (individually certified clean summa canisters with 24 hour flow regulators)
Ambient air sample	-	-	-	-	1	-	-	Individually certified clean summa canister
Waste Drum (soil and water)	-	-	-	-	-	-	10	Number of samples is estimated. Samples were analyzed for PCBs during the Site Characterization and not detected. They are not a contaminant of concern at this Site.
Total Normal Samples	14	14	14	14	5	2	10	
Total Field Duplicates (10 %)	1	1	1	1	1	0	0	Field duplicates will be collected at a rate of 10% of the normal samples collected per media
Trip Blanks	6	-	-	-	-		-	Number of trip blanks is estimated. Trip blanks required for VOC samples.

Appendix A

Health and Safety Plan

(Originally prepared as part of the RI/FS Work Plan,
included here for completeness.)

CONESTOGA-ROVERS & ASSOCIATES

www.CRAworld.com

Site-Specific Health and Safety Plan

Batavia Former MGP Site
Batavia, New York
NYSDEC Site No. 819019

Prepared by:

Conestoga-Rovers & Associates
285 Delaware Avenue, Suite 500
Buffalo, NY 14202

April 2014 • 084144 • Report No. 1 Appendix A

Partners in Sustainability

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(Following Text)

1.0 Introduction

This Health and Safety Plan (HASP) describes the health and safety procedures that will be implemented and adhered to during the Remedial Investigation / Feasibility Study (RI/FS) activities at the Batavia Former MGP Site (Site) in Batavia, New York. Figures 1.1 and 1.2 respectively, in the RI/FS Work Plan present the Site Location and the Site Layout. An Emergency Response and Contingency Plan is presented in Section 11.0 of this HASP and will be in place during project activities. A Community Air Monitoring Plan, presented in Attachment C of this HASP, has also been developed and will be implemented during project activities.

The scope of work to be completed by the selected contractor(s) during the project activities includes the following:

i) mobilization and demobilization of labor, materials, and equipment to and from the Site, which include Site preparation/setup and Site restoration activities;

ii) surveying activities;

iii) installation of a secure fence around the site;

iv) installation of soil borings and groundwater monitoring wells;

v) soil and groundwater sampling activities;

vi) installation of sub-slab vapor probes and soil vapor sampling activities;

vii) the potential installation and eventual removal of erosion control measures (e.g., silt fencing) around excavation areas if excavation work is completed;

viii) the potential excavation, stockpiling and loading of impacted soils for off Site disposal;

ix) collection, storage and disposal of accumulated water from excavations and from decontamination activities;

x) backfilling the excavation areas with clean imported soils (Site restoration activities); and

xi) equipment and personnel decontamination activities.

During a portion of these activities, personnel may come in contact with waste materials, soils, groundwater and wash waters, which may contain hazardous substances. This HASP has been developed to minimize direct contact by project personnel with materials potentially having chemical presence by ensuring:

i) that project personnel are not adversely exposed to the compounds of concern;

ii) that public health and the environment are not adversely impacted by materials with elevated chemical presence that may potentially migrate outside of the work zone during project activities at the Site;

iii) compliance with applicable governmental and non-governmental (American Conference of Governmental Industrial Hygienists [ACGIH]) regulations and guidelines. In particular, the amended rules of the Occupational Safety and Health Administration (OSHA) for Part 1926, of Title 29 Code of Federal Regulations (CFR). Part 1926.65 will be implemented for all Site work where project personnel may come into contact with the health and safety hazards that are present at the Site; and

iv) initiation of proper emergency response procedures to minimize the potential for any adverse impact to project personnel, the general public, or the environment.

A vital element of the selected contractor's Health and Safety Program will be the implementation of a site-specific HASP for all field activities.

This project HASP requires the following measures:

i) communication of the contents of this HASP to project personnel;

ii) elimination of unsafe conditions. Efforts shall be initiated to identify conditions that can contribute to an accident and to remove exposure to these conditions;

iii) utilization of the STAR (Stop, Think, Act, and Review) process before beginning any activity/task/job, after an incident, and/or during any unusual circumstances. Stop the activities to think about the task, analyze the task hazards, and determine methods to reduce risk, and review the results with affected personnel.

iv) Completion of behavioral based safety (BBS) observations via the use of the Safe Task Evaluation Process (STEP).

v) review of existing or the development of new Job Safety Analysis (JSA) forms for each project activity. Supervisors and affected personnel are responsible for the development and on-going revisions of JSAs. The JSAs for all known work activities as well as activities that are typical of RI/FS projects in general are presented Attachment A. Some JSAs may not be applicable unless remedial actions are implemented;

vi) reduction of unsafe acts. Project personnel shall make a conscious effort to work safely. A high degree of safety awareness must be maintained so those safety factors involved

in a task become an integral part of the task. Supervisory personnel shall ensure that project personnel committing unsafe acts are held accountable via counseling, mentoring, and, if necessary, reprimand; and

vii) frequent inspection of project activities. Regular safety inspections of the work site, materials, and equipment by qualified persons ensure early detection of unsafe conditions. Safety and health deficiencies shall be corrected as soon as possible, and project activities shall be temporarily suspended until the appropriate corrective actions are taken. Documentation of the daily inspections and corrective actions taken should be kept with the project files.

For the purpose of this HASP, activities performed at the Site involving contact with materials, which potentially have an elevated chemical presence will be considered contaminated operations requiring the use of Personal Protective Equipment (PPE). A detailed description of the required PPE is presented in Section 5.1 and is also identified on each JSA form.

The applicability of this HASP extends to all project personnel who will be on site, including State Agency personnel, contractor personnel, subcontractor personnel, and visitors to the Site.

All project activities at the Site will be conducted in accordance with the provisions of selected contractor's approved site-specific HASP. A copy of the selected contractor's site-specific HASP and their employer-specific Standard Operating Procedures (SOPs) will be maintained on site whenever project activities are in progress. This HASP shall be used in conjunction with the selected contractor's Safety and Health Program.

1.1 Project Organization

All personnel conducting activities at the Site must conduct their activities in compliance with all applicable safety and health standards as specified by OSHA including, but not limited to, the OSHA 29 Code of Federal Regulation (CFR) 1910 and 29 CFR 1926. Project personnel must also be familiar with the procedures and requirements in their approved site-specific HASP and the applicable procedures found within their company's SOP's and Safety and Health Policy Manual. In the event of any conflicting safety procedures/requirements, personnel shall implement those safety practices, which afford the highest level of safety and protection.

Project Management and Safety Organization

Contractor's Project Manager – (to be determined)

The Contractor's Project Manager (CPM) shall be responsible for the overall implementation of the HASP, and for ensuring that all health and safety responsibilities are carried out in conjunction with this project. This shall include, but is not limited to, review and approval of the HASP; qualifying/directing subcontractors relative to safety and health performance; coordinating all safety and health submittals; providing the appropriate technical information to write submittals; and consultation with representatives of the Performing Parties (PPs) regarding appropriate changes to the HASP.

Contractor's Safety & Health Officer – (to be determined)

The Contractor's Safety and Health Officer (CSHO) is the person who, under the supervision of the CPM and the contractor's Corporate Safety and Health Manager (CSHM), shall be responsible for the communication of the Site requirements to project personnel and any subcontractor personnel. The CSHO will have prior experience in working at hazardous waste sites and is responsible for carrying out the health and safety responsibilities by making sure that:

i) he/she is onsite at all times during the project work activities;

ii) all necessary clean-up and maintenance of safety equipment is conducted by project personnel;

iii) emergency services are contacted when necessary;

iv) a Site-specific Hazard Communication (HAZCOM) Program is maintained on site;

v) project safety forms attached to the HASP are correctly completed, submitted and filed;

vi) a pre-entry briefing is conducted, which will serve to familiarize project personnel with the procedures, requirements, and provisions of this HASP;

vii) all necessary records are maintained in the project files (e.g., air monitoring results, calibration records for air monitoring equipment, incident reports, daily toolbox meeting record sheets, daily safety logbook entries, training, medical and respiratory fit testing records, and certificates etc.). The selected contractor may use either their approved employer-specific safety forms or the forms that are provided in Attachment B of this HASP;

viii) daily safety meetings are held and documented;

ix) safe work practices for project personnel are enforced;

x) safety of any visitors who enter the Site is ensured;

xi) communication is maintained with the CPM and the Representative of the Consulting Engineering Firm;

xii) orders the immediate shutdown of project activities in the case of a medical emergencies, unsafe conditions, or unsafe practices;

xiii) designates work areas and defines minimum PPE requirements;

xiv) provides the safety equipment, PPE, and other items necessary for project personnel;

xv) conducts the required air monitoring program for project personnel (note - a Representative of the Consulting Engineering Firm will conduct the required Community Air Monitoring Program (CAMP);

xvi) enforces the use of required safety equipment, PPE, and other items necessary for project personnel safety;

xvii) ensures that there is a competent person in place who will supervise excavation work. Although not anticipated, the CSHO will oversee any potential confined space entry work (e.g., entry into any wastewater storage tank(s) for cleaning purposes);

xviii) conducts job site inspections with the Construction Superintendent (CS) or Site Supervisor (SS) as a part of quality assurance for safety and health; and

xix) reports safety and health concerns immediately to the CPM, CSHM, and the Consulting Engineering Firm's onsite Representative.

Emergency Coordinator (EC)

The CSHO or his/her designate will act as the EC. The EC shall be able to implement the emergency procedures and is responsible for implementing the following activities in the event of an emergency:

i) the EC shall immediately respond to all imminent or actual emergency situations. The EC shall notify all project personnel and emergency response agencies, identify the problem, assess the health or environmental hazards, and take all reasonable measures to stabilize the situation;

ii) the EC shall take all reasonable measures necessary to ensure that fire, explosion, emission, or discharge does not occur, re-occur, or spread. These measures may include stopping operations, collecting and containing released materials, and/or removing or isolating containers;

iii) the EC shall develop Emergency Evacuation Routes on a daily bases and communicate them to all project personnel; and

iv) the EC shall also be responsible for follow-up activities after any incident such as the cleanup of the affected area, maintenance and decontamination of emergency equipment, and completion and submission of an incident report.

Construction Superintendent (CS) /Site Supervisor (SS) - Contractor (to be determined)

Health and safety is a line management responsibility, and as such, the CS and/or SS will work with the CSHO to implement the overall onsite direction and enforcement of the health and safety policies and procedures for this project. The CS and/or SS must meet the requirements of the "competent person" as per the OSHA regulations. The CS and/or SS will report to the CPM on this project.

The CS and/or SS is the person who, under the supervision of the CPM, shall be responsible for the communication of the site requirements to project personnel and subcontractors, and is responsible for carrying out the health and safety responsibilities by making sure that:

i) all underground utilities have been properly located prior to initiating work activities;

ii) each work area is secured with fencing at the end of each day and that the perimeter fence including all gates are secured at the end of the work day;

iii) all necessary cleanup and maintenance of safety equipment is conducted by project personnel;

iv) JSA forms are developed, reviewed, and revised accordingly;

v) project personnel stop, think about, act accordingly and review the work activities that they are about to start before initiating activities;

vi) project safety forms attached to the HASP are completed properly, submitted as may be required and then filed;

vii) a pre-entry briefing is conducted for all project personnel, which will serve to familiarize everyone with the procedures, requirements, and provisions of this HASP;

viii) orders the immediate shutdown of project activities in the case of a medical emergency, unsafe condition, or unsafe practice;

ix) provides the safety equipment, PPE, and other items necessary for project personnel;

x) enforces the use of required safety equipment, PPE, and other items necessary for personnel or community safety;

xi) conducts job site inspections as a part of quality assurance for safety and health;

xx) reports safety and health concerns immediately to the CPM, CSHM and the Consulting Engineering Firm's onsite Representative;

xii) is responsible for the overall implementation of the HASP, and ensuring that all health and safety responsibilities are carried out during the project work activities. This shall include, but is not limited to, review and approval of any subcontractor HASPs, communication of project requirements to subcontractor personnel and consultation with the CPM, CSHO and the Consulting Firm's Representative regarding appropriate changes to the HASP;

xiii) the CS and/or SS also have the responsibility for enforcing safe work practices for all project personnel;

xiv) the CS and/or SS watch all personnel for any ill effects, especially those symptoms caused by heat stress and/or chemical exposure; and

xv) the CS and/or SS oversee the safety of any visitors who enter the Site.

Corporate Safety & Health Manager (CSHM) Contractor – (to be determined)

The CSHM is an individual who is trained as a health and safety professional, works full-time for the selected contractor in a health and safety role, and who serves in a consulting role to the CPM, CSHO, and CS and/or SS regarding potential health and safety issues.

Equipment Operators

All equipment operators are responsible for the safe operation of heavy equipment. Operators are responsible for inspecting their equipment on a daily basis to ensure safe performance. Brakes, hydraulic lines, backup alarms, and fire extinguishers must be inspected routinely throughout the project. Documentation of daily inspections will be required via an equipment inspection checklist. Heavy equipment inspections will be submitted to the CS for review and subsequently placed in the project files. Unsafe conditions/acts are to be immediately reported to the CS and/or CSHO. Equipment will be taken out of service if an unsafe condition occurs.

Project Personnel Safety Responsibilities

Project personnel are responsible for their own safety as well as the safety of those around them and shall use any equipment provided in a safe and responsible manner, as directed by their supervisor. Project personnel will follow the policies set forth in this HASP and those in their employer-specific SOPs and Safety and Health Program.

Project personnel are directed to take the following actions when appropriate:

i) review all activity hazards and preventative measures on each JSA form before initiating that specific task;

ii) assist in the development/revision of JSA forms that are appropriate to current work activities;

iii) suspend any operations that may cause an imminent health hazard to project personnel;

iv) inspect tools and other equipment before each use or as the manufacturer and/or OSHA mandates;

v) correct job site hazards when possible without endangering life or health; and

vi) report safety and health concerns immediately to the CS, SS, or CSHO.

Subcontractors

Selected subcontractor(s) will be responsible for providing a CS and/or SS ("competent person") and a Safety and Health Officer to direct their activities and to meet all applicable OSHA Regulations. This may be the same individual if so qualified. These individuals will be responsible for ensuring that all contract specifications are met, including those related to project health and safety. The names of these individuals will be presented in the subcontractor Site-specific HASP.

The selected contractor and the Consulting Firm's Representative will review and approve any subcontractor HASP prior to the subcontractor's mobilization to the Site. Subcontractors will be responsible for the health and safety of their personnel, which includes following all applicable OSHA Regulations and the subcontractors' Site-specific HASP. Subcontractors will be required to attend an initial Site briefing put on by the selected contractor's CPM or CSHO and subsequent daily safety meetings.

Authorized Visitors

Authorized Visitors shall be provided with all known information with respect to the project operations and hazards, as applicable to the purpose of their visit.

2.0 Site Characterization and Potentially Hazardous Compounds

See Section 4.0 of the RI/FS Work Plan for a detailed description of the Site along with information on historical investigations and a characterization of the Site.

Table A2.1 presents a listing of the Chemical Compounds of Concern (COCs) and their detected range of concentrations that have been identified in the groundwater and soils at the Site. Table A2.2 presents the exposure routes and regulatory Time Weighted Average (TWA) exposure levels for the COCs. These levels are set to protect the health of workers and indicate the level of airborne concentration where respiratory protection will be required.

3.0 Basis for Design

Regulations set forth by OSHA in Title 29, CFR, Parts 1910 and 1926 (29 CFR 1910 and 1926) form the basis of this HASP. Emphasis is placed on Section 1926.65 (Hazardous Waste Operations and Emergency Response), 1910 Subpart I (Personal Protective Equipment), 1910 Subpart Z (Toxic and Hazardous Substances), 1926 Subpart O (Motor Vehicles and Mechanized Equipment), and 1926 Subpart F (Excavations). Some of the specifications within this section are in addition to the OSHA regulations, and reflect the positions of U.S. EPA, and the National Institute for Occupational Safety and Health (NIOSH), regarding safe operating procedures at hazardous waste sites.

The health and safety of the public and site personnel and the protection of the environment will take precedence over cost and scheduling considerations for all project work.

4.0 Personnel Training

4.1 General

Project personnel who may potentially come into contact with the COCs at the Site shall complete hazardous waste operations and emergency response related training, as required by the OSHA Standard 29 CFR 1926.65. Project personnel shall also initially receive a minimum of three days of actual field experience under the direct supervision of a trained, experienced supervisor. Personnel who completed their training more than 12 months prior to the start of this project shall have also completed an 8-hour refresher course within the past 12 months.

The CS and or SS shall complete the additional 8 hours of training that is required for supervisors along with any "competent persons" training that may be needed for required work.

Additional safety training for specific tasks/activities may include safety training for fall protection, ladder safety, confined space entry work and excavation safety etc. Further safety training may also be required based on the scheduled scope of work. This safety training is to be conducted and documented before any tasks that require additional training are initiated. It is the responsibility of the CSHO and CS and/or SS to ensure that personnel have the necessary training and skills prior to activity assignment. Task safety training requirements are included on each JSA form.

4.2 Basic 40-Hour Course

The following is a list of the topics typically covered in a 40-hour training course:

i) general safety procedures;
ii) physical hazards (fall protection, noise, heat stress, cold stress);
iii) names and job descriptions of key personnel responsible for site health and safety;
iv) safety, health, and other hazards typically present at hazardous waste sites;
v) use, application, and limitations of PPE;
vi) work practices by which employees can minimize risks from hazards;
vii) safe use of engineering controls and equipment on site;
viii) medical surveillance requirements;
ix) recognition of symptoms and signs, which might indicate overexposure to hazards;
x) worker right-to-know (Hazard Communication OSHA 1926.59/1910.1200);
xi) routes of exposure to contaminants;
xii) engineering controls and safe work practices that may be implemented;
xiii) components of a project HASP;
xiv) decontamination practices for personnel and equipment;
xv) confined space entry procedures; and
xvi) general emergency response procedures.

4.3 Supervisor Course

Management and supervisors (i.e., the CS and SS) are required to receive an additional 8 hours of training in topics that are pertinent to the management of hazardous waste operations, which typically includes:

i) instruction in detailed project safety and health procedures dealing with emergencies;

ii) PPE programs;

iii) implementation of specialized emergency response procedures; and

iv) air monitoring techniques.

4.4 Site-Specific Training

All project personnel attending the initial safety meeting will accomplish the project-specific training on the contents of this HASP before work begins. The review will include a discussion of the chemical, physical, and biological hazards that may be present at the Site, the protective equipment and safety procedures to be used and followed, and emergency procedures that will be implemented at the Site. The Training Acknowledgment Form that project personnel will sign off on is provided in Attachment B (Project Safety Forms).

4.5 Daily Safety Meetings

Daily safety meetings (tailgate safety talks) will be held to cover the work that is anticipated to be accomplished each day, the associated hazards, the PPE and procedures required to minimize exposure to these hazards, and the required emergency response procedures. The CS, SS and/or CSHO will present these meetings prior to beginning the day's fieldwork. No work will be performed in an Exclusion Zone (EZ) (see Section 6.6.1 for a definition of EZ) before the daily safety meeting has been held. Additional safety meetings shall also be held prior to initiating new tasks, and repeated if new hazards are encountered. The form for documenting the daily safety meetings is also found in Attachment B.

4.6 First Aid and CPR

At least one individual current in First Aid/CPR will be assigned to the work crew and will be on the Site during all project activities. Refresher training in First Aid and CPR is required to keep the certificates current. These individuals must also receive training regarding the precautions and protective equipment necessary to protect against exposure to blood-borne pathogens.

Blood-borne pathogen training should be included as part of the First Aid/CPR training course delivered by the training provider.

5.0 Personal Protective Equipment

PPE will be required to safeguard project personnel from various hazards. Varying levels of protection may be used depending on the level of contaminants and the degree of any physical hazard. This section presents the various levels of personal protection and defines the conditions of use for each level. Subcontractor Site-specific HASPs, if required, will adequately address PPE concerns for each specific task activity based on their proposed scope of work.

5.1 Levels of Protection

Protection levels are determined based upon chemicals and physical hazards present in the work area. The specific protection levels to be employed at the Site for each work task are presented on each JSA form, which are presented in Attachment A.

5.1.1 Level D Protection

The minimum level of protection that will be required for all project personnel will be Level D. Level D will only be used in clean areas where there is no potential for exposure to the COCs. The following equipment is to be worn as Level D PPE:

i) work clothing as prescribed by the weather including full-length pants;

ii) steel toed work boots meeting American National Standard Institute (ANSI) Z41;

iii) safety glasses or goggles, meeting ANSI Z87;

iv) leather work gloves when handling or moving supplies and or clean equipment;

v) high visibility safety vest (Class II) whenever walking around the Site;

vi) hard hat, meeting ANSI Z89; and

vii) hearing protection (if noise levels exceed 85 dBA, then hearing protection with a Noise Reduction Rating (NRR) of at least 20 dBA must be used).

5.1.2 Modified Level D Protection

Modified Level D will be worn when airborne contaminants are not present at levels where respiratory protection is required, but where project activities present an increased potential for

skin contact with hazardous substances. The following equipment is to be worn as Modified Level D:

i) Tyvek® coveralls or polyethylene coated Tyvek® coveralls (if liquids/splash hazards are present);

ii) steel toed work boots meeting ANSI Z41;

iii) neoprene, or polyvinyl chloride (PVC) over-boots;

iv) safety glasses or goggle meeting ANSI Z87s;

v) hard hat meeting ANSI Z89;

vi) face shield in addition to safety glasses or goggles when projectiles and/or splashing liquids pose a hazard;

vii) disposable nitrile inner gloves (NDEX® 8005, as manufactured by Best, or equivalent);

viii) nitrile outer gloves (Sol-Vex® nitrile as manufactured by Ansell, or equivalent);

ix) hearing protection (if necessary); and

x) high visibility safety vest (Class II) whenever walking around the Site.

5.1.3 Level C Protection (not expected to be worn)

Level C protection will be required when the airborne concentration of chemical contaminants is present in worker breathing zones at sustained levels (15 minutes) greater than 1 part per million (ppm) as measured with a photoionization detector (PID) equipped with an 10.6 electron volt (eV) lamp or 5 mg/m^3 (respirable fraction) measured with a particulate monitor (MIE® personal Data Ram or equivalent). The respiratory action level of 1 ppm is driven by the presence of benzene, a volatile organic compound (VOC) in soils at the Site. If PID readings subside, workers can downgrade respiratory protection as necessary.

The following equipment will be used for Level C protection:

i) full-face air purifying respirator (APR) with organic vapor cartridges in combination with particulate filters (P-100) which are NIOSH approved (MSA GME P100 cartridges or equivalent);

ii) polyethylene coated Tyvek® or Saranex® hooded suit (if liquids/splash hazards are present) or Tyvek® coveralls, ankles, and cuffs taped to boots and gloves;

iii) nitrile outer gloves (Sol-Vex® unlined as manufactured by Ansell, or equivalent);

iv) inner nitrile disposable gloves (NDEX® 8005, as manufactured by Best, or equivalent);

v) steel toed work boots meeting ANSI Z41;

vii) neoprene, or polyvinyl chloride (PVC) over-boots;

viii) hard hat meeting ANSI Z89;

ix) hearing protection (if necessary); and

x) high visibility safety vest (Class II) whenever walking around the Site.

5.1.4 Selection of PPE

Equipment for personal protection will be selected based on the potential for contact, site conditions, ambient air quality, and the judgment of the CPM, CS, SS, CSHO and the CSHM. The PPE used will be chosen to be effective against the compound(s) present on the Site.

5.2 Respiratory Protection

Respiratory protection is an integral part of personnel health and safety at project sites with potential airborne contamination.

5.2.1 Site Respiratory Protection Program

The Site respiratory protection program will consist of the following:

i) all project personnel who may use respiratory protection will have an assigned respirator;

ii) all project personnel who may use respiratory protection will have been fit tested and trained in the use of a full-face piece APR within the past 12 months;

iii) all project personnel who may use respiratory protection must, within the past year, have been medically certified as being capable of wearing a respirator. Documentation of the medical certification must be provided to the CSHO prior to commencement of project work;

iv) only cleaned, maintained, NIOSH approved respirators are to be used on this project;

v) if respirators are used, the respirator cartridge is to be properly disposed of at the end of each work shift, prior to expected breakthrough or when breathing becomes labored (filter load-up occurs);

vi) contact lenses may be worn with a full-face respirator;

vii) all project personnel who may use respiratory protection must be clean-shaven. Mustaches and sideburns are permitted, but they must not interfere with the sealing surface of the respirator;

viii) respirators will be inspected and a negative pressure test performed prior to each use; and

ix) after each use, the respirator will be washed during a formal respirator cleaning procedure. When used, the respirator will be thoroughly cleaned at the end of the work shift. The respirator will be stored in a clean plastic bag, away from direct sunlight in a clean, dry location, in a manner that will not distort the face piece.

Respiratory protection may be required during some of the project activities. This is to ensure worker protection from potentially contaminated particulates and VOCs. It is expected that Modified Level D personal protection will be worn during the majority of the project activities involving the handling of impacted materials. However, the CSHO will make the determination of the acceptable level of protection based upon the results of the air-monitoring program. Also, if during these field activities the real-time air monitoring program indicates the need for an upgrade in protection to Level C then these activities will be continued with the increased level of personal protection and additional source controls (e.g., forced ventilation, foam, plastic sheeting, modified production rate, water spray, etc.) will be implemented to control vapors and/or particulates.

A PID with a 10.6 or greater eV lamp will be used to determine if organic vapors are present while a particulate monitor (MIE® personal Data Ram or equivalent will be used to measure particulate levels. Background readings will be established prior to commencing work activities at each active work area.

Action levels to determine the level of respiratory protection necessary for organic vapors and particulates are based on the sustained (15-minute) concentration of COCs measured within the breathing zone. The action levels and appropriate respiratory protection are referenced in Table A8.1 of this document. The PID action levels have been set based on the presence of the known VOCs, which have been identified at the Site. However, if the ambient concentrations of organic vapors are due to identifiable substances, the level of respiratory protection may be altered by the CSHO.

The appropriate APR respirator cartridges to be used at the Site are a combination organic vapor and P-100 cartridge. The cartridge must be of the same manufacturer as the respirator face piece.

5.3 Using PPE

Depending upon the level of protection selected for this project, specific donning and doffing procedures may be required. The procedures presented in this section are mandatory if Level C PPE is used.

All personnel entering the EZ must put on the required PPE in accordance with the requirements of this plan. When leaving the EZ, PPE will be removed in accordance with the procedures listed, to minimize the spread of contamination.

5.3.1 Donning Procedures

These procedures are mandatory only if Level C PPE is used on the project:

i) remove bulky outerwear. Remove street clothes and store in clean location;
ii) put on work clothes or coveralls;
iii) put on the required chemical protective coveralls or rain gear;
iv) put on the required chemical protective boots or boot covers;
v) tape the legs of the coveralls to the boots with duct tape;
vi) put on the required chemical protective gloves;
vii) tape the wrists of the protective coveralls to the gloves;
viii) don the required respirator and perform appropriate fit check;
ix) put hood or head covering overhead and respirator straps and tape hood to face piece;
x) check and secure all seams; and
xi) don remaining PPE, such as hard hat.

When these procedures are instituted, one person (bottle watch/decontamination attendant) must remain outside the work area to ensure that each person entering has the proper protective equipment.

5.3.2 Doffing Procedures

The following procedures are only mandatory if Level C PPE is required for this project. Whenever a person leaves a Level C work site, the following decontamination sequence will be followed:

i) upon entering the Contamination Reduction Zone (CRZ) rinse contaminated materials from the boots or remove contaminated boot covers;

ii) clean reusable protective equipment;

iv) remove protective garments, equipment, and respirator. All disposable clothing should be placed in a covered container, which is labeled;

v) clean the respirator using the appropriate method as determined by the CSHO;

iv) wash hands, face, and neck and shower as soon as possible at the end of the day;

v) proceed to clean area and dress in clean clothing; and

vi) clean and disinfect respirator for next use.

All disposable equipment, garments, and PPE must be placed in covered containers and labeled for disposal. See Section 9.0 for detailed information on decontamination procedures.

5.4 Selection Matrix

The level of personal protection selected will be based upon real-time air monitoring of the work environment and an assessment by the CSHO and CS and/or SS of the potential for skin contact with contaminated materials. The PPE selection matrix is given in each JSA form that is provided in Attachment A. This matrix is based upon information available at the time this HASP was written.

5.5 Duration of Work Tasks

The duration of activities involving the usage of PPE will be established by the CSHO based upon ambient temperature and weather conditions, the capacity of personnel to work in the designated level of PPE (heat stress, see Section 7.3) and the limitations of the protective equipment (i.e., ensemble permeation rates, life expectancy of the APR cartridges, etc.).

All rest breaks will be taken in the Support Zone (SZ) (see Section 6.6.3 for a definition of SZ) after full decontamination and PPE removal. Rest breaks will be observed based upon the heat stress monitoring guidelines presented in Section 7.3.

5.6 Limitations of Protective Clothing

PPE ensembles have been selected to provide protection against contaminants at anticipated concentrations. However, no protective garment, glove, or boot is chemical-proof, nor will it

afford protection against all chemical types. Permeation of a given chemical through PPE is a complex process governed by contaminant concentrations, environmental conditions, physical condition of the protection garment, and the resistance of a garment to a specific contaminant. Chemical permeation may continue even after the source of contamination has been removed from the garment.

In order to obtain optimum usage from PPE, the following procedures are to be followed by all site personnel using PPE:

i) when using disposable coveralls, don a clean, new garment after each rest break or at the beginning of each shift;

ii) inspect all clothing, gloves, and boots both prior to and during use for:

- a) imperfect seams;
- b) non-uniform coatings;
- c) tears; and
- d) poorly functioning closures;

iii) inspect reusable garments, boots, and gloves both prior to and during use for:

- a) visible signs of chemical permeation;
- b) swelling;
- c) discoloration;
- d) stiffness;
- e) brittleness;
- f) cracks;
- g) any sign of puncture; and
- h) any sign of abrasion.

Reusable gloves, boots, or coveralls exhibiting any of the characteristics listed above will be discarded. PPE used in areas known or suspected to exhibit elevated concentrations of contaminants will not be reused.

Project personnel also carry certain responsibilities for their own health and safety, and are required to observe the following safe work practices:

i) familiarize themselves with this HASP;

ii) use the "buddy system" (system where personnel continually check and watch out for one another) when working in a contaminated operation;

iii) use the safety equipment in accordance with training received, labeling instructions, and common sense;

iv) maintain safety equipment in good condition and proper working order;

v) refrain from activities that would create additional hazards (e.g., eating, etc., in restricted areas, leaning against dirty, contaminated surfaces);

vi) smoking will not be allowed on Site. Eating and drinking will be prohibited except in designated areas. These designated areas may change during the duration of the project to maintain adequate separation from the active work area(s). Designation of these areas will be the responsibility of the CSHO; and

vii) soiled disposable outerwear shall be removed and placed into a covered container prior to washing hands and face, eating, using lavatory facilities, or leaving the Site.

6.0 Site Control

Site control is provided by the implementation of the following measures:

i) the CPM, CSHO, CS and/or SS are to be advised of the dates and purpose of all field activities;

ii) all visitors must sign in and sign out each time they pass the site access gate; and

iii) the selected contractor will ensure that a secure fence is in place around the Site or each active work area during the project activities.

6.1 Authorization to Enter

All personnel working in EZs must have completed hazardous waste operations initial training as defined under OSHA Regulation 29 CFR 1926.65. They shall also have completed their training or refresher training within the past 12 months, and have been certified by a physician as fit for hazardous waste operations in order to enter a site area designated as an EZ or CRZ. Personnel without such training or medical certification may enter the designated SZ only. The CSHO will maintain a list of authorized persons; only personnel on the authorized list will be allowed within the EZ or CRZ.

6.2 Site Orientation and Hazard Briefing

No person will be allowed in the general work area during project activities without first being given a site orientation and hazard briefing. This orientation will be presented by the CSHO, and will consist of attending an initial safety meeting. This training will cover the chemical, physical, and biological hazards, protective equipment, safe work procedures, and emergency procedures for the project. A Training Acknowledgment Form for documentation purposes is provided in Attachment B. In addition to this meeting, daily safety meetings will be held each day before work begins. All individuals on site, including visitors, must document their attendance to this briefing as well as to each daily safety meeting on the form that is also provided in Attachment B.

6.3 Certification Documents

A training and medical file will be established for the project and kept on site during all project activities. The 40-hour training, update, and respirator fit test certificates, as well as current medical clearance for all project field personnel will be maintained within that file. Subcontractor personnel, if needed, will provide a copy of their training, respirator fit test, and medical documentation to the CSHO prior to the start of fieldwork. Additional safety training certification documents (e.g., confined space entry) may be necessary based on the scheduled task activity.

6.4 Entry Requirements

In addition to the authorization, hazard briefing and certification requirements listed above, no person will be allowed to enter the Site unless he/she is wearing the minimum SZ PPE as described in Section 5.0. Personnel entering the EZ or CRZ must wear the required PPE for those locations as identified on each JSA form.

6.5 Emergency Entry and Exit

Individuals who must enter the Site on an emergency basis will be briefed of the hazards by the CSHO. All hazardous activities will cease in the event of an emergency and any sources of emissions will be controlled, if possible.

Individuals exiting the Site because of an emergency will gather in a safe area, as identified by the EC and CSHO. The CSHO is responsible for ensuring that all individuals who entered the work area have exited in the event of an emergency. See Section 11.0 of this HASP for additional information on emergency response.

6.6 Contamination Control Zones

Contamination control zones are maintained to prevent the spread of contamination and to prevent unauthorized people from entering hazardous areas.

6.6.1 Exclusion Zone (EZ)

The EZ consists of the specific work area, or may be the entire area of suspected contamination. All project personnel entering the EZ must use the required PPE, and must have the appropriate training and medical clearance for hazardous waste work. The EZ is the defined area where there is a possible respiratory and/or contact health hazard with the COCs. Barrier tape, fencing, or other appropriate means will identify the location of each EZ.

6.6.2 Contamination Reduction Zone (CRZ)

The CRZ or transition area will be established to perform decontamination of personnel and equipment and to provide a buffer zone around the EZ. All personnel entering or leaving the EZ will pass through this area to prevent any cross-contamination. Tools, equipment, and machinery will be decontaminated in the CRZ (or a separate CRZ decontamination area) that may be set up to better address equipment decontamination. The decontamination of all personnel will be performed on site in the CRZ that is adjacent to each EZ. Personal protective outer garments and respiratory protection will be removed in the CRZ and prepared for cleaning or disposal. This zone is the only appropriate corridor between the EZ and the SZ.

6.6.3 Support Zone (SZ)

The SZ is a clean area outside of the CRZ located to prevent project personnel from exposure to hazardous substances. Eating and drinking will be permitted in the SZ only after proper decontamination. Smoking will not be allowed anywhere on Site.

7.0 Activity Hazard/Risk Analysis and General Safety Practices

This section identifies and evaluates the potential chemical, physical, and biological hazards, which may be encountered while conducting project activities. Specific JSA forms (see Attachment A) have been developed to address the hazards associated with scheduled/known project activities, which are outlined in Section 1.0 of this HASP.

NOTE: If a non-routine task or previously unidentified task becomes necessary then a JSA that addresses the new task shall be developed and implemented before initiating the new activity.

In addition to the chemical hazards identified in Table A2.1 of this HASP, physical and biological hazards may exist at the Site including: potential heat/cold stress; hazards presented by the use of heavy and drilling equipment; underground/overhead utility hazards; hazards presented by excavations/trenches; biological hazards including, poison ivy, mosquitoes, bees, wasps, snakes; uneven terrain and slippery surfaces; electrical and other hazardous energy sources, hazards presented by undertaking hot work and the use of decontamination equipment. It will be the responsibility of the CSHO and all project personnel to identify the physical and/or biological hazards posed by the various project activities that they are partaking in and implement all necessary preventative measures.

7.1 General Practices

Additional general safety practices to be implemented are as follows:

i) at least one copy of this HASP must be at the Site, in a location readily available to all personnel;

ii) all project personnel must use the "buddy system";

iii) food and beverages shall not be present or consumed in the EZ and CRZ. Cosmetics must not be applied within these zones;

iv) emergency equipment such as eyewash, fire extinguishers, etc., must be removed from storage areas and staged in readily accessible locations;

v) contaminated waste, debris, and clothing must be properly contained and legible and understandable precautionary labels must be affixed to the containers;

vi) removing contaminated soil or waste debris from protective clothing and/or equipment using compressed air, shaking, or any other means that disperses contaminants into the air is prohibited;

vii) containers must be moved only with the proper equipment, and must be secured to prevent dropping or loss of control during transport; and

viii) visitors to the Site must be instructed to stay outside of the EZ and CRZ and remain within the SZ during the extent of their stay. Visitors must be cautioned to avoid skin contact with surfaces, which are contaminated or suspected to be contaminated.

7.1.1 Buddy System

All project personnel shall use the buddy system. Visual contact must be maintained between project team members at all times, and personnel must observe each other for signs of chemical exposure and heat stress. Indications of adverse effects include, but are not limited to:

i) changes in complexion and skin coloration;

ii) changes in coordination;

iii) excessive salivation and papillary response; and

iv) changes in speech pattern.

Project personnel should also be aware of potential exposure to possible safety hazards, unsafe acts, or noncompliance with safety procedures. Personnel shall inform their partners, fellow team members, CSHO, CS and/or the SS of non-visible effects of exposure to toxic materials. The symptoms of such exposure may include:

i) headaches;

ii) dizziness;

iii) nausea;

iv) blurred vision;

v) cramps; and

vi) irritation of eyes, skin, or respiratory tract.

If protective equipment or noise levels impair communications, pre-arranged hand signals must be used for communication. Personnel must stay within line of sight of another team member. Downrange field teams in conjunction with the "buddy system" will use the following hand signals. These signals are very important when working with heavy equipment. The entire field team shall know them before operations commence.

Signal	***Meaning***
Hand Gripping Throat	Out of Air; Can't Breathe
Grip Partner's Wrist	Leave Area Immediately
Hands on Top of Head	Need Assistance
Thumbs Up	Ok, I'm All Right, I Understand
Thumbs Down	No, Negative

7.1.2 Sanitation

Sanitation at the Site will be maintained according to OSHA and the Department of Health requirements.

7.1.3 Break Area

Breaks must be taken in the SZ, away from the active work area after project personnel go through decontamination procedures. There will be no eating, drinking, or chewing gum in any area other than the SZ.

7.1.4 Potable Water

The following rules apply for all project field operations:

i) an adequate supply of potable water will be provided in each CRZ. Potable water must be kept away from hazardous materials, contaminated clothing, and contaminated equipment;

ii) portable containers used to dispense drinking water must be capable of being tightly closed, and must be equipped with a tap dispenser. Water must not be drunk directly from the container, nor dipped from the container;

iii) containers used for drinking water must be clearly marked and not used for any other purpose;

iv) disposable cups must be supplied, and both a sanitary container for unused cups and a receptacle for disposing of used cups must be provided; and

v) should the selected contractor use individual servings of bottled water then a recycling program will be implemented to ensure that all empty bottles are collected for recycling purposes.

7.1.5 Washing Facilities

Access to facilities for washing ones hands, face and neck before eating, drinking, or smoking will be provided.

7.1.6 Lavatory

An adequate number of portable chemical toilets will be provided for use. Separate facilities for males and females will be maintained at all times during the project.

7.1.7 Trash Collection

Trash collected from the CRZ will be separated as potentially contaminated waste. Trash collected in the support and break areas will be disposed of as non-hazardous waste. Trash receptacles will be set up in the CRZ and in the SZ.

7.2 Chemical Exposure

Preventing exposure to toxic chemicals is a primary concern. Chemical substances can enter the unprotected body by inhalation, skin absorption, ingestion, or through a puncture wound (injection). A contaminant can cause damage at the point of contact or can act systematically, causing a toxic effect at a part of the body distant from the point of initial contact. The COCs and their properties are identified in Table A2.1

Chemical exposures are generally divided into two categories: acute and chronic. Symptoms resulting from acute exposures usually occur during or shortly after exposure to a sufficiently high concentration of a contaminant. The concentration required to produce such effects varies widely from chemical to chemical. The term "chronic exposure" generally refers to exposures to "low" concentrations of a contaminant over a long period of time. The "low" concentrations required to produce symptoms of chronic exposure depend upon the chemical, the duration of each exposure, and the number of exposures. For a given contaminant, the symptoms of an acute exposure may be completely different from those resulting from chronic exposure.

For either chronic or acute exposure, the toxic effect may be temporary and reversible, or may be permanent (disability or death). Some chemicals may cause obvious symptoms such as burning, coughing, nausea, tearing eyes, or rashes. Other chemicals may cause health damage without any such warning signs (this is a particular concern for chronic exposures to low concentrations). Health effects such as cancer or respiratory disease may not become evident for several years or decades after exposure. In addition, some toxic chemicals may be colorless and/or odorless, may dull the sense of smell, or may not produce any immediate or obvious physiological sensations. Thus, a worker's senses or feelings cannot be relied upon in all cases to warn of potential toxic exposure.

The effects of exposure not only depend on the chemical, its concentration, route of entry, and duration of exposure, but may also be influenced by personal factors such as the individual's smoking habits, alcohol consumption, medication use, nutrition, age, and sex.

An important exposure route of concern at the Site is inhalation. The lungs are extremely vulnerable to chemical agents. Even substances that do not directly affect the lungs may pass through lung tissue into the bloodstream, where they are transported to other vulnerable areas of the body. Some toxic chemicals present in the atmosphere may not be detected by human senses (e.g., they may be colorless, odorless, and their toxic effects may not produce any immediate symptoms). Respiratory protection is therefore extremely important if there is a possibility that the work site atmosphere may contain such hazardous substances. Chemicals can also enter the respiratory tract through punctured eardrums. Where this is a hazard, individuals with punctured eardrums should be medically evaluated specifically to determine if such a condition would place them at an unacceptable risk and preclude their working at the task in question.

Direct contact of the skin and eyes by hazardous substances is another important route of exposure. Some chemicals directly injure the skin. Some pass through the skin into the bloodstream where they are transported to vulnerable organs. Abrasions, cuts, heat, and moisture enhance skin absorption. The eye is particularly vulnerable because airborne chemicals can dissolve in its moist surface and be carried to the rest of the body through the bloodstream (capillaries are very close to the surface of the eye). Wearing protective equipment, not using contact lenses in contaminated atmospheres (since they may trap chemicals against the eye surface), keeping hands away from the face, and minimizing contact with liquid and solid chemicals can help protect against skin and eye contact.

Although ingestion should be the least significant route of exposure at the Site, it is important to be aware of how this type of exposure can occur. Deliberate ingestion of chemicals is unlikely; however, personal habits such as chewing gum or tobacco, drinking, eating, smoking cigarettes, and applying cosmetics at the Site may provide a route of entry for chemicals.

The last primary route of chemical exposure is injection, whereby chemicals are introduced into the body through puncture wounds (e.g., by stepping or tripping and falling onto contaminated sharp objects). Wearing safety shoes, avoiding physical hazards, and taking common sense precautions are important protective measures against injection.

Chemical Hazard Controls

Airborne exposure or contact with the contaminants of concern at the Site shall be controlled by:

i) skin contact with chemicals may be controlled by use of the proper PPE and good housekeeping procedures. The proper PPE (e.g., polycoated Tyvek®, gloves) as described in Section 5.0 of this HASP shall be worn for all activities where contact with potentially harmful media or materials is anticipated;

ii) monitoring air concentrations for VOCs and particulates shall be conducted in the breathing zone with a PID with an 10.6 eV lamp or greater and a particulate monitor, as described in Section 8.0;

iii) dust control measures, such as wetting the immediate area, shall be employed when visible dust is generated in active work areas;

iv) contact the CSHM for additional information regarding a particular product's or activity's exposure hazards; and

v) using respiratory protection as appropriate, in areas known to have concentrations above the specified action level.

Hazard Communication

Personnel required to handle or to use hazardous materials as part of their job duties will be trained and educated in accordance with the Hazard Communication Standard. The training shall include instruction on the safe usage, and handling procedures of hazardous materials, how to read and access Material Safety Data Sheets (MSDS), and the proper labeling requirements.

The MSDS for those chemicals in use at the Site will be available to project personnel. The CSHO will be responsible for organizing the onsite Hazard Communication Program and for maintaining copies of all MSDS on site.

7.3 Heat Stress

Heat stress is caused by a number of interacting factors including environmental conditions, clothing, workload, etc., as well as the physical and conditioning characteristics of the individual. Since heat stress is one of the most common illnesses associated with heavy outdoor work conducted with direct solar load, and in particular, because wearing PPE can increase the risk of

developing heat stress, workers must be capable of recognizing the signs and symptoms of heat-related illnesses. Personnel must be aware of the types and causes of heat-related illnesses and be able to recognize the signs and symptoms of these illnesses in both themselves and their co-workers.

Heat Rashes: Are one of the most common problems in hot work environments. Commonly known as prickly heat, a heat rash is manifested as red papules and usually appears in areas where the clothing is restrictive. As sweating increases, these papules give rise to a prickling sensation. Prickly heat occurs in skin that is persistently wetted by unevaporated sweat, and heat rash papules may become infected if they are not treated. In most cases, heat rashes will disappear when the affected individual returns to a cool environment.

Heat Cramps: Are usually caused by performing hard physical labor in a hot environment. These cramps have been attributed to an electrolyte imbalance caused by sweating. It is important to understand that cramps can be caused both by too much and too little salt.

Cramps appear to be caused by the lack of water replenishment. Because sweat is a hypotonic solution (plus or minus 0.3 percent NaCl), excess salt can build up in the body if the water lost through sweating is not replaced. Thirst cannot be relied on as a guide to the need for water; instead, water must be taken every 15 to 20 minutes in hot environments.

Under extreme conditions, such as working for six to eight hours in heavy protective gear, a loss of sodium may occur. Drinking commercially available carbohydrate-electrolyte replacement liquids is effective in minimizing physiological disturbances during recovery.

Heat Exhaustion: Occurs from increased stress on various body organs due to inadequate blood circulation, cardiovascular insufficiency, or dehydration. Signs and symptoms include pale, cool, moist skin, heavy sweating, dizziness, nausea, headache, vertigo, weakness, thirst, and giddiness. Fortunately, this condition responds readily to prompt treatment.

Heat exhaustion should not be dismissed lightly, however, for several reasons. One is that the fainting associated with heat exhaustion can be dangerous because the victim may be operating machinery or controlling an operation that should not be left unattended; moreover, the victim may be injured when he or she faints. Also, the signs and symptoms seen in heat exhaustion are similar to those of heat stroke, which is a medical emergency.

Workers suffering from heat exhaustion should be removed from the hot environment, be given fluid replacement, and be encouraged to get adequate rest.

Heat Stroke: Is the most serious form of heat stress. Heat stroke occurs when the body's system of temperature regulation fails and the body's temperature rises to critical levels. This condition is caused by a combination of highly variable factors, and its occurrence is difficult to predict.

Heat stroke is a medical emergency. The primary signs and symptoms of heat stroke are confusion, irrational behavior, loss of consciousness, convulsions, a lack of sweating (usually), hot, dry skin, and an abnormally high body temperature, e.g., a rectal temperature of 41°C (105.8°F). If body temperature is too high, it causes death. The elevated metabolic temperatures caused by a combination of workload and environmental heat load, both of which contribute to heat stroke, are also highly variable and difficult to predict.

If a worker shows signs of possible heat stroke, professional medical treatment should be obtained immediately. The worker should be placed in a shady area and the outer clothing should be removed. The worker's skin should be wetted and air movement around the worker should be increased to improve evaporative cooling until professional methods of cooling are initiated and the seriousness of the condition can be assessed. Fluids should be replaced as soon as possible. The medical outcome of an episode of heat stroke depends on the victim's physical fitness and the timing and effectiveness of first aid treatment.

Regardless of the worker's protestations, no employee suspected of being ill from heat stroke should be sent home or left unattended unless a physician has specifically approved such an order.

Proper training and preventive measures will help avert serious illness and loss of work productivity. Preventing heat stress is particularly important because once someone suffers from heat stroke or exhaustion, that person may be predisposed to additional heat injuries.

Heat Stress Safety Precautions: Heat stress monitoring and work rest cycle implementation should commence when the ambient adjusted temperature exceeds 72°F. A minimum work rest regimen and procedures for calculating ambient adjusted temperature are described below.

Adjusted Temperature[1]	*Work-Rest Regimen Normal Work Ensemble*[2]	*Work-Rest Regimen Impermeable Ensemble*
90°C (32.°C) or above	After each 45 minutes of work	After each 15 minutes of work
87.5° to 90°F (30.8°C to 32.2°C)	After each 60 minutes of work	After each 30 minutes of work
82.5° to 87.5°F (28.1° to 30.8°C)	After each 90 minutes of work	After each 60 minutes of work
77.5° to 82.5°F (25.3° to 28.1°C)	After each 120 minutes of work	After each 90 minutes of work
72.5° to 77.5°F (30.8° to 32.2°C)	After each 150 minutes of work	After each 120 minutes of work

Notes:

(1) Calculate the adjusted air temperature (ta adj) by using this equation: ta adj °F=ta °F + (13 x percent sunshine). Measure air temperature (ta) with a standard thermometer, with the bulk shielded from radiant heat. Estimate percent sunshine by judging what percent time the sun is not covered by clouds that are thick enough to produce a shadow (100 percent sunshine = no cloud cover and a sharp, distinct shadow; 0 percent sunshine = no shadows).

(2) A normal work ensemble consists of cotton coveralls or other cotton clothing with long sleeves and pants.

In order to determine if the work rest cycles are adequate for the personnel and specific site conditions, additional monitoring of individual heart rates will be conducted during the rest cycle. To check the heart rate, count the radial pulse for 30 seconds at the beginning of the rest period. If the heart rate exceeds 110 beats per minute, shorten the next work period by one-third and maintain the same rest period.

Additionally, one or more of the following control measures can be used to help control heat stress and are mandatory if any site worker has a heart rate (measure immediately prior to rest period) exceeding 115 beats per minute:

i) project personnel will be encouraged to drink plenty of water and electrolyte replacement fluids throughout the day;

ii) on-site drinking water will be kept cool (50 to 60°F);

iii) a work regimen that will provide adequate rest periods for cooling down will be established, as required;

iv) all personnel will be advised of the dangers and symptoms of heat stroke, heat exhaustion, and heat cramps;

v) cooling devices such as vortex tubes or cooling vests should be used when personnel must wear impermeable clothing in conditions of extreme heat;

vi) project personnel shall be instructed to monitor themselves and co-workers for signs of heat stress and to take additional breaks as necessary;

vii) a shaded rest area must be provided. All breaks should take place in the shaded rest area;

viii) project personnel must not be assigned to other tasks during breaks;

ix) project personnel must remove impermeable garments during rest periods. This includes Tyvek® garments; and

x) all project personnel must be informed of the importance of adequate rest, acclimation (usually takes about 2 hours/day for 1-2 weeks to become acclimated), and proper diet in the prevention of heat stress disorders.

7.4 Sun Exposure

Overexposure to sunlight is a common concern when field activities occur during warm weather conditions. Overexposure can occur on clear, sunny days as well as on overcast and cloudy days. Ultraviolet (UV) rays from the sun can cause skin damage or sunburn, but can also result in vision problems, allergic reactions, and other skin concerns. Two types of UV rays are emitted from the sun: UVA and UVB rays.

UVB rays cause sunburn, skin cancer, and premature aging of the skin. UVB rays stimulate tanning but are also linked to other problems such as impaired vision, skin rashes, and some allergic and other reactions to certain drugs. Extra care should be taken if activities are to be conducted on or near water. Sunlight reflected off the surface of the water is intensified resulting in accelerated effects. The following steps should be taken to protect against overexposure to sunlight:

i) always use sunscreen: Apply a broad-spectrum sunscreen with Sun Protection Factor (SPF) of at least 15 or higher liberally on exposed skin. Reapply every 2 hours or more. Even waterproof sunscreen can come off when you towel off or sweat;

ii) cover up: Wearing tightly woven, loose-fitting, and full-length clothing is a good way to protect your skin from UV rays;

iii) wear a hat: A hat with a wide brim offers good sun protection to your eyes, ears, face, and the back of your neck – areas particularly prone to overexposure to the sun;

iv) wear sunglasses that block 99 to 100 percent of UV radiation: Sunglasses that provide 99 to 100 percent UVA and UVB protection will greatly reduce sun exposure that can lead to cataracts and other eye damage. Check the label when buying sunglasses;

v) seek shade: Shade is a good source of protection, but keep in mind that shade structures (e.g., trees, umbrellas, canopies) do not offer complete sun protection; and

vi) limit time in the midday sun: The sun's rays are strongest between 10 a.m. and 4 p.m. Whenever possible, limit exposure to the sun during these hours.

7.5 Cold Stress

Cold stress is similar to heat stress in that it is caused by a number of interacting factors including environmental conditions, clothing, workload, etc., as well as the physical and conditioning characteristics of the individual. Fatal exposures to cold have been reported in individuals failing to escape from low environmental air temperatures or from immersion in low temperature water. Hypothermia, a condition in which the body's deep core temperature falls significantly below 98.6°F (37°C), can be life threatening. A drop in core temperature to 95°F (35°C) or lower must be prevented.

Air temperature is not sufficient to determine the cold hazard of the work environment. The wind chill must be considered as it contributes to the effective temperature and insulating capabilities of clothing. The equivalent chill temperature should be used when estimating the combined cooling effect of wind and low air temperatures on exposed skin or when determining clothing insulation requirements to maintain the body's core temperature.

The body's physiologic defense against cold includes constriction of the blood vessels, inhibition of the sweat glands to prevent loss of heat via evaporation, glucose production, and involuntary shivering to produce heat by rapid muscle contraction.

The frequency of accidents increases with cold temperature exposures as the body's nerve impulses slow down, individuals react sluggishly, and numb extremities make for increased clumsiness. Additional safety hazards include ice, snow blindness, reflections from snow, and possible skin burns from contact with cold metal.

Pain in the extremities may be the first early warning of danger to cold stress. During exposure to cold, maximum severe shivering develops when the body temperature has fallen to 95°F (35°C). This must be taken as a sign of danger to the individuals on site, and cold exposures should be immediately terminated for any individual when severe shivering becomes evident. Useful physical or mental work is limited when severe shivering occurs.

Predisposing Factors for Cold Stress

There are certain predisposing factors that make an individual more susceptible to cold stress. It is the responsibility of the project team members to inform the CSHO/SS to monitor an individual, if necessary, or use other means of preventing/reducing the individual's likelihood of experiencing a cold related illness or disorder.

Predisposing factors that will increase an individual's susceptibility to cold stress are listed below:

- **Dehydration:** The use of diuretics and/or alcohol, or diarrhea can cause dehydration. Dehydration reduces blood circulation to the extremities;
- **Fatigue during Physical Activity:** Exhaustion reduces the body's ability to constrict blood vessels. This results in the blood circulation occurring closer to the surface of the skin and the rapid loss of body heat;
- **Age:** Some older and very young individuals may have an impaired ability to sense cold;
- **Poor Circulation:** Vasoconstriction of peripheral vessels reduces blood flow to the skin surface;
- **Heavy Work Load:** Heavy workloads generate metabolic heat and make an individual perspire even in extremely cold environments. If perspiration is absorbed by the individual's clothing and is in contact with the skin, cooling of the body will occur;
- **The Use of PPE:** PPE usage that traps sweat inside the PPE may increase an individual's susceptibility to cold stress;
- **Lack of Acclimatization:** Acclimatization, the gradual introduction of workers into a cold environment, allows the body to physiologically adjust to cold working conditions; and
- **History of Cold Injury:** Previous injury from cold exposures may result in increased cold sensitivity.

Prevention of Cold Stress

There are a variety of measures that can be implemented to prevent or reduce the likelihood of individuals developing cold related ailments and disorders. These include acclimatization, fluid and electrolyte replenishment, eating a well-balanced diet, wearing warm clothing, the provision of shelter from the cold, thermal insulation of metal surfaces, adjusting work schedules, and personnel education.

- **Acclimatization:** Acclimatization is the gradual introduction of workers into the cold environment to allow their bodies to physiologically adjust to cold working conditions. However, the physiological changes are usually minor and require repeated uncomfortably cold exposures to induce them;
- **Fluid and Electrolyte Replenishment:** Cold, dry air can cause individuals to lose significant amounts of water through the skin and lungs. Dehydration affects the flow of blood to the extremities and increases the risk of cold injury. Warm, sweet, caffeine-free, non-alcoholic drinks and soup are good sources to replenish body fluids;
- **Eating a Well Balanced Diet:** Restricted diets including low salt diets can deprive the body of elements needed to withstand cold stress. Eat high-energy foods throughout the day;
- **Warm Clothing:** It is beneficial to maintain air space between the body and outer layers of clothing in order to retain body heat. However, the insulating effect provided by such air spaces is lost when the skin or clothing is wet; and
- **Work/Rest Regimes:** Schedule work during the warmest part of the day, if possible. Rotate personnel and adjust the work/rest schedule to enable individuals to recover from the effects of cold stress.

The parts of the body most important to keep warm are the feet, hands, head, and face. As much as 40 percent of body heat can be lost when the head is exposed.

7.6 Earthwork – Excavation and Soil Handling Activities

Project activities will involve excavation, stockpiling of contaminated soil and loading of soils for off Site disposal. Prior to initiating excavation activities, the CS is responsible for making sure that the following conditions are in place:

i) ensure that all above and underground utilities have been properly located prior to initiating work activities;

ii) ensure that approved protective shoring devices are available for use at the Site if this means of protection is going to be used;

iii) ensure that the excavation safety checklist has been completed and put in place, should it become necessary, prior to allowing project personnel to enter any excavation. It is not expected that project personnel will need to enter any excavation but this section does include required procedures for project personnel to follow should it become necessary to enter any excavation; and

iv) ensure that the proper fencing materials are available to secure each active work area.

The selected contractor's competent person shall observe all excavation operations. The competent person shall be responsible for evaluating, classifying and inspecting excavation operations to prevent possible cave-in and entrapment, and to avoid other hazards presented by excavation activities.

It is the responsibility of the CS and CSHO to implement the following components of the selected contractor's Excavation Safety Program as they relate to project activities:

i) ensure that all excavations are completed in accordance with the approved Excavation Safety Program;

ii) ensure that the proper protective materials and equipment are available and being used to complete the excavation and/or trenching procedures; and

iii) ensure that the necessary inspections of the excavation are completed as required prior to allowing any worker to enter excavations.

Personnel required to enter or to work in excavations at any time must be protected from the hazards of cave-ins. This requires the use of sloping and/or shoring systems that comply with State and Federal OSHA standards. Excavation operations require pre-planning to develop appropriate designs for such systems. The selected contractor shall make the appropriate plans.

The estimated location of all underground installations shall be determined before excavation begins. If there are any nearby buildings, walls, sidewalks, trees, or roads that may be threatened or undermined by the excavation, where the stability of any of these items may be endangered by the excavation, they must be removed or supported by adequate shoring, bracing, or underpinning.

Excavations may not go below the base of footings, foundations, or retaining walls, unless they are adequately supported or a person who is registered as a PE has determined that they will not be affected by the soil removal. OSHA recommends using civil engineers or those with licenses in a related discipline and experience in the design and use of sloping and shoring systems. PE qualifications shall be documented in writing and available at the Site.

The selected contractor's Excavation Safety Program and the OSHA Excavation Standard (29 CFR 1926 Subpart P) will be followed during all excavation activities and provide detailed information regarding such activities.

Access and Egress

Personnel access and egress from excavations are as follows:

i) a stairway, ladder, ramp, or other means of egress must be provided in excavations greater than four feet deep and for every 25 feet of lateral travel; and

ii) all ladders shall extend three feet above the top of the excavation.

Monitoring and Testing of the Atmosphere

Air quality is measured by the following three parameters:

i) oxygen concentration;

ii) flammability; and

iii) presence of toxic substances.

There is a potential for hazardous atmospheres to exist in each proposed excavation. As such, project personnel will not be allowed to be exposed to any hazardous atmosphere. Whenever potentially hazardous atmospheres are suspected in excavations, the competent person shall test the atmosphere. A gas monitor capable of measuring the oxygen level, lower explosive limit (LEL) and toxicity will be used to take readings prior to and while workers are in any excavation. A hazardous atmosphere is defined as one that could contain less than 19.5 percent of oxygen, concentrations of hazardous substances greater than their permissible exposure level (PEL) including carbon monoxide and a LEL reading greater than ten percent. A forced air ventilator will first be used to pump fresh air into the excavation and to push out (purge) any potentially contaminated air.

In the event that an unusual odor or liquid is suspected in excavations, the competent person shall stop work and arrange for air quality assessment and mitigation, if necessary.

Daily Inspections of Open Excavations

The competent person shall perform daily inspections of any open excavations, the adjacent areas, and all protective systems for situations that could potentially result in slope failure.

The competent person shall inspect, evaluate, and document the inspection of the excavation on an Excavation Inspection Checklist at the following intervals:

i) prior to the start of work, after each extended halt in work, and as needed throughout the shift as new sections of the excavation is opened; and

ii) after every rainstorm and other natural or man-made event that may increase the load on the walls of the excavation, or otherwise affect their stability.

The competent person shall stop the work and instruct all project personnel to leave the excavation when any potential hazards are detected. The competent person has the ***authority*** to immediately suspend work if any unsafe condition is detected.

7.7 Heavy Equipment Safety

Personnel operating heavy equipment (such as backhoes) and personnel working in the vicinity of heavy equipment shall adhere to the following practices:

i) heavy equipment is to be inspected when equipment is initially mobilized/delivered to a job site or after it is repaired and returned to service to ensure that it meets all manufacturer and OSHA specifications;

iii) heavy equipment is to be inspected on a daily basis. Documentation of this daily pre-operational inspection is to be filed with the project files;

iv) heavy equipment is only to be operated by authorized, competent operators;

v) seat belts are to be provided on heavy equipment that is not designed for stand up operation;

vi) equipment/vehicles whose payload is loaded by a crane, excavator, loader, etc. will have a cab shield and/or canopy to protect the operator;

vii) personnel will not be raised/lowered in buckets;

viii) personnel will not ride on fender steps or any place outside the cab;

ix) before leaving the equipment controls, ensure that the equipment is in its safe resting position. For a backhoe, apply the parking brake, put the front loader bucket down on ground level, and ensure that the rear excavator bucket is locked in the travel position. Bulldozers and scraper blades, loader buckets, dump bodies, and similar equipment will be fully lowered or blocked when not in use;

x) before raising any booms, buckets, etc., check for overhead obstructions;

xi) project personnel involved in the operation shall not wear any loose-fitting clothing, which has the potential to be caught in moving machinery;

xii) personnel shall wear high visibility safety vests, steel-toed shoes, safety glasses, hearing protection, and hard hats during heavy equipment operations; and

xiii) when moving heavy equipment or when working in tight quarters, a spotter will be used.

Overhead Electrical Clearances: If drilling is conducted in the vicinity of overhead power lines, the power to the lines must be shut off or the equipment must be positioned and blocked such that no part, including cables, can come within the minimum clearances as follows:

Nominal System Voltage	***Minimum Required Clearance***
0 to 50 kV	10 Feet
51 to 100 kV	12 Feet
101 to 200 kV	15 Feet
201 to 300 kV	20 Feet
301 to 500 kV	25 Feet
501 to 750 kV	35 Feet
751 to 1,000 kV	45 Feet

When heavy equipment is in transit with the boom lowered and no load, the equipment clearance must be at least 4 feet for voltages less than 50 kV, 10 feet for voltages of 50 kV to 345 kV, and 16 feet for voltages above 345 kV.

7.8 Drilling Safety

Drilling Equipment

The following practices shall be adhered to by drilling personnel:

i) equipment should be inspected daily by the operator to ensure that there are no operational problems.

ii) the kill switch will be function-checked and verified to be operational during the documented daily equipment check.

iii) personnel shall be instructed in the location and use of the emergency kill switch on the drill rig.

iv) Project personnel involved in the operation shall not wear any loose-fitting clothing, including untied shoe/boot laces, draw strings, etc., which have the potential to be caught in moving machinery.

v) before leaving the controls, shift the transmission controlling the rotary drive into neutral and place the feed lever in neutral. Before leaving the vicinity of the drill, shut down the drill engine.

vi) before raising the mast, check for overhead obstructions.

vii) before the mast of a drill rig is raised, the drill rig must first be leveled and stabilized with leveling jacks and/or cribbing. Re-level the drill rig if it settles after initial setup. Lower the mast only when the leveling jacks are down, and do not raise the leveling jack pads until the mast is lowered completely.

viii) during freezing weather, do not touch any metal parts of the drill rig with exposed flesh. Freezing of moist skin to metal can occur almost instantaneously.

ix) project personnel shall wear steel toed shoes, safety glasses, hearing protection, and hard hats during drilling operations.

x) The drilling area shall be roped off, marked, or posted to keep the area clear of pedestrian traffic and/or spectators.

7.9 Confined Space Entry Work

A confined space provides the potential for unusually high concentrations of contaminants, explosive atmospheres, oxygen deficient atmospheres, potential cave-ins, limited visibility, and restricted movement. This section establishes requirements for safe entry into, continued work in, and safe exit from confined spaces. Additional information regarding confined space entry can be found in 29 CFR 1926.21, 29 CFR 1910.146, and NIOSH-106.

It is not expected that project personnel will have to enter confined spaces during project activities however, the following procedures are being included in the HASP should it become necessary to enter any confined spaces (e.g., to enter and clean any portable wastewater

storage tanks). Prior to initiating these activities the CSHO will pre-plan for potential emergency rescue for any permit-required confined space entry. This may involve meeting with the local emergency responders to pre-plan emergency rescue activities per OSHA's standard for permit-required confined spaces. All confined space entry work will follow the guidelines presented in the selected contractor's approved Confined Space Entry Program.

Site-Specific Confined Space Entry Procedures

All confined space entries shall be evaluated to determine the entry status as a permit or non-permit confined space. Prior to entry the following shall be conducted:

i) the atmosphere of the space shall be tested for oxygen, LEL, and toxic concentrations;

ii) the appropriate level of protection shall be determined by conducting a task hazard analysis;

iii) a forced air ventilator will be used to vent hazardous atmospheres and to introduce fresh air into any confined space that may need to be entered;

iv) at a minimum, two persons trained in confined space entry shall be available for the entry, which includes an entrant, and an attendant/supervisor;

v) the confined space entry permit shall be filled out, signed by the entry supervisor, and posted at the confined space; and

vi) rescue services as identified on the confined space permit shall be available, verified and notified of the entry for any permit-required confined space.

During entry operations, air monitoring shall be conducted continuously and communication between the attendant and the entrant shall be maintained. The confined space entry permit(s) shall be maintained in a file located at the Site.

7.10 Fall Hazards

Site personnel may be exposed to fall hazards greater than six feet above another surface and where there are no barriers in place to protect them. These hazards may be found next to each excavation and on top of any of the structures (e.g., portable storage tanks) that are on site. Project personnel exposed to fall hazards greater than six feet will follow the selected contractor's Fall Protection Program.

The CSHO, CS and/or SS will control all fall hazards as they relate to project activities. It is their responsibility to implement the following components of the project's fall protection requirements as they relate to project activities:

i) ensure appropriate fall protection systems are utilized for project activities;

ii) verify that all project personnel are fully protected from fall hazards;

iii) ensure that necessary materials for proper fall protection (PPE including a harness and lanyard etc.) are available for project activities;

iv) provide for proper inspection and replacement of fall protection devices;

v) provide and ensure that all personnel have received the required training in the use, inspection and the need for fall protection devices (proper fit, proper use, and proper inspection procedures). NOTE: This includes additional training required for the usage of ladders, scaffolds, and manlifts/aerial lifts; and

vi) develop a written emergency rescue plan prior to allowing personnel to wear personal fall arrest equipment for retrieval of any worker who falls and is suspended in air.

Slip/Trip/Hit/Fall Injuries

Slip/trip/hit/fall injuries are the most frequent of all injuries to workers. They occur for a wide variety of reasons, but can be minimized by the following prudent practices:

i) spot check the work area to identify hazards;

ii) establish and utilize a pathway which is free of slip and trip hazards;

iii) beware of trip hazards such as slippery and uneven surfaces or terrain;

iv) carry only loads which you can see over;

v) keep work areas clean and free of clutter, especially walkways; and

vi) communicate hazards to project personnel.

7.11 Noise

Exposure to noise over the OSHA action level can cause temporary impairment of hearing; prolonged and repeated exposure can cause permanent damage to hearing. The risk and severity of hearing loss increases with the intensity and duration of exposure to noise. In addition to damaging hearing, noise can impair voice communication, thereby increasing the risk of accidents on Site. Heavy equipment and power tools are primary sources of noise that

will be present at the Site. The selected contractor's Hearing Conservation Program will be implemented for affected project personnel.

Control: All personnel must wear hearing protection with a Noise Reduction Rating (NRR) of at least 20 when noise levels exceed 85 dBA. When it is difficult to hear a co-worker at normal conversation distance, the noise level is approaching or exceeding 85 dBA, and hearing protection is necessary. All site personnel who may be exposed to noise must also receive baseline and annual audiograms and training as to the causes and prevention of hearing loss.

Whenever possible, equipment that does not generate excessive noise levels will be selected for this project. If the use of noisy equipment is unavoidable, barriers or increased distance will be used to minimize worker exposure to noise, if feasible.

7.12 Electrical Hazards

Electricity may pose a particular hazard to project personnel due to the use of portable electrical equipment. When electrical work is needed, a qualified electrician must perform it.

General electrical safety requirements include:

i) all electrical wiring and equipment must be a type listed by Underwriters Laboratory (UL), Factory Mutual Engineering Corporation (FM), or other recognized testing or listing agency;

ii) all installations must comply with the National Electrical Safety Code (NESC), the National Electrical Code (NEC), or United States Coast Guard regulations;

iii) a multi-conductor cord having an identified grounding conductor and a multi-contact polarized plug-in receptacle must ground portable and semi-portable tools and equipment;

iv) tools protected by an approved system of double insulation, or its equivalent, need not be grounded. Double insulated tools must be distinctly marked and listed by UL or FM;

v) live parts of wiring or equipment must be guarded to prevent persons or objects from touching them;

vi) electric wire or flexible cord passing through work areas must be covered or elevated to protect it from damage by foot traffic, vehicles, sharp corners, projections, or pinching;

vii) all circuits must be protected from overload;

viii) temporary power lines, switch boxes, receptacle boxes, metal cabinets, and enclosures around equipment must be marked to indicate the maximum operating voltage;

ix) plugs and receptacles must be kept out of water unless of an approved submersible construction;

x) all extension outlets must be equipped with ground fault circuit interrupters (GFCIs);

xi) attachment plugs or other connectors must be equipped with a cord grip and be constructed to endure rough treatment;

xii) extension cords or cables must be inspected prior to each use, and replaced if worn or damaged. Cords and cables must not be fastened with staples, hung from nails, or suspended by bare wire;

xiii) flexible cords must be used only in continuous lengths without splice, with the exception of molded or vulcanized splices made by a qualified electrician; and

xiv) the OSHA requirements for electrical safety will be adhered to as minimum requirements to be followed by all site personnel, including subcontractors. Electrical inspections are to occur during initial site setup and monthly thereafter. These inspections are to be documented via either the CS's and/or the SS's logbook, the CSHO's logbook, or on specific forms that the selected contractor may have as part of their Electrical Safety Program.

7.13 Material Handling

Material handling operations to be conducted at the Site will include manual lifting of materials to and from trucks and the setup/maintenance of storage areas.

Hoisting and Rigging

Wire ropes, chains, ropes, and other rigging equipment will be inspected prior to each use and as necessary during use to assure their safety. Defective rigging equipment will be immediately removed from service.

Rigging will not be used unless the weight of the load falls within the rigging's safe work operating range. The authorized rigger prior to any "pick" or lifting operation must verify this.

Only personnel trained in safe rigging procedures will be authorized to engage in rigging procedures. Additionally, the rigger shall be qualified and must understand and use recognized crane signals.

Job or shop hooks and links and other makeshift fasteners **will not** be used. When U-bolts are used for eye splices, the U-bolt will be applied so the "U" section is in contact with the dead end of the rope.

Wire ropes, chains, ropes, and other rigging equipment will be stored where they will remain clean, dry, and protected from the weather and corrosive fumes.

The proper length of rope or chain slings will be used to avoid wide-angle lifts and dangerous slack. Knotted ropes or lengths of ropes reduced by bolts, knots, or other keepers will not be used.

General Storage Practices

The basic safety requirement for storage areas is that the storage of materials and supplies shall not create a hazard. Additional general storage area practices include the following:

i) bags, containers, bundles, etc. stored in tiers shall be stacked, blocked, interlocked, and limited in height so that they are stable and secure against sliding or collapse;

ii) all stacked materials, cargo, etc. shall be examined for sharp edges, protrusions, signs of damage, or other factors likely to cause injury to persons handling these objects. Defects should be corrected as they are detected;

iii) storage areas shall be kept free from accumulation of materials that constitute hazards from tripping, fire, explosion, or pest harborage;

iv) storage areas shall have provisions to minimize manual lifting and carrying. Aisles and passageways shall provide for the movement of mechanical lifting and conveyance devices;

v) stored materials shall not block or obstruct access to emergency exits, fire extinguishers, first aid equipment, lights, electrical control panels, or other control boxes;

vi) "NO SMOKING" signs shall be conspicuously posted, as needed, in areas where combustible or flammable materials are stored and handled; and,

vii) cylindrical materials such as pipes and poles shall be stored in racks, or stacked on the ground and blocked.

Special Precautions for Hazardous or Incompatible Materials Storage

Generally, materials are considered hazardous if they are ignitable, corrosive, reactive, or toxic. Manufacturers and suppliers of these materials must provide the recipient with MSDS, which

describe their hazardous characteristics, and give instructions for their safe handling and storage.

Many hazardous materials are incompatible, which means they form mixtures that may have hazardous characteristics not described on the individual MSDS. The following special precautions shall be followed regarding the storage of hazardous materials:

i) based on the information available on the MSDS, incompatible materials shall be kept in separate storage areas; and

ii) warning signs shall be conspicuously posted, as needed, in areas where hazardous materials are stored.

Hand Protection

Hand protection is the most important form of PPE when handling materials manually. The CSHO will select the appropriate hand protection for the task/activity. Gloves are often relied upon to prevent against abrasions, cuts and burns during material handling activities and many types of gloves actually improve your grip factor. Therefore, it is most important that the most appropriate glove (leather, cotton, Kevlar, metal mesh, nitrile, etc.) is selected for the given situation. The following table presents protection factors for commonly used gloves.

Type of Glove	***Protection***
Rubber	Acids, bases, alcohol – moderate resistance to cuts.
Canvas or cloth	Dirt, wood slivers, sharp edges – some resistance to cuts.
Metal mesh or Kevlar	Highly resistant to cuts and scratches and caught between hazards (crushing, etc.)
Insulated	Electrical charges
Cuffed	Protects against liquids trickling into glove and protects the wrist/forearm area from cuts and abrasions.
Leather	Moderate resistance to cuts and abrasions and caught between hazards.

It is important to wash hands frequently when wearing gloves to prevent the build-up of sweat and dirt on the hands. Check gloves regularly for cracks, holes and rips/tears. Keep gloves clean and dry as much as possible.

7.13.1 Manual Lifting

When lifting objects, use the following proper lifting techniques:

i) feet must be parted, with one foot alongside the object being lifted and one foot behind. When the feet are comfortably spread, a more stable lift can occur and the rear foot is in a better position for the upward thrust of the lift;

ii) do not lift more than 50 pounds without the assistance of another individual;

iii) use the squat position and keep the back straight - but remember that straight does not mean vertical. A straight back keeps the spine, back muscles, and organs of the body in correct alignment. It minimizes the compression of the guts that can cause a hernia;

iv) grip is one of the most important elements of correct lifting. The fingers and the hand are extended around the object you're going to lift - using the full palm. Fingers have very little power - use the strength of your entire hand;

v) the load must be drawn close, and the arms and elbows must be tucked into the side of the body. Holding the arms away from the body increases the strain on the arms and elbows. Keeping the arms tucked in helps keep the body weight centered; and

vi) the body must be positioned so that the weight of the body is centered over the feet. This provides a more powerful line of thrust and also ensures better balance. Start the lift with a thrust of the rear foot. Do not twist your back while lifting or moving heavy objects.

7.14 Hand and Power Tools

Hand Tools Requirements:

i) hand tools must meet the manufacturer's safety standards;

ii) hand tools must not be altered in any way;

iii) at a minimum, eye protection must be used when working with hand tools;

iv) wrenches (including adjustable, pipe, end, and socket wrenches) must not be used when jaws are sprung to the point that slippage occurs;

v) impact tools (such as drift pins, wedges, and chisels) must be kept free of mushroom heads; and

vi) wooden handles must be free of splinters or cracks and secured tightly to the tool.

Power Tools Requirements:

i) all power tools must be inspected regularly and used in accordance with the manufacturer's instructions and the tool's capabilities;

ii) electric tools must not be used in areas subject to fire or explosion hazards, unless they are approved for that purpose;

iii) portable electric tools must be connected to a Ground Fault Circuit Interrupter (GFCI) when working in wet areas;

iv) proper eye protection must be used when working with power tools;

v) personnel must be trained in the proper use of each specific tool; and

vi) any damaged or defective power tools must be immediately tagged and removed from service.

7.15 Adverse Weather Conditions

The CSHO, CS and/or SS shall decide on the continuation or discontinuation of work based on current and pending weather conditions. Electrical storms, tornado warnings, and strong winds (approximately 40 mph) are examples of conditions that would call for the discontinuation of work and evacuation of the Site. Strong winds can generate hazardous conditions during the handling of materials.

In addition, no work with elevated super structures (i.e., drill rigs, excavators etc.) will be permitted during any type of electrical storm or during wind events that have wind speeds exceeding 25 mph.

7.16 Hot Work

Project activities may involve cutting with torches. Because of the serious potential for fire and explosion, safe work practices and procedures must be employed. All Hot Work activities will adhere to the selected contractor's approved specific Hot Work procedures. The primary objective is that hot work be done only in a safe designated area and with appropriate precautions in place. Prior to any hot work being performed, the selected contractor will issue a hot work permit. An example Hot Work Permit and Checklist is presented in Attachment B.

7.17 Biological Hazards

Biological hazards may include poison ivy, snakes, thorny bushes, ticks, mosquitoes and other pests.

7.17.1 Vegetation Overgrowth

Overgrown weeds, bushes, trees, grass and other vegetation are fire and safety hazards. There are a number of hidden hazards not immediately recognized due to the overgrowth of vegetation in areas where field activities may occur, including discarded junk, litter, and debris. Construction materials such as boards, nails, concrete, and other debris may be hidden beneath blades of tall grass, weeds, and bushes. Other hazards may include steep slopes, potholes, trenches, soft spots, dips, etc.; all dangerously concealed from the view of the individual walking or operating motorized equipment in the area. Additionally, there are biological hazards such as snakes, ticks, chiggers, and mosquitoes that breed in overgrowth conditions.

Actions to be taken are:

xi) assess the work area and determine if the area requires vegetation clearance. Consider that overgrowth that extends above the lowest level of motorized equipment (i.e., bumper or fender) or 6 inches above your ankle has hidden hazards that you will not be able to readily identify;

xii) determine if the area is safe to walk or whether you need motorized equipment. Consider the limitations of the equipment;

xiii) identify slip, trip, and fall hazards and remove from the general work area. Remember to give adequate clearance so that the items being removed do not pose future hazards;

xiv) adequately protect yourself against the hazards by wearing boots that protect the ankles, long pants, and using insecticides; and

xv) consider the limitations of manual or mechanical equipment for the clearance of overgrowth, particularly the safety hazards when using sling blades, machetes, weed eaters, bush hogs, or other brush removing equipment.

Before taking any action, determine whether there any ecological issues that would affect or prevent the removal of overgrowth in protected areas such as wetlands, wildlife habitats, or sanctuaries for endangered and/or protected species.

7.17.2 Tick-Borne Diseases

Lyme Disease, Ehrlichiosis, and Rocky Mountain Spotted Fever (RMSF) are diseases transmitted by ticks and occur throughout the United States during spring, summer, and fall.

Lyme Disease: The disease commonly occurs in summer and is transmitted by the bite of infected ticks. "Hot spots" in the United States include New York, New Jersey, Pennsylvania, Massachusetts, Connecticut, Rhode Island Minnesota, and Wisconsin. Few cases have been identified in other states.

Ehrlichiosis: The disease also commonly occurs in summer and is transmitted by the bite of infected ticks. "Hot spots" in the United States include New York, Massachusetts, Connecticut, Rhode Island Minnesota, and Wisconsin. Few cases have been identified in other states.

Primarily the Deer Tick transmits these diseases, which is smaller and redder than the common Wood Tick. The disease may be transmitted by immature ticks, which are small and hard to see. The tick may be as small as a period on this page.

Symptoms of Lyme disease include a rash or a peculiar red spot, like a bull's eye, which expands outward in a circular manner. The victim may have headache, weakness, fever, a stiff neck, swelling and pain in the joints, and eventually, arthritis. Symptoms of Ehrlichiosis include muscle and joint aches, flu-like symptoms, but there is typically no skin rash.

Control: Tick repellent containing diethyltoluamide (DEET) should be used in tick- infested areas, and pants legs should be tucked into boots. In addition, workers should search the entire body every three or four hours for attached ticks. Ticks should be removed promptly and carefully without crushing, since crushing can squeeze the disease-causing organism into the skin. A gentle and steady pulling action should be used to avoid leaving the head or mouth parts in the skin. Hands should be protected with surgical gloves when removing ticks.

7.17.3 Poisonous Plants

Common Poison Ivy (Rhus radicans) grows as a small plant, a vine, and a shrub. Poison Ivy occurs in every state. The leaves always consist of three glossy leaflets. Poison Sumac (Rhus vernix) grows as a woody shrub or small tree 5 to 25 feet tall. It usually contains nine leaves, with eight paired leaves and one on top, and is common in swampy areas. The plants are potent sensitizers and can cause a mild to severe allergic reaction. This reaction is called contact dermatitis.

Dermatitis, in Rhus-sensitive persons, can result from contact with the milky sap found in the roots, stems, leaves, and fruit. The sap may retain its potency for months or years in a dry atmosphere, and can occur during any time of the year. The sap may also be carried by animals, equipment or apparel.

The best form of prevention is to avoid contact. This can occur by wearing long sleeves and gloves if necessary. Disposable clothing, such as Tyvek, is recommended in high-risk areas to avoid exposure from contaminated apparel. Barrier creams and cleaners are also recommended.

7.17.4 Insects

Construction work presents many opportunities to be exposed to a variety of insects. Many these insects may present health and safety hazards. Wasps, bees, spiders, and mosquitoes present the bulk of these hazards.

Bees and wasps present problems to people working outdoors due to being stung and having adverse reactions to the venom injected during the sting. Mosquitoes on the other hand cause hazards by transmitting disease(s) from other infected animals and humans.

It is important to recognize the venomous spiders (spiders dangerous to humans) that are present in your work environment. Inspect boots, clothing and other areas before using/entering, as spiders tend to hide in dark places. Many spiders are nocturnal.

<u>Preventing Exposure</u>

Preventing exposure to insects can be accomplished by the following:

i) wearing proper clothing and PPE;

ii) inspecting work areas for wasp or bee nests prior to conducting work activities;

iii) awareness of regional insects and their behavioral habits;

iv) shaking out clothing and shoes and inspecting areas for spiders; and

v) using repellants.

Proper Clothing

While working outdoors it is important to wear proper clothing and PPE. Insects tend to be attracted to bright colors, floral, prints, black, white, green, tan and khaki colors. Also it is important to wear long pants and if possible a long-sleeved shirt. Personnel should tuck the pant bottoms into the tops of boots and use insect proof work gloves (leather, thick cloth, etc.).

Repellants

It is important to ensure that there is an adequate supply of insect repellent. Use insect repellent, which contains DEET. Apply it as per the manufacturer's directions.

Reaction to insect bites can range from mild reactions to severe allergic reactions. In addition, mosquitoes may carry life-threatening diseases such as West Nile virus.

Bee (and Wasp) Stings

Reaction to bee stings may range from painful swelling, redness, itching all the way to shock. Swelling, redness, and itching should stop hurting within a day or two. Treatment for these items can be done at home. The treatment will involve initially removing any stinger left in the skin by scraping away from the skin and towards the venom sac (thus preventing one from squeezing more venom into the wound). Afterwards apply ice and anti-histamine cream. If irritation, swelling and/or pain persist seek medical attention.

If the victim of a bee sting is aware that they are allergic to bees, or if they begin to exhibit signs such as difficulty swallowing, difficulty breathing, abdominal cramps, nausea then they may be going into anaphylactic shock and will require medical treatment.

If personnel know that they are allergic to insects then they will be required to carry their own insect sting kit as directed by their personal physician. The victim must be taken to the hospital immediately.

Mosquito Bites

Mosquito bites can range from mild skin irritation to severe viral infections. One of the most common viruses that mosquitoes carry is the West Nile virus. West Nile virus can cause encephalitis (swelling of the brain) and meningitis (swelling of the spinal cord).

First symptoms are as follows: rapid onset of headaches, dizziness, difficulty swallowing, deep muscle aches, nausea, stiff neck, high-fever, high fever, confusion, muscle weakness. Once any of these symptoms are exhibited seek medical attention.

7.17.4.1 Poisonous Spiders

Northern Black Widow

New York State has only one known species of poisonous spider and it is the northern black widow. Northern black widow spiders are not usually deadly (especially to adults) and only the female is venomous. The female spider is shiny jet-black, usually with a reddish hourglass shape on the underside of her spherical abdomen. Her body is about .5 inches long while the adult male's is approximately one third the size of the female. The hourglass of the Northern Black Widow is typically incomplete, with the bottom half and top half separated. The bottom half (farthest from the head) is typically more rounded, rather than triangular. The northern black widow will typically have a row of red dots running down the top of its abdomen, with white stripes running diagonally down the sides of the abdomen.

Northern black widow spiders are nocturnal and non-aggressive, which means they are active during the nighttime. They spend most of their time hanging "upside down" in their web, which often makes the hourglass marking immediately visible. Northern black widow spiders are typically not aggressive, and bite as a defensive measure when they are attacked or feel threatened. They will often retreat into hiding, but are more protective of their web when there are egg sacs present.

<u>Spider bites</u>

Spider bites can range from mild skin irritation to severe infections and tissue damage depending on the type of spider. Only about one percent of her bites are fatal. The bite is not painful and may not be noticed until later when stomach, muscular or feet pains begin. Other symptoms include heavy sweating, swollen eyelids, erratic saliva production, and difficulty breathing. Clean the area of the bite with soap and water and seek medical attention. Apply a cool compress to the bite location. Keep effected limb elevated to about heart level. Ask doctor if Tylenol or aspirin can be taken to relieve minor symptoms. Additional information can be obtained from the Poison Center (1-800-222-1222).

7.17.5 Threatening Dogs

If you are approached by a frightened or menacing dog:

i) do not attempt to run and don't turn your back;

ii) stay quiet, and remember to breathe;

iii) be still, with arms at sides or folded over chest with hands in fists;

iv) slowly walk away sideways;

v) don't stare a dog in the eyes, as this will be interpreted as a threat;

vi) avoid eye contact;

vii) if you have a jacket, you could wrap it around your arm and should he snap, take the bite harmlessly; and

viii) try calling its bluff. Yell, "sit!" "stay!" or "go home!" You might convince the dog that you are the stronger in the situation.

7.17.6 Rodents

Rodentia: (rats, mice, beavers, squirrels, guinea pigs, capybaras, coypu)

Rodents, or Rodentia, are the most abundant order of mammals. There are hundreds of species of rats; the most common being the black and brown rat.

The **Brown Rat** has small ears, blunt nose, and short hair. It is approximately 14 to 18 inches long (with tail). They frequently infest garbage/rubbish, slaughterhouses, domestic dwellings, warehouses, shops, super-markets; in fact, anywhere there is an easy meal and potential nesting sites.

The **Black Rat** can be identified by its' tail, which is always longer than the combined length of the head and body. It is also slimmer and more agile than the Norwegian or Brown rat. Its size varies according to its environment and food supply.

The **House Mouse** has the amazing ability to adapt and it now occurs more or less in human dwellings. In buildings, mice will live anywhere and they are very difficult to keep out. Mice are also totally omnivorous; in other words, they will eat anything.

Rats and mice often become a serious problem in cold winter months when they seek food and warmth inside buildings. They may suddenly appear in large numbers when excavation work disturbs their in-ground nesting locations or their food source is changed.

There are six major problems caused by rats and mice:

i) they eat food and contaminate it with urine and excrement;

ii) they gnaw into materials such as paper, books, wood, or upholstery, which they use as nest material. They also gnaw plastic, cinder blocks, soft metals such as lead and aluminum, and wiring, which may cause a fire hazard;

iii) rats occasionally bite people and may kill small animals;

iv) they, or the parasites they carry (such as fleas, mites, and worms), spread many diseases such as salmonella, trichinosis, rat bite fever, Hantavirus, Weils disease, and the bubonic plague;

v) rats can damage ornamental plants by burrowing among the roots or feeding on new growth or twigs. They also eat some garden vegetables, such as corn and squash;

vi) rats and mice are socially unacceptable. These rodents have been a problem for centuries, chiefly because they have an incredible ability to survive and are so difficult to eliminate. In addition, they are extremely compatible with human behavior and needs.

8.0 Air Monitoring

This section of the HASP presents the requirements for conducting air monitoring at the Site. The air monitoring program will consist of two separate components. The first is will be for worker protection and will be conducted by the selected contractor. The second will be for protection of the community and will be conducted by the Consulting Engineering Firm's Representative. The air monitoring program is designed to ensure protection for both personnel who are working on Site as well as the surrounding community. The on Site monitoring program will be conducted by the CSHO or designee (i.e., Environmental Monitoring Technician) and will consist of monitoring project personnel exposures to VOCs, dust/particulate matter, oxygen and combustible gas levels, and carbon monoxide. The Community Air Monitoring Plan (CAMP) is presented in Attachment C of this document. The air monitoring program will be completed with the use of real-time direct reading instruments and with sampling media that will be sent to a laboratory for analysis.

Inhalation hazards are caused from the intake of vapors and contaminated dust. Air monitoring shall be performed when potential exposure to onsite contaminants is anticipated and during any entry into open excavations. The purpose of air monitoring is to identify and quantify airborne contaminants in order to determine the level of worker protection needed. Initial screening for identification is often qualitative, but the determination of its concentration (quantification) must wait subsequent testing. Two principle approaches are available for identifying and/or quantifying airborne contaminants:

i) The use of real-time (on-site) reading instruments (i.e., PIDs. Combustible Gas Meters, etc.); and

ii) Laboratory analysis of air samples obtained by the use of various sampling equipment and methods.

Direct reading instruments are used to rapidly detect flammable or explosive atmospheres, oxygen deficiency, certain gases and vapors, and dusts. They are the primary tools of initial site characterization. The information provided by direct reading instruments will be used to institute appropriate measures (i.e., PPE, evacuation), and determine the most appropriate equipment for future monitoring. All direct reading instruments have inherent constraints in their ability to detect hazards. It is imperative that direct reading instruments are operated, and the data interpreted by qualified individuals who are thoroughly familiar with the particular devices, operating principles and limitations. At hazardous waste sites, where unknown and multiple contaminants are the rule rather than the exception, instrument readings should be interpreted conservatively. The following guidelines may facilitate accurate recording and interpretation:

i) calibrate instruments according to the manufacturer's instruction before and after each use;

ii) develop chemical response curves if the instrument manufacturer does not provide them. Response curves/response factors are necessary to adapt PID action levels to actual PID readings when a specific contaminant of concern is detected via air sampling and/or colorimetric evaluation;

iii) remember that the instrument readings have limited value where contaminants are unknown. When reading unknown contaminants, report them as "needle deflection", or "positive instruments response", or "units", rather than a specific concentration (i.e., PPM). Conduct additional monitoring at any location where a positive response occurs;

iv) a reading of zero should be reported as "no instrument response" rather than "clean" because quantities of the chemicals may be present that are not detectable by the instrument; and

v) the survey should be repeated with several detection systems to maximize the number of chemicals detected.

The data collected throughout the monitoring effort shall be used to determine the appropriate levels of protection.

8.1 Site Air Monitoring Program

The CSHO or designee (i.e., Environmental Monitoring Technician) will perform air monitoring to evaluate the exposure of project personnel to chemical and physical hazards, verify the effectiveness of engineering controls, evaluate the effectiveness of Site control measures, and to determine the proper level of PPE. The CSHO will immediately notify the CS and/or SS and the Consulting Engineering Firm's Representative should any air monitoring action level be exceeded. During the progress of project activities, the CSHO will monitor the levels of VOCs, oxygen and combustible gases, carbon monoxide, and particulate levels on an hourly basis or more frequently as necessary based on site conditions. The following monitoring equipment will be used for this purpose:

i) a PID equipped with an 10.6 or greater eV lamp;

ii) a three-gas monitor capable of measuring oxygen, combustible gas and carbon monoxide; and

iii) a particulate monitor.

An EZ perimeter air monitoring program will be implemented. PID and particulate monitoring will be conducted on an hourly basis or more frequently as necessary at the perimeter of the EZ in order to evaluate the effectiveness of site control measures and verifies the integrity of the Site's clean areas. If necessary, the CSHO in conjunction with the CS or SS will adjust the EZ and CRZ boundaries.

All instruments will be calibrated on a daily basis in accordance with the manufacturer's guidelines. Records of all calibrations and real-time measurements will be kept in a bound field logbook or documented via air monitoring and calibration log sheets. All air monitoring data collected by CSHO will be filed and made available upon request.

8.1.1 Real-Time VOC Monitoring

The CSHO or designee will continuously monitor for the presence of VOCs and particulates during all excavation activities and soil handling activities, which include soil stabilization activities. These readings will be taken in and around all EZs. An action level is a point at which increased protection or cessation of activities is required due to the concentration of contaminants in the work area. Most activities shall be initiated in Modified Level D. The action levels for upgrading or downgrading of PPE have been established and are presented in Table A8.1.

In addition to the action levels, an upgrade to Level C or evacuation of the immediate area is required if:

i) any symptoms occur, as described in Section 7.1;

ii) sustained readings (15 minutes or greater) occur in the worker's breathing zone that are above the applicable action levels;

iii) requested by an individual performing the task; and

iv) any irritation to eye, nose, throat, or skin occurs.

8.1.2 Combustible Gas, Oxygen and Carbon Monoxide

Air monitoring for combustible gases, carbon monoxide, and oxygen will also be conducted during excavation and soil handling activities and during other activities where oxygen deficient, elevated carbon monoxide readings, and/or flammable atmospheres may be encountered (e.g. entry into excavations etc.). The point of excavation and the immediate work area around these activities must be monitored to ensure that an adequate level of oxygen is present, and to determine if a flammable atmosphere exists. Air monitoring for these gases will be conducted continuously while in any confined space. All work activity must stop where monitoring indicates the flammable vapor concentration is 10 percent of the lower explosive limit (LEL) at a location with a potential ignition source. Such an area must be ventilated to reduce the concentration to an acceptable level.

Action levels for combustible gases, oxygen, and carbon monoxide are provided in Table A8.1.

8.1.3 Particulate Monitoring

A particulate monitor such as a DataRam, or equivalent, will be used to perform the particulate monitoring. The particulate action level of 5 mg/m3 (respirable fraction) is presented in Table A8.1. Dust control measures (water spray, etc.) should be implemented at the Site to control visible dust emissions. All readings shall be taken in the worker's breathing zone.

8.1.4 Personal Air Sampling Program

The selected contractor shall also implement a personnel air sampling program for those project personnel who have the highest risk of potential for exposure to chemicals present on site. This monitoring will be done in compliance with 29 CFR 1926.65(h). Samples will be collected during startup of those project activities where personnel face potential exposure and to comply with OSHA's Standard for benzene (1926.1028). Benzene is present in soils at the Site and will be monitored for in accordance with the OSHA standard. The CSHO and CPM will determine what additional chemicals will be sampled, the number of samples that will be collected and the frequency of the sampling events. At a minimum samples will be collected on a weekly basis during excavation and soil handling activities.

Samples should be collected on days when precipitation is not expected and during activities where there is a potential for VOCs and particulates to become airborne. Appropriate NIOSH methodology will be followed and all samples are to be sent to an American Industrial Hygiene Association (AIHA) accredited laboratory. Results for all personnel air sampling events will be shared with all project personnel.

9.0 Decontamination Procedures

In general, everything that enters the EZ at this Site must either be decontaminated or properly discarded upon exit from the EZ. This will include the under carriage and tires of all trucks that will be used for transporting soils off Site. All personnel, including any State and local officials must enter and exit the EZ through the CRZ. Prior to demobilization, all transport trucks as well as other potentially contaminated equipment will be decontaminated on a wash pad (decontamination pad) which will have a built in sump and the equipment will be inspected by the CSHO before it is moved into the clean zone. A decontamination facility complete with water supply and sump for collection of wash water will be constructed at the Site. Any material that is generated by decontamination procedures will be collected and stored in a designated area in the EZ until disposal arrangements are made.

The type of decontamination solution to be used is dependent on the type of chemical hazards. The decontamination solution for heavy equipment and for any reusable PPE is Alconox/Liquinox soap. The MSDS for Liquinox and any other chemical containing products brought to the Site will be maintained on Site by the CSHO.

9.1 Transport Trucks and Equipment Decontamination Procedures

All equipment that comes in contact with waste material or potentially contaminated soils and all transport trucks coming in contact with any soils (clean or potentially contaminated) must be decontaminated within the CRZ by high-pressure water cleaner upon exit from the EZ. Decontamination procedures will include knocking soil/mud from machines; water brush scrubbing using a solution of water and Liquinox; and a final water rinse. Personnel shall wear Modified Level D protection when decontaminating equipment. All decontamination wash water and residues will be carefully collected and disposed of in accordance with the appropriate environmental regulations. Following decontamination and prior to exiting from the EZ, the CSHO shall be responsible for ensuring that the item has been sufficiently decontaminated. This inspection shall be included in the site log.

9.2 Personnel Decontamination Procedures

Procedures for decontamination must be followed to prevent the spread of contamination and to eliminate the potential for chemical exposure. Personnel decontamination will be completed in accordance with the procedures that are presented below. Potentially contaminated PPE and trash will be stored in covered and labeled containers until disposal arrangements are made. It will be kept separate from trash generated in clean areas of the Site.

All disposable equipment shall be doffed before meal breaks and at the conclusion of the workday and replaced with new equipment prior to commencing work. Spent PPE will be kept in covered containers.

Personnel - Decontamination will take place upon exiting the contaminated work area in the CRZ.

Modified Level D decontamination procedures are as follows:

Step 1 - Remove all visible contamination and loose debris by washing with clean water.
Step 2 - Remove all outer clothing that came in contact with the contamination (i.e., boot covers and outer gloves) and either dispose of in disposable container or wash in detergent solution and rinse.
Step 3 - Remove protective clothing; dispose of in disposable container.
Step 4 - Remove inner gloves, dispose of in disposable container.
Step 5 - Wash and rinse hands.

Level C and Level B decontamination procedures to be utilized as follows:

Step 1 - Remove all visible contamination and loose debris by washing with clean water.
Step 2 - Remove all outer clothing that came in contact with the contamination (i.e., boot covers and outer gloves) and either dispose of in disposable container or wash in detergent solution and rinse.
Step 3 - Remove protective clothing; dispose of in disposable container.
Step 4 - Remove respirator, sanitize prior to reuse.
Step 5 - Remove inner gloves; dispose of in disposable container.
Step 6 – Wash and rinse hands with soap and water.

10.0 Medical Surveillance

In accordance with the requirements detailed in 29 CFR 1926.65 and 29 CFR 1910.134, all project personnel who will come in contact with potentially contaminated materials will have received medical surveillance by a licensed physician or physician's group.

Medical records for all project personnel will be maintained by their respective employers and a copy will be maintained by the CSHO at the Site. The medical records will detail the tests that were taken and will include a copy of the consulting physician's statement regarding the tests and the individual's suitability for work as per the employer's medical surveillance program which is to be in accordance with 29 CFR 1926.65.

The medical records will be available to the employee or his designated representative upon written request, as outlined in 29 CFR 1910.1020.

If it becomes necessary to use subcontractors, they will also provide certifications to the CSHO showing that their personnel involved in site activities have all necessary medical examinations prior to commencing work. The certifications will show proof of medical surveillance and respiratory fit testing. Personnel not obtaining medical certification will not perform work within contaminated areas.

Interim medical surveillance will be completed if an individual exhibits poor health or high stress responses due to any project activity or when accidental exposure to elevated concentrations of contaminants occur.

11.0 Emergency Response and Contingency Procedures

It is essential that project personnel be prepared in the event of an emergency. Emergencies can take many forms; illnesses or injuries, chemical exposure, fires, explosions, spills, leaks, releases of harmful contaminants, or sudden changes in the weather. The following sections outline the general procedures for emergencies.

Emergency information should be posted as appropriate. Radios will be provided for contact purposes. All emergencies will be reported to the appropriate emergency responders. They may give the selected contractor further direction as to the responsibilities during any emergency situation. In general, project personnel will shut down equipment and evacuate to a safe pre-determined meeting area (rally point) during Site emergencies.

The CSHO will contact and meet on-Site with local emergency response agencies (e.g., fire department, police department, etc.) prior to initiating construction activities. The purpose of this meeting is to inform these local authorities of the nature of the work and potential risks, to ensure that these responders are equipped to respond to a Site emergency, and to identify and resolve any potential problems, concerns, or conflicts.

The CSHO will be informed of Site hazards and activities prior to project initiation so those emergency situations can be handled most efficiently. A general orientation meeting to discuss emergency response procedures is to be held prior to initiating project activities.

In case of an emergency, an evacuation alarm would sound, which means that all the personnel should evacuate the area and proceed to a rally point for further instruction.

The CSHO will notify all project personnel of the emergency through radio/cell phone communications. Radios and cell phones will be taken to the rally point to enable further receipt of instruction(s) from the CSHO.

11.1 Accident, Injury ,and Illness Reporting

Any work-related incident, accident, injury, illness, exposure, or property loss shall be immediately reported to your supervisor, the CSHO and the SS. The SS and/or CSHO will report the accident details to the CSHM and will submit a completed accident report form to the project engineering firm. A sample Incident Reporting Form is provided in Attachment B. The selected contractor may use their own company-specific form if they so choose. The report must be filed for the following circumstances:

i) accident, injury, illness, or exposure to project personnel;

ii) injury to any subcontractor personnel;

iii) damage, loss, or theft of property; and/or

iv) any motor vehicle accident regardless of fault, which involves a company vehicle, rental vehicle, or personal vehicle while the individual is acting in the course of employment.

The CSHO and PM will investigate occupational accidents resulting in employee injury or illness. This investigation will focus on determining the cause of the accident and modifying future work activities to eliminate the hazard.

All project personnel have the obligation and right to report unsafe work conditions, previously unrecognized safety hazards, or safety violations of others. If you wish to make such a report, it may be made orally to your supervisor or other member or management, or you may submit your concern in writing, either signed or anonymously.

11.2 Emergency Contacts

Fire Department 911
Police Department 911
Ambulance 911
Hospital: United Memorial medical Center 585-343-6030
127 North St. Batavia, NY
See Figure A11.1 – Hospital Route Map Directions to the Hospital.

Communication between work areas and the command post, located within the CZ, will be via verbal communication, auto horn, or two-way radio. The CSHO will use a mobile telephone to communicate with outside emergency and medical facilities.

The following signals shall be established for use with auto or compressed air-type horns:

i) 3 Blasts: evacuate exclusion zones and meet at the designated evacuation area.

ii) An "All Clear" will be conveyed by radio communication.

11.3 Additional Emergency Contacts and Phone Numbers

National Response Center (NRC)	800-424-8802
Poison Information	800-764-7661
Utility Locating Commission (One Call Nationwide	811
Agency for Toxic Substances & Disease Registry (24 Hours)	404-488-4100
U.S. EPA Emergency Response	800-424-8802
State of New York Emergency Response Commission	513-457-9996
Engineering Project Manager (Katherine Galanti)	716-856-2142
Client Representative (Chad LaCivita)	585-749-4936
NYSDEC Site Representative/Albany Office (William Wu)	518-402-9662
Engineering Safety and Health Manager (Craig Gebhardt)	716-297-6150
Contractor Site Superintendent	To Be Determined
Contractor Safety and Health Officer	To Be Determined

11.4 Emergency and First Aid Equipment

Emergency safety equipment will be available for use by project personnel and will be located and maintained on Site. The safety equipment will include, but is not limited to, the following:

i) portable emergency eye wash (15 –minute flushing capability);

ii) two 20-pound ABC type dry chemical fire extinguishers;

iii) approved first-aid kit for a minimum of twenty personnel;

iv) fire blanket;

v) spill response kit containing absorbent materials (booms/socks, pads, and earth/clay), overpack drum, shop vacuum, and hand tools (shovel, rake/hoe, etc.);

vi) two Self Contained Breathing Apparatus (SCBA) units; and

vii) portable air horn.

11.5 Project Personnel Responsibilities During Emergencies

Contractor's Safety and Health Officer (CSHO)

As the administrator of the HASP, the CSHO has primary responsibility for responding to and correcting emergency situations. The CSHO will:

i) take appropriate measures to protect personnel including: posting of acceptable Site evacuation routes, withdrawal from the EZ, total evacuation and securing of the Site or upgrading or downgrading the level of protective clothing and respiratory protection;

ii) take appropriate measures to protect the public and the environment including isolating and securing the Site, preventing runoff to surface waters, and ending or controlling the emergency to the extent possible;

iii) ensure that appropriate Federal, State, and local agencies are informed, and emergency response plans are coordinated. In the event of fire or explosion, the local fire department should be summoned immediately. In the event of an air release of toxic materials, the local authorities should be informed in order to assess the need for evacuation. In the event of a spill, sanitary districts and drinking water systems may need to be alerted;

iv) ensure that appropriate decontamination treatment or testing for exposed or injured personnel is obtained;

v) determine the cause of the incident and make recommendations to prevent the reoccurrence; and

vi) ensure that all required reports have been prepared.

11.6 Medical Emergencies

Any person who becomes ill or injured in the EZ must be decontaminated to the maximum extent possible. If the injury or illness is minor, full decontamination should be completed and first aid administered prior to transport. If the patient's condition is serious, at least partial decontamination should be completed as much as possible without causing further harm to the

patient. First aid should be administered while awaiting an ambulance or paramedics. All injuries and illnesses must immediately be reported to the CSHO, SS and CPM.

Any person transporting an injured/exposed person to a clinic or hospital for treatment should take with them directions to the hospital and a copy of the identified chemicals on Site to which they may have been exposed.

Any vehicle used to transport contaminated personnel, will be cleaned or decontaminated as necessary.

11.7 Fire or Explosion

In the event of a fire or explosion, the local fire department should be summoned immediately. Upon their arrival, the CSHO or designated alternate will advise the fire commander of the location, nature, and identification of the hazardous materials on Site.

If it is safe to do so, Site personnel should:

i) report to the CPM and Consulting Engineering Representative;

ii) use firefighting equipment available on Site; or

iii) remove or isolate flammable or other hazardous materials, which may contribute to the fire.

11.8 Spill Control and Counter Measurers

If a spill has occurred, the first step is personal safety, then controlling the spread of contamination if possible. Project personnel will immediately contact Site management to inform them of the spill and activate emergency spill procedures.

General Spill Procedures

If a spill occurs, the following general procedures will be followed:

i) notify the CSHO, SS, CPM and the Consulting Engineering Representative:

ii) evacuate immediate area of spill;

iii) determine the needed level of PPE;

iv) don required levels of PPE and prepare to make entry to apply spill containment and control procedures;

v) after obtaining the proper spill response tools (shovels, booms and pads, absorbent socks, etc.) and PPE, personnel will attempt to contain the spill so that it does not enter any conveyance (sewer, drainage ditch, etc.) that eventually discharges to surface water;

vi) locate and abate source of spill;

vii) absorb or otherwise clean up the spill and containerize the material, sorbent, and affected soils;

viii) clean and decontaminate the affected area(s); and

ix) replace used/spent spill kit contents.

All spill material and debris will be managed in a manner that complies with applicable federal, state, and local environmental rules regarding recycling or disposal of wastes.

The CSHO and SS have the authority to commit resources as needed to contain and control released material and to prevent its spread to off-Site areas.

12.0 Recordkeeping

The CSHO shall establish and maintain records of all necessary and prudent monitoring activities as described below:

i) name and job classification of the employees involved on specific tasks;

ii) records of fit testing and medical surveillance results for project personnel;

iii) records of all OSHA and other applicable safety training certifications for project personnel;

iv) records of daily site safety inspections;

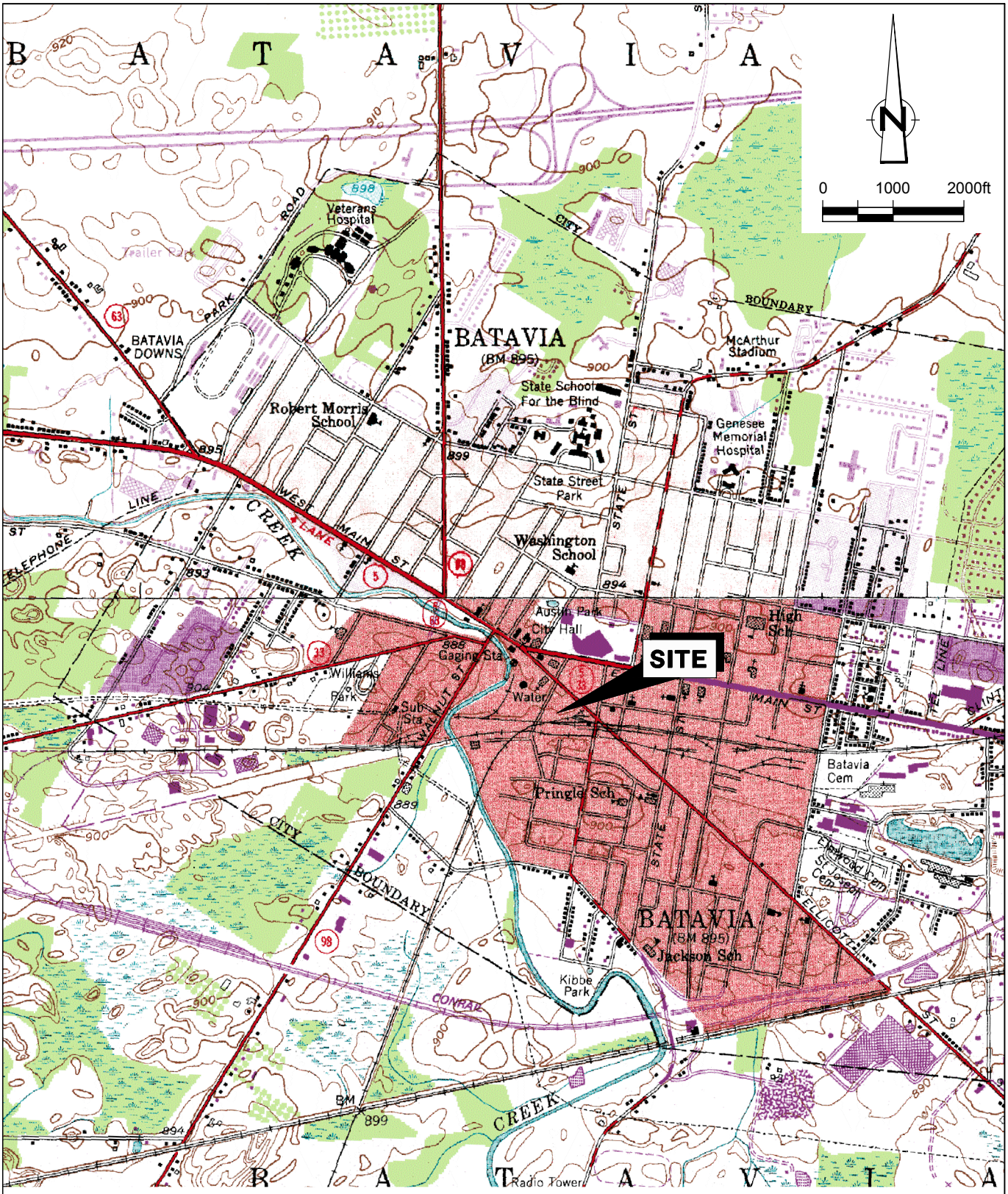
iv) records of training acknowledgment forms and daily safety meetings;

v) emergency report sheets describing any incidents or accidents;

vi) air monitoring equipment calibrations; and

vii) air monitoring data.

Figures



SOURCE: USGS 7.5 MINUTE SERIES, TOPO QUAD:
BATAVIA SOUTH, NY 1978, BATAVIA NORTH, NY 1978

figure A1.1

SITE LOCATION MAP
BATAVIA FORMER MGP SITE
Batavia, New York

84144-00(001)GN-BU002 APR 16/2014

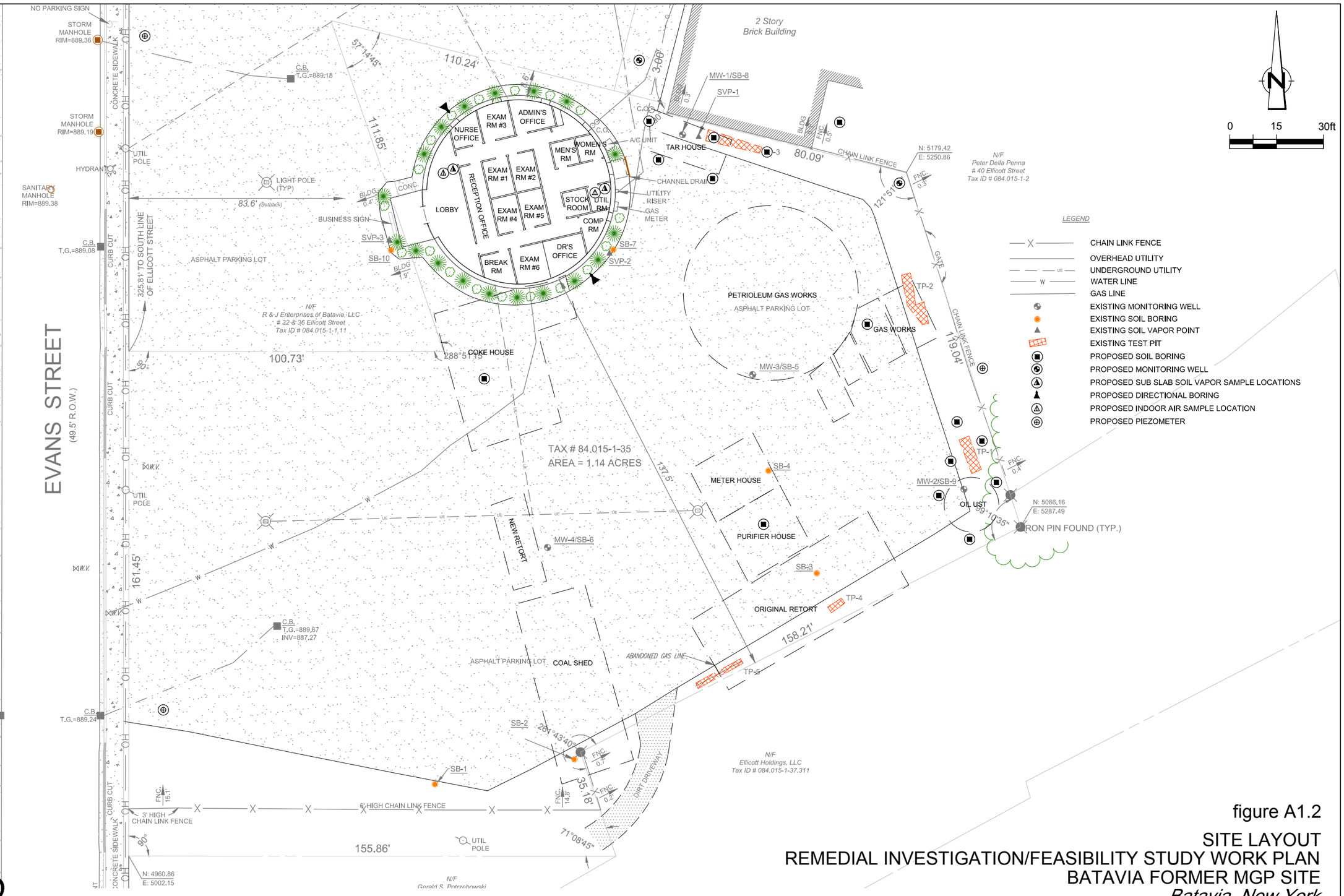


figure A1.2

SITE LAYOUT
REMEDIAL INVESTIGATION/FEASIBILITY STUDY WORK PLAN
BATAVIA FORMER MGP SITE
Batavia, New York

1. HEAD NORTHEAST ON EVANS ST TOWARD ELLICOTT ST
2. CONTINUE ONTO COURT ST
3. TURN RIGHT ONTO MAIN ST
4. TURN LEFT ONTO SUMMIT ST
5. TURN RIGHT ONTO NORTH ST

DESTINATION WILL BE ON THE LEFT

figure A11.1

ROUTE TO THE HOSPITAL
FORMER BATAVIA MGP SITE
11 EVANS STREET
Batavia, New York

Tables

Table A2.2

Exposure Routes and Exposure Levels for the Chemical Compounds of Concern
The Batavia Former MGP Site
Batavia, New York

	Chemical Compound	*Ionization Potential*	*Exposure Routes*	*Acceptable Exposure Levels in Air*
VOCs				
	1,2,4-Trimethylbenzene	NI	Inhalation, Ingestion	25 ppm (1)
	1,3,5-Trimethylbenzene	NI	Inhalation, Ingestion	25 ppm (1)
	4-Isopropyltoluene	NI	Inhalation, Ingestion	NE
	Acetone	9.69	Inhalation, Ingestion	500 ppm (1) 1000 ppm (2) 2500 ppm (3)
	Benzene	9.2	Inhalation, Ingestion, Skin Absorption, Human Carcinogen	0.5 ppm (1) 1 ppm (2) 500 ppm (3)
	n-Butylbenzene	NI	Inhalation, Ingestion	NE
	sec-Butylbenzene	NI	Inhalation, Ingestion	NE
	Carbon Disulfide	10.08	Inhalation, Ingestion, Skin Absorption	10 ppm (1) 20 ppm (2) 500 ppm (3)
	Ethylbenzene	8.8	Inhalation, Ingestion	100 ppm (1) (2) 800 ppm (3)
	Isopropylbenzene	8.75	Inhalation, Ingestion, Skin Absorption	50 ppm (1) (2) 900 ppm (3)
	Naphthalene	8.12	Inhalation, Ingestion	10 ppm (1) (2) 250 ppm (3)
	n-Propylbenzene	NI	Inhalation, Ingestion	NE
	Toluene	8.8	Inhalation, Ingestion, Skin Absorption	50 ppm (1) 200 ppm (2) 500 ppm (3)
	m,o,p - Xylenes	8.5	Inhalation, Ingestion	100 ppm (1) (2)

Table A2.2

Exposure Routes and Exposure Levels for the Chemical Compounds of Concern The Batavia Former MGP Site Batavia, New York

Chemical Compound	*Ionization Potential*	*Exposure Routes*	*Acceptable Exposure Levels in Air*
			900 ppm (3)
Semi-Volatiles			
2-Methylnaphthalene	NA	Inhalation, Ingestion	NE
4-Methylphenol	NI	Inhalation, Ingestion	NE
Acenaphthene	NA	Inhalation, Ingestion	NE
Acenaphthylene	NA	Inhalation, Ingestion	NE
Anthracene	NA	Inhalation, Ingestion	NE
Benzo(a)anthracene	NA	Inhalation, Ingestion	NE
Benzo(a)pyrene	NA	Inhalation, Ingestion, Suspected Human Carcinogen	0.2 mg/m3 (2)
Benzo(b)fluoranthene	NA	Inhalation, Ingestion, Suspected Human Carcinogen	0.2 mg/m3 (2)
Benzo(k)fluoranthene	NA	Inhalation, Ingestion	NE
Benzo (g,h,i)Perylene	NA	Inhalation, Ingestion	NE
Bis(2-ethylhexyl) phthalate	NA	Inhalation, Ingestion	NE
Carbazole	NI	Inhalation, Ingestion, Suspected Human Carcinogen	0.2 mg/m3 (4)
Chrysene	NA	Inhalation, Ingestion, Human Carcinogen	0.2 mg/m3 (1) (2) 80 mg/m3 (3)
Dibenzo(a,h)anthracene	NA	Inhalation, Ingestion, Suspected Human Carcinogen	0.2 mg/m3 (2)
Dibenzofuran	NI	Inhalation, Ingestion	NE
Fluoranthene	NA	Inhalation, Ingestion	NE
Fluorene	NA	Inhalation, Ingestion	NE
Indeno(1,2,3cd) Pyrene	NA	Inhalation, Ingestion	NE

Table A2.2

Exposure Routes and Exposure Levels for the Chemical Compounds of Concern The Batavia Former MGP Site Batavia, New York

	Chemical Compound	*Ionization Potential*	*Exposure Routes*	*Acceptable Exposure Levels in Air*
	Naphthalene	8.12	Inhalation, Ingestion, Skin	52 mg/m3 (1) 50 mg/m3 (2)
	Phenanthrene	NA	Inhalation, Ingestion, Suspected Human Carcinogen	NE
	Phenol	8.69	Inhalation, Ingestion, Skin Absorption	1 mg/m3 (1) 11 mg/m3 (2) 500 mg/m3 (3)
	Pyrene	NA	Inhalation, Ingestion	NE
Pesticides				
	Endosulfan Sulfate	NI	Inhalation, Ingestion, Skin Absorption	0.1 mg/m3 (1)

Notes:

(1)	2013 Values, American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs).
(2)	Federal Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (PEL).
(3)	Immediately Dangerous to Life and Health (IDLH).
ppm	Parts Per Million.
mg/m^3	Milligrams per Cubic Meter.
NA	Not Applicable.
NE	Not Established.
NI	No Information

Table A8.1

On-Site Air Monitoring Program Action Levels
The Batavia Former MGP Site
Batavia, New York

Monitoring Device	*Action Level*	*Action*
Combustible Gas Indicator	>10 Percent LEL	Cease operations and move to a safe place. Notify CSHO. Do not continue working until conditions are constantly below 10 percent LEL.
Oxygen Meter	<19.5 Percent or >23.5 Percent	Cease operations and move to a safe place. Notify CSHO. Do not continue working until oxygen levels are between 19.5 and 23.5 percent. Note: When oxygen levels are outside this range, percent LEL readings are not reliable.
Photoionization Detector (PID)		
10.6 or greater eV lamp	< 1.0 ppm or Background	Full-Face Respirator Available
	$\geq$ 1.0 ppm and $\leq$ 50 ppm	Full-face air purifying respirator Level C PPE
	>50 ppm and < 500 ppm	Supplied air respirator Level B PPE. Implement additional engineering controls
	$\geq$ 500 ppm	Shut down activities. Notify CSHO. Implement additional engineering controls
Dust / Particulate - For Worker Protection	< 5.0 mg/m³ (respirable fraction)	Full-Face Respirator Available
	$\geq$ 5.0 mg/m³	Wear Full-Face Respirator - Level C PPE
Carbon Monoxide	>35 ppm	Shut down activities. Notify CSHO. Implement additional engineering controls

Notes:

CSHO	Contractor Safety and Health Officer
LEL	Lower Explosive Limit.
PPE	Personal Protection Equipment.
ppm	Parts Per Million.

Attachment A

Job Safety Analysis (JSA) Forms

JOB SAFETY ANALYSIS (JSA)

OVERSIGHT OF CONSTRUCTION ACTIVITIES

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. All project personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised	April 2014	**JSA Type**	Oversight of Construction Activities
Work Type	Construction	**Client**	
Work Activity	Oversight of Construction Activities		
Work Site	The Batavia Former MGP Site – Batavia, New York		
Key Equipment	NA		
Task-specific Training	Safety Introduction/Briefing, 40-HR (initial) and 8-HR Refresher HAZWOPER training, Hazard Communication Training, Personal Protective Equipment, Confined Space Entry, Mobil Equipment Safety Awareness training and Fall Protection training		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)						
☒ Reflective Vest	☐ Goggles	☒ Gloves*	**Supplied Air**		**APR**	
☒ Hard Hat	☐ Face Shield*	☐ Coveralls*	☐ SCBA		☐ Full Face APR	☐ Particulate ☐ Organic Vapor
☒ Lifeline/Harness*	☐ Hearing Protection*	☐ PPE Clothing*	☐ Airline Respirator (attach description)		☐ Half Mask APR	☐ Particulate/Organic Vapor Combined
☒ Safety Glasses	☒ Safety-toed Boots					☐ Acid Gas
☒ Other*	Personal Fall Arrest Equipment as may be required		☒ Other*	Air Monitoring Equipment (LEL/O2 and a PID)	☐ Other*	
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)						
Reflective Vest -Class II	Air Monitoring Equipment to be provided by the contractor					
Gloves – Leather	Lifeline/Harness (Personal Fall Arrest Equipment) – As required by OSHA's Fall Protection Standard					

Reviewed By	Position/Title	Date	Reviewed By	Position/Title	Date

JOB SAFETY ANALYSIS (JSA)

OVERSIGHT OF CONSTRUCTION ACTIVITIES

Safety Means Awareness Responsibility Teamwork

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	• Discuss STAR (Stop Think Act & Review) and Stop Work Authority (SWA)	• Near Loss, Injury, and even Death	• Identify any hazards. Modify the JSA accordingly. Discuss the task and expectations of the task to all personnel. Have all applicable personnel sign off on this JSA prior to starting work. • Project team to discuss the importance of and documentation procedures for SWA during pre-job safety meeting. Use SWA to stop any work that is unsafe.	Site Representative
2	• General inspection of contractor's work activities	• Slip/Trip/Falls • Injury from Heat/Cold Stress or Inclement Weather • Working From Elevated Heights Greater Than 6 Feet • Noise • Biological Hazards • Lifting Heavy Objects • Exposure to Vehicular traffic and Heavy Equipment • Potential Hazards in Excavations including potential falls, being trapped, changing conditions (i.e., water accumulation, changing atmospheric hazards, communication issues etc.) • Failure to identify and remove all hazards including atmospheric hazards, water, electrical, biological and items falling into the confined space from above • Electrical hazards and potential physical injury from exposure to hazardous energy (i.e., hydraulic, pneumatic etc.)	• Walk work area first, especially when view of ground surface is covered. • Keep area free of excess materials and debris. • Remove all travel path hazards by keeping materials/objects organized and out of walkways. • Note and communicate areas of slick or uneven ground. • Take breaks as needed by monitoring the Daily Heat Index, as outlined in the HASP • Consume adequate food/beverages. Personnel should consume at least 8 ounces of cool water or electrolyte replacement drinks every 20-30 minutes. • Observe work-rest schedule to manage heat/cold stresses • When warranted, stay alert for rain, lightning, and high wind hazards, perform work in such weather as outlined in the HASP. • Fall protection is required when working adjacent to work areas are 6 ft. or greater • Do not stand directly next to open excavations > 6-ft. without fall protection • Access ladders must be available to enter into and out of any excavation • Perform pre-entry air monitoring to verify acceptable conditions • Complete and Sign off on the Confined Space Entry Permit when required • Perform continuous air monitoring while the inspector is in any confined space • Remain vigilant and maintain communications between the Attendant and the Entrant • Use a powerful flashlight to provide adequate light • Attendant is not to leave the opening at the Confined Space. • The Attendant will maintain a cell phone and keep it available during the inspection activities. • Keep supplies away from the edge of the opening for any confined space. • Hearing protection required when working within 20' of operating equipment or units, if levels are suspected to be >85 dBA, or for personal comfort. • Determine that object is within weight limit. • Check for contact hazards such as other boxes/objects in the vicinity as well as other people/equipment in the area. Check there is ample room to squat, lift, turn, or maneuver without twisting the back or other muscles or joints. • Check travel path for, and remove, slip hazards such as tools puddles, and debris. • Wear Reflective Safety Vest in areas near moving traffic and operating equipment • Maintain eye contact with equipment operators and do not walk into their path unless the operator motions for you to move. • Review any applicable energy control procedures as necessary. • Perform Lock Out/Tag Out (LOTO) as necessary. • Close/turn off appropriate valves and switches.	Site Representative

JOB SAFETY ANALYSIS (JSA)

OVERSIGHT OF CONSTRUCTION ACTIVITIES

Safety Means Awareness Responsibility Teamwork

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

EQUIPMENT FUELING ACTIVITIES

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. All project personnel have the authority and responsibility to use **Stop Work Authority.**

Date Issued/Revised	April 2014	**JSA Type:**	Equipment Fueling Activities
Work Type	Construction	**Client:**	
Work Activity	Pumping fuel into equipment		
Work Site	The Batavia Former MGP Site – Batavia, New York		
Key Equipment	Pickup Truck w/ Fuel Tank and Temporary fuel storage tank w/ secondary containment		
Task-specific Training	HAZCOM, PPE, Mobile Equipment Operations		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (SEE JOB STEPS FOR TASK-SPECIFIC REQUIREMENTS)			
☒ REFLECTIVE VEST*	☐ GOGGLES	☐ APR: _____ *	☒ GLOVES*
☒ HARD HAT	☐ FACE SHIELD*	☐ SUPPLIED AIR RESPIRATOR*	☐ COVERALLS*
☐ LIFELINE / HARNESS*	☐ HEARING PROTECTION*	☐ PPE CLOTHING*	☐ OTHER*
☒ SAFETY GLASSES	☒ STEEL TOED BOOTS	☐ OTHER* _____	☐ OTHER*
ADDITIONAL PPE: * Provide specific type(s) or descriptions of this item below			
Reflective Vest - Class II			

Reviewed By	**Position/Title**	**Date**	**Reviewed By**	**Position/Title**	**Date**

JOB SAFETY ANALYSIS (JSA)

EQUIPMENT FUELING ACTIVITIES

JOB STEPS (1)	TASK ACTIVITY	POTENTIAL HAZARD(S) (2)	CORRECTIVE MEASURE(S)(3)	Person Responsible
1	Perform the STAR Process (Stop Think Act Review) and discuss Stop Work Authority (SWA) -	• Slips, trips, falls; • Situational risks - use STAR;	• Verify that personnel training is sufficient for scheduled task(s). Is Job Instruction (hands-on) Training necessary?	Fueling Technician
2	Refer to the equipment manufacturer's operating manual before using any machinery. Place Nozzle in tank	• Property damage and personal injury from fire; • Fire potential from static/ contact spark	• No cell phones allowed on site. No cell phones in fueling areas. No smoking. No fueling during storm events. Determine appropriate area for fueling. Have two 20lb fire extinguishers within 25 feet of the fueling area. Use a bonding wire to establish a connection between the two tanks.	Fueling Technician
3	Turn on pump and dispense fuel into equipment	• Property damage and personal injury from fire; • Fire potential from static/ contact spark; • Personal injury due to skin /eye contact with fuel due to splash/ spills of fuel	• No cell phones allowed on site. No cell phones in fueling areas. No smoking. No fueling during storm events. Determine appropriate area for fueling. Have two 20lb fire extinguishers within 25 feet of the fueling area. Ensure the end of the nozzle is secured in the tank before turning on the pump and dispensing fuel. Wear the proper PPE. Stay upwind when fueling equipment. Remain in attendance of the nozzle at all times during fueling. Avoid overfilling of the equipment. Use a bonding wire to establish a connection between the two tanks.	Fueling Technician
4	Turn off pump and return nozzle to the fuel tank	• Property damage and personal injury from fire; • Fire potential from static/ contact spark; • Slips/ trips/ falls; pinch points	• No cell phones allowed on site. No cell phones in fueling areas. No smoking. No fueling during storm events. Determine appropriate area for fueling. Have two 20lb fire extinguishers within 25 feet of the fueling area. Ensure the end of the nozzle is secured in the tank before turning on the pump and dispensing fuel. Wear the proper PPE. Stay upwind when fueling equipment. Remain in attendance of the nozzle at all times during fueling. Avoid overfilling of the equipment. Pay Attention to surroundings. Pick up tools, equipment, and trash in the fueling area. Pay attention to the surroundings. Wear gloves. Do not rush.	Fueling Technician

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress / ergonomics / lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught"

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable and quantified terms. Avoid subjective general statements such as, "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

EXCAVATION ACTIVITIES

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. All project personnel have the authority and responsibility to use **Stop Work Authority.**

Date Issued/Revised	April 2014	**JSA Type:**	Excavation Activities
Work Type	Construction	**Client:**	
Work Activity	Excavation Activities		
Work Site	The Batavia Former MGP Site – Batavia, New York		
Key Equipment	Excavator; air monitoring equipment (PID and 4-gas); Excavation Safety Checklist		
Task-specific Training	40 HR and 8 HR HAZWOPER, PPE, Mobile Equipment Operations, Excavation Safety Training; Excavation Competent Person (for supervisors); Heavy Equipment Safety		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (SEE JOB STEPS FOR TASK-SPECIFIC REQUIREMENTS)			
☒ REFLECTIVE VEST*	☐ GOGGLES	☐ APR: Full-Facepiece*	☒ GLOVES*
☒ HARD HAT	☐ FACE SHIELD*	☐ SUPPLIED AIR RESPIRATOR*	☐ COVERALLS*
☐ LIFELINE / HARNESS*	☐ HEARING PROTECTION*	☐ PPE CLOTHING*	☐ OTHER*
☒ SAFETY GLASSES	☒ STEEL TOED BOOTS	☐ OTHER*	☐ OTHER*
ADDITIONAL PPE: * Provide specific type(s) or descriptions of this item below			
Reflective Vest- Class II Gloves - Leather			
APR –Full-Facepiece equipped with organic vapor and particulate cartridges			

Reviewed By	Position/Title	Date	Reviewed By	Position/Title	Date

JOB SAFETY ANALYSIS (JSA)

EXCAVATION ACTIVITIES

JOB STEPS [1]	TASK ACTIVITY	POTENTIAL HAZARD(S) [2]	CORRECTIVE MEASURE(S)[3]	Person Responsible
1	Perform the STAR Process (Stop Think Act Review) and discuss Stop Work Authority (SWA) -	• Slips, trips, falls; • situational risks - use STAR;	• Verify personnel training is sufficient for scheduled task(s). Is Job Instruction (hands-on) Training necessary?	All Affected Personnel
2	Verify Utility Clearance procedures completed (overhead and underground); verify excavation trench layout	• Underground utility strike • Overhead utilities	• Clear all underground utilities • Utility Locate Ticket number on file within 10 days of excavation startup? • Mark work area and safe distances for overhead lines • use spotter as necessary	Site Supervisor Project Manager
3	Setup necessary work area and traffic controls	• Fall-in • Caught-between and struck-by hazards	• Demarcate site and work areas to ensure that personnel and truck/equipment traffic is maintained safely and smoothly • Stockpile and laydown area are setup properly	Site Supervisor Laborers
4	Hand digging and pot holing activities conducted (where/if necessary based on utility locates)	• Underground utility strike	• Use preventive techniques • Maintain proper utility clearances with heavy equipment and use hand digging/pot holing when necessary	Site Supervisor Laborers Operator
5	Heavy equipment operations to excavate and handle soils and spoils	• Caught-between and struck-by hazards • Underground/overhead utilities	• Stay out of swing radius • Use spotters to verify clear route of travel and work area; maintain eye contact with operator and/or signal operator; keep soil 2 feet from edges • Inspect heavy equipment – document inspection • Ensure above utility clearances and safe work protocols are followed	All Affected Personnel
6	Excavation Activities	• Soil cave-in; noise • Struck-by/against • Encountering impacted soils	• Keep proper distances from edge of excavation • Limit equipment operations in trench area • Keep work area free of trip hazards • Perform necessary soil classification • Use hearing protection as necessary • Follow air monitoring protocols • Contact site supervisor if odors and/or discolored soils are encountered	Operator Laborers Site Supervisor
7	Entry into an Excavation	• Soil cave-in • Struck-by/against • Encountering slag • Hazardous atmospheres • Slip/trip/fall hazards • Emergency egress	• Keep proper distances from edge of excavation • Limit equipment operations in trench area • Keep work area free of trip hazards • Perform necessary soil classification • Use daily inspection form to document/meet competent person inspection requirements • Inspect trench after any change in conditions (rain, equipment vibrations, etc.) • Utilize trench box properly; ensure that tabulated data sheet is on site (as required) • Use 4-gas monitor and PID to screen excavation air prior to and during entry • Ladder safety and proper slope of ladder • If necessary based on air monitoring and/or other site conditions use harness and lifeline when entering trenches over 5 feet deep	Site Supervisor Operators Laborers

JOB SAFETY ANALYSIS (JSA)

EXCAVATION ACTIVITIES

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress / ergonomics / lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught"

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable and quantified terms. Avoid subjective general statements such as, "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS

EXCAVATOR OPERATION ACTIVITIES

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. All project personnel have the authority and responsibility to use **Stop Work Authority.**

Date Issued/Revised	April 2014	**JSA Type**	Loading Soil and/or Waste Material
Work Type	Construction	**Client**	
Work Activity	Excavator Operation Activities		
Work Site	The Batavia Former MGP Site – Batavia, New York		
Key Equipment	Excavator		
Task-specific Training	40 HR and 8 HR HAZWOPER, PPE, Mobile Equipment Operations, Excavation Safety Training; Heavy Equipment Safety		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (SEE JOB STEPS FOR TASK-SPECIFIC REQUIREMENTS)			
☒ REFLECTIVE VEST*	☐ GOGGLES	☐ APR: Full Facepiece*	☒ GLOVES*
☒ HARD HAT	☒ FACE SHIELD*	☐ SUPPLIED AIR RESPIRATOR*	☐ COVERALLS*
☐ LIFELINE / HARNESS*	☒ HEARING PROTECTION*	☐ PPE CLOTHING*	☐ OTHER*
☒ SAFETY GLASSES	☒ STEEL TOED BOOTS	☐ OTHER* _____	☐ OTHER* _____
ADDITIONAL PPE: * Provide specific type(s) or descriptions of this item below			
Reflective Vest - Class II Gloves - Leather			

Reviewed By	Position/Title	Date	Reviewed By	Position/Title	Date

JOB SAFETY ANALYSIS

EXCAVATOR OPERATION ACTIVITIES

JOB STEPS [1]	TASK ACTIVITY	POTENTIAL HAZARD(S) [2]	CORRECTIVE MEASURE(S)[3]	Person Responsible
1	Perform the STAR Process (Stop Think Act Review) and discuss Stop Work Authority (SWA) -	• Slips, trips, falls; • Situational risks - use STAR;	• Verify personnel training is sufficient for scheduled task(s). Is Job Instruction (hands-on) Training necessary?	Site Supervisor on all
2	Inspect equipment	• Equipment malfunction or damage • Hydraulic fluid, fuel, oil leaks/spills • Loss of steering, loss of brakes, etc.; accidents, decreased visibility • Fire • Slip/trip/fall hazards • Unexpected operation of equipment • Swing radius signage missing	• Follow Equipment Inspection Form/Tag Out if malfunction found • Grease moving parts • Check all fluids • Ensure that fluids are not too low or too full • Walk around equipment and look for leaking fluids • Ensure that tracks are acceptable (no unacceptable wear and no objects present) • Ensure that windows and mirrors are clean. Adjust mirrors! • Remove trash or other debris from cab • Ensure that back up alarm and horn are operational • Correct any problems immediately and inform supervisor • If equipment appears as though it has been tampered with or vandalized, do not start it • Ensure that fire extinguisher is in place and functioning • Inspect the fire extinguisher monthly • Use three point mount/dismount at all times • Be cautious of where you step and be aware of your surroundings • Ensure that ignition key is in your pocket, equipment is in neutral and parking brake is engaged • Use interlock safety mechanism any time equipment is not conducting a productive and/or controlled activity	Site Supervisor and Operator
3	Entering equipment	• Reduced visibility • Uncomfortable seating - back strain • Debris on floor getting stuck under pedals • Unexpected movement of excavator	• Adjust seat and mirrors so that you are able to see where traveling • Adjust controls and seat to your comfort and safety • Ensure that all materials inside cab are secured • Be cautious of where you step and be aware of your surroundings • Ensure steps are clear of water, mud, and other debris • Ensure parking brake is engaged and gear is in neutral • Use interlock safety mechanism any time equipment is not conducting a productive and/or controlled activity	Site Supervisor and Operator
4	Configure controls and seating	• Ergonomics/unnecessary physical stress/ back injury • Incapable of reaching controls • Visual blocks	• Upon sitting, adjust seat fully to accommodate reach and comfort zone • Fasten seat belt • Make certain all controls are set in neutral positions • Adjust mirrors	Site Supervisor and Operator
5	Starting and warming up	• Unanticipated rolling or movement, engine fire, or mechanical/electrical faults	• Review operator's manual if new to this particular machine • Start engine and check controls to ensure all are in working conditions • Allow a minimum of 2 minutes to warm up	Site Supervisor and Operator

JOB SAFETY ANALYSIS

EXCAVATOR OPERATION ACTIVITIES

JOB STEPS [1]	TASK ACTIVITY	POTENTIAL HAZARD(S) [2]	CORRECTIVE MEASURE(S)[3]	Person Responsible
6	Moving equipment work area	• Other equipment, personnel, or objects in work area • Uneven terrain	• Perform STAR – be aware of surroundings • Know the daily task and other people and equipment in the area • Make eye contact with other operators and site personnel in the immediate vicinity • Inspect pathway prior to moving equipment to ensure clear pathway	Site Supervisor and Operator
7	Performing tasks	• Other equipment (collision) • Slopes, ground conditions possible injuries to personnel and equipment, buried obstacles, underground and overhead utilities • Dust	• Perform STAR • Know where utilities are located – know where your bucket is in relation to any underground utilities at all times • Be aware of the scope of work to be performed • Use a spotter • Know the paths of other equipment or persons entering and leaving your work area • Communicate with supervisors and other operators throughout the day with any questions • Stop work immediately and contact a supervisor if you are uncertain of your task, experience equipment failure, or personal injury or near loss • Wear dust mask if conditions warrant	Site Supervisor and Operator
8	Stopping at end of day	• Slip/trip/fall hazards • Overnight parking of equipment	• Be cautious of where you step and be aware of your surroundings • Park in designated area • Set brake/control locks • Idle for 2 minutes if engine is hot • Lower bucket to ground – zero energy state • Turn equipment off; remove keys • Use three-point dismount • Secure inside equipment (i.e., fire extinguisher)	Site Supervisor and Operator

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress / ergonomics / lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught"

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable and quantified terms. Avoid subjective general statements such as, "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

FENCE INSTALLATION ACTIVITIES

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. All project personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised:	April 2014	**JSA Type:**	Fence Installation Activities
Work Type:	Construction	**Client:**	
Work Activity:	Fence Installation Activities		
Work Site:	The Batavia Former MGP Site – Batavia, New York		
Key Equipment:	Jacks, chains, fencepost driver, power tools and a come-along		
Task-specific Training:	PPE, Hazard Communication and Hand and Power Tool Safety		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)					
☐ Reflective Vest	☐ Goggles	☒ Gloves*	**Supplied Air**	**APR**	
☒ Hard Hat	☐ Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate ☐ Organic Vapor
☐ Lifeline/Harness*	☐ Hearing Protection*	☐ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined
☒ Safety Glasses	☒ Safety-toed Boots				☐ Acid Gas
☐ Other*			☐ Other*	☐ Other*	
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)					
Gloves- Leather or cut resistant gloves					

Reviewed By	**Position/Title**	**Date**	**Reviewed By**	**Position/Title**	**Date**

JOB SAFETY ANALYSIS (JSA)

FENCE INSTALLATION ACTIVITIES

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	Discuss STAR and SWA	• Site personnel not aware of STAR and SWA	• Project team to discuss the importance of SWA during pre-job safety meeting • Use SWA to stop any work that is unsafe	Project Personnel
2	Check weather	• Unexpected storm • Fog; rain; snow; lightening/thunder • Heat/cold stress	• Check local weather forecast • Discuss weather issues and precautions to take while driving and on site during the pre-job safety meeting • If weather conditions (e.g., fog, rain, snow, etc.) impair the ability/vision of the driver, exit at nearest safe location and assess the situation • While on site, at first sign of lightening/thunder utilize SWA and assess weather conditions • In extreme temperatures, ensure all personnel have proper clothing, hydration, and heat/cold protection (e.g., canopy, fan, glove warmers)	Project Personnel
3	Load equipment into vehicle	• Lifting hazards • Manual material handling • Back injury • Cuts • Pinch points • Hand/foot injury • Forgotten or damaged equipment	• Reduce travel distance when there is a need to carry/lift materials • Make sure grip is adequate; wear leather/cotton gloves • Size up the load; if the object is too large or odd shaped OR is in excess of 50 pounds then assistance (mechanical or a buddy lift) will be required • Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and keep lower back in a neutral position • Avoid one-handed carrying if possible; maintain awareness of footing • Avoid placing hands/fingers in pinch point locations • Wear safety-toed boots • Load equipment in an organized manner to prevent shifting during transport or use cargo netting	Project Personnel
4	Equipment inspection	• Hydraulic failure • Instrument/monitor failure	• Inspect equipment lines and fluid reservoirs; document inspection • Calibrate instrument prior to use; document calibration	Project Personnel
5	Inspection of the work zone	• Underground insects/hives • Poisonous plants • Stinging/biting insects • Chemical hazards	• Visually inspect area of fence installation for any activity regarding hornets, yellow jackets, bees, fire ants, or termites • A slow walk or drive along the fence path prior to excavation to inspect for insects flying in and out or ground, ant humps or mounds, and trails • Stop work if free product (mercury droplets) is encountered	Project Personnel
6	Removal and re-installation of fencing	• Struck-by/against • Potential Back strains • Utilities • Chemical hazards • Cross-contamination • Cuts/punctures	• Setup safe work area • Use a spotter when moving equipment • Spotter will be used when working near overhead lines to assist equipment operator and keep machine away/out of lines • Wear appropriate PPE (leather or cut resistant gloves, steel-toed boots)	Project Personnel
7	Use of hand tools	• Improper hammer/tool selection • Cuts/punctures • Chemical hazards • Electrical shock	• Use only a hammer of a weight and handle length appropriate to individual laborer's capability • Inspect every post and hammer for signs of metal fatigue/fractures • Safety glasses and awareness of installer hand location during use of a hammer • Ensure that all hand tools (fence post driver, shovel, etc.) are in good working condition • Wear proper PPE such as stout leather gloves to prevent trauma to hands	Project Personnel

JOB SAFETY ANALYSIS (JSA)

FENCE INSTALLATION ACTIVITIES

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
8	Fence layout activities	• Lifting hazards • Manual material handling • Back injury • Cuts/punctures	• Reduce distance traveled when carrying materials • Make sure grip is adequate; use gloves to enhance grip when necessary • Size up the load; if the object is too large or odd shaped OR is in excess of 50 pounds then assistance (mechanical or a buddy lift) will be required • Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and keep lower back in a neutral position • Avoid one-handed carrying if possible; maintain awareness of footing	Project Personnel

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(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

GEOPROBE-HYDROPUNCH SAMPLING ACTIVITIES

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. CRA personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised:	April 2014	**JSA Type:**	Geoprobe-Hydropunch Sampling Activities
Work Type:	Environmental	**Client:**	
Work Activity:	Geoprobe-Hydropunch Sampling Activities		
Work Site:	The Batavia Former MGP Site – Batavia, New York		
Key Equipment:			
Task-specific Training:	40-Hour HAZWOPER, 8-Hour Refresher, Hazard Communication. Supervisor shall be training in CPR, First Aid, and have Supervisor Training.		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)

☒ Reflective Vest	☒ Goggles	☒ Gloves*	**Supplied Air**	**APR**	
☒ Hard Hat	☐ Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate ☐ Organic Vapor
☐ Lifeline/Harness*	☒ Hearing Protection*	☐ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined
☒ Safety Glasses	☒ Safety-toed Boots				☐ Acid Gas
☐ Other*			☐ Other*	☐ Other*	

ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)

Minimum Level D PPE; type of gloves dependent on job-specific requirements. Additional PPE may be required in the Health and Safety Plan (HASP).
Also refer to the HASP for required traffic control, air monitoring, and emergency procedures.

Reviewed By	Position/Title	Date	Reviewed By	Position/Title	Date

JOB SAFETY ANALYSIS (JSA)

GEOPROBE-HYDROPUNCH SAMPLING ACTIVITIES

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	Perform the STAR Process (Stop Think Act Review) and discuss Stop Work Authority (SWA) -	• Slips, trips, falls; • situational risks - use STAR;	• Verify personnel training is sufficient for scheduled task(s). Is Job Instruction (hands-on) Training necessary?	All Affected Personnel
2	Obtain necessary permits, agreements, bonds, coordinate inspections and subcontractors, and notify stakeholders	• Fines, law suits, delays, or added work	• Coordinate with project manager to ensure all approvals obtained (well, encroachment, access agreements, traffic control plans, etc.) and owner, tenant, subcontractors, and agencies notified of start date	All Affected Personnel
3	Mark site for proposed borehole locations	• Traffic hazards • Overhead and underground lines and obstructions • Dealer inconvenience	• Review proposed location map in advance of arriving on site • Reference Borehole Clearance Review form and coordinate with Property Manger (or designee) to minimize potential conflicts	All Affected Personnel
4	Call USA for line location clearance	• Hitting underground utility (electrocution, explosion, product release, property damage, and interruption of services)	• Contact USA at least 2 full working days before drilling/digging • Get list of utilities that will be contacted and USA reference number (bring with you to site) • Visit site before drilling to confirm that all utilities have been marked • Contact companies that have not marked utility locations • Do not drill until all utilities are accounted for	All Affected Personnel
5	If necessary, coordinate private line locator for private property	• Hitting underground utility (electrocution, explosion, product release, property damage, and interruption of services)	• Review proposed locations against available construction drawings and known utilities, tanks, product lines, etc. • Where possible, perform preliminary site visit	All Affected Personnel
6	Select preferred order for drilling locations	• Cross-contamination, adversely impacting station fuel sales	• Drill clean areas first if possible • Minimize site disruption and minimize the need to move equipment	All Affected Personnel
7	Mobilize with proper equipment/ supplies for drilling	• Delay or improper performance of work due to improper equipment on site	• Make sure subcontractors are aware of their responsibilities for safety, labor, equipment, and supplies • Review HASP and permit conditions and gather necessary PPE	All Affected Personnel
8	Meet with Property Manager (or designee) on start date before commencing work	• Unknown traffic or other work hazards • Adverse business impact due to lack of communication between all interested parties	• Explain planned activities. Confirm drilling locations and schedule. Locate emergency product shut-off switch.	All Affected Personnel
9	Perform STAR and tailgate safety meeting upon arrival at site	• Consider worst-case scenario (including weather conditions)	• Review HASP with co-workers • Highlight aspects identified by STAR and, if necessary, add to HASP • Have all co-workers sign the HASP • Ensure all site workers have donned PPE and it is in good condition • Confirm all necessary subcontractor certifications and keep copies on site	All Affected Personnel
10	Visually clear proposed drilling locations	• Underground and overhead utilities/obstructions • Tip hazards due to slope angles	• Complete Pre-Mobilization section of Borehole Clearance Review form and adjust drilling locations as necessary	All Affected Personnel
11	Set up any necessary traffic control	• Accident during placement or as a result of improper traffic control equipment placement	• Use buddy system for placing traffic control • Reference traffic control plan section of HASP (may include specific requirements based on encroachment permit)	All Affected Personnel

JOB SAFETY ANALYSIS (JSA)

GEOPROBE-HYDROPUNCH SAMPLING ACTIVITIES

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
12	Assist with setup of drill rig	• Damage caused by drill rig while accessing setup location • Back injury • Unstable ground under drill rig	• Make sure driller ensures clear pathway to drilling location and clearance for raising mast • Provide as-needed hand signals and guidance to driver to place rig • Use proper lifting techniques – no bending or twisting while under load • Refer to the HASP for additional lifting information • Visually inspect rig (fire extinguisher on board, no oil or other fluid leaks, cabling and associated equipment in good condition, pressurized hoses secured with whip-checks or adequate substitute, jacks in good condition?) • Inspect soil for loose, soft or unstable conditions under rig jacks or outriggers	All Affected Personnel
13	Set up exclusion zone(s), stockpile area and establish work areas/heavy equipment pathways	• Injury or exposure to public or other on-site personnel • Slip/fall hazards • On-site vehicular accident with heavy equipment	• Implement exclusion zone setup instructions of HASP • Use orange fence (not just cones) to secure work area • Set up clear walking paths between workstations	All Affected Personnel
14	Clear upper 8 feet of borehole using air or water knife	• Exposure to chemical hazards • Hitting an underground utility	• Don any additional PPE and initiate air quality monitoring in accordance with the HASP • Use proper lifting techniques and tools • Complete the Pre-Drilling section of the Borehole Clearance Review form	All Affected Personnel
15	Perform STAR	• Changes in anticipated subsurface conditions • Consider worst-case scenario	• Reconcile air monitoring results with current PPE and HASP guidance	All Affected Personnel
16	Commence direct-push drilling.	• Cross-contamination from previous hole • Back strain • Heat or cold stress • Eye injury • Hearing damage • Exposure to chemical hazards • Hitting an underground utility • Trip and fall hazards • Catastrophic equipment failure	• Decontaminate sampling after collecting a sample and decontaminate drilling equipment after each borehole • Use proper lifting techniques • Use PPE and monitoring in accordance with the HASP (especially note ear protection) • Monitor drilling • Keep work area clear of tripping or slipping hazards • Perform periodic visual inspections of drill rig	All Affected Personnel
17	Collect samples in accordance with sampling plan	• Cross-contamination • Improper labeling or storage	• Decontaminate sampling equipment between each sampling run • Label samples in accordance with sampling plan • Keep samples stored in proper containers, at correct temperature, and away from work area	All Affected Personnel
18	Store cuttings (if any) properly in accordance with site-specific requirements	• Exposure to public • Traffic hazard or obstruction • Inconvenience to station operation • Improper storage or disposal	• Have proper storage containment and labeling available on site • Place materials in isolated location away from traffic and other site functions • Coordinate proper disposal off site (where applicable)	All Affected Personnel

JOB SAFETY ANALYSIS (JSA)

GEOPROBE-HYDROPUNCH SAMPLING ACTIVITIES

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
19	Backfill borehole	• Improper grouting can lead to future vertical conduit for contaminant migration • Back strain • Trip hazard • Eye injury from splashing or release of pressurized grout • Unauthorized backfilling causes extra work	• Make sure grout is mixed to specification and completely fills hole • Use proper lifting techniques and PPE • Keep work area clear of tripping hazards • Keep work area clear of tripping hazards • Have inspector and permits present if required for grouting	All Affected Personnel
20	Dispose of or store purge water (if any) on site	• Back strain • Exposure to contaminants • If disposing through on-site treatment system, damage or injury from improper use of equipment • Improper storage or disposal	• Use proper equipment to transport water (pumps, drum dollies, etc.) • Use proper lifting techniques – no bending or twisting while under load • Refer to the HASP for additional lifting information • Where PPE in accordance with the HASP • Review any necessary instructions for use of on-site treatment systems • Label storage containers properly and locate in isolated area away from traffic and other site functions • Coordinate off-site disposal (where applicable)	All Affected Personnel
21	Clean site/demobilize	• Traffic hazard • Nuisance or safety hazard left on site	• Use buddy system as necessary to remove traffic control • Leave site clean of refuse and debris • Clearly mark/barricade any borings that need later topping off or curing • Notify property personnel of departure • Map boring locations and note any cuttings/purge water left on site • Visit site next day to top off any subsidence	All Affected Personnel

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(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

HEAVY EQUIPMENT DECONTAMINATION – PRESSURE STEAM HEAT

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. Project personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised	April 2014	**JSA Type**	Heavy Equipment Decontamination – Pressure Steam Heat
Work Type	Construction	**Client**	
Work Activity	Heavy Equipment Decontamination – Pressure Steam Heat		
Work Site	The Batavia Former MGP Site – Batavia, New York		
Key Equipment	Steam Cleaner, brushes Liquinox		
Task-specific Training	40 HR and 8 HR HAZWOPER, PPE, Mobile Equipment Operations and Hazard Communication		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)					
☐ Reflective Vest	☐ Goggles	☒ Gloves*	**Supplied Air**	**APR**	
☒ Hard Hat	☒ Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate ☐ Organic Vapor
☐ Lifeline/Harness*	☒ Hearing Protection*	☐ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined
☒ Safety Glasses	☒ Safety-toed Boots				☐ Acid Gas
☒ Other*			☐ Other*	☐ Other*	
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)					
Splash shield, poly coated Tyvek®, rubber neoprene gloves					
Gloves – Outer Nitrile Gloves					

Reviewed By	**Position/Title**	**Date**	**Reviewed By**	**Position/Title**	**Date**

JOB SAFETY ANALYSIS (JSA)

HEAVY EQUIPMENT DECONTAMINATION – PRESSURE STEAM HEAT

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	Discuss STAR and SWA	• Site personnel not aware of STAR and SWA • Property damage • Personal injury • Cross contamination	• Project team to discusses importance of and documentation procedures for SWA during pre-job safety meeting • Use SWA if unsafe conditions exist • Discuss all potential hazards based on location, utilities, terrain, and waste water disposal	Site Supervisor All personnel involved with the Task.
2	Review manufacturer's Operation and Maintenance Manual (prior to initial operations of pressure washer)	• Improper inspection procedures • Lack of recognition/ knowledge of specific manufactured model • High pressure (>2,000 psi)	• Review manufacturer's Operation and Maintenance Manual • Utilize the STAR process and discuss with site supervisor on the operations of the equipment • Make sure rental company provides a copy of the manual or have them illustrate proper operating procedures including daily checks • Important: Read manufacturer's warning labels on the pressure unit itself for step by step operations (DOs and DON'Ts)	Site Supervisor Operator
3	Inspect equipment	• Equipment malfunction • Leaks • Missing/broken components • Personal injury • Property damage • Spills	• Complete a daily equipment checklist – Report all NR (Needs Repair) or items in question to your site supervisor – Do not use until repairs/parts have been completed • Thoroughly check hose, hose fitting, pressure wand, o-rings, leaks, pressure tips, engine oil, fuel type, etc. • Reference Manufacturer's Operation and Maintenance Manual for **specific** daily checks • Wear hand protection • Review site JSA on Fueling Operations • Avoid overfilling and immediately clean up spills using absorbent pads, towels and shovel or combination of all three and dispose of properly • Review Haz. Com. (MSDS) on type of fuel used in unit (i.e., Flammable, Combustible and Health risks). • Use an approved OSHA safety can (red or yellow) for dispensing needs; remove can from service if severely dented, missing, or broken components; tag out of service immediately • Keep gasoline can away from any heat sources; place in OSHA- approved storage cabinet or in a fenced-off secondary spill containment area with signage and labeled	Operator

JOB SAFETY ANALYSIS (JSA)

HEAVY EQUIPMENT DECONTAMINATION – PRESSURE STEAM HEAT

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
4	Mobilize washer into position	• Slip/trip/fall hazards • Back strain • Property damage • Unsecured • Uneven terrain • Heavy lifting	• Get assistance (buddy system) when moving washer either physically or means of powered equipment • Use proper lifting techniques; keep back straight and knees slightly bent when placing unit into the decon area • Keep hose(s) and wand securely on unit • Place washer on solid, level ground • Determine your route of travel to work area; avoid uneven ground, slopes, and inclines • Secure washer if transporting by truck, trailer, or loader using nylon ratchet straps; DO NOT use chains or bungee cords • Determine best place to position washer to account for length of hose to reach all points of washing	Operator & Spotter
4	Connect water source to pressure washer	• Splashing • Slip hazard • Pinch points • Improper fittings • Water pressure • Property damage • Personal injury • Electrical - electrocution	• Don appropriate PPE (polycoated Tyveks®, rubber gloves, rubber overboots, splash shield, hard hat, hearing protection, etc.) • Check water hose condition and connections • Install one end of hose to unit first and then to water source • Slowly release water into pressure washer unit; avoid excessive splashing and don't leave unit unattended • Keep hands and fingers clear of pinch points • Minimize water pooling; tighten connections as necessary to avoid slip hazards • Keep water away from electrical panels, outlets, and power cords	Operator
5	Operate pressure washer In this Order: 1. Select proper wash tip 2. Start the washer unit 3. Move into position 4. Hold pressure wand and handle firmly with both hands 5. Point wand in area to begin wash *6.* Pull trigger and begin washing	• High pressure (>2,000 psi) • Infections - bacteria • Eye, hand, foot Injury • Flying debris • Slip/trip hazards • Hose whipping • Kink in hose • Equipment malfunction • Property damage • Hand and wrist fatigue/numb • Noise • Poor visibility • Windy conditions • Clogged pressure tips • Poor communications • Steam burns	• Wear splash shield and hearing protection! • Determine wind direction and place back to the wind to avoid over spray of water back into the operator's face • Install proper washing tip on the end of wand; turn unit off, relieve pressure from unit, and let it cool down before changing tips • Keep both hands on the wand at all times to avoid excessive fatigue and numbness in hand and wrists • Keep hands off metal section of wand to avoid a burn to the hand • Do not point the spray towards others, ground, or hose • Position your body off to one side during washing to prevent deflection of material debris back in your direction; keep a safe distance between surface to be washed and the spray • Keep hoses free and clear to avoid trips; be aware of your surroundings • Keep face shield clear as best as you can; stop washing and wipe off as needed • Never unclog a tip while the unit is running; shut off unit, depressurize hose and wand, then remove tip for cleaning • Keep hands, feet, and eyes out of the "line of fire" of the spray – High pressure can cut through gloves, boots, and severely and cause bodily injury; infections can occur if cut into the skin • DO NOT use steam washer to remove debris from clothing (PPE) or any parts of the body!	Operator

JOB SAFETY ANALYSIS (JSA)

HEAVY EQUIPMENT DECONTAMINATION – PRESSURE STEAM HEAT

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
6	End of task 1. Relieve pressure 2. Turn off water supply to unit and disconnect 3. Shut off pressure washer 4. Allow to cool down 5. Storage	• Burns (muffler) • Hose damage • Equipment damage • Theft • Slips • Back strain	• Doff PPE and dispose of properly • Relieve pressure on hose and drain the water from hose and unit • Avoid placing hands on muffler section of washer unit; allow unit to cool down before handling and or filling with gasoline • Drain hose and wrap up to unit; inspect hose for excessive wear or blistering • During cold temperatures, winterize unit using environmentally safe anti-freeze • Secure unit inside connex trailer or use chain and padlock to prevent theft • Check unit over and make sure all components (tips, wand, hose) are in good condition • Turn gasoline valve to off/close when not in use or in storage • Use proper lifting techniques when moving unit and get assistance (buddy system)	Operator and Spotter
7	Collect a wipe sample (if necessary)	• Cross contamination • Liability	• Confirm with site supervisor if a wipe sample is needed prior to demobilization of equipment from the site	Project Manager and Site Supervisor

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)
HEAVY EQUIPMENT OPERATION DOZER/LOADER

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. All project personnel have the authority and responsibility to use **Stop Work Authority.**

Date Issued/Revised	April 2014	**JSA Type**	Construction
Work Type	Construction	**Client**	
Work Activity	Heavy Equipment Operation: Dozer / Loader		
Work Site	The Batavia Former MGP Site – Batavia, New York		
Key Equipment	Dozer and or Loader		
Task-specific Training	40 HR and 8 HR HAZWOPER, Heavy equipment operation; Mobile Equipment Operations, HAZCOM, PPE		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (SEE JOB STEPS FOR TASK-SPECIFIC REQUIREMENTS)			
☒ REFLECTIVE VEST*	☐ GOGGLES	☐ APR: Full-Facepiece*	☒ GLOVES*
☒ HARD HAT	☐ FACE SHIELD*	☐ SUPPLIED AIR RESPIRATOR*	☐ COVERALLS*
☐ LIFELINE / HARNESS*	☒ HEARING PROTECTION*	☐ PPE CLOTHING*	☒ OTHER* Fire Extinguisher
☒ SAFETY GLASSES	☒ STEEL TOED BOOTS	☐ OTHER*	☐ OTHER* _____
ADDITIONAL PPE: * Provide specific type(s) or descriptions of this item below			
Gloves - Leather Hearing Protection - NNR 20 Reflective Vest - Class 2			

Reviewed By	Position/Title	Date	Reviewed By	Position/Title	Date

JOB SAFETY ANALYSIS (JSA)
HEAVY EQUIPMENT OPERATION DOZER/LOADER

JOB STEPS [1]	TASK ACTIVITY	POTENTIAL HAZARD(S) [2]	CORRECTIVE MEASURE(S)[3]	Person Responsible
1	Perform the STAR Process and discuss Stop Work Authority (SWA) Perform Review "General Site Activities" JSA.	• Failing to identify hazardous conditions resulting in losses or near losses.	• Perform the STAR Process STAR. • Assess the risks and verify that personnel training is sufficient for scheduled task(s). • Determine the hazards of performing the task and survey the work area. • Consider weather conditions such as fog that could reduce visibility. • Always consider the worst case scenario. • Analyze the hazards determined. • Decide a plan of action to eliminate or reduce the hazards and act on it.	Construction Superintendent and Operator
2	Inspect Equipment	• Equipment malfunction or damage. • Hydraulic fluid, fuel, oil leaks/spills • Loss of steering, loss of brakes, etc. – accidents decreased visibility. • Fire. • Slips, trips, falls. • Unexpected operation of equipment.	• Follow equipment inspection form/tag out if malfunction found. • Grease moving parts. • Check all fluids. • Ensure that fluids are not too low or too full. • Walk around equipment and look for leaking fluids. • Ensure that dozer tracks are acceptable (no unacceptable wear and no objects present). Check loader tires • Ensure that windows and mirrors are clean. • Remove trash or other debris from cab. • Ensure that back up alarm and horn are operational. • Correct any problems immediately and inform supervisor. • If equipment appears as though it has been tampered with or vandalized, do not start it • Ensure that fire extinguisher is in place and functioning. • Inspect the fire extinguisher monthly. • Use three point mount/dismount at all times. • Be cautious of where you step and be aware of your surroundings. • Ensure that ignition key is in your pocket, equipment is in neutral and parking brake is engaged.	Construction Superintendent and Operator
3	Entering Equipment	• Reduced visibility, uncomfortable seating-back strain. • Debris on floor getting stuck under pedals. • Unexpected movement of truck. • Unexpected movement of truck.	• Adjust seat and mirrors so that you are able to see where traveling. • Adjust controls and seat to your comfort and safety. • Ensure that all materials inside cab are secured. • Be cautious of where you step and be aware of your surroundings. • Ensure steps are clear of water, mud and other debris • Ensure parking brake is engaged and gear is in neutral.	Construction Superintendent and Operator

JOB SAFETY ANALYSIS (JSA)
HEAVY EQUIPMENT OPERATION DOZER/LOADER

JOB STEPS [1]	TASK ACTIVITY	POTENTIAL HAZARD(S) [2]	CORRECTIVE MEASURE(S)[3]	Person Responsible
4	Configure controls and seating.	• Ergonomics / unnecessary physical stress. • Incapable of reaching controls. • Visual blocks.	• Upon sitting, adjust seat fully to accommodate reach and comfort zone. • Fasten seat belt • Make certain all controls are set in neutral positions. • Adjust mirrors.	Construction Superintendent and Operator
5	Starting and warming up.	• Unanticipated rolling or movement, • engine fire, or mechanical/electrical faults	• Review operator's manual if new to this particular machine. • Start engine and check controls to ensure all are in working conditions. • Allow a minimum of two minutes to warm up.	Construction Superintendent and Operator
6	Moving equipment work area.	• Other equipment, personnel, or objects in work area. • Uneven terrain.	• Perform the STAR Process. • Know the daily task and other people and equipment in the area. • Make eye contact with other operators and site personnel in the immediate vicinity. • Inspect pathway prior to moving equipment to ensure clear pathway.	Construction Superintendent and Operator
7	Performing tasks.	• Other equipment (collision), • slopes, ground conditions • possible injuries to personnel and equipment, • buried obstacles, underground and overhead utilities. • Organic Vapors/Dust.	• Perform the STAR Process • Know where utilities are located. Be aware of the scope of work to be performed. • Know the paths of other equipment or persons entering and leaving your work area. • Communicate with supervisors and other operators throughout the day with any questions. • Stop work immediately and contact a supervisor if you are uncertain of your task, experience equipment failure, or personal injury or near loss. • Wear respirator if conditions warrant.	Construction Superintendent and Operator
8	Stopping at end of day.	• Slips, trips and falls. • Overnight parking of equipment.	• Be cautious of where you step and be aware of your surroundings. • Park in designated area. • Set brake/control locks. • Idle for two minutes if engine is hot. • Lower blade or bucket to ground. • Turn equipment off. • Use 3-point dismount. • Secure inside instruments (i.e., fire extinguisher).	Construction Superintendent and Operator

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

JOB SAFETY ANALYSIS (JSA)
HEAVY EQUIPMENT OPERATION DOZER/LOADER

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress / ergonomics / lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught"

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable and quantified terms. Avoid subjective general statements such as, "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

MATERIAL HANDLING ACTIVITIES – RIGGING AND PLACEMENT OF MATERIALS

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. All project personnel have the authority and responsibility to use **Stop Work Authority.**

Date Issued/Revised	April 2014	**JSA Type**	Material Handling Activities
Work Type	Construction	**Client**	
Work Activity	Rigging and Placement of Materials		
Work Site	The Batavia Former MGP Site – Batavia, New York		
Key Equipment	Excavator, Backhoe, or Crane		
Task-specific Training	Rigging; lifting signals; heavy equipment safety; use of taglines; proper use of load charts; 40 HR and 8 HR HAZWOPER, HAZCOM, PPE, Mobile Equipment Operations		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (SEE JOB STEPS FOR TASK-SPECIFIC REQUIREMENTS)			
☒ REFLECTIVE VEST*	☐ GOGGLES	☐ APR: _____*	☒ GLOVES*
☒ HARD HAT	☐ FACE SHIELD*	☐ SUPPLIED AIR RESPIRATOR*	☐ COVERALLS*
☐ LIFELINE / HARNESS*	☐ HEARING PROTECTION*	☐ PPE CLOTHING*	☐ OTHER* _____
☒ SAFETY GLASSES	☒ STEEL TOED BOOTS	☐ OTHER* _____	☐ OTHER* _____
ADDITIONAL PPE: * Provide specific type(s) or descriptions of this item below			
Reflective Vest - Class II			
Gloves - Leather			

Reviewed By	**Position/Title**	**Date**	**Reviewed By**	**Position/Title**	**Date**

JOB SAFETY ANALYSIS (JSA)

MATERIAL HANDLING ACTIVITIES – RIGGING AND PLACEMENT OF MATERIALS

JOB STEPS [1]	TASK ACTIVITY	POTENTIAL HAZARD(S) [2]	CORRECTIVE MEASURE(S)[3]	Person Responsible
1	Perform the STAR Process and discuss Stop Work Authority (SWA) Equipment Inspection	• Hydraulic failure	• Inspect equipment lines and fluid reservoirs	Operator
2	Rigging components – Inspection of load and rigging	• Attachment point failure	• Inspect attachment hook/ring for fractures, dents or abuse. • Certify load capability of attachment point.	Operator, Qualified Rigger and all field personnel involved in the operation
3	Rigging components – Continue inspection of load, rigging, and material to be lifted	• Rigging assembly failure	• Inspect rigging chains, wire rope, cables, hooks, slings, d-rings, splitters, spreaders and all other components for unusual shape, fractures, fraying, dents, abuse or abnormalities. • Insure components used have annual certification, proper load rating and are implemented as recommended by training and the manufacturer.	Operator, Labor and all field personnel involved in operation.
4	Rigging components	• Improper component attachment, lifting point usage, incorrect balance or component orientation	• Use the manufacturer's recommended lifting attachment points, slots or cable points to secure load to be rigged. • Use proper rigging components to assure load is evenly distributed, proper balance is achieved and place hoisting equipment and rigged components in proper orientation to assure placement logistics are correct.	Operator, Labor and all field personnel involved in operation.
5	Tag lines – Proper placement of taglines to ensure control of load. No one is to work under a suspended load	• Lift control failure	• Use of tag lines, as a lifting control measure is mandatory as appropriate for correct placement of rigged component. • Personnel assisting rigging or lift should never physically be in contact with rigged or lifted components as a measure of component control.	Operator, Labor and all field personnel involved in operation.
6	Pre-plan the lift and prepare the landing zone	• Objects/personnel in swing radius path; • Lifting outside of equipment's load safe load radius	• Pre-plan the lift to ensure swing radius does not impact other operations. • Ensure that load and load path stays within load radius of lifting equipment.	Rigger, And Operator
7	Component placement – Pick the load and place the item in the correct position.	• Improper preparation of location receiving rigged or lifted component resulting in need for multiple lifts.	• Preparation of the area receiving the rigged or lifted component to avoid and necessary re-lift or multiple lifts.	Operator, Labor and all field personnel involved in operation.
8	Maintain Control of Area	• Unauthorized personnel or equipment in rigging or lifting exclusion zone	• Area marking and clearance of all personnel and equipment to prevent interference during rigging or lifting activities. • Spotter action to terminate rigging or lifting if situational changes occur putting personnel or equipment at risk.	Operator, Labor and all field personnel involved in operation.
9	Control of communication between task personnel	• Multiple signals interfering with operator	• During lifting or rigging activities, a communication order must be established previous to any attempt to hoist load. • Spotters communicate to one load controller; load controller communicates to operator. • Operator must maintain visual contact with load controller at all times. • All operations are controlled by ground controller.	Operator, Labor and all field personnel involved in operation.

JOB SAFETY ANALYSIS (JSA)

MATERIAL HANDLING ACTIVITIES – RIGGING AND PLACEMENT OF MATERIALS

JOB STEPS [1]	TASK ACTIVITY	POTENTIAL HAZARD(S) [2]	CORRECTIVE MEASURE(S)[3]	Person Responsible
10	Trench entry in order to place materials and piping – see JSA for Excavation Activities	• Excavation Hazards (review of that JSA)	• Follow JSA for Excavation.	All Affected Personnel

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(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress / ergonomics / lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught"

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable and quantified terms. Avoid subjective general statements such as, "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

MOBILE EQUIPMENT OPERATION ACTIVITIES

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. All project personnel have the authority and responsibility to use **Stop Work Authority.**

Date Issued/Revised	April 2014	**JSA Type:**	Mobile Equipment Operation Activities
Work Type	Construction	**Client:**	
Work Activity	Mobile Equipment Operation Activities		
Work Site	The Batavia Former MGP Site – Batavia, New York		
Key Equipment	Excavator; Dozer, Loader, Skidsteer, Compactor, Grader, Off-road Dump Truck, Pickup Trucks		
Task-specific Training	40 HR and 8 HR HAZWOPER, PPE and Mobile Equipment Operations		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (SEE JOB STEPS FOR TASK-SPECIFIC REQUIREMENTS)			
☒ REFLECTIVE VEST*	☐ GOGGLES	☐ APR: _with organic vapor and P-100 cartridges for stabilization activities_*	☒ GLOVES*
☒ HARD HAT	☐ FACE SHIELD*	☐ SUPPLIED AIR RESPIRATOR*	☐ COVERALLS*
☐ LIFELINE / HARNESS*	☐ HEARING PROTECTION*	☐ PPE CLOTHING*	☐ OTHER*
☒ SAFETY GLASSES	☒ STEEL TOED BOOTS	☐ OTHER* _____	☐ OTHER* _____
ADDITIONAL PPE: * Provide specific type(s) or descriptions of this item below			
Reflective Vest- Class II Gloves – Outer Leather			

Reviewed By	**Position/Title**	**Date**	**Reviewed By**	**Position/Title**	**Date**

JOB SAFETY ANALYSIS (JSA)

MOBILE EQUIPMENT OPERATION ACTIVITIES

JOB STEPS (1)	TASK ACTIVITY	POTENTIAL HAZARD(S) (2)	CORRECTIVE MEASURE(S)(3)	Person Responsible
1	Perform the STAR Process (Stop Think Act Review) and discuss Stop Work Authority (SWA) -	• Slips, trips, falls; • Situational risks	• Verify that personnel training is sufficient for scheduled task(s). Is Job Instruction (hands-on) Training necessary?	Operator
2	Perform daily (pre-shift) equipment inspection include area around the equipment and PPE and perform a complete walk around inspection	• Equipment failure • PPE failure	• Don all necessary PPE • Provide training to personnel on inspection procedures • Document daily inspection • Defects must be corrected before operating unit	Operator
3	Mount/dismount the equipment	• Slip/trip/fall hazards • Sprains/Strains • Potential injury	• Use three points of contact • Never jump from the machine • Clear tracks and personnel access points of debris and mud as necessary • Only a trained operator will be allowed on equipment • Never carry riders unless unit is so designed	Operator
4	Starting heavy/mobile equipment	• Struck-by • Caught between • Equipment failure	• Perform inspection (see Task 2) • Check to be certain all workers and equipment are a safe distance from unit • All operators manuals should be available for each piece of equipment and used in employee training • Allow proper warm-up and wait for gauges to register properly • Raise the blade, cable and chokers, boom, grapple, or other attachments before moving the unit	Operator
5	Operation of heavy/mobile equipment	• Struck-by/Caught In • Overhead/underground utilities • Flying debris • Rollover • Fire • Broken and/or frayed cables	• Appropriate guarding (according to machine type and use) shall be in place at all times unit is in operation • Backup alarms shall be functional • Seat belts shall be provided and their use enforced • Fire extinguishers and first aid kits shall be provided on each unit • Fire extinguishers shall be inspected for functionality on a daily basis • Do not operate equipment unless you have been trained to safely operate the equipment	Operator
6	Perform equipment maintenance	• Equipment failure/loss • Sharp objects • Pinch points	• Use STAR process • Follow equipment manufacturer's preventive maintenance procedures and instructions • Only qualified individuals should perform maintenance activities on equipment	Operator
7	Cleaning and housekeeping of equipment	• Fire • Slip/trip/fall hazards • Equipment failure	• Remove loose items and all trash from the operator's compartment • Clean equipment as necessary to prevent buildup of debris that may cause fire	Operator

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(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress / ergonomics / lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught"

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable and quantified terms. Avoid subjective general statements such as, "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

MOBILIZATION AND DEMOBILIZATION ACTIVITIES

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. All project personnel have the authority and responsibility to use **Stop Work Authority.**

Date Issued/Revised	April 2014	**JSA Type**	Mobilization and Demobilization Activities
Work Type	Construction	**Client**	
Work Activity	Mobilization of Equipment and Supplies to and from the job site		
Work Site	The Batavia Former MGP Site – Batavia, New York		
Key Equipment	Pickup trucks and trailers		
Task-specific Training	PPE, HAZCOM, Motor Vehicle Safety, Mobile Equipment Operations		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (SEE JOB STEPS FOR TASK-SPECIFIC REQUIREMENTS)

☒ REFLECTIVE VEST*	☐ GOGGLES	☐ APR: _____*	☒ GLOVES*
☒ HARD HAT	☐ FACE SHIELD*	☐ SUPPLIED AIR RESPIRATOR*	☐ COVERALLS*
☐ LIFELINE / HARNESS*	☐ HEARING PROTECTION*	☐ PPE CLOTHING*	☐ OTHER* _____
☒ SAFETY GLASSES	☒ STEEL TOED BOOTS	☐ OTHER* _____	☐ OTHER* _____

ADDITIONAL PPE: * Provide specific type(s) or descriptions of this item below

Reflective Vest - Class II

Gloves - Leather

Reviewed By	Position/Title	Date	Reviewed By	Position/Title	Date

JOB SAFETY ANALYSIS (JSA)

MOBILIZATION AND DEMOBILIZATION ACTIVITIES

JOB STEPS [1]	TASK ACTIVITY	POTENTIAL HAZARD(S) [2]	CORRECTIVE MEASURE(S)[3]	Person Responsible
1	Discuss STAR (Stop Think Assess & Review) and Stop Work Authority (SWA)	• Site personnel not aware of STAR & SWA	• Project team to discuss the importance of and documentation procedures for SWA during pre-job safety meeting. Use SWA to stop any work that is unsafe.	Personnel Taking Part in this Activity
2	Check weather	• Unexpected storm; Fog; Rain; Snow; Lightening/Thunder; • Heat/Cold stress	• Check local weather forecast. • Discuss weather issues and precautions to take while driving and on-site during the pre-job safety meeting. If weather conditions (e.g., fog, rain, snow, etc.) impair the ability/vision of the driver, exit at nearest safe location and assess the situation. • While on-site, at first sign of lightening/thunder utilize SWA and assess weather conditions. In extreme temperatures, ensure all personnel have proper clothing, hydration, and heat/cold protection (e.g., canopy, fan, and glove warmers).	Personnel Taking Part in this Activity
3	Load equipment into vehicle	• Back strain; • Cuts; • Pinch points; • Hand/Foot injury; • Forgotten equipment; • Damaged equipment	• Use proper lifting techniques and buddy system if needed. • Wear leather/cotton gloves and avoid placing hands/fingers in pinch point locations. Wear steel toe boots. • Verify requested equipment against warehouse form. • Load equipment in an organized manner to prevent shifting during transport or use cargo netting.	Personnel Taking Part in this Activity
4	Complete Daily Operator Vehicle Checklist	• Damaged vehicle lights, tires, windows, mirrors, horn; Inadequate vehicle documents and/or safety items	• Check for fluid leaks under vehicle. • Test operation of headlights, front/rear turn signals, backup lights, brake lights, and emergency flashers. Visually check the pressure/wear of tires. Ensure the vehicle has a spare tire. Assure windshield and window glass is clean and free from obstructions. Test the windshield wipers and horn. Verify vehicle registration, insurance card, and inspection sticker is present and valid. • Ensure the vehicle contains a first aid kit, fire extinguisher, and road hazard kit.	Personnel Taking Part in this Activity
5	Check and adjust seat, steering wheel, headrest, and mirrors	• Back/body strain; • Blind spots; impaired vision.	• Adjust seat, headrest, and steering wheel height so body is fully supported/comfortable and pedals are within easy reach. Ensure mirrors are properly adjusted.	Personnel Taking Part in this Activity
6	Fasten seat belt(s) and ensure passenger(s) seat belts are fastened	• Serious injury, ejection, or death from collision and/or traffic citation	• Verify driver and passenger(s) seat belts are in good condition and properly latched.	Personnel Taking Part in this Activity
7	Ensure vehicle doors are locked	• Serious injury, ejection, or death from collision; • Unwanted intrusion; Lost equipment	• Manually lock all doors to vehicle.	Personnel Taking Part in this Activity

JOB SAFETY ANALYSIS (JSA)

MOBILIZATION AND DEMOBILIZATION ACTIVITIES

JOB STEPS [1]	TASK ACTIVITY	POTENTIAL HAZARD(S) [2]	CORRECTIVE MEASURE(S)[3]	Person Responsible
8	Start engine and check gauges and warning lights	• Vehicle breakdown	• Verify sufficient fuel and other hazard lamps (e.g., battery, oil, and temperature) are not lit.	Personnel Taking Part in this Activity
9	Mobilize to site	• Arriving late; • Collision; • Injury or Death to occupants or other parties	• Do not use cell phones or perform other distracting activities while vehicle is in motion. • Constantly scan intersections, move eyes, check mirrors, and assess traffic lights (fresh vs. stale). • Maintain safety cushion around vehicle (front, sides, and rear) and 4 second following distance. • Utilize all driving defensive techniques.	Personnel Taking Part in this Activity
10	Arrive at site	• Pedestrian injury; • Collision	• Maintain awareness of pedestrian/vehicular traffic when entering site and traveling to work zone.	Personnel Taking Part in this Activity
11	Park vehicle	• Pedestrian injury; • Collision; • Property damage	• Maintain awareness of pedestrian/vehicular traffic. • Park vehicle in pull-through parking space or facing the exit. • Use caution and mirrors/spotter when backing vehicle.	Personnel Taking Part in this Activity
12	Demobilization	• Collision; • Injury or Death to occupants or other parties	• Perform perimeter vehicle check. • Maintain awareness of pedestrian/vehicular traffic when exiting site. • Utilize defensive driving techniques. • Complete post-departure checklist and report vehicle problems to company vehicle maintenance manager or rental car agency.	Personnel Taking Part in this Activity

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(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress / ergonomics / lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught"

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable and quantified terms. Avoid subjective general statements such as, "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

OVERSIGHT OF SOIL BORINGS AND WELL INSTALLATION ACTIVITIES

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. All project personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised:	April 2104	**JSA Type:**	Drilling – Oversight of Soil Borings and Well Installations
Work Type:	Environmental	**Client:**	
Work Activity:	Drilling – Oversight of Soil Borings and Well Installations		
Work Site:	The Batavia Former MGP Site – Batavia, New York		
Key Equipment:	Air monitoring equipment; safety cones/fencing/barricades		
Task-specific Training:	40-hr HAZWOPER and 8-hr refresher, HAZCOM, PPE, Mobile Equipment Operations and CRA Field Method Training		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)					
☒ Reflective Vest	☐ Goggles	☒ Gloves*	**Supplied Air**	**APR**	
☒ Hard Hat	☐ Face Shield*	☐ Coveralls*	☐ SCBA	☒ Full Face APR	☐ Particulate ☐ Organic Vapor
☐ Lifeline/Harness*	☒ Hearing Protection*	☐ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined
☒ Safety Glasses	☒ Safety-toed Boots				☐ Acid Gas
☐ Other*			☐ Other*	☐ Other*	
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)					
Gloves – Leather for moving equipment and inner nitrile gloves if sampling soils, Reflective Vest – Class II, Hearing Protection – Noise Reduction Rating (NRR) 20, APR – wear cartridges for organic vapors when organic vapors are present					

Reviewed By	**Position/Title**	**Date**	**Reviewed By**	**Position/Title**	**Date**

JOB SAFETY ANALYSIS (JSA)

OVERSIGHT OF SOIL BORINGS AND WELL INSTALLATION ACTIVITIES

Safety Means Awareness Responsibility Teamwork

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	Tailgate safety meeting	• Not identifying all hazards while performing tasks • Injury • Property damage	• Discuss work to be performed and associated hazards with CRA personnel and subcontractors • Include discussion on hospital route, evacuation procedures, and emergency contacts; complete daily tailgate forms • Discuss site-specific requirements for working onsite	All Project Personnel
2	Perform the STAR Process and discuss Stop Work Authority (SWA). Refer to the specific snow thrower's equipment manufacturer's operating manual before using the equipment.	• Slips, Trips, Falls • Situational risks	• Verify personnel's training is sufficient for the scheduled task(s). • Is job instruction training (hands-on) training necessary? • Employees should remove finger rings, necklaces, or jewelry, which may be hazardous in equipment operation.	All Project Personnel
3	Markout underground utilities	• Property damage • Explosion • Electrocution • Injury • Death	• Call public underground utility agency (One-Call) at least 5 or more days prior to work activities • Review state law pertaining to underground pipe line safety and have private utility mark-out performed • Expose lines if warranted (i.e., hand dig, test pit, or daylight)	Project Manager and Site Supervisor
4	Project Coordination	• Miscommunication • Possible Injury	• Inform Site Operator of activities to be performed at Site	Technician
5	Conduct site walk, identify unsafe conditions, and determine sample point locations	• Traffic • Slip/trip/fall hazards • Biological hazard • Overhead/underground hazards	• Maintain awareness of on-site traffic and walking surfaces • When selecting soil boring locations, be aware of biological hazards (e.g., ants, poison ivy, wasps) and overhead/underground hazards (e.g., overhead utilities, concrete scarring, station canopy)	Technician
6	Equipment inspection	• Pinch points • Property damage • Lost time due to damaged equipment/parts	• Discuss pinch points on equipment (e.g., drill rig, air knife, pressure washer, etc.) • Familiarize all personnel with location/operation of fire extinguisher(s) and kill switch on drill rig • Visually inspect equipment/parts for damage and document inspections	Technician
7	Set up work zone for drilling activities	• Traffic • Slip/trip/fall hazards • Property damage • Overhead hazards • Environmental impact	• Maintain awareness of on-site traffic, work zones, walking surfaces, overhead hazards (e.g., canopy and low hanging overhead lines) • Utilize barricades/cones/caution tape to define work zone and direct traffic • Wear leather/cotton when setting up barricades • Be aware of any potential sensitive receptors and verify all personnel are aware of the location of spill kit.	Technician
8	Set up staging area	• Traffic • Slip/trip/fall hazards • Back strain • Pinch points • Heat/cold stress	• Maintain awareness of on-site traffic and walking surfaces • Utilize barricades/cones/caution tape to define work zone and direct traffic • Wear leather/cotton gloves when setting up barricades • Utilize proper lifting techniques and use buddy system if needed • Avoid placing hands/fingers in pinch point locations • In extreme temperatures, ensure all personnel have proper clothing, hydration, and heat/cold protection (e.g., canopy, fan, glove warmers)	Technician

JOB SAFETY ANALYSIS (JSA)

OVERSIGHT OF SOIL BORINGS AND WELL INSTALLATION ACTIVITIES

Safety Means Awareness Responsibility Teamwork

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
9	Contractor oversight/ management of hole clearance/drilling activities	• Traffic • Slip/trip/fall hazards • Back strain • Underground utilities • Contaminant exposure • Heat/cold stress	• Maintain awareness of on-site traffic and practice good house keeping • Ensure subcontractors don proper PPE (e.g., face shield, leather/cotton gloves, hearing protection) and utilize proper lifting techniques • If non-native material (e.g., pea gravel, sand, fill material) or underground utilities are observed, utilize SWA and assess situation • Monitor safe drill movement/positional setup • Monitor breathing zone and refer to HASP for action levels • Monitor all personnel for signs and symptoms of heat/cold stress and refer to HASP for recommendations • Be aware of unsafe hoisting and material handling practices • Be aware of proper augering and auger handling techniques	Technician
10	Site/boring security	• Traffic • Slip/trip/fall hazards • Back strain	• Wear leather/cotton gloves when moving barricades • Maintain awareness of on-site traffic and walking surfaces • Use proper lifting techniques and buddy system if needed. Ensure area is clean of debris • Secure boring location if open overnight	Technician

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(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate."

JOB SAFETY ANALYSIS (JSA)

SILT FENCE INSTALLATION

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. All project personnel have the authority and responsibility to use **Stop Work Authority.**

Date Issued/Revised	April 2014	JSA Type	Construction
Work Type	Construction	Client	
Work Activity	Silt Fence Installation Activities		
Work Site	The Batavia Former MGP Site – Batavia, New York		
Key Equipment	Skidsteer, Sledge Hammer, Shovel		
Task-specific Training	Mobile Equipment Operations, PPE, Hand and Power Tool Safety		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (SEE JOB STEPS FOR TASK-SPECIFIC REQUIREMENTS)			
☒ REFLECTIVE VEST*	☐ GOGGLES	☐ APR*	☒ GLOVES*
☒ HARD HAT	☐ FACE SHIELD*	☐ SUPPLIED AIR RESPIRATOR*	☐ COVERALLS*
☐ LIFELINE / HARNESS*	☐ HEARING PROTECTION*	☐ PPE CLOTHING*	☐ OTHER* _____
☒ SAFETY GLASSES	☒ STEEL TOED BOOTS	☐ OTHER* _____	☐ OTHER* _____
ADDITIONAL PPE: * Provide specific type(s) or descriptions of this item below			
Reflective Vest - Class II Gloves - Leather			

Reviewed By	**Position/Title**	**Date**	**Reviewed By**	**Position/Title**	**Date**

JOB SAFETY ANALYSIS (JSA)

SILT FENCE INSTALLATION

JOB STEPS [1]	TASK ACTIVITY	POTENTIAL HAZARD(S) [2]	CORRECTIVE MEASURE(S)[3]	Person Responsible
1	Perform the STAR Process and discuss Stop Work Authority (SWA) Equipment Inspection	• Hydraulic failure • Instrument/monitor failure	• Inspect equipment lines and fluid reservoirs – document inspection. • Calibrate instrument prior to use – document calibration.	Personnel involved in this activity
2	Underground Utilities	• Impact, breach or rupture of underground utilities	• Inspect area. • Call underground utility locator and monitor locator during locating activities. • Verify all markings, locations and procedures prior to installation work.	Personnel involved in this activity
3	Installation zone inspection	• Underground Insects, nests and hives; • Poisonous plants; • Stinging/biting insects • Chemical hazards	• Visually inspect area of fence installation for any activity regarding hornets, yellow jackets, bees, fire ants or termites. A slow walk or drive along the fence path prior to excavation to inspect for insects flying in and out or ground, ant humps or mounds and trails.	Personnel involved in this activity
4	Silt fence trough (pathway) excavation	• Struck-by/against; • Utilities; • Chemical hazards; • Cross-contamination	• Setup safe work area. Use a spotter when moving equipment. • Use a spotter when digging to assist with observing for underground installations. Spotter will be used when working near overhead lines to assist equipment operator and keep machine away/out of lines. • Control areas where excavator will travel. Attempt to keep excavator tires out of impacted spoils and areas. Employees are to setup work area access to minimize spread of contamination.	Personnel involved in this activity
5	Hand tool use	• Improper hammer/tool selection; • Improper stapler use • Potential cuts/abrasions • Chemical hazards	• Use only a hammer of a weight and handle length appropriate to individual laborers' capability. Inspect every post and hammer for signs of metal fatigue/fractures. Inspect stapler for correct staple installation. Inspect stapler and test operation for gauging correct drive pressure. Use staples of a length needed for the job. Safety glasses and awareness of installer hand location during use of a hammer or staple gun. • Ensure that all hand tools (fence post driver, shovel, etc.) are in good working condition. • Wear proper PPE such as stout leather gloves to prevent trauma to hands. • Use work practices that do not generate visible dust levels.	Personnel involved in this activity
6	Fence layout activities	• Back or muscle strain	• Use the 'buddy system' during fence installation. 100' fence rolls require a coordinated two-man effort to place fence correctly and according to Mfg. requirements.	Personnel involved in this activity

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(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable and quantified terms. Avoid subjective general statements such as, "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

SOIL AND GROUNDWATER SAMPLING ACTIVITIES

Safety Means Awareness Responsibility Teamwork

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Date Issued/Revised	April 2014	**JSA Type:**	Soil and Groundwater Sampling Activities
Work Type	Construction	**Client:**	
Work Activity	Soil and Groundwater Sampling Activities		
Work Site	The Batavia Former MGP Site – Batavia, New York		
Key Equipment			
Task-specific Training	40 HR and 8 HR HAZWOPER, PPE, Hand and Power tool Safety and Hazard Communication		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)					
☒ Reflective Vest	☐ Goggles	☒ Gloves*	**Supplied Air**	**APR**	
☒ Hard Hat	☐ Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate ☐ Organic Vapor
☐ Lifeline/Harness*	☐ Hearing Protection*	☐ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined
☒ Safety Glasses	☒ Safety-toed Boots				☐ Acid Gas
☐ Other*			☐ Other*	☐ Other*	
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)					
Gloves – nitrile for sampling. Light duty mechanic style gloves for moving equipment and supplies around the site					

Reviewed By	**Position/Title**	**Date**	**Reviewed By**	**Position/Title**	**Date**

JOB SAFETY ANALYSIS (JSA)

SOIL AND GROUNDWATER SAMPLING ACTIVITIES

Safety Means Awareness Responsibility Teamwork

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Mitigating Measure(s)[3]	Person Responsible
1	Perform the STAR Process (Stop Think Act Review) and discuss Stop Work Authority (SWA) -	• Site personnel not aware of STAR and SWA	• Project team to discusses importance of and documentation procedures for SWA during pre-job safety meeting • Use SWA to stop any work that is unsafe	Sampling Technician
2	Inspect and calibrate sampling and monitoring equipment	• Lost time from improperly functioning equipment • Incorrect sampling procedures/ collection due to malfunctioning equipment	• Ensure all equipment is functioning properly • Wear light duty mechanic style gloves	Sampling Technician
3	Prepare to collect soil and/or groundwater samples	• Lifting hazards • Back injury • Manual material handling • Pinch points • Cuts • Punctures • Sample misidentification • Electrical Shock Hazards	• Wear Ndex nitrile gloves over light duty mechanic style gloves • Size up the load; if the object is too large or odd shaped OR is in excess of 50 pounds then assistance (mechanical or a buddy lift) will be required • Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and keep lower back in a neutral position • Avoid one-handed carrying if possible; maintain awareness of footing • No bending or twisting while under load • Refer to the HASP for additional lifting information • Avoid placing hands/fingers in pinch point locations • Use proper tools when opening container packaging • Do not use fixed open blade knives when opening boxes or containers • Ensure the sample id label matches sample location with site plan site supervisor/subcontractor	Sampling Technician
4	Sample collection	• Contaminant exposure • Cuts from container breakage • Sample misidentification	• Wear Ndex nitrile gloves over light duty mechanic style • Inspect glass bottles for breaks/cracks • Do not attempt to use any suspect containers • Close glass sample containers carefully to avoid breakage • Check sample labels for accuracy prior to placing in cooler	Sampling Technician
5	Headspace screening of soil samples	• Contaminant exposure • Incorrect headspace readings	• Wear Ndex nitrile gloves over light duty mechanic style • Ensure proper calibration of equipment	Sampling Technician
6	Sample selection	• Bottle breakage • Contaminant exposure • Pinch points • Lost time due to incorrect sample selection	• Wear Ndex nitrile gloves over light duty mechanic style • Confirm selected samples are correct based on work plan selection criteria, PID readings, and soil boring logs • Avoid placing hands/fingers in pinch point locations (e.g., between cooler and lid)	Sampling Technician

JOB SAFETY ANALYSIS (JSA)

SOIL AND GROUNDWATER SAMPLING ACTIVITIES

Safety Means Awareness Responsibility Teamwork

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Mitigating Measure(s)[3]	Person Responsible
7	Packing samples in cooler(s)	• Bottle breakage • Contaminant exposure • Cuts • Pinch points • Lifting hazards • Back injury • Manual material handling • Lost time due to incorrect sample packaging or hold time exceedances	• Wear Ndex nitrile gloves over light duty mechanic style • Pack glass containers in bubble wrap • Check COC against sample labels for accuracy before shipping • Avoid placing hands/fingers in pinch point locations (e.g., between cooler and lid) • Use proper lifting techniques as discussed in step 3 • If possible use a dolly or cart if cooler is heavy or has to be moved over a long distance • Ensure equipment and supplies are loaded correctly and do not shift during transport	Sampling Technician
8	Investigation derived waste (IDW) management	• Contaminant exposure • Lifting hazards • Back injury • Manual material handling • Pinch points • Slips/trips/fall hazards • Mislabeled waste	• Wear Ndex nitrile gloves over light duty mechanic style • Use proper lifting techniques as discussed in step 3 • Avoid placing hands/fingers in pinch point locations • Maintain awareness of walking surfaces • Label IDW with generator, a contact number, identification of contents, and site location • Specify IDW as either hazardous or non-hazardous material	Sampling Technician

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(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

STOCKPILE SOIL SAMPLING ACTIVITIES

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. All project personnel have the authority and responsibility to use **Stop Work Authority.**

Date Issued/Revised	April 2014	**JSA Type:**	Stockpile Soil Sampling Activities
Work Type	Construction	**Client:**	
Work Activity	Stockpile Soil Sampling Activities		
Work Site	The Batavia Former MGP Site – Batavia, New York		
Key Equipment			
Task-specific Training	40 HR and 8 HR HAZWOPER, PPE and Hazard Communication		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)					
☒ Reflective Vest	☐ Goggles	☒ Gloves*	**Supplied Air**	**APR**	
☒ Hard Hat	☐ Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate ☐ Organic Vapor
☐ Lifeline/Harness*	☐ Hearing Protection*	☒ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined
☒ Safety Glasses	☒ Safety-toed Boots				☐ Acid Gas
☐ Other*			☐ Other*	☐ Other*	
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)					
Gloves – nitrile for sampling. Light duty mechanic style gloves for moving equipment and supplies around the site					

Reviewed By	**Position/Title**	**Date**	**Reviewed By**	**Position/Title**	**Date**

JOB SAFETY ANALYSIS (JSA)

STOCKPILE SOIL SAMPLING ACTIVITIES

Safety Means Awareness Responsibility Teamwork

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Mitigating Measure(s)[3]	Person Responsible
1	Perform the STAR Process (Stop Think Act Review) and discuss Stop Work Authority (SWA) -	• Site personnel not aware of STAR and SWA	• Project team to discusses importance of and documentation procedures for SWA during pre-job safety meeting • Use SWA to stop any work that is unsafe	Site Personnel
2	Inspect and calibrate sampling and monitoring equipment	• Lost time from improperly functioning equipment • Incorrect sampling procedures/ collection due to malfunctioning equipment	• Ensure all equipment is functioning properly • Wear light duty mechanic style gloves • Complete Quality Control documents	Sampling Technician
3	Prepare to collect soil samples	• Lifting hazards • Back injury • Manual material handling • Pinch points • Cuts • Punctures • Sample misidentification	• Wear Ndex nitrile gloves over light duty mechanic style gloves • Size up the load; if the object is too large or odd shaped OR is in excess of 50 pounds (23 kg) then assistance (mechanical or a buddy lift) will be required • Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and keep lower back in a neutral position • Avoid one-handed carrying if possible; maintain awareness of footing • No bending or twisting while under load • Refer to the HASP for additional lifting information • Avoid placing hands/fingers in pinch point locations • Use proper tools when opening container packaging • Do not use fixed open blade knives when opening boxes or containers • Ensure the sample id label matches sample location with site plan site supervisor/subcontractor	Sampling Technician
4	Sample collection	• Contaminant exposure • Cuts from container breakage • Sample misidentification	• Wear Ndex nitrile gloves over light duty mechanic style • Inspect glass bottles for breaks/cracks • Do not attempt to use any suspect containers • Close glass sample containers carefully to avoid breakage • Check sample labels for accuracy prior to placing in cooler	Sampling Technician
5	Headspace screening of samples	• Contaminant exposure • Incorrect headspace readings	• Wear Ndex nitrile gloves over light duty mechanic style • Ensure proper calibration of equipment	Sampling Technician
6	Sample selection	• Bottle breakage • Contaminant exposure • Pinch points • Lost time due to incorrect sample selection	• Wear Ndex nitrile gloves over light duty mechanic style • Confirm selected samples are correct based on work plan selection criteria, PID readings, and soil boring logs • Avoid placing hands/fingers in pinch point locations (e.g., between cooler and lid)	Sampling Technician

JOB SAFETY ANALYSIS (JSA)

STOCKPILE SOIL SAMPLING ACTIVITIES

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Mitigating Measure(s)[3]	Person Responsible
7	Packing samples in cooler(s)	• Bottle breakage • Contaminant exposure • Cuts • Pinch points • Lifting hazards • Back injury • Manual material handling • Lost time due to incorrect sample packaging or hold time exceedances	• Wear Ndex nitrile gloves over light duty mechanic style • Pack glass containers in bubble wrap • Check COC against sample labels and SSOW for accuracy before shipping • Avoid placing hands/fingers in pinch point locations (e.g., between cooler and lid) • Use proper lifting techniques as discussed in step 3 • If possible use a dolly or cart if cooler is heavy or has to be moved over a long distance • Ensure equipment and supplies are loaded correctly and do not shift during transport	Sampling Technician
8	Investigation derived waste (IDW) management	• Contaminant exposure • Lifting hazards • Back injury • Manual material handling • Pinch points • Slips/trips/fall hazards • Mislabeled waste	• Wear Ndex nitrile gloves over light duty mechanic style • Use proper lifting techniques as discussed in step 3 • Avoid placing hands/fingers in pinch point locations • Maintain awareness of walking surfaces • Label IDW with generator, a contact number, identification of contents, and site location • Specify IDW as either hazardous or non-hazardous material	Sampling Technician

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(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

SUB-SLAB VAPOR PROBE INSTALLATION AND SAMPLING USING SUMMA CANISTERS

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. CRA personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised:	April 2014	**JSA Type:**	Sub-Slab Vapor Probe Installation and Sampling Using Summa Canisters
Work Type:	Sub-slab installation and air sampling	**Client:**	
Work Activity:	Installing sub slab vapor probes ,sampling with SUMMA canisters with mass flow controllers, purging probe with low flow pump		
Work Site:	The Batavia Former MGP Site – Batavia, New York		
Key Equipment:	SUMMA canisters, mass flow controllers, low volume pump, sub slab probes, drill		
Task-specific Training:	Safety Introduction/Briefing, 40-HR (initial) and 8-HR Refresher HAZWOPER training, Hazard Communication Training, Personal Protective Equipment		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)

☐ Reflective Vest	☐ Goggles	☒ Gloves*	**APR:**			☐ Particulate
☐ Hard Hat	☐ Face Shield*	☐ Coveralls*		☐ Half Mask APR	☐ Full Face APR	☐ Organic Vapor
☐ Lifeline/Harness*	☒ Hearing Protection*	☐ PPE Clothing*	☐ Supplied Air	☐ SCBA	☐ Airline Respirator	☐ Particulate/Organic Vapor Combined
☒ Safety Glasses	☒ Safety-toed Boots				(attach description)	☐ Acid Gas
☐ Other*				☐ Other*		☐ Other*

ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)

Gloves – Leather When handling Cement / Gloves – Nitrile For Sampling

Reviewed By	Position/Title	Date	Reviewed By	Position/Title	Date

JOB SAFETY ANALYSIS (JSA)

SUB-SLAB VAPOR PROBE INSTALLATION AND SAMPLING USING SUMMA CANISTERS

Safety Means Awareness Responsibility Teamwork

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	Discuss STAR (Stop Think Act & Review) and Stop Work Authority (SWA)	• Near Loss, Injury, and even Death	• Identify any hazards. Modify the JSA accordingly. Discuss the task and expectations of the task to all personnel. Have all applicable personnel sign off on this JSA prior to starting work. • Project team to discuss the importance of and documentation procedures for SWA during pre-job safety meeting. Use SWA to stop any work that is unsafe.	Technicians
2	The concrete slab is drilled with a ½" drill bit until it punctures through the bottom of the slab. When selecting a ½" drill bit, choose a bit that is several inches longer than what is required to puncture through the bottom of the slab	• Kick back from the drill, flying concrete debris, rebar • Loud noise from drilling and coring concrete slab • Inadequate working space/confined space.	• Ensure adequate working space for drilling procedure, select sample location in an open space • Wear safety goggles to protect eyes from any debris. Wear safety boots to protect your feet should the drill slip. Drill as straight as possible to reduce the risk of the drill bit getting stuck • Keep legs bent and outward, if the drill kicks back your legs/knees will not be hit by the drill	Technicians
3	Use a 2" drill bit to drill 2" into the concrete slab directly above the ½" drilled hole to facilitate working space to install the probe	• Kick back from the drill, flying concrete debris, rebar • Loud noise from drilling and coring concrete slab • Inadequate working space/confined space.	• Wear safety goggles to protect eyes from any debris. Wear safety boots to protect your feet should the drill slip. Drill as straight as possible to reduce the risk of the drill bit getting stuck • Ensure adequate working space for drilling procedure, select sample location in an open space • Keep legs bent and outward, if the drill kicks back your legs/knees will not be hit by the drill	Technicians
4	Install sub slab vapor probe in 1'2 hole Secure with Rockite Cement	• Rockite cement dries quickly and can adhere to skin • Pinch points/poking injuries from clip used to hold probe in place	• Wear gloves to protect hands and skin from cement • Clip fits snugly on probe- insert probe on clip holding the clip away from the body to reduce the risk of poking injuries	Technicians
5	Once sub-slab probe has been installed, purge three volumes of ambient air from probe. Purge with low volume pump at 100 mls/min for appropriate length of time to remove the three volumes of air from the probe	• Pinch points, objects falling	• Ensure pump is placed on a flat surface to avoid tipping or falling	Technicians
6	One end of the tubing is attached to the inlet of the pump, the other is placed in the sub- slab probe. Leak testing can be performed at the same time using a helium shroud	• Tubing tangled, pump falling • Compressed gas tank tipping over	• Ensure tubing does not tangle, keep straight to prevent pump from falling • Ensure eye ware is on when using gas • Keep gas on a stable surface so the tank does not fall over	Technicians
7	One purging is complete, prepare summa canister for sampling. Place summa canister on a level flat surface	• Canister can fall or slip during installation process	• Wear steel toed boots and insure canister is placed securely on a flat level surface, big enough to support the bottom of the canister	Technicians
8	Remove swage nut from top of canister and attach the mass flow controller to the top of the canister, ensure controller is secured tightly to prevent leaking	• Pinch points	• Use correct size wrench to remove swage nut and secure controller	Technicians

JOB SAFETY ANALYSIS (JSA)

SUB-SLAB VAPOR PROBE INSTALLATION AND SAMPLING USING SUMMA CANISTERS

Safety Means Awareness Responsibility Teamwork

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
9	Open valve of canister all the way and once sampling time is complete, close valve on canister	• Pinch points, canister falling	• Valve should be open and tighten by hand, not a wrench • Ensure canister is on a level surface, wear steel toed boots to protect feet	Technicians
10	One valve is closed securely, remove mass flow controller with wrench and replace swage not on top of canister	• Pinch points	• Use appropriate size wrench to remove the controller and to tighten the swage nut once sampling is complete	Technicians
11	Replace canister and mass flow controller in appropriate boxes for shipping	• Pinch points and falling objects	• Wear steel toed boots , to minimize pinch points, place equipment in boxes that they were shipped in for delivery to lab	Technicians
12	Sub-slab probes will stay installed in the slab for another sampling event-cover hole with flush mount monitoring well cover	• Pinch points/trips and falls	• Cover hole carefully, ensure fingers are not trapped beneath cover. Secure covers with appropriate hardware to prevent trips and falls	Technicians

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

SURVEYING AND COMMUNITY AIR MONITORING ACTIVITIES

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. All project personnel have the authority and responsibility to use **Stop Work Authority.**

Date Issued/Revised	April 2014	**JSA Type**	Surveying and Community Air Monitoring Activities
Work Type	Construction	**Client**	
Work Activity	Surveying and Community Air Monitoring Activities		
Work Site	The Batavia Former MGP Site – Batavia, New York		
Key Equipment	GPS Unit, Grade Rod, Stakes, Hammer, Wood Lathe, Ribbon, Tripods, Air Monitoring Equipment		
Task-specific Training	Flagger safety; Traffic control devices; PPE, Mobile Equipment Operations		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (SEE JOB STEPS FOR TASK-SPECIFIC REQUIREMENTS)			
☒ REFLECTIVE VEST*	☐ GOGGLES	☐ APR: _____ *	☒ GLOVES* Leather
☒ HARD HAT	☐ FACE SHIELD*	☐ SUPPLIED AIR RESPIRATOR*	☐ COVERALLS*
☐ LIFELINE / HARNESS*	☐ HEARING PROTECTION*	☐ PPE CLOTHING*	☐ OTHER*
☒ SAFETY GLASSES	☒ STEEL TOED BOOTS	☐ OTHER* _____	☐ OTHER* _____

ADDITIONAL PPE: * Provide specific type(s) or descriptions of this item below

Reflective Vest – Class II

Gloves - Leather gloves for mobilization and demobilization equipment

Reviewed By	Position/Title	Date	Reviewed By	Position/Title	Date

JOB SAFETY ANALYSIS (JSA)

SURVEYING AND COMMUNITY AIR MONITORING ACTIVITIES

JOB STEPS [1]	TASK ACTIVITY	POTENTIAL HAZARD(S) [2]	CORRECTIVE MEASURE(S)[3]	Person Responsible
1	Perform the STAR Process and discuss Stop Work Authority (SWA) Perform Review "General Site Activities" JSA.	• Failing to identify hazardous conditions resulting in losses or near losses.	• Perform the STAR Process STAR. • Assess the risks. • Determine the hazards of performing the task and survey the work area. • Consider weather conditions such as fog that could reduce visibility. • Always consider the worst case scenario. • Analyze the hazards determined. • Decide a plan of action to eliminate or reduce the hazards and act on it.	Survey or Air Monitoring Technician
2	Mob equipment to surveying area	• Potential back Injuries loading equipment; • Pinch points; • Moving or flying projectiles inside vehicle while transporting equipment; • Slip/trip/fall; • Biological hazards. • Struck by moving vehicles	• Follow proper lifting procedure identified in the HASP; • Wear leather gloves when moving equipment around; • Review JSA and HASP; • Practice STAR; • Properly secure all equipment inside the vehicle. • Contact the owner of any public roadway (State or City) to determine requirements for surveying on or along their roadway. • Develop a Temporary Traffic Control Plan (TTCP) if surveying activities will be taking place on or along the shoulder of a public highway. • Set up a Temporary Traffic Control Zone (TTCZ) if surveying activities will be taking place on or along the shoulder of a public highway. The TTCP will describe the set up of the TTCZ.	Survey or Air Monitoring Technician
3	Setup in work zone	• Struck by oncoming traffic/heavy equipment; • Slip/trip/fall; • Biological hazards; • Potential back injuries from moving equipment; • Heat/Cold Stress; • Struck by moving vehicles	• Communication with other personnel/heavy equipment operators to notify them of survey team presence; • Position a company truck with flashers on for added protection and to aid in the protection of the survey crew as they set up the TTCZ; • Follow hot/cold stress procedures presented in the HASP. Ensure fluid intake and clothing/PPE is appropriate for conditions.	Survey or Air Monitoring Technician

JOB SAFETY ANALYSIS (JSA)

SURVEYING AND COMMUNITY AIR MONITORING ACTIVITIES

JOB STEPS (1)	TASK ACTIVITY	POTENTIAL HAZARD(S) (2)	CORRECTIVE MEASURE(S)(3)	Person Responsible
4	Conduct survey activities	• Struck by oncoming traffic; • Slip/trip/fall; • Potential injuries from misuse of tools or use of tools in disrepair; • Splinters, eye injuries from broken stakes; • Utility strikes; • Biological hazards; • Weather • Struck by moving vehicles	• Wear hi-visibility safety vest, steel-toed boots, safety glasses, and hard hat; • Do not use old or faded PPE; • Make sure that proper PPE is being worn; • Notify nearby equipment of changes in you activities/movement through work area; • Inspect tools; • Repair/replace tools as necessary; • Visually inspect stakes prior to driving into ground. Do not use stakes that are cracked, split, have large knots, etc; • Perform utility clearance to with clients representative to verify presence of underground utilities to avoid driving grade stakes through any underground obstructions; • Watch for snakes, insects, animals, etc; avoid walking though tall grass and shrubs as much as possible; • Check weather prior to entering work area; • Should conditions be windy, wear spoggles (safety glass goggles) to prevent dirt and debris from getting into the eyes; • Wear sunscreen, as required; • If thunder is heard o lightning seen, leave work area immediately and take shelter; do not re-enter work area until 30 minutes after last lightning strike is seen	Survey or Air Monitoring Technician
5	Exit work zone	• Struck by oncoming traffic; • Slip/trip/fall; • Biological hazards; • Weather • Struck by moving vehicles	• Walk through clear paths, especially when carrying equipment; watch for and avoid rough terrain as much as possible; • Note traffic patterns, make sure path to vehicle is clear and notify nearby equipment you are moving through their path; • Watch for snakes, insects, animals, etc; avoid walking though tall grass and shrubs as much as possible; • Check weather prior to entering work area; • Should conditions be windy, wear spoggles (safety glass goggles) to prevent dirt and debris from getting into the eyes; • Wear sunscreen, as required; • If thunder is heard o lightning seen, leave work area immediately and take shelter; do not re-enter work area until 30 minutes after last lightning strike is seen.	Survey or Air Monitoring Technician

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(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress / ergonomics / lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught"

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable and quantified terms. Avoid subjective general statements such as, "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

TRASH PUMP SETUP AND OPERATION

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. All project personnel have the authority and responsibility to use **Stop Work Authority.**

Date Issued/Revised	April 2014	JSA Type	Construction
Work Type	Construction	Client	
Work Activity	Setup and operation of 2" and 3" trash pumps		
Work Site	The Batavia Former MGP Site – Batavia, New York		
Key Equipment	Trash pump; fittings; hose sections; safety fuel can;		
Task-specific Training	40 HR and 8 HR HAZWOPER, HAZCOM, PPE Hand and Power Tool Safety		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (SEE JOB STEPS FOR TASK-SPECIFIC REQUIREMENTS)			
☒ REFLECTIVE VEST*	☒ GOGGLES – as necessary	☐ APR: _____*	☒ GLOVES* see below
☒ HARD HAT	☐ FACE SHIELD*	☐ SUPPLIED AIR RESPIRATOR*	☐ COVERALLS*
☐ LIFELINE / HARNESS*	☒ HEARING PROTECTION*	☐ PPE CLOTHING*	☐ OTHER* _____
☒ SAFETY GLASSES	☒ STEEL TOED BOOTS	☐ OTHER* _____	☐ OTHER* _____
ADDITIONAL PPE: * Provide specific type(s) or descriptions of this item below			
Reflective Vest - Class II Gloves - Leather			
Hearing Protection - NRR 20			

Reviewed By	**Position/Title**	**Date**	**Reviewed By**	**Position/Title**	**Date**

JOB SAFETY ANALYSIS (JSA)

TRASH PUMP SETUP AND OPERATION

JOB STEPS [1]	TASK ACTIVITY	POTENTIAL HAZARD(S) [2]	CORRECTIVE MEASURE(S)[3]	Person Responsible
1	Perform the STAR Process and discuss Stop Work Authority (SWA)	• Slips, Trips, Falls • Situational risks	• Verify personnel's training is sufficient for the scheduled task(s). • Is job instruction training (hands-on) training necessary? • Employees should remove finger rings, necklaces, or jewelry, which may be hazardous in equipment operation.	All Affected Personnel
2	Equipment Safety Checklist	• Faulty hose connections; • Damaged hoses and fittings	• Replace worn or damaged hoses and fittings. • Replace hose connections with operational connections. • Perform an overall inspection of the equipment for any defects or signs of damage. • Refer to the specific pump's equipment manufacturer's operating manual before using the equipment.	All Affected Personnel
3	Pump and hose set-up	• Slip, Trip, Fall; • Uneven terrain; • Wet, icy, and muddy conditions; • Material Handling – Back sprains and strains; • Struck-by and Line of Fire; • Pinch-points.	• Be aware of your surrounding conditions (footing, weather conditions, etc.) • Use proper lifting techniques; "straight back-bent knee" lifting approach. Have a "buddy" assist with the lift. • Use gloves to ensure a secure grip. • Grab the equipment only at designated handles or if none are available, at locations where the hands and fingers will not get caught in the equipment or smashed. • Test the weight of the equipment before lifting. • Straighten out hoses before connection and keep them out of high traffic areas. • Be aware of "stored energy" hazards presented by hoses.	All Affected Personnel
4	Equipment Fueling/Refueling	• Fires; Explosions; • Chemical hazard	• Turn off equipment before fueling and let it first cool down prior to refueling. • No smoking while fueling. • Do not use cell phones while fueling. • Store fuel in proper safety containers only. • If transferring fuel from large vessels into portable cans, use proper grounding or bonding techniques. • Do not fuel the equipment when it is hot. • Wear gloves and wash hands after fueling.	All Affected Personnel
5	Starting the pump	• Back Strains; • Slippery Conditions	• Make sure the starting cord is free pulling. Test the cord before pulling. • Be aware of your surrounding conditions. Make sure Slip/Trip/Fall/ hazards were properly identified and corrected.	Assigned Laborer
6	Pump Operation	• Splash Hazards; • Hot Surfaces; • Noise	• Remove worn or damaged hoses until they can be repaired or replaced. • Keep hands away from the exhaust or hot components of the equipment. • Be aware of any unguarded moving parts on the equipment.	Assigned Laborer

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(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable and quantified terms. Avoid subjective general statements such as, "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

WASTEWATER TANK SAMPLING ACTIVITIES

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. All project personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised	April 2014	**JSA Type**	Wastewater Tank Sampling Activities
Work Type	Construction	**Client**	
Work Activity	Wastewater Tank Sampling Activities		
Work Site	The Batavia Former MGP Site – Batavia, New York		
Key Equipment			
Task-specific Training	40 HR and 8 HR HAZWOPER, PPE and Hazard Communication		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)					
☐ Reflective Vest	☐ Goggles	☒ Gloves*	**Supplied Air**	**APR**	
☒ Hard Hat	☐ Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate ☐ Organic Vapor
☐ Lifeline/Harness*	☐ Hearing Protection*	☐ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined
☒ Safety Glasses	☒ Safety-toed Boots				☐ Acid Gas
☒ Other* Fire Retardant Coveralls			☐ Other*	☐ Other*	
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)					
Gloves - nitrile					

Reviewed By	**Position/Title**	**Date**	**Reviewed By**	**Position/Title**	**Date**

JOB SAFETY ANALYSIS (JSA)

WASTEWATER TANK SAMPLING ACTIVITIES

Safety Means Awareness Responsibility Teamwork

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	Perform the STAR Process (Stop Think Act Review) and discuss Stop Work Authority (SWA) -	• Slips, trips, falls; • Situational risks - use STAR;	• Verify personnel training is sufficient for scheduled task(s). Is Job Instruction (hands-on) Training necessary?	All Project Personnel
2	Locate the sampling point	• Pinch fingers/hands • Sharp edges • Slips and trips while on top of tanks • Falls from ladders, stairways or on top of tanks	• Wear eye protection • Wear nitrile gloves • Use caution when climbing ladders or stairs • Keep workboots free of mud	All Project Personnel
3	Sample collection	• Slip/trip/fall hazards • Contaminant exposure • Sample misidentification	• Prepare the proper sample container • Wear nitrile gloves while collecting the sample • Wear cut resistant gloves to prevent cuts from broken sample containers • Do not use any suspect containers • Close containers carefully to avoid breakage • Check sample labels for accuracy prior to placing in cooler	All Project Personnel
4	Cover the sampling port (location)	• Pinch fingers/hands • Sharp edges • Slips and trips while on top of tanks • Falls from ladders, stairways or on top of tanks	• Wear leather gloves • Use caution when unfastening the cover straps • Use two people remover box cover • Wear eye protection	All Project Personnel
5	Packing samples in cooler(s)	• Bottle breakage • Back injury • Contaminant exposure • Cuts • Pinch points • Back strain • Lost time due to incorrect sample packaging or hold time exceedances	• Wear nitrile gloves when handling sample containers • Wear cut resistant gloves to prevent cuts from broke sample containers • Pack glass containers in bubble wrap • Check COC against sample labels for accuracy before shipping • Avoid placing hands/fingers in pinch point locations • Use proper lifting techniques and buddy system if needed • Ensure equipment and supplies are loaded correctly and do not shift during transport • Use proper lifting techniques – no bending or twisting while under load • Refer to the HASP for additional lifting information	All Project Personnel

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Attachment B

Project Safety Forms

- HASP Training Acknowledgement Form
- Daily Safety Meeting Form
- Incident Reporting Form
- Safety Inspection Checklist for Excavations
- Safety Inspection Checklist for Mobile Equipment
- Hot Work Permit and Checklist
- Manlift Daily Equipment Checklist

CONESTOGA-ROVERS & ASSOCIATES (CRA) INCIDENT REPORTING FORM

CRA Inc and Ltd – Incidents must be called into Incident Hot Line: 1-866-529-4886
CRA Europe – Incidents must be called into the Head Office during working hours (0115 965 6700) and to the CRA Europe Incident Hotline afterhours (0773 076 2845)

Instructions: For Personal Injuries, Occupational Illnesses, and Property Damage, complete Sections 1 and 2.
For Vehicle Accidents, Complete Sections 1, 2, and 4. **Initial report must be submitted within 24 hours.**

Report Status (insert date)	**Initial Report**	**Update Report**	**Final Report**	**Verification/Validation**	**Report Input into SMART Database**

SECTION 1

A. Employee Identification ☐ **CRA Employee** ☐ **Temporary Employee** ☐ **Subcontractor**

Employee No.	Last Name	First Name	Middle Name/Initial	☐ Male ☐ Female

Area Code ( ) Telephone Number	Employee Home Address (Street, City, State/Province/County, Postal/Zip Code)

Date of Hire Month Day Year	Position/Title	Supervisor	Employee's Company/Home Office Location

B. General Information

Where did the Incident occur and which country? ☐ Office ☐ Project Site ☐ Other _____ ☐ Canada ☐ United States ☐ UK	Type of incident (Check all that apply) ☐ Employee Injury/Illness ☐ Vehicle Accident ☐ Property Damage Only

Address of Incident (City, State/Providence/County, Postal/Zip Code)	Specific Location of incident (e.g., where on site)

Date and Hour of Incident Month Day Year	a.m. p.m.	Date and Hour Reported to Employer Month Day Year	a.m. p.m.	Date and Hour Last Worked Month Day Year	a.m. p.m.	Time Employee Began Work	a.m. p.m.

Normal Work Hours From:. To:	Witnesses? ☐ Yes ☐ No	Witness Name and Telephone Number

C. Project Information (Project Related Incident Only) Project Related? ☐ Yes ☐ No

Project #	Project Name	Project Manager	Site Telephone Number ( )	Project Manager Cell Number ( )

Client Name	Was the Client Advised of the Incident? ☐ Yes ☐ No	Name of Person Contacted	Date and Time Contacted

SECTION 2

A. Details of the Incident

1. What job/task was being performed when the incident occurred? (Example: collecting groundwater samples).

2. Provide a detailed description of the employee's specific activities at the time of the incident. Include details of equipment/materials being used, including the size and weight of objects being handled, and weather conditions at time of the incident. If necessary, attach additional pages to the report.

3. For injuries, identify the specific part of body injured, and specify left or right side. For illnesses, identify and describe the affected area/body part.

4. Identify the object or substance that directly injured the employee and how. Include size, weight, and shape of object, quantity of substance, etc.

5. Identify property damaged and how it was damaged (include owner of property, nature and source of damage, and model and serial number, if appropriate).

B. Health Care/Medical Treatment

Employee received health care? ☐ Yes ☐ No	Identify the type of health care provided and where it was performed. **(Check all that apply).** ☐ First Aid ☐ Medical treatment other than first aid (sutures, etc.) ☐ Hospitalized ☐ Clinic ☐ Hospital emergency room ☐ On location by self or CRA employee) ☐ On site by EMT

Name of Health Care Provider, Physician Name, Phone Number, Address (Street, City, Province/State/County, and Postal/Zip Code)

SECTION 2 (continued)

C. Incident Investigation
☐ **5 Why Root Cause Analysis Investigation [Non-OSHA Recordable, <$5,000/£3,000 damage]**
☐ **Tap Root Cause Analysis [OSHA Recordable, and/or >$5,000/£3,000 damages]**

HASP prepared? ☐ Yes ☐ No ☐ N/A Submit a PDF of HASP and relevant JSA(s)/Risk Assessment to Investigation Team. If yes, was the HASP on site? ☐ Yes ☐ No	Did the safety plan identify and provide safety procedures for the specific tasks the employee was conducting when injured? ☐ Yes ☐ No If no, why not? (Explain) _____ Did the employee utilize the STAR process before initiating the task? ☐ Yes ☐ No If no, why not? (Explain) _____ Was the employee drug & alcohol tested post incident? ☐ Yes ☐ No

5-Why Root Cause: Incident Statement	Additional information: Attach photos, witness statement(s), affected employee statement, accident diagrams, as applicable, to the end of this document.
1. Why did "above" happen?	
2. Why did "1" happen?	
3. Why did "2" happen?	
4. Why did "3" happen?	
	See *Corrective Actions/Verification and Validation* Section (Page 4)
5. Why did "4" happen?	
6. Why did "5" happen?	

D. Accountability

Initial Report Date Month Day Year	Initial Report Prepared by: (please print)	Initial Report Prepared by: (signature)
Investigation Team	Company	Position/Title
Final Report Date Month Day Year	Final Report Prepared by: (please print)	Final Report Prepared by: (signature)

E. Stewardship

Will an Incident Summary be Prepared? ☐ Yes ☐ No By:	Disciplinary Action Taken? ☐ Yes ☐ No	
Quality Review By:	Date:	Findings:

CRA Inc & Ltd - Fax Completed Form to CRA's Incident Reporting Fax: (832) 485-5259
CRA Europe – Email Completed Form to the RSHM
Send Original to CRA's Incident Reporting Department, Houston, Texas

SECTION 3

A. Agency Reporting and Recording Information (To be completed by the Regional Safety and Health Manager)			
CANADA			
Provincial Regulatory Agency Reporting Required? ☐ Yes ☐ Not required	Employee Injury Information (Injury met the following criteria): ☐ First Aid ☐ Medical Treatment ☐ Critical Injury ☐ Modified Duty ☐ Lost Time Injury If medical treatment, what?		
Joint Safety and Health Committee Notified? ☐ Yes ☐ No	Total days of modified duty If exceeds 7 days, report to WSIB	Total days of lost time (if any)	Date employee returned to work Month Day Year
UNITED STATES			
OSHA Recordable Injury? ☐ Yes ☐ No OSHA Recordable.pdf	Employee Injury Information (Injury met the following OSHA 300 Log criteria) ☐ First Aid ☐ Medical Treatment ☐ Restricted Duty ☐Lost Time Injury If medical treatment, what?		
Total days of restricted duty:	Total days of lost time (if any)		Date employee returned to work Month Day Year
UNITED KINGDOM			
RIDDOR Reportable Injury? ☐ Yes ☐ No RIDDOR.pdf	Employee Injury Information (Injury met the following criteria): ☐ First Aid ☐ Medical Treatment ☐ Restricted Duty ☐Lost Time Injury If medical treatment, what? (HSE RIDDOR reporting: http://www.hse.gov.uk/riddor/report.htm)		
Total days of restricted duty:	Total days of lost time (if any)		Date employee returned to work Month Day Year

VEHICLE ACCIDENT SECTION

(Complete this Section for all Vehicle Accidents)

SECTION 4

A. Vehicle CRA Employee was Operating ☐ Personal ☐ CRA-Owned ☐ Rental - Rental Company:

License Plate No.	State/Province/County	Police Department City	State/Province/County
Vehicle Year/Make/Model	Odometer Reading at Time of Accident	Police Report Number	Weather Conditions

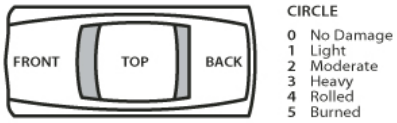
Name of Person Operating Vehicle

Address

City State/Province/County Postal/Zip Code

Telephone: Area Code ( )

"X" IN AREA OF VEHICLE DAMAGE



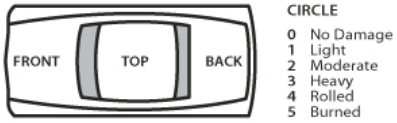
Description of Vehicle Damage:

B. Other Vehicles Involved

Name of Owner	Address	City/State/Prov./County/Postal/Zip	Area Code and Telephone Number ( )
Operator's Name (if different from above)	Address	City/State/Prov./County/Postal/Zip	Area Code and Telephone Number ( )

Year/Make/Model	Description of Property Damage:
Insurance Co. Name & Telephone	
License Plate No./State/Province	

"x" IN AREA OF VEHICLE DAMAGE



C. Injured Persons

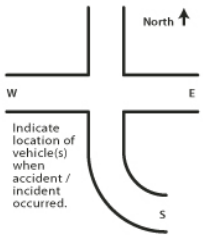
Name	Address Street, City, State/Prov./County/Postal/Zip Code	Phone Number	Nature of Injury	Indicate if Injured was a Vehicle Driver/ Passenger, CRA Employee, Other, or Pedestrian
1.				
2.				
3.				

D. Witnesses

Name	Address Street, City, State/Prov./County/Postal/Zip Code	Area Code and Telephone Number
1.		( )
2.		( )

E. Description of Accident

PLEASE COMPLETE OR ATTACH SEPARATE DIAGRAM



Was Ticket Issued? Reason:

☐ Other Operator

☐ CRA Operator

Report Date Month Day Year	Report Prepared by: (please print)	Report Prepared by: (signature)

Note: If Additional Space is Required to Complete this Report, Use Separate Sheet of Paper and Attach.

CRA Inc & Ltd - Fax Completed Form to CRA's Incident Reporting Fax: (832) 485-5259
CRA Europe – Email Completed Form to the RSHM
Send Original to CRA's Incident Reporting Department, Houston, Texas

INCIDENT REPORT
CORRECTIVE ACTIONS/VERIFICATION AND VALIDATION

Safety Means Awareness Responsibility Teamwork

Causative Factors and Corrective Actions						Verification (Did we do what we said we would do?) and Validation (Is it working?)		
Item No.	CF	Corrective Actions (Must match Causative Factor)	Responsible Party	Date Due	Date Completed	Verified By/ Validated By	Date	Details
						Verified By:		
						Validated By:		
						Verified By:		
						Validated By:		
						Verified By:		
						Validated By:		
						Verified By:		
						Validated By:		

CRA 10 CAUSATIVE FACTORS

Personal Factors		Company Factors		External Factors	
1	Insufficient training for task	5	Incomplete or no procedures	10	Exposure to conditions
2	Hurrying to complete the task	6	Procedures not known or enforced		
3	Easier if proper process not followed	7	Improper PPE		
4	Took shortcuts without prior incident	8	Improper tools		
		9	Improper workplace layout		

NL

CONESTOGA-ROVERS & ASSOCIATES (CRA) NEAR LOSS REPORTING FORM

CRA Inc and Ltd – A Significant Near Loss must be called into Incident Hot Line: 1-866-529-4886
CRA Europe – Incidents must be called into the Head Office during working hours (0115 965 6700) and to the CRA Europe Incident Hotline afterhours (0773 076 2845)

CRA SMART PROGRAM
Safety Means Awareness Responsibility Teamwork

Instructions:
1) *Employee completes the Near Loss Report and submits to Supervisor.*
2) *Supervisor reviews and makes other comments.*
3) *Employee discusses Near Loss with Project Manager.*
4) *Submit to Regional Safety & Health Manager*

Report Status (insert date)	Initial Report	Update Report	Final Report	Verification/Validation	Report Input into SMART Database

SECTION 1

A. Employee Identification ☐ **CRA Employee** ☐ **Temporary Employee** ☐ **Subcontractor**

Employee No.	Last Name	First Name	Employee's Company - if Subcontractor
Date of Hire	**Position/Title**	**Supervisor**	**Home Office Location - if CRA Employee**

B. General Information

Where did the Near Loss occur?
☐ Office ☐ Project Site ☐ Other _____
☐ Canada ☐ United States ☐ UK

Type of Near Loss (Check all that apply)
☐ Employee Injury/Illness ☐ Vehicle Accident ☐ Property Damage ☐ Environmental

Address of Near Loss (City, State/Province/County, Postal/Zip Code)

Specific Location of Near Loss (e.g., where on site)

Date and Hour of Near Loss		Date and Hour Reported to CRA		Time Employee Began Work
Month Day Year	a.m. p.m.	Month Day Year	a.m. p.m.	a.m. p.m.

Witnesses?
☐ Yes ☐ No

Witness Name and Telephone Number

C. Project Information (Project Related Near Loss Only): Project Related: ( ) Yes ( ) No

Project #	Project Name	CRA Project Manager	Client	Client Contact

Was the Client Advised of the Near Loss?	Name:	Date and Time
☐ Yes ☐ No ☐ N/A		Month Day Year Time

SECTION 2

A Details of the Near Loss

1. What job/task was being performed when the Near Loss occurred? (Example: collecting groundwater samples).

2. Provide a detailed description of the employee's specific activities at the time of the Near Loss. Include details of equipment/materials being used, including the size and weights of objects being handled, and weather conditions at time of the Near Loss. If necessary, attach additional pages to the report.

B. Near Loss Investigation

Conduct a 5-Why Root Cause Analysis Investigation. In addition, if there was the potential for a significant injury or loss, report the Near Loss to the Incident Hot Line (this will determine if a Tap Root Cause Analysis is necessary).

HASP prepared?
☐ Yes ☐ No ☐ N/A
Submit a PDF of HASP to Investigation Team.
If yes, was the HASP on site?
☐ Yes ☐ No

Did the safety plan identify and provide safety procedures for the specific tasks being performed when the Near Loss occurred?
☐ Yes ☐ No If no, why not? (Explain) _____
Did the employee utilize the STAR process before initiating the task?
☐ Yes ☐ No If no, why not? (Explain) _____

SECTION 2 (continued)

5-Why Root Cause:	Additional information: Attach photos, witness statement(s), affected employee statement, as applicable, to the end of this document.
1. Why did "above" happen?	
2. Why did "1" happen?	
3. Why did "2" happen?	
4. Why did "3" happen?	
5. Why did "4" happen?	See Section 3 Below: Corrective Actions/ Verification and Validation
6. Why did "5" happen?	

C. Accountability

Initial Report Date Month Day Year	Initial Report Prepared by: (please print)	Initial Report Prepared by: (signature)
Investigation Team	Company	Position/Title
Final Report Date Month Day Year	Final Report Prepared by: (please print)	Final Report Prepared by: (signature)

D. Stewardship

Will a Near Loss Summary be Prepared? ☐ Yes ☐ No If yes, by:

Quality Review By:	Date:	Findings:

SECTION 3

Corrective Action					Validation & Verification		
CF	**Corrective Actions (Must match Causative Factor)**	**Responsible Party**	**Due Date**	**Date Completed**	**Verified By/ Validated By**	**Date**	**Details**
					Verified By		
					Validated By		
					Verified By		
					Validated By		
					Verified By		
					Validated By		

CRA 10 CAUSATIVE FACTORS (CF)

PERSONAL FACTORS		COMPANY FACTORS		EXTERNAL FACTORS	
1	Insufficient training for task	5	Incomplete or no procedures	10	Exposure to conditions
2	Hurrying to complete the task	6	Procedures not known or enforced		
3	Easier if proper process not followed	7	Improper PPE		
4	Took shortcuts without prior incident	8	Improper tools		
		9	Improper workplace layout		

FIELD SAFE TASK EVALUATION PROCESS (F-STEP)

Report Status: (insert date)	Initial Report	Updated Report	Final Report	Verification/Validation	Report Input to SMART Database

Observer's Name	Date:	Time:
Client:	Project Name:	
Observer's Office:	Site Location:	
Observer's Supervisor:	Project No. (If applicable):	
Subcontractor: ☐ Yes ☐ No	Subcontractor Company Name:	

Feedback Conducted By:	Date:
Observee's Supervisor:	Time:

Check Task Being Observed (if not listed here, go to columns at right)		If checking this column, write in the specific task	
☐ Air Knifing	☐ Mob/Demob	☐ Agricultural Services	
☐ Clearing	☐ Project Oversight	☐ Construction	
☐ Demolition	☐ Soil Sampling	☐ Landfill	
☐ Drilling	☐ Stack Testing	☐ Office Operations	
☐ Electrical Work	☐ Surveys & Audits	☐ O&M	
☐ Excavation	☐ Traffic Control	☐ Pipeline	
☐ General Site Cleaning	☐ UST Removal	☐ Refinery	
☐ Heavy Equipment Operations	☐ Water Sampling	☐ Treatment Plants	
☐ IH Sampling	☐ Well Management	☐ Other	
☐ Manual Lifting			

Give a brief description of task being performed and your surroundings

Observer's Positive Comments

1.

2.

3.

Feedback Session Conclusion:
If NO Questionable Items: Brief Recap of Positive Actions/Comments
If Questionable Items: Brief Recap of Positive Actions/Comments AND Why the Questionable Item(s) Occurred

FIELD SAFE TASK EVALUATION PROCESS (F-STEP)

PERSONAL PROTECTIVE EQUIPMENT	Meets Work Standards	???	N/A	Evaluation Comments
1. Hearing Protection (e.g., Ear Plugs)			☐	
2. Head Protection (e.g., Hard Hat)			☐	
3. Eye Protection (e.g., Safety Glasses/Goggles)			☐	
4. Hand Protection (e.g., Gloves)			☐	
5. Foot Protection (e.g., Steel-toe Boots)			☐	
6. Respiratory Protection			☐	
7. Fall Protection (e.g., lanyard/harness)			☐	
8. High Visibility Clothing (e.g., Work Vest)			☐	
9. First Aid Kit/Fire Extinguisher			☐	
10. Other (be specific)			☐	
BODY POSITION	**Meets Work Standards**	**???**	**N/A**	**Evaluation Comments**
11. Proper Body Positioning When Exerting Force (Lifting/Pushing/Pulling)			☐	
12. Pinch Points/Moving Equipment - Hands/Body Placement			☐	
13. 3-Points of Contact			☐	
14. Other (be specific)			☐	
WORK ENVIRONMENT	**Meets Work Standards**	**???**	**N/A**	**Evaluation Comments**
15. Work/Walk Surface Clear (Free And Clear Pathway)			☐	
16. Housekeeping/Equipment Storage			☐	
17. Controlled Work Zone (e.g., Warning Devices, Barricades, Cones, Flags)			☐	
18. Emergency Stop/Safety Switches			☐	
19. Materials Labeled Correctly			☐	
20. Storage/Disposal of Waste			☐	
21. Other (be specific)			☐	
OPERATING PROCEDURES	**Meets Work Standards**	**???**	**N/A**	**Evaluation Comments**
22. STAR Performed/Job Planning			☐	
23. Stop Work Authority Process – understood and considered			☐	
24. JSA/JLA/Risk Assessment Reviewed and Followed			☐	
25. Daily Site Inspection			☐	
26. High Risk Task Specific (Hot Work, Confined Space, LOTO, Excavation/ Trenching)			☐	
27. Inspect Work Zone for Hazards			☐	
28. Coordinate/Communicate with Site Rep and/or others on site			☐	
29. Spotters used appropriately			☐	
30. Underground/Overhead Utilities Identified			☐	
31. Other (be specific)			☐	
TOOLS/EQUIPMENT	**Meets Work Standards**	**???**	**N/A**	**Evaluation Comments**
32. Hand/Power Tool - Selection, Condition, and Use			☐	
33. Field/Test Equipment - Selection, Condition, and Use			☐	
34. Heavy Equipment - Selection, Condition, and Use			☐	
35. Other (be specific)			☐	
Observation Total Occurrences				
% Observations to Meet Work Standards				
Item Specific to Work Task	**Meets Work Standards**	**???**		**Evaluation Comments**
Insert Task/JSA/SOP Step				
Insert Task/JSA/SOP Step				
Insert Task/JSA/SOP Step				

FIELD SAFE TASK EVALUATION PROCESS (F-STEP)

Causative Factors and Corrective Actions						Verification (Did we do what we said we would do?) and Validation (Is it working?)		
Item No.	CF	Corrective Actions (Must match Causative Factor)	Responsible Party	Date Due	Date Completed	Verified By/ Validated By	Date	Details
						Verified By:		
						Validated By:		
						Verified By:		
						Validated By:		
						Verified By:		
						Validated By:		
						Verified By:		
						Validated By:		

CRA 10 CAUSATIVE FACTORS

Personal Factors		Company Factors		External Factors	
1	Insufficient training for task	5	Incomplete or no procedures	10	Exposure to conditions
2	Hurrying to complete the task	6	Procedures not known or enforced		
3	Easier if proper process not followed	7	Improper PPE		
4	Took shortcuts without prior incident	8	Improper tools		
		9	Improper workplace layout		

Daily Safety Meeting Form

PROJECT: **The Batavia Former MGP Site**

LOCATION: **Batavia, New York**

DATE/TIME: _____

1. Safety Issues or Topics Discussed:
2. Work Summary and Physical/Chemical Hazards of Concern:
Planned Activities:
Physical hazards:
Biological hazards:
Chemicals onsite:
3. Protective Equipment/Procedures:
4. Emergency Procedure:
MUSTERING POINT:
5. Signatures of Attendees (Handwriting must be legible):

HASP Acknowledgement Form

This is to certify that I have received a pre-entry briefing regarding this HASP for the Batavia Former MGP Site - Batavia, New York and I understand its contents. My failure to follow and comply with the requirements contained in this plan may result in disciplinary action and/or removal from the Site.

Print Name	Signature	Company	Date

Hot Work Permit and Hot Work Checklist

Location (facility, well name, rig, etc.):

Description of Hot Work:

I have reviewed the proposed work, agree that hot work is necessary and may proceed without unreasonable risk.

Initial authorization: **Date:** **Expiration time:**

The following precautions must be taken to complete the work safely (attach details of specific procedures or checklist if appropriate).

Check	Yes	NA	Check	Yes	NA	Check	Yes	NA
All lines depressurized?			Area/space gas free?			Standby man/fire watch?		
All liquids drained?			Combustibles removed?			Pre-job safety meeting complete?		
Space cleaned and purged?			Continuous atmosphere monitoring?			Emergency procedure established?		
Space properly ventilated?			Fire extinguisher/water available?			Special PPE required?		
Lockout/tagout complete?			Respiratory protection required?					

Positive Isolation ☐ NA
☐ Blind ☐ Double Block and Bleed
☐ Disconnect ☐ Full thickness Skillet

Electric lighting and equipment properly rated for hazardous area location
☐ Yes ☐ No ☐ NA

Communication Method ☐ NA
☐ Hand signal ☐ Voice
☐ Radio ☐ Horn

PPE

Head: ☐ Hardhat
☐ Other: _____
Eye/Face: ☐ Safety glasses w/side shields
☐ Face shield ☐ Goggles
☐ Other: _____
Arms/ Hands: ☐ Leather gloves
☐ Leather gloves w/long sleeves
☐ Other: _____
Footwear: ☐ Leather Boots
Clothing: ☐ Flame-resistant clothing

Rescue Equipment

Emergency Response Plan?
☐ Yes ☐ No ☐ NA
If no, notify outside rescue services
GPS Coordinates: _____

☐ Full body harness
☐ Lifeline
☐ Personnel basket
☐ Rigid stretcher
☐ Mechanical lift for >5 degrees vertical

Emergency Phone Numbers

Ambulance/EMS:

Rescue Services:

Air Rescue:

Fire Department:

Other:

Atmospheric Testing Acceptable Conditions	Time ➔	Results : AM/PM	Results : AM/PM	Results : AM/PM	Results : AM/PM	Results : AM/PM
Oxygen	19.5% to 23.5%					
Flammability	<10% LEL					
H_2S	<10 ppm					
Norm	<50 Micrograms					
Vessel Temperature	<100ºF (43ºC)					
Tester Signature:						
X		Initials	Initials	Initials	Initials	Initials
Direct Reading Monitor		Model and Unit Number:			Calibration Date: / /	

This permit is approved for ____ hours on this date ____/_____/___
Signature of On-site Supervisor:
X Start Time: :

Only the On-site Supervisor may extend the permit time (Max. 12 hours)
Time was extended to: _____ hours.
Rep. Initials: _____ Time: :
Permit start time shall be the same as the initial test time.

Cancellation of Permit
Signature of On-site Supervisor: Date: ____/_____/___
X

Permit Retention: 1 year or until audited

Signature of person(s) performing Hot Work:
X
X
X
X

Signature of Fire Watch:
X

Signature of Contract Supervisor:
X

Distribution: Original - Client Representative and Work Site Copy - Initial Authorization

Hot Work Checklist	
Signature	All welding machines **shall** be located in an unclassified area while in use (for offshore welding, machines must be 3 m or 10 feet away from a well-bay or production area and 0.5 m or 18 inches or away from deck drains – refer to Electrical Area Classification drawing).
	Welding machines with AC power convenience receptacles **shall** be labeled as AC power and **shall** be used with ground fault circuit interrupter (GFCI) adapters. The adapters should be placed as close to the welding machine as possible.
	Welding machines with DC power convenience receptacles **shall** be removed or otherwise disabled and must not be used.
	Welding machines used offshore **shall** be equipped with drip pans, shut down devices, and spark arresters.
	All welding leads **shall** be grounded as close as possible to the work area.
	All welding leads and extension cords **shall** be completely insulated, UL rated, and in good working condition.
	Welding rods **shall not** be left in the electrode holder when laid down on steel decks. The stud ends **shall** be put into a container – not on the floor or deck.
	Oxygen and acetylene bottles **shall** be separated by a or 5-foot high metal barrier, secured in a rack. Acetylene bottles shall be kept in an upright position.
	Regulators **shall** be equipped with properly operating gauges.
	Oxygen and acetylene hoses **shall** be leak-free and routed to prevent mechanical damage.
	Oxygen and acetylene hoses **shall not** be hung on cylinders when in use.
	Oxygen and acetylene **shall** be turned off at the cylinder valve and hoses bled anytime the equipment is not in use. Regulators **shall** be removed and protective cylinder caps put in place anytime cylinders are to be moved.
	Acetylene pressure downstream of the regulator **shall** be kept at or below 15 psi.
	Check valves/flame arresters **shall** be installed on the torch and the regulator.
	Only friction spark devices **shall** be used for ignition of cutting torches. Due to a potential ignition source, friction sparkers shall **not** be permitted to be carried throughout the facility.
	When lighting the cutting torch, the fuel gas valve shall be opened before opening the oxygen valve.
	Equipment containing hydrocarbons or other flammable substances has been relocated at least 35 feet horizontally from the hot work site. Similar equipment located at a lower elevation where slag, sparks, or other burning material could fall has been relocated at least 35 feet from the point of impact. When relocation is impractical, the equipment has been either shielded or the contents rendered inert.
	Fire resistant blankets (if used) **shall** be of a good quality and should be installed in a manner that does not create pockets or folds.
	Instrument gas systems and devices isolated or shielded.
	On-Site Supervisor: _____ Date: _____ Welder: _____ Date: _____

Safety Inspection Checklist for Excavations

Referenced by OSHA Standards

This checklist is to be completed by the competent person at the start of work and as needed throughout the shift (i.e., after rain events, etc.). ***(A competent person has been trained in the current OSHA excavation standard, is knowledgeable about soil analysis and protective systems, and has the authority to shut down the job.)***

Site Location:		Project #:	
Date:	Time:	Competent Person:	
Were visual soil tests made? If Yes, what type?		YES NO ☐	Type:
Were manual soil tests made? If yes, what type?		YES NO ☐	Type:
Soil Type:		Signature:	
Soil Classification:			
Excavation Depth:		Excavation Width:	
Protective System Used:			

In the following table, please place a Y for Yes, N for No, or N/A for Not Applicable in the right hand column for each item. If No, place the date of correction.

	Subject	Y, N, or NA	Date Corrected
GENERAL INSPECTION OF THE JOB SITE			
1.	Does the competent person have the authority to remove employees from the excavation immediately?		
2.	**ARE SURFACE OBSTRUCTIONS REMOVED OR SUPPORTED?**		
3.	Are employees protected from loose rock or soil that could pose a hazard by falling or rolling into the excavation?		
4.	Are hard hats worn by all employees?		
5.	Are excavated soil, materials, and equipment placed at least 2 feet from the edge of the excavation?		
6.	Are walkways and bridges over excavations 4 feet or more in depth equipped with standard guardrails and toe-boards?		
7.	Are warning vests or other highly visible clothing provided and worn by all employees exposed to public vehicular traffic?		
8.	Are employees required to stand away from vehicles being loaded or unloaded?		
9.	Is a warning system established and used when mobile equipment operates near the edge of the excavation?		
10.	Are employees prohibited from going beneath suspended loads?		
11.	Are employees prohibited from working on the faces of sloped or benched excavations above other employees?		
UTILITIES			
12.	Were utility companies contacted and/or utilities located?		
13.	Are the exact locations of the utilities marked?		
14.	Are underground installations protected, supported, or removed when excavation is opened?		
MEANS OF ENTERING AND EXITING THE TRENCH			
15.	Is the distance along the trench to an exit no greater than 25 feet in excavations 4 feet or more in depth?		
16.	**IS A SUPPORT SYSTEM, SUCH AS UNDERPINNING, BEING USED?**		
17.	Are ladders used in excavations secured and extended 3 feet above edge of the trench?		

	Subject	Y, N, or NA	Date Corrected
18.	Are structural ramps used by employees designed by a competent person?		
19.	Are structural ramps used for equipment designed by a registered professional engineer?		
20.	Are employees protected from cave-ins when entering or exiting the excavation?		
WET CONDITIONS			
21.	Is water removal equipment monitored by a competent person?		
22.	Is surface water or run-off diverted or controlled to prevent accumulation in the excavation?		
23.	Are inspections made after every rainstorm or other hazard-increasing occurrence?		
HAZARDOUS ATMOSPHERE			
24.	Is the atmosphere within the excavation tested where there is a reasonable possibility of an oxygen deficiency, combustible, or other harmful contaminant exposing employees to a hazard?		
25.	Are adequate precautions taken to protect employees from exposure to an atmosphere containing less than 19.5% oxygen and/or other hazardous atmospheres?		
26.	Is ventilation provided to prevent employee exposure to an atmosphere containing flammable gas 10% above the lower explosive limit of a gas?		
27.	Is testing conducted often to ensure that the atmosphere remains safe?		
28.	Is emergency equipment, such as breathing apparatus, safety harness and lifeline, and/or basket stretcher readily available where hazardous atmospheres could or do exist?		
SUPPORT SYSTEMS			
29.	Are materials and/or equipment for support systems selected based on soil analysis, trench depth, and expected loads?		
30.	Are materials and equipment used for protective systems inspected and in good condition?		
31.	Are protective systems installed without exposing employees to the hazards of cave-ins (including end walls), collapses, or threat of being struck by materials or equipment?		
32.	Are excavations below the level of the base, or footing supported, approved by a registered professional engineer?		
33.	Does the removal of support systems progress from the bottom and members are released slowly? Note any indication of possible failure.		
34.	Is the excavation of material a level no greater than 2 feet below the bottom of the support system and only if the system is designed to support the loads calculated for the full depth?		
35.	Is there a shield system placed to prevent lateral movement?		

Safety Inspection Checklist – Mobile Equipment Safety

Week Ending:	Job No.:	Equipment:

(This form is to be completed daily by the operator. Deficiencies should be addressed immediately.)

Superintendent: _____

	Date:	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.	Sun.	Comments
Equipment Hours:	***Start:***								
	Stop:								
Fluid Levels:									
	Oil								
	Hydraulic								
	Transmission								
	Radiator								
	Grease Fittings								
	Fuel								
Safety Checks:									
	Fire Extinguisher								
	Seat and Safety Belts								
	Warning Devices (backup alarms, lights, etc.)								
	Housekeeping								
	Brakes								
	Mirrors								
	Windshield and Wipers								
	Steering								
	Horn								
	Lights								
	Tires								
	Guards								
	Instruments								
	Exhaust System								
Accessories:									
	Boom or Mast								
	Controls								
	Level Indicators								
	Tracks								
	Other								
Sign-Off:									
	Operator's Initials								
	Supervisor's Initials								

Additional Comments: (Please write any additional comments here. Use the back of this form if necessary.)

√ = OK NR = Needs Repair NA = Not Applicable

UNSAFE ACTS/UNSAFE CONDITIONS/ STOP WORK AUTHORITY (SWA) REPORT

Reported By:		Employee's Office:	
To: CRA RSHM -		Date:	Time:
Employee Supervisor:		Employee Principal:	
Project Related:	☐ No ☐ Yes If yes, Name of Client:		
Client Contact:		Project No (if applicable):	

Re: (check all that apply) ☐ **Unsafe Act** ☐ **Unsafe Condition** ☐ **Stop Work Authority (SWA)**
Location: (check one) ☐ Driving ☐ Field ☐ Office

Date Reported to Supervisor/PM:		Date Corrected:	
Time Reported to Supervisor/PM:		Time Corrected:	

Describe the unsafe act, unsafe condition, or SWA Situation:

List corrective action(s) implemented:

Did the corrective action(s) mitigate the unsafe act/unsafe condition?

For SMART Administrators Use Only:

CRA Category:

- ☐ **PPE** - Personal Protective Equipment
- ☐ **BP** - Body Positioning
- ☐ **WE** – Work Environment
- ☐ **OP** – Operating Procedures
- ☐ **TE** – Tools and Equipment
- ☐ **CU** – Computer Usage
- ☐ **PD** – Pre-Driving
- ☐ **OPP** – Operating Procedures – Parking

Chevron Category:

- ☐ **A –** Person or People
- ☐ **B –** Equipment
- ☐ **C –** Environmental
- ☐ **D –** Procedures/ Processes/ JSA-review/revise
- ☐ **E –** Visitors

Causative Factor:

- ☐ 1. Insufficient training for task
- ☐ 2. Hurrying to complete the task
- ☐ 3. Easier if proper process not followed
- ☐ 4. Took shortcuts without prior incident
- ☐ 5. Incomplete or no procedures
- ☐ 6. Procedures not known or enforced
- ☐ 7. Improper PPE
- ☐ 8. Improper tools
- ☐ 9. Improper workplace layout
- ☐ 10. Exposure to conditions

Energy Source:

- ☐ **G –** Gravity
- ☐ **M –** Motion
- ☐ **ME –** Mechanical
- ☐ **E –** Electrical
- ☐ **P –** Pressure
- ☐ **T –** Temperature
- ☐ **C –** Chemical
- ☐ **B –** Biological
- ☐ **R –** Radiation
- ☐ **S –** Sound

Are additional actions required? ☐ No ☐ Yes If yes, what? _____

Attachment C

Community Air Monitoring Plan

Community Air Monitoring Plan
For the Batavia Former MGP Site– Batavia, New York
Developed in Accordance With the New York State Department of Health's
Generic Community Air Monitoring Plan

Overview

This site-specific Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the upwind and 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 remedial work activities. The action levels specified herein require increased monitoring and corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP will help to confirm that work activities do not spread contamination off site through the air.

Designated air monitoring station locations will be established around the perimeter of the site for use as monitoring locations. The site-specific CAMP presented below will be implemented during the soil handling activities at the site which include excavation activities. Each day that this activity is in progress, two upwind and two downwind air monitoring stations will be set up to collect data. The instruments that will be used to collect the air monitoring data will have data logging capabilities. The data will be downloaded periodically, stored electronically, and will be available to agency personnel for their review.

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

Weather Station

A weather station will be set up at the Site to measure temperature, humidity, and wind speed and direction. The station will have data logging capabilities and the data will be reviewed periodically throughout the day to determine if monitoring station locations need to be adjusted.

Community Air Monitoring Plan

Real-time air monitoring for VOCs and particulate levels at locations upwind and downwind of the site will be conducted as described below.

Continuous monitoring

Continuous monitoring will be performed during soil handling at the Site, including during excavation activities. Four (4) monitoring stations, two upwind and two downwind, will be installed. The monitoring stations will each be equipped with a photoionization detector (PID) and a particulate monitor. The instruments will monitor continuously and have data logging capabilities. Monitors will be housed in weather tight enclosures.

Periodic monitoring

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil samples (if completed). Periodic monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while overturning soil and then taking a reading prior to leaving a sample location.

VOC Monitoring, Response Levels, and Actions

The specific type of air monitoring equipment that will be used at the site for VOC monitoring will be a MiniRae 3000, or equivalent. The equipment will be calibrated in accordance with the manufacturer's guidelines. The equipment will 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 VOCs at the downwind perimeter of the site 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 site 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 designated work area 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 site, activities must be shutdown.

4. All 15-minute readings will be recorded and be available for State (New York State Department of Environmental Conservation [NYSDEC] and the New York State Department of Health [NYSDOH]) personnel to review. Instantaneous readings, if any, used for decision purposes will also be recorded.

Particulate/Fugitive Dust Monitoring, Response Levels, and Actions

Particulate concentrations will be monitored continuously at the two upwind and two downwind monitoring stations on the Site. The particulate monitoring will 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 particulate monitor that will be used will be a TSI 8520 DustTrak, or equivalent. The equipment will be equipped with an audible and/or visible alarm to indicate exceedance of the response 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 designated 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 designated 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 (NYSDEC and NYSDOH) personnel to review.

The following fugitive dust suppression and corrective procedures will be employed at the site.

1. Reasonable fugitive dust suppression techniques will be employed during all remedial activities, which may generate fugitive dust.

2. The following techniques are generally effective for controlling the generation and migration of dust during construction activities and may be employed as necessary:

   (a) Applying water on haul roads

   (b) Wetting equipment and excavation faces

   (c) Spraying water on buckets during excavation and dumping

   (d) Hauling materials in properly tarped or watertight containers

   (e) Restricting vehicle speeds to 10 mph

   (f) Covering excavated areas and material after excavation activity ceases

   (g) Reducing the excavation size and/or number of excavations

   When techniques involving water application are used, care must be taken not to use excess water, which can result in unacceptably wet conditions. Using atomizing sprays will prevent overly wet conditions, conserve water, and provide an effective means of suppressing the fugitive dust.

Routine Procedures

- The PID and particulate meters will be inspected and calibrated each day and logged in the field book.
- At least one of the upwind stations will be located near the two occupied buildings immediately adjacent to the excavation; the doctor's office located at 11 Evans Street and the occupied commercial building at 34 Ellicott Street. Daily locations will be determined based on the wind direction determined by the Site weather station.
- The weather station will be checked throughout the day to determine if monitoring stations need to be adjusted. Daily locations and changes will be noted in the field book.
- Monitoring stations will be equipped with audible alarms and also will be checked throughout the day.
- Monitoring data will be downloaded daily and stored electronically and will be submitted to NYSDEC and NYSDOH weekly.

Appendix B

Quality Assurance Project Plan

(Originally prepared as part of the RI/FS Work Plan,
included here for completeness.)

CONESTOGA-ROVERS & ASSOCIATES

www.CRAworld.com

Remedial Investigation/Feasibility Study Work Plan
Quality Assurance Project Plan

Batavia Former MGP Site
Batavia, New York
NYSDEC Site No. 819019

Prepared by:

Conestoga-Rovers & Associates
285 Delaware Avenue, Suite 500
Buffalo, NY 14202

April 2014 • 084144 • Report No. 1 Appendix B

Partners in Sustainability

Quality Assurance Project Plan

Project Title: Remedial Investigation/Feasibility Study Work Plan
Batavia Former MGP Site
Batavia, New York
NYSDEC Site No. 819019

Revision Number: 0

Revision Date:

Prepared By: Conestoga-Rovers & Associates

Prepared For: R & J Enterprises of Batavia, LLC

Approved By: NAME_____ Date:_____
Project Manager

Approved By: NAME_____ Date:_____
QA Officer

Approved By: NAME_____ Date:_____
Field QA Officer

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QAPP Distribution List

Name/Organization	*Number of Copies*

List of Acronyms and Short Forms

CRA	-	Conestoga-Rovers & Associates, Inc.
DO	-	Dissolved Oxygen
DQOs	-	Data Quality Objectives
EPA	-	Environmental Protection Agency
FSP	-	Field Sampling Plan
GC/MS	-	Gas Chromatography/Mass Spectrometry
LCS	-	Laboratory Control Sample
MDLs	-	Method Detection Limits
MS/MSD	-	Matrix Spike/Matrix Spike Duplicate
MNA	-	Monitored Natural Attenuation
GA EDP	-	Georgia Environmental Protection Division
PARCCS	-	Precision, Accuracy, Representativeness, Comparability, Completeness, Sensitivity
PE	-	Performance Evaluation
%R	-	Percent Recovery
%RSD	-	Percent Relative Standard Deviation
QA	-	Quality Assurance
QA/QC	-	Quality Assurance/Quality Control
QAPP	-	Quality Assurance Project Plan
QC	-	Quality Control
RDWP	-	Remedial Design Work Plan
RPD	-	Relative Percent Difference
SAP	-	Sampling and Analysis Plan
SOPs	-	Standard Operating Procedures
USEPA	-	United States Environmental Protection Agency
VOCs	-	Volatile Organic Compounds

Section 1.0 Introduction

This Quality Assurance Project Plan (QAPP) has been prepared by Conestoga-Rovers & Associates, Inc. (CRA) to govern the collection of environmental data referenced in the Remedial Investigation/Feasibility Study Work Plan (RI/FS WP) and associated documents for the Batavia Former MGP Site in Batavia, New York (Site). This QAPP is Appendix B of the RI/FS WP. It is expected that this QAPP will provide the framework for soil, groundwater and soil vapor sampling activities at the Site. The QAPP is a planning document that provides a "blueprint" for obtaining the type and quantity of data needed to support remedial design activities and environmental decision making. The QAPP integrates all technical and quality aspects of a project and documents all quality assurance (QA), quality control (QC), and technical activities and procedures associated with planning, implementing, and assessing environmental data collection operations to meet National Contingency Plan requirements as identified at 300.435(b).

This QAPP has been prepared by CRA in accordance with the United States Environmental Protection Agency (USEPA) QAPP guidance documents "EPA Requirements for Quality Assurance Project Plans", EPA QA/R-5, March 2001, and "EPA Guidance for Quality Assurance Project Plans", EPA QA/G-5, December 2002. In accordance with these documents, there are four basic groups of elements that must be included in a QAPP. These four groups and associated elements follow:

- Group A - Project Management. The elements in this group include all aspects of project management, project objectives, and project history.
- Group B – Data Generation and Acquisition. The elements in this group include descriptions of the design and implementation of all measurement systems that will be used during the project.
- Group C – Assessment/Oversight. The elements in this group encompass the procedures used to ensure proper implementation of the QAPP.
- Group D – Data Validation and Usability. The elements in this group cover the QA activities that occur after the data collection phase of the project is completed.

The elements associated with the project management, data generation and acquisition, assessment/oversight, and data validation and usability for the investigation activities that are being conducted at the Site are presented in this QAPP.

Section 2.0 Project Organization

The responsibilities of management, QA personnel, field personnel, and laboratory personnel are provided in the following subsections. Additionally, any special training/certification requirements for the project are identified.

2.1 Management Responsibilities

The Supervising Contractor Project Manager is ultimately responsible for ensuring that the project objectives are achieved working under direction of the coordinating contractor. The Project Manager is responsible for coordinating the project team currently consisting of technical personnel (engineering, hydrogeology, chemistry, and data management), QA personnel, and the analytical laboratory. The Project Manager and the other team members specific responsibilities follow:

Project Manager

- Technical representation on behalf of the Client
- Advising on corrective actions
- Overview of field activities
- Ensures all resources are available on an as-required basis
- Preparing and reviewing reports
- Coordinating technical group

A New York State certified laboratory will be used for the analytical portion of the investigation. The analytical laboratory's Project Manager is responsible for ensuring the project objectives are achieved by the laboratory. The specific responsibilities follow:

Laboratory Project Manager

- Coordinate laboratory analyses
- Supervise in-house chain-of-custody
- Data review of final analytical reports
- Approve final reports prior to submission to the Supervising Contractor

2.2 Quality Assurance Responsibilities

Project team members with QA responsibilities include the QA Officer, the Field QA Officer, and the laboratory QA Officer. These team members and their specific responsibilities follow:

Quality Assurance Officer

- Review laboratory QA/QC
- Coordinate and review data validation and assessment
- Advise on laboratory corrective action procedures
- Preparation and review of QA reports
- QA/QC representation of project activities

Field Quality Assurance Officer

- Overview and review field QA/QC
- Management of field activities and field QA/QC
- Field data assessment
- Internal field technical system audits
- Technical representation of field activities
- Preparation of standard operating procedures (SOPs) for field activities
- Implement and document field corrective actions, if necessary

Laboratory QA Officer

- Coordinate and overview of laboratory systems audits
- Overview of QA/QC documentation
- Conduct detailed data review
- Implement and document laboratory corrective actions, if required
- Technical representation of laboratory QA procedures
- Oversee preparation of laboratory SOPs

2.3 Field Responsibilities

Field sampling and collection of field measurements related to sampling will be conducted during the monitoring activities. The specific procedures for field sample collection and field measurements are presented in the RI/FS WP.

The field sampling will be conducted by technical staff. The Field QA Officer will be responsible for documenting any non-conformances and subsequent corrective actions. The Field QA Officer or any field team member can identify and report non-conformances.

2.4 Laboratory Responsibilities

Specific information regarding the sampling and analysis program for the investigation is provided in Section 3.3 of this QAPP and additional information can be located in the RI/FS WP.

The specific responsibilities of laboratory personnel involved in the project follow:

Laboratory Director

- Ensures all resources of the laboratory are available on an as-required basis
- Schedule sample analyses
- Oversee data review
- Oversee preparation of analytical reports

Laboratory Sample Custodian

- Receive and inspect incoming sample containers
- Record the condition of incoming sample containers
- Sign appropriate documents
- Verify correctness of chain-of-custody documentation
- Notify project manager of any non-conformances identified during sample receipt and inspection
- Assign a unique identification number to each sample, and enter the client identification number and sample identification numbers into the sample receiving log/information system
- Initiate transfer of the samples to appropriate laboratory sections
- Control and monitor access/storage of samples and extracts

2.5 Problem Definition/Background Information

This QAPP focuses on specific QA/QC activities designed to achieve the stated objectives in the SAP. It is a living document and will be updated with specific addenda as needed to reflect new phases of work as they are implemented at the Site. The modifications will be made by the QA Officer and reviewed by the Project Manager.

2.6 Project/Task Description

An overview of the sampling and analysis program is summarized in Table 2.1. Target analytes and targeted quantitation limits are presented in Table 2.2.

2.6.1 Project Schedule

The schedule for various sampling activities will be provided in the associated work plans/addendums, etc. Schedules will be dependent on some critical items such as regulatory reviews and approvals, property access, and weather. All of these critical items may impact the ultimate implementation and completion of scheduled activities.

2.7 Quality Objectives and Criteria for Measurement Data

The quality objectives and measurement performance criteria for data obtained for the investigation are presented in the following subsections.

2.7.1 Data Quality Objectives

Data quality objectives (DQOs) are qualitative and quantitative statements derived from the outputs of each step of the DQO process. The DQO process is a series of planning steps based on the scientific method that is designed to ensure that the type, quantity, and quality of environmental data used in decision making are appropriate for the intended application.

There are seven steps in the DQO process that include:

- Stating the problem
- Identifying the goal of the study
- Identifying information inputs
- Defining the boundaries of the study
- Developing the analytic approach
- Specifying performance or acceptance criteria
- Developing the plan for obtaining data

The DQOs for the programs were developed using the objectives for the programs as a problem statement. The resulting statements and DQOs are summarized in the following.

1. Problem	Characterize the nature and extent of contamination on-Site and off-Site
2. Goal	Determine if constituents of concern are detected in soil, groundwater or air at statistically significant levels.
3. Inputs	Data from sample collection activities per the SAP/FSP.
4. Boundaries	To be confirmed based on extent of Site-related detections.
5. Analytic Approach	If Facility-related constituents exceed New York State Limits, additional activities may be necessary to address the findings.
6. Performance or Acceptance Criteria	Ability to detect constituents at laboratory method detection limits and quantitate constituents at laboratory targeted quantitation limits (refer to QAPP Section 5.0 and Table 2.2).
7. Design	Soil, groundwater and air sample collection and other Site-related reporting.

2.7.2 Measurement Performance Criteria

The measurement performance criteria for precision, accuracy, representativeness, completeness, comparability, and sensitivity (PARCCS) are provided in the following subsections.

2.7.2.1 Field Precision Criteria

Precision of the field sample collection procedures will be assessed by the analysis of field duplicate samples. Field duplicate samples will be collected at a frequency of 1 per 10 or fewer investigative samples or at a minimum frequency of 1 per sampling event. The samples will be labeled such that the field duplicate sample is "blind" to the laboratory. A relative percent difference (RPD) of 100 percent will be used as an advisory limit for analytes detected in both the investigative and field duplicate soil samples at concentrations greater than or equal to 5 times their quantitation limits. A relative percent difference (RPD) of 50 percent will be used as an advisory limit for analytes detected in both the investigative and field duplicate groundwater samples at concentrations greater than or equal to 5 times their quantitation limits. Professional judgment will be used to qualify associated investigative sample data.

2.7.2.2 Laboratory Precision Criteria

Laboratory precision will be assessed through the calculation of RPDs for laboratory duplicate sample analyses. These will be laboratory duplicate, matrix spike/matrix spike duplicate (MS/MSD) and/or duplicate laboratory control samples (LCS/LCSD) samples. These will be collected/designated a frequency of 1 per 20 or fewer samples. The equation to be used to

determine precision is presented in Section 5.3.1 of this QAPP. Laboratory precision acceptance criteria are specified in the methods or are determined statistically by the laboratory; and will be included in the laboratory reports.

2.7.2.3 Field Accuracy Criteria

The criteria for accuracy of the field sample collection procedures will be to ensure that samples are not affected by sources external to the sample, such as inadequate equipment decontamination procedures or sample contamination by ambient conditions or sample cross-contamination. Field sampling accuracy will be assessed by the data from equipment blank samples and trip blank samples.

Field equipment blank samples will be collected at a frequency of 1 per 20 sampling equipment decontamination procedures or at a minimum frequency of 1 per sampling event during which equipment decontamination occurs. Field equipment blank samples (also referred to herein as equipment blank samples) will be collected by routing laboratory-provided deionized water through decontaminated sampling equipment. The samples will be labeled such that the equipment blank sample is "blind" to the laboratory. Equipment blank samples will be analyzed to check for procedural contamination or ambient conditions that may cause sample contamination.

Trip blank samples, consisting of volatile organic-free water poured into sample vials at the laboratory, will be provided by the laboratory for the sampling effort. Trip blank samples will be handled in a manner consistent with actual field samples, but will not be opened, and will be shipped back to the laboratory with the samples. Trip blank samples will provide a measure of potential cross-contamination of samples by VOCs during shipment and handling. One trip blank sample will be included in each shipping cooler containing samples for VOC analysis.

Equipment and trip blank samples should not contain target analytes. The equipment and trip blank sample data will be evaluated using the procedures specified in Section 5.3.2 of this QAPP. Accuracy also will be ensured by adhering to all sample handling procedures, sample preservation requirements, and holding time periods.

Accuracy of field measurements will be assessed by analyzing calibration check samples, as applicable to the parameter being measured. Accuracy acceptance criteria for field measurements obtained during the field activities are +/- 10 percent.

2.7.2.4 Laboratory Accuracy Criteria

Laboratory accuracy will be assessed by determining percent recoveries from laboratory control sample (LCS) analyses. An LCS will be analyzed at a frequency of 1 per laboratory batch of 20 or fewer samples of the same matrix. Accuracy relative to the sample matrix will be assessed by determining percent recoveries from the analysis of matrix spike samples. MS/MSD samples will be collected/designated at a frequency of 1 per 20 or fewer samples of the same matrix or at a minimum frequency of 1 per sampling event. The equation to be used to determine accuracy for this project is presented in Section 5.3.2 of this QAPP. Laboratory accuracy acceptance criteria are specified in the methods or are determined statistically by the laboratory; and will be included in the laboratory reports.

The accuracy of all organic analyses also will be monitored through the analysis of surrogate compounds. Surrogate compounds are added to each sample, standard, blank, and QC sample prior to sample preparation and analysis. Surrogate compounds are not expected to be found occurring naturally in the samples, but behave analytically similar to the compounds of interest. Consequently, surrogate compound percent recovery data will provide information on the effect that the sample matrix exhibits on the accuracy of the analyses. Surrogate compound percent recovery acceptance criteria are specified in the methods and will be included in the laboratory reports.

2.7.2.5 Field Representativeness Criteria

Representativeness is dependent upon the proper design of the sampling program. The representativeness criteria for field sampling will be to ensure that the correct soil locations/depths, monitoring wells, and locations are sampled and that the proper sampling procedures are followed. The sampling program was designed to provide data representative of conditions at the Site. During development of the RI/FS WP, consideration was given to existing analytical data and physical setting.

2.7.2.6 Laboratory Representativeness Criteria

The representativeness criteria for laboratory data will be to ensure that the proper analytical procedures are used for sample preparation, sample analysis, and that sample holding times are met. Additionally, the accuracy and precision of the laboratory data affect representativeness. The laboratory representativeness criteria will include achieving the accuracy and precision criteria for the sample analyses.

2.7.2.7 Field Comparability Criteria

The criteria for field comparability will be to ensure and document that the proper sampling procedures are followed.

2.7.2.8 Laboratory Comparability Criteria

The criteria for laboratory data comparability will be to ensure that the analytical methods used for the investigation are comparable to the methods used for previous sampling events, as applicable. The methods identified in Section 3.3.2 of this QAPP are the same or comparable to the methods used to generate previous monitoring data.

2.7.2.9 Field Completeness Criteria

The criteria for field completeness will be 90 percent or more of the field-measured data are usable. The procedure for determining field data usability is provided in Section 3.9.2 of this QAPP. The equation for calculating completeness is presented in Section 5.3.4 of this QAPP.

2.7.2.10 Laboratory Completeness Criteria

The criteria for laboratory completeness will be 90 percent or more of the laboratory data are determined to be usable for the intended purpose. The procedure for determining laboratory data usability is provided in Section 3.9.2 of this QAPP. The equation for calculating completeness is presented in Section 5.3.4 of this QAPP.

2.7.2.11 Laboratory Sensitivity Criteria

The sensitivity criteria for the laboratory analyses are the targeted quantitation limits provided in Table 2.2 of this QAPP.

It should be noted that high concentration of target and non-target analytes and matrix interferences may prevent the targeted quantitation limits from being achieved for all samples. The methods selected for analyzing the samples are USEPA methods routinely used to support environmental investigations and data gathering activities. The laboratory will report detected data down to the method detection limits (MDLs) current at the time of analysis. All data detected between the MDL and the targeted quantitation limits will be flagged as estimated.

2.8 Special Training/Certification Requirements

The contractor field sampling team members are required to have successfully completed relevant field training protocols. They are also required to have received the 40-hour Hazardous Waste Operations and Emergency Response (known as HAZWOPER) safety training and annual 8-hour refresher courses required by 29 CFR Parts 1910 and 1926.

Laboratory personnel training records are maintained by each laboratory. The laboratory is required to be accredited by the National Environmental Laboratory Accreditation Program (NELAP) to demonstrate compliance with USEPA's requirement that the laboratory have a documented quality system that complies with ANSI/ASQC E4-94 ("Specifications and Guidelines for Quality System for Environmental Data Collection and Environmental Technology Programs", January 1995), and EPA QA/R-2 ("EPA Requirements for Quality Management Plans", March 2001).

2.9 Documentation and Records

The documents, records, and reports generated during the monitoring activities are identified in the following subsections.

2.9.1 Field and Laboratory Records

Documents and records generated during the project include sample collection records, QC sample records, field measurement records, laboratory records, and data handling records. A brief description of these documents and records are provided below. Detailed information on these records is provided in subsequent sections of this QAPP.

Sample collection records that will be used during the program's sampling activities include field logbooks and/or project standard field forms, stratigraphic logs, chain-of-custody records, and shipping papers.

QC sample records that will be used during the project to document the generation of QC samples include field logbooks and/or project standard field forms recording field blank samples, field duplicate samples, and MS/MSD samples. The laboratory will maintain appropriate documentation of trip blank sample preparation. The laboratory will maintain quality records for deionized water sent for field blank samples, and sample integrity information. Records of sample preservation will be maintained in field logbooks and/or on project standard field forms, and by the laboratory.

Field measurements (such as depth to water, pH, temperature, conductivity, dissolved oxygen (DO), turbidity, and sample appearance) will be recorded in field logbooks and/or on project

standard field forms. Calibration data, where applicable, will also be recorded in these logbooks and/or on project standard field forms.

Laboratory records that will be maintained for the project include sample receipt documentation, field and laboratory chain-of-custody documentation, sample container cleanliness certifications, reagent and standard reference material certifications, sample preparation records, sample analysis records (e.g., run logs), instrument/raw data, QC data, calibration data, corrective action reports, and final reports.

Data handling records that will be maintained include verification of computer programs used to manipulate or reduce raw data into final results and data validation reports. The laboratory will maintain documentation of data verification and reduction procedures as necessary for the analyses used during the monitoring activities. The contractor will maintain checklists, notes, and reports generated during the external data validation process.

2.9.2 Data Reporting Format

Field data will be recorded in field logbooks and/or on project standard field forms. The details for recording field data are provided in Section 3.2.2.1 of this QAPP. Field data will be generated primarily from direct-reading meters or consist of field readings (e.g., depth to water measurements) or observations. These data will be tabulated and included in project reports or submittals.

Laboratory reports for the monitoring activities will include the data deliverables summarized in Table 2.3.

Raw instrument data (including calibration data and instrument performance checks), method detection limit (MDL) studies, and method performance and validation studies will be maintained by the laboratory.

2.9.3 Data Archiving and Retrieval

All records will be maintained consistent with the contractor and laboratory record retention policies.

Section 3.0 Data Generation and Acquisition

The design and implementation of the measurement systems that will be used during the monitoring activities, including sampling procedures, analytical procedures, and data handling and documentation, are detailed in the following subsections.

3.1 Sampling Process Design

The rationale for the sampling program was provided in Section 2.5 of this QAPP.

3.1.1 Sampling Methods

Sample collection methods are provided in the RI/FS WP.

3.1.2 Field Equipment and Sample Container Cleaning Procedures

Dedicated or single-use sampling equipment will be utilized for all sampling activities. Sample containers will be provided by the laboratory. All containers will be precleaned in accordance with the U.S. EPA guidance document entitled "Specifications and Guidance for Contaminant-Free Sample Containers", EPA 540/R-93/051. Certificates of analysis for each lot of containers will be maintained by the laboratory or be available from the vendor upon request.

3.1.3 Field Equipment Maintenance, Testing, and Inspection Requirements

Field equipment will be inspected and tested prior to use in the field. Maintenance logs for all field equipment are kept in field equipment files. Prior to use in the field, the equipment is checked again, generally during field calibration, and the performance information is recorded in the field logbook and/or on a standard field equipment form. All equipment returned from the field is inspected and tested. Any required maintenance is performed and documented prior to the equipment being returned to service.

Critical spare parts for field equipment and replacement field equipment are available and can be delivered to the field when the need is identified. Alternately, field equipment vendors can provide replacement equipment if needed. The replacement equipment can be shipped for overnight delivery as necessary.

3.1.4 Inspection and Acceptance Requirements for Supplies and Sample Containers

The field supplies for the monitoring activities consist of calibration standard solutions for field instrument calibration and calibration checks, detergent (Alconox) and solvents for equipment

cleaning, distilled water for sample collection equipment rinsing, deionized water for final sample collection equipment rinsing and for collecting equipment rinsate blank samples, chemical preservatives for pH adjustment of the appropriate aliquots of samples, and sample containers to collect the samples.

Field calibration standards are traceable to National Institute of Standards and Technology standards. The field QA Officer is ultimately responsible for ensuring that the field calibration standards for the project are acceptable. Calibration standards will be checked prior to being sent to the field to ensure that they have not expired or otherwise degraded. New calibration standards will be purchased if existing standards are found to be expired or degraded. Alconox, a standard laboratory-grade detergent, and distilled water will be purchased as needed from a variety of vendors.

Deionized water, purge-and-trap grade water, chemical preservatives, and sample containers will be provided by the laboratory. The laboratory will maintain documentation of the purity/cleanliness for these materials. The laboratory QA Officer is ultimately responsible for ensuring these materials are acceptable for the project. The acceptability of these materials for use will be evaluated by reviewing lot analysis certificates (deionized water, chemical preservatives, and containers). Water, preservatives, and containers that do not meet the laboratory's acceptability requirements will not be shipped to the field.

3.2 Sample Handling and Custody Requirements

The procedures for sample handling, labeling, shipping, and chain-of-custody documentation are provided in the subsections that follow.

3.2.1 Sample Handling

The procedures used to collect the samples are provided in the RI/FS WP. Sample aliquots will be containerized in order of decreasing analyte volatility. Table 3.2 identifies the requirements for the number of containers, container volume, container type (material of construction), preservation, holding time periods, and shipping for the analyses.

Samples will be placed in shipping coolers containing bagged, cubed ice immediately following collection. The samples will be grouped in the shipping cooler by the order in which the samples are collected, and then either couriered to the laboratory that day or shipped to the laboratory via an overnight courier service, generally on the day they are collected. The only exceptions to this procedure will be for samples collected after the courier service has picked up the shipment for the

day and when samples are collected on a Sunday or holiday. In these instances, the samples will be shipped on the next business day.

3.2.2 Sample Custody

Chain-of-custody is the sequence of possession of an item. An item (such as a sample or final evidence file) is considered to be in custody if the item is in actual possession of a person, the item is in the view of the person after being in his/her actual possession, or the item was in a person's physical possession but was placed in a secure area by that person. Field, laboratory, and final evidence files custody procedures are described in the subsections that follow.

3.2.2.1 Field Custody Procedures

Logbooks and/or project standard field forms will be used to record field data collection activities. Entries will be described in as much detail as possible to ensure that a particular situation could be reconstructed solely from these entries. Field logbooks are bound field survey books or notebooks with consecutively numbered pages. Logbooks will be assigned to field personnel and will be stored by the contractor when not in use. Each logbook will be identified by a project-specific document number.

The title page of each logbook will contain the following information:

- Person to whom the logbook is assigned
- Logbook number
- Project name
- Project start date
- End date

Entries into the logbook will contain a variety of information. At the beginning of each day's logbook entry, the date, start time, weather, names of all sampling team members present, and the signature of the person making the entry will be entered. The names of individuals visiting the site or field sampling team and the purpose of their visit will also be recorded in the field logbook.

All field measurements obtained and sample collection information will be recorded in a logbook and/or on a project standard field form. Project standard field forms are specifically prepared for each project sample location. These forms are used to record all field measurements obtained and samples collected for each location. All entries will be made in ink, signed, and dated with no

erasures. If an incorrect entry is made, the incorrect information will be crossed out with a single strike mark. The correct information will be entered adjacent to the original entry.

Whenever a sample is collected or a measurement is made, an identification and a detailed description (if necessary) of the location will be recorded in the logbook and/or on a project standard field form. Photographs taken at a location, if any, will be noted in the logbook. All equipment used to obtain field measurements will be recorded in the field logbook and/or on a project standard field form. In addition, the calibration data for all field measurement equipment will be recorded in the field logbook or on standard field forms.

Samples will be collected according to the sampling procedures documented in the RI/FS WP. The equipment used to collect samples, time of sample collection, sample description, volume and number of containers, and preservatives added (if applicable) will be recorded in the field logbook and/or on a project standard field form. A deviation from sampling procedures will be documented in the field logbook and/or on a project standard field form. Each sample will be uniquely identified.

The sample packaging and shipping procedures summarized below will ensure that the samples arrive at the laboratory with the chain-of-custody intact:

1. The field sampler is personally responsible for the care and custody of the samples until they are transferred to another person or the laboratory. As few people as possible will handle the samples.
2. All sample containers will be identified by using sample labels that include the date and time of collection and analyses to be performed. Sample labels will be completed for each sample using waterproof ink.
3. Samples will be accompanied by a properly completed chain-of-custody form. The sample identification numbers and required analyses will be listed on the chain-of-custody form. When transferring the possession of samples, the individuals relinquishing and receiving the samples will sign and record the date and time on the form. The chain-of-custody form documents sample custody transfers from the sampler to another person, to the laboratory, or to/from a secure storage area.
4. Water samples will be properly packaged for shipment using bubble wrap or foam sleeves and dispatched to the laboratory for analysis with a separate signed chain-of-custody form enclosed in and secured to the inside top of each shipping cooler. Shipping coolers for water samples will be secured with custody seals for shipment to the laboratory. The custody seal is then covered with clear plastic tape to prevent accidental damage to the custody seal.

5. If samples are split (collocated) with a government agency or other entity, it is the responsibility of that entity to prepare its own chain-of-custody form for the samples. Information regarding the identity of the entity and the sample(s) that are being split will be recorded in the field logbook.
6. All sample shipments will be accompanied by the chain-of-custody form identifying its contents. The chain-of-custody form is a four part carbonless-copy form. The form is completed by the sampling team which, after signing and relinquishing custody to the shipper, retains the bottom (goldenrod) copy. The shipper, if different than the sampling team members, retains the pink copy after relinquishing custody to the laboratory. The yellow copy is retained by the laboratory and the fully executed white copy is returned as part of the data deliverables package.
7. If the samples are sent by common carrier, a bill of lading (e.g., FedEx airbill) will be used and copies will be retained as permanent documentation. Commercial carriers are not required to sign the chain-of-custody form provided the form is sealed inside the sample cooler with the custody tape intact.

3.2.2.2 Laboratory Custody Procedures

Laboratory sample custody begins when the samples are received at the laboratory. Each laboratory's sample custodian will assign a unique laboratory sample identification number to each incoming sample. The field sample identification numbers, laboratory sample identification numbers, date and time of sample collection, date and time of sample receipt, and requested analyses will be entered into the sample receiving log. The laboratory's sample log-in, custody, and document control procedures will be consistent with its standard operating procedure.

Following log-in, all samples will be stored within an access-controlled location and will be maintained properly preserved (as defined in Table 3.2) until completion of all laboratory analyses. Unused sample aliquots and sample extracts/digestates will be maintained properly preserved for a minimum of 30 days following receipt of the final report. The laboratory will be responsible for the disposal of unused sample aliquots, sample containers, and sample extracts/digestates in accordance with all applicable local, state, and federal regulations.

The laboratory will be responsible for maintaining analytical logbooks and laboratory data.

3.2.2.3 Final Evidence Files Custody Procedures

The final evidence file for the project will be maintained by de maximis or the client approved contractor and will consist of the following:

1. Project plans
2. Project logbooks
3. Field data records
4. Sample identification documents
5. Chain-of-custody records
6. Correspondence
7. References, literature
8. Final data packages
9. Miscellaneous - photos, maps, drawings, etc.
10. Reports

The final evidence file materials will be the responsibility of the evidentiary file custodian with respect to maintenance and document removal.

3.3 Analytical Method Requirements

The field and laboratory analytical methods that will be used during the monitoring activities are detailed in the following subsections.

3.3.1 Field Analytical Methods

Field measurements obtained during sampling may include pH, temperature, conductivity, turbidity, and dissolved oxygen. These data will also be used to determine when groundwater or surface water is suitable for the collection of representative samples, as applicable to the investigation. Field-portable meters will be used to analyze the samples.

3.3.2 Laboratory Analytical Methods

The analytical methods that will be used are presented in Table 2.1. The quantities and types of QC samples to be collected are included in Table 2.1.

The turnaround time required for the analyses required for each batch of samples will be noted on the chain-of-custody documents submitted with the samples and will be communicated to the laboratory prior to the sampling event, as necessary.

3.4 Quality Control Requirements

The field and laboratory QC requirements for the monitoring activities are discussed in the following subsections. Specific QC checks and acceptance criteria are provided in the referenced analytical methods.

3.4.1 Field Sampling Quality Control

Field QC requirements include analyzing reference standards for instrument calibration and for routine calibration checks. Field QC samples for this project include equipment blank samples to determine the existence and magnitude of sample contamination resulting from ambient conditions or sampling procedures, field duplicate samples to assess the overall precision of the sampling and analysis event, and trip blank samples to monitor cross-contamination of samples by VOCs. The frequency of collection of these field QC samples is summarized in Table 2.1 of this QAPP. The evaluation of field QC data is provided in Section 3.9.2 of this QAPP.

3.4.2 Analytical Quality Control

The laboratory QC requirements for the analyses include analyzing method blanks, instrument performance checks, initial calibration standards, calibration verification standards, internal standards, surrogate compound spikes, interference check samples, serial dilution samples, MS/MSD samples, and LCSs. The acceptance criteria are specified in the methods or are determined statistically by the laboratory and will be included in the laboratory reports. The analysis frequency will be consistent with the referenced methods in Table 2.1.

3.5 Instrument/Equipment Testing, Inspection, and Maintenance Requirements

The procedures used to verify that instruments and equipment are functional and properly maintained are described in the following subsections.

3.5.1 Field Instrument Maintenance

The field equipment for this project may include water level, pH/temperature, conductivity, DO, and turbidity meters. Specific preventive maintenance procedures to be followed for field equipment are those recommended by the manufacturer. Field instruments will be checked and calibrated daily before use, as applicable. The maintenance schedule and trouble-shooting procedures for field instruments are presented in Table 3.1 of this QAPP.

3.5.2 Laboratory Instrument Maintenance

As part of its QA/QC program, each laboratory conducts routine preventive maintenance to minimize the occurrence of instrument failure and other system malfunctions. Designated laboratory employees will regularly perform routine scheduled maintenance and repair of (or coordinate with the instrument manufacturer for the repair of) all instruments. All maintenance that is performed will be documented in the laboratory's maintenance logbooks. All laboratory instruments are maintained in accordance with manufacturer's specifications.

3.6 Calibration Procedures and Frequency

The procedures for maintaining the accuracy for all the instruments and measuring equipment that will be used for conducting field tests and laboratory analyses are described in the following subsections. These instruments and equipment will be calibrated prior to each use or according to a periodic schedule.

3.6.1 Field Instruments/Equipment

Instruments and equipment used to gather, generate, or measure environmental data will be calibrated with sufficient frequency and in such a manner that accuracy and reproducibility of results are consistent with the manufacturer's specifications.

Equipment to be used during field sampling will be examined to confirm that it is in operating condition. This includes checking the manufacturer's operating manual for each instrument to ensure that all maintenance requirements are being observed. Individual calibration records for each field instrument that will be used for the project will be reviewed to ensure that any prior equipment problems have not been overlooked and all necessary repairs to equipment have been completed.

3.6.2 Laboratory Instruments

Calibration of laboratory equipment will be based on approved written procedures. Records of calibration, repairs, or replacement will be filed and maintained by the designated laboratory personnel performing these quality control activities. These records generally will be filed at the location where the work is performed and will be subject to a QA audit. The laboratory will have trained staff and in-house spare parts available for instrument repair or will maintain service contracts with vendors. Specific calibration procedures and frequencies are detailed in the referenced methods.

3.7 Inspection/Acceptance Criteria for Supplies and Consumables

The procedures that will be used to ensure that supplies and consumables used in the field and laboratory will be available as needed and free of contaminants are detailed in the following subsections.

3.7.1 Field Supplies and Consumables

Supplies and consumables for field measurements and sampling will be obtained from various vendors and may include standards for pH, turbidity, and conductivity meter calibration, sample containers, preservatives, solvents and detergent, water for equipment decontamination, and equipment blank water. The vendors and inspection and acceptance criteria for these field supplies were presented in Section 3.1.4 of this QAPP. Additional field supplies and consumables may include pump tubing and personnel protective equipment (PPE). Pump tubing will be constructed of pre-cleaned high density polyethylene. These materials will not introduce contaminants into the samples or interfere with the analyses. All field supplies will be consumed or replaced with sufficient frequency to prevent deterioration or degradation that may interfere with the analyses.

3.7.2 Laboratory Supplies and Consumables

The laboratory's vendors for general labware and reagents may include VWR Scientific Products and Fisher Scientific. Vendors for chromatography supplies and organic standards may include Ultra Scientific, Supelco, Accustandard, Restek, ChemService, Cambridge Isotopes, and Aldrich Chemical. The lot numbers of reagents and standards will be recorded and dates of receipt, first use, and expiration will be documented by the laboratory. Certificates of analysis will be maintained on file to document reagent/standard purity.

The referenced methods provide details on identifying contaminants in reagents and standards, determining deterioration of reagents and standards, and the corrective actions required if contaminants or deterioration are identified. The laboratory QA Officer is ultimately responsible for the ensuring the acceptability of supplies and consumables.

3.8 Data Acquisition Requirements (Non-Direct Measurements)

Data generated during the sampling events are verified and validated. Data from other sources are not required for these sampling events.

3.9 Data Management

The procedures for managing data from generation to final use and storage are detailed in subsections that follow.

3.9.1 Data Recording

Field data will be recorded in field logbooks and/or on project standard field forms and consist of measurements from direct reading instruments or direct measurements. Field staff are responsible for recording field data and the Field QA Officer is responsible for identifying and correcting recording errors.

Laboratory data are recorded in a variety of formats. Data from instruments are recorded on magnetic media, strip charts, or bench sheets. The referenced methods provide the data recording requirement for each preparation and analysis method.

3.9.2 Data Validation

Validation of field data for this project will primarily consist of checking for transcription errors and reviewing data recorded in field logbooks. Data transcribed from the field logbook into summary tables for reporting purposes will be verified for correctness by the Field QA Officer or his designee. Any limitations on the use of field data will be identified in the required reports.

Validation of the analytical data will be performed based on the relevant and applicable evaluation criteria outlined in "USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review", EPA 540-R-08-01, June 2008 and "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review," EPA-540-R-10-011, January 2010. The evaluation and action criteria specified in these documents (referred to hereafter as the National Functional Guidelines) will be used for validating the data. Qualifiers assigned to the data will be consistent with the data qualifiers specified in the National Functional Guidelines.

The results of the data validation process will be documented in a report that specifies all limitations on the usability of the analytical data.

3.9.3 Data Transformation/Data Reduction

Field data reduction procedures will be minimal in scope compared to those implemented for laboratory data. Only direct reading instrumentation will be employed in the field. The use of field instruments will generate data read directly from the meters following calibration. These data will

be recorded into field logbooks and/or on project standard field forms immediately after the measurements are obtained.

Laboratory data reduction consists of producing the final results from raw data. The procedures, calculations, and specific equations used by the laboratory for data reduction are detailed in the referenced methods.

3.9.4 Data Transmittal/Transfer

Field data will be entered into a standard Microsoft Excel spreadsheet or similar format. The Field QA Officer is responsible for verifying the correctness of the field data after the data are transferred to a spreadsheet format. Geographical data are maintained in a database that is described below.

The laboratory will provide data in electronic format as electronic data deliverables (EDDs). EDDs are generated directly from the laboratory information management system (LIMS), thereby eliminating the possibility of manual transcription errors. Laboratory EDDs are imported into the EQuIS database, and the data are maintained in the database for manipulation and presentation.

The contractor shall verify the correctness of the analytical database after the laboratory data for each event have been imported. This is accomplished by comparing the data from the database to the hardcopy analytical reports for a minimum of 10 percent of the sample results. If discrepancies between the database and hardcopy analytical reports are detected, a complete verification of the database will be performed or a new EDD will be submitted, imported, and verified as described previously.

3.9.5 Data Analysis

Data will be analyzed and compared to determine if concentrations of analytes exceed applicable criteria.

3.9.6 Data Assessment

Assessment of laboratory data will be performed using the procedures detailed in each analytical method. These assessments included determining the mean, standard deviation, relative standard deviation, percent difference, RPD, and percent recovery for certain QC elements.

Assessment of QC data for data validation purposes will include determining the percent recovery, RPD, and percent completeness. The statistical equations to determine these parameters are provided in Section 5.3 of this QAPP.

3.9.7 Data Tracking

Data generated in the field, such as water level measurements, will be recorded in field logbooks and/or on project standard field forms. There are no unique or special tracking requirements for these data. The data will be transcribed for analysis and reporting as discussed in Section 3.9.4, and the field logbooks and forms will be maintained in the final evidence file.

The laboratory's LIMS will provide the means for tracking data in the laboratory. The Laboratory Director is ultimately responsible for data tracking in the laboratory.

Tracking of analytical data in the database includes recording the laboratory generating the data, the dates when the EDD was received and imported, the date when qualifiers were applied to the results, the level of data review performed, and the data review guidance used to evaluate the data. The Project Manager is ultimately responsible for tracking data from entry to reporting.

3.9.8 Data Storage and Retrieval

Laboratory data will be stored in hardcopy and/or electronic format for a minimum period of 5 years. Electronic instrument data will be maintained for this same time period. All laboratory records for this project will be maintained consistent with the storage requirements stated in Section 2.9.3 of this QAPP.

The Project Manager is responsible for project data storage and retrieval. Final evidence files, which will include a copy of all laboratory data, will be maintained by de maximis, inc. or the client approved contractor.

3.9.9 Data Security

Laboratory data security is the responsibility of the Laboratory Director. Archived data cannot be accessed without authorization, and the name and purpose of personnel accessing archived data are recorded. The laboratory's LIMS is password protected and access rights are restricted by job function. Consultant data security procedures include limiting project database access to database managers and analysts, in addition to general building security procedures.

Section 4.0 Assessment/Oversight

The following subsections describe the procedures used to ensure proper implementation of this QAPP and the activities for assessing the effectiveness of the implementation of the project and associated QA/QC activities.

4.1 Assessments and Response Actions

Assessments consisting of internal and external audits may be performed during the project. Internal technical system audits of both field and laboratory procedures will be conducted to verify that sampling and analysis are being performed in accordance with the procedures established in the RI/FS WP and QAPP. External field and laboratory audits may be conducted.

An internal field technical system audit of field activities, including sampling and field measurements, will be conducted by the Field QA Officer or his designee at the beginning of the field sampling activities to identify deficiencies in the field sampling and documentation procedures. The field technical system audit will include examining field sampling records, field instrument operating records, field instrument calibration records, and chain-of-custody documentation. In addition, sample collection, handling, and packaging in compliance with the established procedures will be reviewed during the field audit. Any deficiencies identified will be documented and corrective actions will be taken to rectify the deficiencies.

Corrective action resulting from internal field technical system audits will be implemented immediately if data may be adversely affected from the use of unapproved methods or the improper use of approved methods. The field QA Officer will identify deficiencies, if any, and recommended corrective action to the Project Manager. Implementation of corrective actions will be performed by the Field QA Officer and field team. Corrective action will be documented in the field logbook and/or the project file. Follow-up audits will be performed as necessary to verify that deficiencies have been corrected and that the QA/QC procedures described in this QAPP and the SAP are maintained throughout the project.

An external field technical system audit may be conducted by NYSDEC any time during the field operations. These audits may or may not be announced and are conducted at the discretion of the agency.

An internal laboratory technical system audit will be conducted by the laboratory's QA Officer or designee. The laboratory technical system audit typically is conducted on an annual basis and includes examining laboratory documentation regarding sample receiving, sample log-in, storage and tracking, chain-of-custody procedures, sample preparation and analysis, instrument operating

records, data handling and management, data tracking and control, and data reduction and verification. The laboratory's QA Officer will evaluate the results of the audit and provide a report to section managers and the Laboratory Director that includes any deficiencies and/or noteworthy observations.

Corrective action resulting from deficiencies identified during the internal laboratory technical system audit will be implemented immediately. The Laboratory Director or section leaders, in consultation with the laboratory supervisor and staff, will approve the required corrective action to be implemented by the laboratory staff. The laboratory QA/QC Officer will ensure implementation and documentation of the corrective action. All problems requiring corrective action and the corrective action taken will be reported to the Laboratory Project Manager. Follow-up audits will be performed as necessary to verify that deficiencies have been corrected.

An external laboratory audit may be conducted at the discretion of the client. These audits may or may not be announced. External laboratory audits, if conducted, may include, but not be limited to, reviewing laboratory analytical procedures, laboratory on-site audits, and/or submitting performance evaluation samples to the laboratory for analysis.

4.2 Reports to Management

Quality assurance information will be summarized following completion of a monitoring event's activities. This information will consist of the results of external performance evaluations and system audits, results of periodic data quality validation and assessment, data use limitations, and any significant QA problems identified and corrective actions taken.

The QA Officer will be responsible within the organizational structure for compiling this information. The Project Manager will be provided with this information, to be included, as appropriate, in required reports.

Section 5.0 Data Verification/Validation and Usability

The QA activities that will be performed to ensure that the data are scientifically defensible, properly documented, of known quality, and meet the project objectives are described in the following sections.

5.1 Data Review, Verification, and Validation Requirements

All field and laboratory data will be reviewed, verified, and validated. These terms are defined as follows:

- Data review is the in-house examination to ensure that the data have been recorded, transmitted, and processed correctly.
- Data verification is the process for evaluating the completeness, correctness, and conformance/compliance of a specific data set against the method, procedural, or contractual specifications.
- Data validation is an analyte- and sample-specific process that extends the evaluation of data beyond method, procedure, or contractual compliance (i.e., data verification) to determine the quality of a specific data set relative to the end use.

The procedures and criteria used to verify and validate field and laboratory data are presented in Section 5.2. Field data and logbooks will be reviewed to ensure that the requirements of the sampling program, including the number of samples and locations, sampling, and sample handling procedures, were fulfilled.

Laboratory data review consists of raw data being reduced to results and checked by the responsible analyst. A second review of the data reduction procedure is conducted by another analyst or senior chemist. After the data are verified (see Section 5.2), a draft report is reviewed by the laboratory Project Manager. Final reports are generated, signed, and transmitted after approval of the draft by the Project Manager.

5.2 Verification and Validation Methods

Field data will be verified by reviewing field documentation and chain-of-custody records. Data from direct-reading field instruments will be verified by reviewing calibration and operating records and the QC data specified in Section 2.7.2 of this QAPP.

Verification of sample collection procedures consists of reviewing sample collection documentation for compliance with the requirements of the RDWP and QAPP. If alternate sampling procedures were used, the acceptability of the procedure will be evaluated to determine the effect on the usability of the data. Data usability will not be affected if the procedure used is determined to be an acceptable alternative that fulfills the measurement performance criteria in Section 2.7.2 of this QAPP.

The laboratory will internally verify its data by reviewing and documenting sample receipt, sample preparation, sample analysis (including internal QC checks), and data reduction and reporting. Any deviations from the acceptance criteria, corrective actions taken, and data determined to be of limited usability (i.e., laboratory-qualified data) will be noted in the laboratory reports.

Verification of laboratory data will consist of reviewing the final reports to ensure that the methods used to analyze the samples were consistent with the requirements of this QAPP. Sample handling records will also be reviewed to ensure that sample integrity remained intact from collection to laboratory receipt and that samples were properly preserved. Chain-of-custody documentation and sample condition upon laboratory receipt will be reviewed. Laboratory results, holding time periods, and QC data will be reviewed to determine compliance with the measurement performance criteria in Section 2.7.2 of this QAPP and the analytical methods.

Data validation will be conducted consistent with the procedure identified in Section 3.9.2 of this QAPP. The results of the data validation procedure will identify data that do not meet the measurement performance criteria in Section 2.7.2 of this QAPP. Data validation will determine whether the data are acceptable, of limited usability (qualified as estimated), or rejected. Data qualified as estimated will be reviewed and a discussion of the usability of estimated data will be included in the data validation memoranda. The results of data verification/validation will be summarized in data validation memoranda provided to the Project Manager for use in interpreting the results and for use in project reports.

Data determined to be unusable may require corrective action to be taken. Potential types of corrective action may include resampling by the field team or reanalysis of samples by the laboratory. The corrective actions taken are dependent upon the ability to mobilize the field team and whether or not the data are critical for project DQOs to be achieved. The Project Manager will be responsible for approving the implementation of any corrective action deemed to be necessary during data verification/validation.

5.3 Usability/Reconciliation with Data Quality Objectives

The overall usability of the data for the investigation will be assessed by evaluating the PARCCS of the data set to the measurement performance criteria in Section 2.7.2 of this QAPP using basic statistical quantities, as applicable. The procedures and statistical formulas to be used for these evaluations are presented in the following subsections.

5.3.1 Precision

Precision of field sampling procedures will be evaluated by assessing the RPD data from field duplicate samples. Analytical precision will be evaluated by assessing the RPD data from either duplicate spiked sample analyses, laboratory duplicate analyses, or duplicate LCS analyses. The RPD between two measurements is calculated using the following simplified formula:

$$RPD = \frac{|R_1 - R_2|}{R_1 + R_2} \times 200$$

where:

R_1 = value of first result
R_2 = value of second result

RPD data will provide the means to evaluate the overall variability attributable to the sampling procedure, sample matrix, and laboratory procedures. It should be noted that the RPD of two measurements can be very high when the concentrations approach the quantitation limit of an analysis. RPDs for field duplicate samples will only be calculated when the concentrations of an analyte detected in both samples are greater than or equal to 5 times the quantitation limit for the analyte. The variability of analytes detected at concentrations less than 5 times their quantitation limits will be determined by visually examining the results for the investigative and field duplicate sample, but RPDs will not be calculated in these instances.

5.3.2 Accuracy/Bias

The data from method blank samples, trip blank samples, MS/MSD samples, surrogate compound spikes, and LCSs will be used to determine accuracy and potential bias of the sample data.

The data from method blank samples provide an indication of laboratory contamination that may result in bias of sample data. Sample data associated with method blank contamination will have been identified during the data verification/validation process. Sample data associated with method blank contamination are evaluated during the data validation procedure to determine if analytes detected in samples associated with contaminated method blanks are "real" or are the result of laboratory contamination. The procedure for this evaluation involves comparing the concentration of the analyte in the sample to the concentration in the method blank sample taking into account adjustments for sample preparation and dilution factors. In general, the sample data are qualified as not detected if the sample concentration is less than 5 times (10 times for common organic laboratory contaminants) the method blank concentration. Typically, the quantitation limit for the affected analyte is elevated to the concentration detected in the sample.

The data from equipment and trip blank samples provide an indication of field conditions that may result in bias of sample data. Sample data associated with contaminated equipment, field, and trip blank samples will have been identified during the data verification/validation process. The evaluation procedure and qualification of sample data associated with equipment and trip blank contamination are performed in a similar manner as the evaluation procedure for method blank sample contamination.

Matrix spike sample data provide information regarding the accuracy/bias of the analytical methods relative to the sample matrix. Matrix spike samples are field samples that have been fortified with target analytes prior to sample preparation and analysis. The percent recovery data provide an indication of the effect that the sample matrix may have on the preparation and analysis procedure. Sample data exhibiting matrix effects will have been identified during the data verification/validation process.

Surrogate spike recoveries provide information regarding the accuracy/bias of organic analyses on an individual sample basis. Surrogate compounds are not expected to be found in the samples and are added to every sample prior to sample preparation. The percent recovery data provide an indication of the effect that the sample matrix may have on the preparation and analysis procedure. Sample data exhibiting matrix effects will have been identified during the data verification/validation process.

Analytical accuracy/bias will be determined by evaluating the percent recovery data of LCSs. LCSs are artificial samples prepared in the laboratory using a blank matrix fortified with analytes from a standard reference material that is independent of the calibration standards. LCSs are prepared and analyzed in the same manner as the field samples. The percent recovery data from LCS analyses will provide an indication of the accuracy and bias of the analytical method for each analyte or analyte group.

Percent recovery is calculated using the following formula:

$$\%R = \frac{SSR - SR}{SA} \quad X \quad 100$$

where:

SSR = Spiked Sample Result
SR = Sample Result or Background
SA = Spike Added

The percent recovery for surrogate compounds and LCSs are determined by dividing the measured value by the true value and multiplying by 100.

Accuracy/bias will be determined by comparing the percent recovery data to the measurement performance criteria in Section 2.7.2 of this QAPP.

5.3.3 Sample Representativeness

Representiveness of the samples will be assessed by reviewing sample holding times, the results of field audits, if conducted, and the data from field duplicate samples. Sample representativeness will be considered acceptable if holding time periods are met, the results of field audits indicate that the approved sampling methods or alternate acceptable sampling methods were used to collect the samples, and the field duplicate RPD data are acceptable.

5.3.4 Completeness

Completeness will be assessed by comparing the number of valid (usable) sample results to the total possible number of results within a specific sample matrix and/or analysis. Percent completeness will be calculated using the following formula:

$$\% \text{ Completeness} = \frac{\text{Number of Valid (usable) measurements}}{\text{Number of Measurements Planned}} \text{ X } 100$$

Completeness will be considered acceptable if 90 percent of the data are determined to be valid. However, valid sample data will not be rendered unusable if this completeness goal is not met.

5.3.5 Comparability

The comparability of data sets will be evaluated by reviewing the sampling and analysis methods used to generate the data for each data set. Comparability will be determined to be acceptable if the sampling and analysis methods specified in this QAPP and any approved QAPP revisions or amendments are used for generating the data.

Comparability of data from split samples (samples that are collected at the same time from the same location and split equally between two parties using sample containers from the same source or vendor), if collected, will be evaluated by determining the RPD of detected analytes in both samples following data verification/validation. Analytes that are detected in only one of the two samples will be assessed by reviewing the data validation reports for both data sets and determining the cause of the discrepancy, if possible. Comparability of split sample data will be considered acceptable if the RPD for detected analytes with concentrations greater than or equal

to 5 times their respective quantitation limits does not exceed RPD acceptance criteria for field duplicate samples.

5.3.6 Sensitivity and Quantitation Limits

Laboratory reports will include method reporting limits and method detection limits. These limits will be reviewed for the samples to ensure that the sensitivity of the analyses was sufficient to achieve the program requirements. All relevant QC data will be reviewed to assess compliance with the measurement performance criteria specified in Section 2.7.2 of this QAPP.

It should be noted that quantitation limits may be elevated as a result of high concentrations of target compounds, non-target compounds, and matrix interferences (collectively known as sample matrix effects). In these cases, the sensitivity of the analyses will be evaluated on an individual sample basis relative to the applicable evaluation criteria.

5.3.7 Data Limitations and Actions

Data use limitations will be identified in data validation reports. Data that do not meet the measurement performance criteria specified in this QAPP will be identified and the impact on the project quality objectives will be assessed and discussed in these reports and project reports. Field information will be reviewed to ensure that all sampling procedures and field measurements were conducted in accordance with the requirements of this QAPP. Field measurements obtained or data from samples collected using procedures inconsistent with the requirements of this QAPP will be evaluated using the procedures in Section 5.1 of this QAPP. Specific actions for field or laboratory data that do not meet the measurement performance criteria depend on the use of the data, and may require that additional samples are collected or the use of the data be restricted.

FIGURE A2.1

PROJECT QA ORGANIZATION

TABLES

TABLE 2.1

SAMPLING AND ANALYSIS SUMMARY
REMEDIAL INVESTIGATION WORK PLAN
BATAVIA FORMER MGP SITE
BATAVIA, NEW YORK

Matrix	*Analytical Parameters*	*Analytical Methods*	*Estimated Number of Samples*	*Field Duplicates*	*Equipment Blanks* [4]	*Trip Blanks*	*MS/MSD/Dup*
Soil Samples	TCL VOCs	SW 8260C [1]	21	1 per 10	2	0	1 per 20
	TCL SVOCs	SW 8270 [1]	21	1 per 10	2	0	1 per 20
	TAL Total Metals	SW 6010/6020/7471 [1]	21	1 per 10	2	0	1 per 20
	Total Cyanide	SW 9010 [1]	21	1 per 10	2	0	1 per 20
Groundwater Samples	TCL VOCs	SW 8260C [1]	6	1 per 10	2	1/cooler	1 per 20
	TCL SVOCs	SW 8270 [1]	6	1 per 10	2	0	1 per 20
	TAL Total Metals	SW 6010/6020/7470 [1]	6	1 per 10	2	0	1 per 20
	Total Cyanide	SW 9010 [1]	6	1 per 10	2	0	1 per 20
Soil Vapor Samples	TCL VOCs	TO-15	2	1 per 10	0	0	1 per 20
Indoor Air Samples	TCL VOCs	TO-15	2	1 per 10	0	0	1 per 20
Ambient Air Samples	TCL VOCs	TO-15	1	1 per 10	0	0	1 per 20
Waste Drum(Soil and Water)	TCL VOCs	SW 8260C [1]	8	0	0	0	0
	TCL SVOCs	SW 8270 [1]	8	0	0	0	0
	TAL Total Metals	SW 6010/6020/7470/7470 [1]	8	0	0	0	0

TABLE 2.1

SAMPLING AND ANALYSIS SUMMARY
REMEDIAL INVESTIGATION WORK PLAN
BATAVIA FORMER MGP SITE
BATAVIA, NEW YORK

Matrix	*Analytical Parameters*	*Analytical Methods*	*Estimated Number of Samples*	*Field Duplicates*	*Equipment Blanks* [4]	*Trip Blanks*	*MS/MSD/Dup*
Waste Drum(Soil and Water)	Reactivity		8	0	0	0	0
	Corrosivity		8	0	0	0	0
	Ignitability		8	0	0	0	0

Notes:

(1) - "Test Methods for Solid Waste Physical/Chemical Methods", SW-846, 3rd Edition, September 1986 (with all subsequent revisions)
(2) - "Methods for the Chemical Analysis of Water and Wastes", EPA-600/4-79-220, March 1983 (with revisions).
(3) - "Standard Methods for the Examination of Water and Wastewater", 20th Edition, 1999.
(4) - No equipment blank collection is necessary if dedicated sampling equipment is used.
(5) - Analysis of Dissolved Methane, Ethane, and Ethylene in Ground Water by a Standard Gas Chromatographic Technique. ADA, 1997. (Region 1 Library)

Dup - Duplicate
MS - Matrix Spike
MSD - Matrix Spike Duplicate
TCL - Target Compound List
VOCs - Volatile Organic Compounds
TBD - To be determined.
MNA - Monitored Natural Attenuation

TABLE 2.2

ANALYTE LIST AND QUANTITATION LIMITS
REMEDIAL INVESTIGATION WORK PLAN
BATAVIA FORMER MGP SITE
BATAVIA, NEW YORK

	CAS Number	*Groundwater Quantitation Limits*	*Soil Quantitation Limits*
Volatile Organic Compounds		***µg/L***	***µg/Kg***
1,1,2,2-Tetrachloroethane	79-34-5	1.0	10
1,1,2-Trichloroethane	79-00-5	1.0	10
1,1-Dichloroethane	75-34-3	1.0	10
1,1-Dichloroethylene	75-35-4	1.0	10
1,2-Dibromo-3-chloropropane	96-12-8	1.0	10
1,2-Dibromoethane	106-93-4	1.0	10
1,2-Dichloroethane	107-06-2	1.0	10
1,2-Dichloropropane	78-87-5	1.0	10
Bromodichloromethane	75-27-4	1.0	10
Bromoform	75-25-2	1.0	10
Carbon tetrachloride	56-23-5	1.0	10
Chlorobenzene	108-90-7	1.0	10
Chloroethane	75-00-3	1.0	10
Chloroform	67-66-3	1.0	10
cis-1,3-Dichloropropene	10061-01-5	1.0	10
Dibromochloromethane	124-48-1	1.0	10
Dichlorodifluoromethane	75-71-8	1.0	10
m-Dichlorobenzene	541-73-1	1.0	10
Bromomethane	74-83-9	1.0	10
Chloromethane	74-87-3	1.0	10
Methylene chloride	75-09-2	1.0	10
o-Dichlorobenzene	95-50-1	1.0	10
p-Dichlorobenzene	106-46-7	1.0	10
Tetrachloroethylene	127-18-4	1.0	10
trans-1,2-Dichloroethylene	156-60-5	1.0	10
trans-1,3-Dichloropropene	10061-02-6	1.0	10
Trichloroethylene	79-01-6	1.0	10
Trichlorofluoromethane	75-69-4	1.0	10
Vinyl chloride	75-01-4	1.0	10
4-Methyl-2-pentanone	108-10-1	5.0	10
2-Butanone	78-93-3	5.0	10
Benzene	71-43-2	1.0	10
Ethylbenzene	100-41-4	1.0	10
Styrene	100-42-5	1.0	10
Toluene	108-88-3	1.0	10
Xylene(total)	1330-20-7	1.0	10
1,1,1-Trichloroethane	71-55-6	1.0	10
2-Hexanone	591-78-6	5.0	10
Acetone	67-64-1	5.0	10

TABLE 2.2

ANALYTE LIST AND QUANTITATION LIMITS
REMEDIAL INVESTIGATION WORK PLAN
BATAVIA FORMER MGP SITE
BATAVIA, NEW YORK

	CAS Number	*Groundwater Quantitation Limits*	*Soil Quantitation Limits*
Volatile Organic Compounds (Continued)		***µg/L***	***µg/Kg***
Carbon disulfide	75-15-0	1.0	10
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	1.0	10
Methyl Acetate	79-20-9	1.0	10
Methyl tert-Butyl Ether	1634-04-4	1.0	10
cis-1,2-Dichloroethene	156-59-2	1.0	10
Cyclohexane	110-82-7	1.0	10
Methylcyclohexane	108-87-2	1.0	10
Isopropylbenzene	98-82-8	1.0	10
1,2,4-Trichlorobenzene	120-82-1	1.0	10
Semi-Volatile Organic Compounds			
2,4,6-Trichlorophenol	88-06-2	10	330
2,4-Dichlorophenol	120-83-2	10	330
2,4-Dimethylphenol	105-67-9	10	330
2,4-Dinitrophenol	51-28-5	25	830
2-Chlorophenol	95-57-8	10	330
4,6-Dinitro-o-cresol	534-52-1	25	830
o-Nitrophenol	88-75-5	10	330
p-Chloro-m-cresol	59-50-7	10	330
Pentachlorophenol	87-86-5	25	830
Phenol	108-95-2	10	330
p-Nitrophenol	100-02-7	25	830
Bis(2-ethylhexyl) phthalate	117-81-7	10	330
Butyl benzyl phthalate	85-68-7	10	330
Diethyl phthalate	84-66-2	10	330
Dimethyl phthalate	131-11-3	10	330
Di-n-butyl phthalate	84-74-2	10	330
Di-n-octyl phthalate	117-84-0	10	330
2,4-Dinitrotoluene	121-14-2	10	330
2,6-Dinitrotoluene	606-20-2	10	330
Isophorone	78-59-1	10	330
Nitrobenzene	98-95-3	10	330
Acenaphthene	83-32-9	10	330
Acenaphthylene	208-96-8	10	330
Anthracene	120-12-7	10	330
Benzo[a]anthracene	56-55-3	10	330
Benzo[a]pyrene	50-32-8	10	330
Benzo[b]fluoranthene	205-99-2	10	330
Benzo[ghi]perylene	191-24-2	10	330

TABLE 2.2

ANALYTE LIST AND QUANTITATION LIMITS
REMEDIAL INVESTIGATION WORK PLAN
BATAVIA FORMER MGP SITE
BATAVIA, NEW YORK

	CAS Number		*Soil Quantitation Limits*
Semi-Volatile Organic Compounds (Continued)			***µg/Kg***
Benzo[k]fluoranthene	207-08-9	10	330
Chrysene	218-01-9	10	330
Dibenz[a,h]anthracene	53-70-3	10	330
Fluoranthene	206-44-0	10	330
Fluorene	86-73-7	10	330
Indeno(1,2,3 cd)pyrene	193-39-5	10	330
Naphthalene	91-20-3	10	330
Phenanthrene	85-01-8	10	330
Pyrene	129-00-0	10	330
2-Chloronaphthalene	91-58-7	10	330
Hexachlorobenzene	118-74-1	10	330
Hexachlorobutadiene	87-68-3	10	330
Hexachlorocyclopentadiene	77-47-4	10	330
Hexachloroethane	67-72-1	10	330
2,4,5-Trichlorophenol	95-95-4	25	830
2-Methylnaphthalene	91-57-6	10	330
3,3'-Dichlorobenzidine	91-94-1	10	330
4-Chlorophenyl phenyl ether	7005-72-3	10	330
Bis(2-chloroethoxy)methane	111-91-1	10	330
Bis(2-chloroethyl)ether	111-44-4	10	330
Dibenzofuran	132-64-9	10	330
m-Nitroaniline	99-09-2	25	830
N-Nitrosodiphenylamine	86-30-6	10	330
N-Nitrosodipropylamine	621-64-7 1	10	330
o-Cresol	95-48-7	10	330
o-Nitroaniline	88-74-4	25	830
p-Chloroaniline	106-47-8	10	330
p-Cresol	106-44-5	10	330
p-Nitroaniline	100-01-6	25	830
Benzaldehyde	100-52-7	10	330
2,2'-oxybis(1-Chloropropane)	108-60-1	10	330
Acetophenone	98-86-2	10	330
Caprolactam	105-60-2	10	330
1,1'-Biphenyl	92-52-4	10	330
4-Bromophenyl-phenylether	101-55-3	10	330
Atrazine	1912-24-9	10	330
Carbazole	86-74-8	10	330

TABLE 2.2

ANALYTE LIST AND QUANTITATION LIMITS
REMEDIAL INVESTIGATION WORK PLAN
BATAVIA FORMER MGP SITE
BATAVIA, NEW YORK

	CAS Number	*Groundwater Quantitation Limits µg/L*	*Soil Quantitation Limits mg/Kg*
Metals			
Aluminum	7429-90-5	200	20
Antimony	7440-36-0	60	6.0
Arsenic	7440-38-2	10	1.0
Barium	7440-39-3	200	20
Beryllium	7440-41-7	5.0	0.5
Cadmium	7440-43-9	5.0	0.5
Calcium	7440-70-2	5000	500
Chromium	7440-47-3	10	1.0
Cobalt	7440-48-4	50	5.0
Copper	7440-50-8	25	2.5
Iron	7439-89-6	100	10
Lead	7439-92-1	5.0	0.5
Magnesium	7439-95-4	5000	500
Manganese	7439-96-5	15	1.5
Mercury	7439-97-6	0.2	0.1
Nickel	7440-02-0	40	4.0
Potassium	7440-09-7	5000	500
Selenium	7782-49-2	5.0	0.5
Silver	7440-22-4	10	1.0
Sodium	7440-23-5	5000	500
Thallium	7440-28-0	10	1.0
Vanadium	7440-62-2	50	5.0
Zinc	7440-66-6	20	2.0
Cyanide	57-12-5	10	1.0

TABLE 2.2

ANALYTE LIST AND QUANTITATION LIMITS
REMEDIAL INVESTIGATION WORK PLAN
BATAVIA FORMER MGP SITE
BATAVIA, NEW YORK

	Indoor Air* RL (ppbv)	Soil Gas** RL (ppbv)
TO-15 VOC LIST		
1,1,1-Trichloroethane	0.04	0.2
1,1,2,2-Tetrachloroethane	0.04	0.2
1,1,2-Trichloroethane	0.04	0.2
1,1-Dichloroethane	0.04	0.2
1,1-Dichloroethene	0.04	0.2
1,2-Dibromoethane	0.04	0.2
1,2-Dichloroethane	0.08	0.2
1,2-Dichloropropane	0.08	0.2
1,3,5-Trimethylbenzene	0.08	0.2
1,3-Butadiene	0.08	0.5
2,2,4-Trimethylpentane	0.04	0.2
3-Chloropropene	0.08	0.5
4-Ethyltoluene	0.04	0.2
Benzene	0.04	0.2
Bromodichloromethane	0.04	0.2
Bromoethene	0.08	0.2
Bromoform	0.04	0.2
Bromomethane	0.08	0.2
Carbon Tetrachloride	0.04	0.2
Chloroethane	0.08	0.5
Chloroform	0.04	0.2
cis-1,2-Dichloroethene	0.04	0.2
cis-1,3-Dichloropropene	0.04	0.2
Cyclohexane	0.04	0.2
Dibromochloromethane	0.04	0.2
Dichlorodifluoromethane	0.04	0.5
Dichlorotetrafluoroethane	0.04	0.2
Ethylbenzene	0.04	0.2
m,p-Xylene	0.08	0.5
Methyl tert-Butyl Ether	0.04	0.5
Methylene Chloride	0.8	0.5
n-Heptane	0.04	0.2
n-Hexane	0.08	0.5
o-Xylene	0.04	0.2
Tetrachloroethene	0.04	0.2
Toluene	0.04	0.2
trans-1,2-Dichloroethene	0.04	0.2
trans-1,3-Dichloropropene	0.04	0.2
Trichloroethene	0.04	0.2
Trichlorofluoromethane	0.04	0.2
Vinyl Chloride	0.08	0.2

TABLE 2.2

ANALYTE LIST AND QUANTITATION LIMITS
REMEDIAL INVESTIGATION WORK PLAN
BATAVIA FORMER MGP SITE
BATAVIA, NEW YORK

Notes:

(1) - Targeted limits are presented for guidance only and may not be achievable for all samples as a result of matrix interferences, low percent solids, or high concentrations of target and non-target compounds.

TCL - Target Compound List

VOCs - Volatile Organic Compounds

MNA - Monitored Natural Attenuation

MNA - Monitored Natural Attenuation

TABLE 2.3

LABORATORY REPORTING DELIVERABLES
REMEDIALINVESTIGATION WORK PLAN
BATAVIA FORMER MGP SITE
BATAVIA, NEW YORK

A. Chain of Custody Documentation and Detailed Narrative [1]

B. Sample Information:
   - i) date collected
   - ii) date extracted
   - iii) date analyzed

C. Results [2]:
   - i) sample results
   - ii) duplicate
   - iii) blanks
   - iv) laboratory control sample recoveries
   - v) spike; spike duplicate recoveries
   - vi) surrogate recoveries

D. Supporting QA/QC:
   - i) analytical methodology and reference
   - ii) method detection limits

All sample data and its corresponding QA/QC data shall be maintained accessible either in hard copy or on magnetic tape or disc (computer data files).

Notes:

(1) - A detailed report narrative should accompany each submission, summarizing the contents, results, and all relevant circumstances of the work.

(2) - Method or laboratory generated control limits must be provided.

QA - Quality Assurance

QC - Quality Control

TABLE 3.1

ROUTINE MAINTENANCE PROCEDURES AND SCHEDULES
REMEDIAL INVESTIGATION WORK PLAN
BATAVIA FORMER MGP SITE
BATAVIA, NEW YORK

Instrument/Equipment	*Maintenance Procedures/Schedule*	*Spare Parts in Stock*
pH/Temperature Meter	1. Check battery (if used in field); and replace if discharged. 2. After use in samples containing free oil, wash the electrode in soap and rinse thoroughly with water. Immerse the lower third of the electrode in diluted HCl (1:9) solution for 10 minutes to remove any film formed. Rinse thoroughly with water. 3. Keep electrode properly filled with appropriate filling electrolyte solution.	1. Standard buffers 2. Electrolyte filling solution 3. Spare electrode
Specific Conductivity, Dissolved oxygen, eH (ORP), and Turbidity Meters	1. Check battery (if used in field); and replace if discharged. 2. After use in samples containing free oil, wash the electrode in soap and rinse thoroughly with water.	1. Standard solution 2. Spare electrodes

TABLE 3.2

CONTAINER, PRESERVATION, SHIPPING, AND PACKAGING REQUIREMENTS FOR LABORATORY ANALYSES
REMEDIAL INVESTIGATION WORK PLAN
BATAVIA FORMER MGP SITE
BATAVIA, NEW YORK

Analyses	*Sample Containers* [1]	*Preservation*	*Maximum Holding Time from Sample Collection*	*Volume of Sample*	*Shipping*	*Normal Packaging*
SOIL						
Metals	1 - 4 oz. glass jar	Cool to 0-6 °C	180 days from collection to analysis	Fill to neck of bottle	Overnight Courier	Foam Liner or Bubble-wrap
TCL VOCs	EnCore samplers	Cool to 0-6 °C	14 Days	Fill Completely.	Overnight Courier	Foam Liner or Bubble-wrap
TCL SVOCs	1 - 4 oz. glass jar	Cool to 0-6 °C	14 days from collection to extraction; 40 days from extraction to analysis	Fill to neck of bottle	Overnight Courier	Foam Liner or Bubble-wrap
Cyanide	1 - 4 oz. glass jar	Cool to 0-6 °C	14 Days for analysis	Fill to neck of bottle	Overnight Courier	Foam Liner or Bubble-wrap
GROUNDWATER						
Total Metals[2]	One 500 mL plastic bottle	HNO3 to pH < 2	180 days from collection to analysis	Fill to neck of bottle	Overnight Courier	Foam Liner or Bubble-wrap
TCL VOCs	Three 40 mL teflon-lined septum vials per analysis	HCl to pH < 2 Cool to 0-6 °C	14 Days	Fill Completely. (No headspace)	Overnight Courier	Foam Liner or Bubble-wrap
TCL SVOCs	2 1-liter amber glass	Cool to 0-6 °C	7 days for extraction 40 days after extraction for analysis	Fill completely	Overnight or Hand Deliver	Foam Liner or Bubble-wrap
GROUNDWATER						
Cyanide	1-liter glass	0.6gAscorbic Acid, NaOH to pH >12, Cool to 4° ± 2°C	14 Days for analysis	Fill to neck of bottle	Overnight Courier	Foam Liner or Bubble-wrap

TABLE 3.2

CONTAINER, PRESERVATION, SHIPPING, AND PACKAGING REQUIREMENTS FOR LABORATORY ANALYSES
REMEDIAL INVESTIGATION WORK PLAN
BATAVIA FORMER MGP SITE
BATAVIA, NEW YORK

Analyses	*Sample Containers* [1]	*Preservation*	*Maximum Holding Time from Sample Collection*	*Volume of Sample*	*Shipping*	*Normal Packaging*
WASTE DRUM						
Metals	1 - 4 oz. glass jar	Cool to 0-6 °C	180 days from collection to analysis	Fill to neck of bottle	Overnight Courier	Foam Liner or Bubble-wrap
TCL VOCs	EnCore samplers	Cool to 0-6 °C	14 Days	Fill Completely.	Overnight Courier	Foam Liner or Bubble-wrap
TCL SVOCs	1 - 4 oz. glass jar	Cool to 0-6 °C	14 days from collection to extraction; 40 days from extraction to analysis	Fill to neck of bottle	Overnight Courier	Foam Liner or Bubble-wrap
Ignitability/Corrosivity/Reactivity	1 - 4 oz. glass jar	Cool to 0-6 °C	28 Days for analysis	Fill to neck of bottle	Overnight Courier	Foam Liner or Bubble-wrap

Notes:

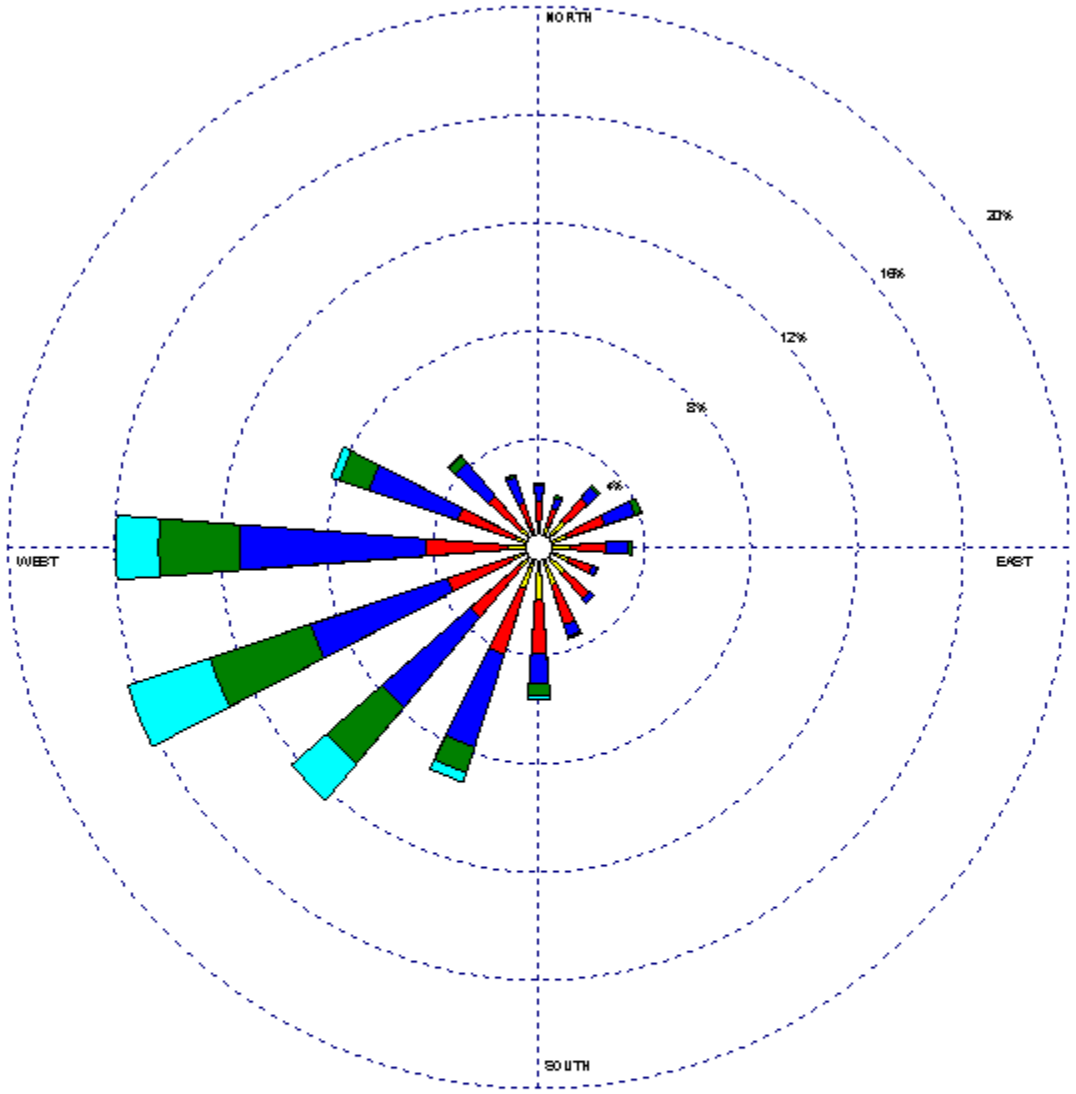
[1] - The laboratory may choose to combine analyses in the same bottles, at their discretion.
TCL - Target Compound List
VOCs - Volatile Organic Compounds
SVOCs - Semi-Volatile Organic Compounds

Appendix C

Wind Rose Data

WIND ROSE PLOT

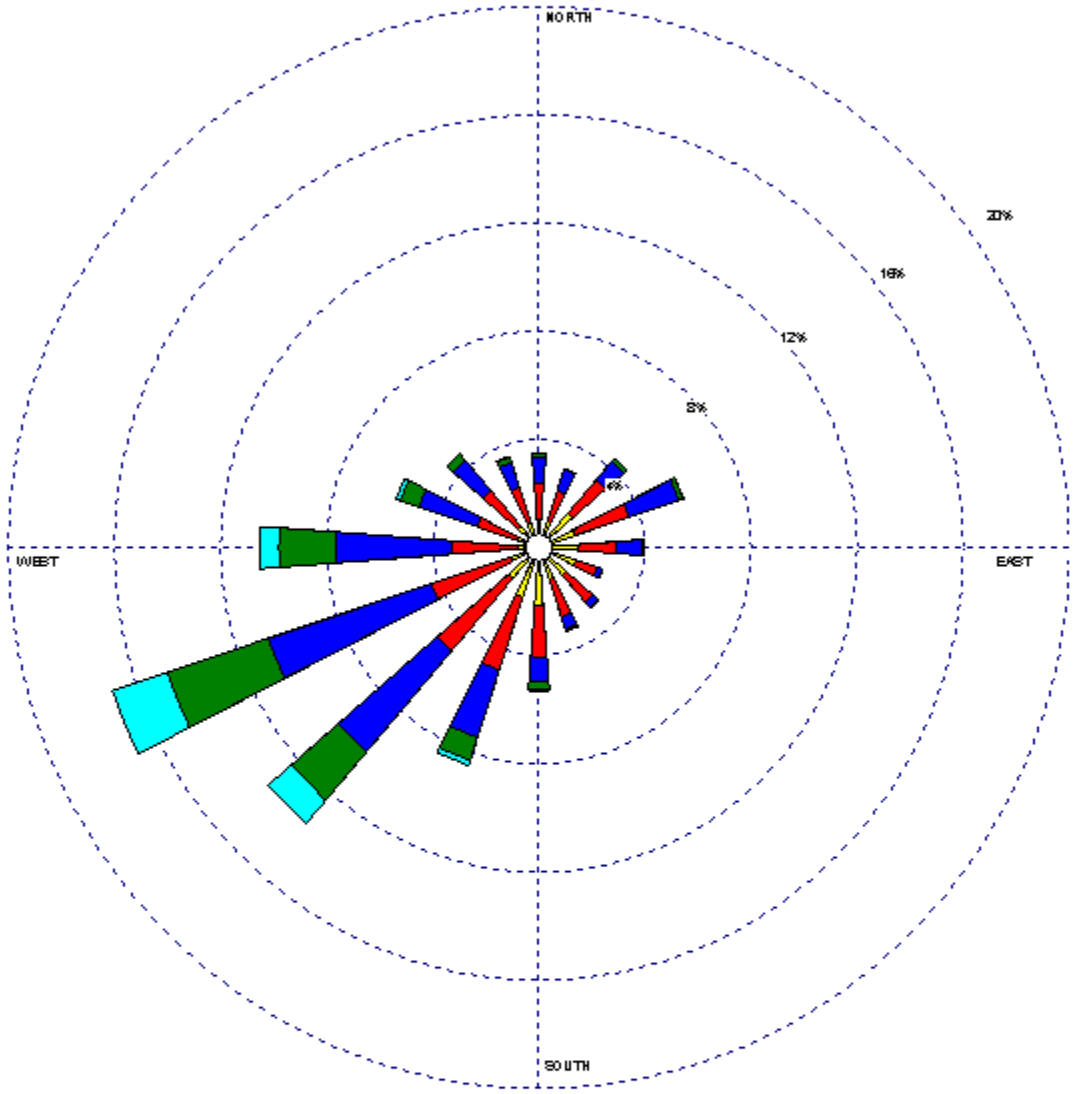
Station #14733 - BUFFALO/GREATER BUFFALO INT'L, NY



Wind Speed (m/s) > 11.06 8.49 - 11.06 5.40 - 8.49 3.34 - 5.40 1.80 - 3.34 0.51 - 1.80	MODELER	DATE 11/1/2002	COMPANY NAME
	DISPLAY Wind Speed	UNIT m/s	COMMENTS
	AVG. WIND SPEED 6.25 m/s	CALM WINDS 1.21%	
	ORIENTATION Direction (blowing from)	PLOT YEAR-DATE-TIME 1961 Jan 1 - Jan 31 Midnight - 11 PM	PROJECT/PLOT NO.

WIND ROSE PLOT

Station #14733 - BUFFALO/GREATER BUFFALO INT'L, NY

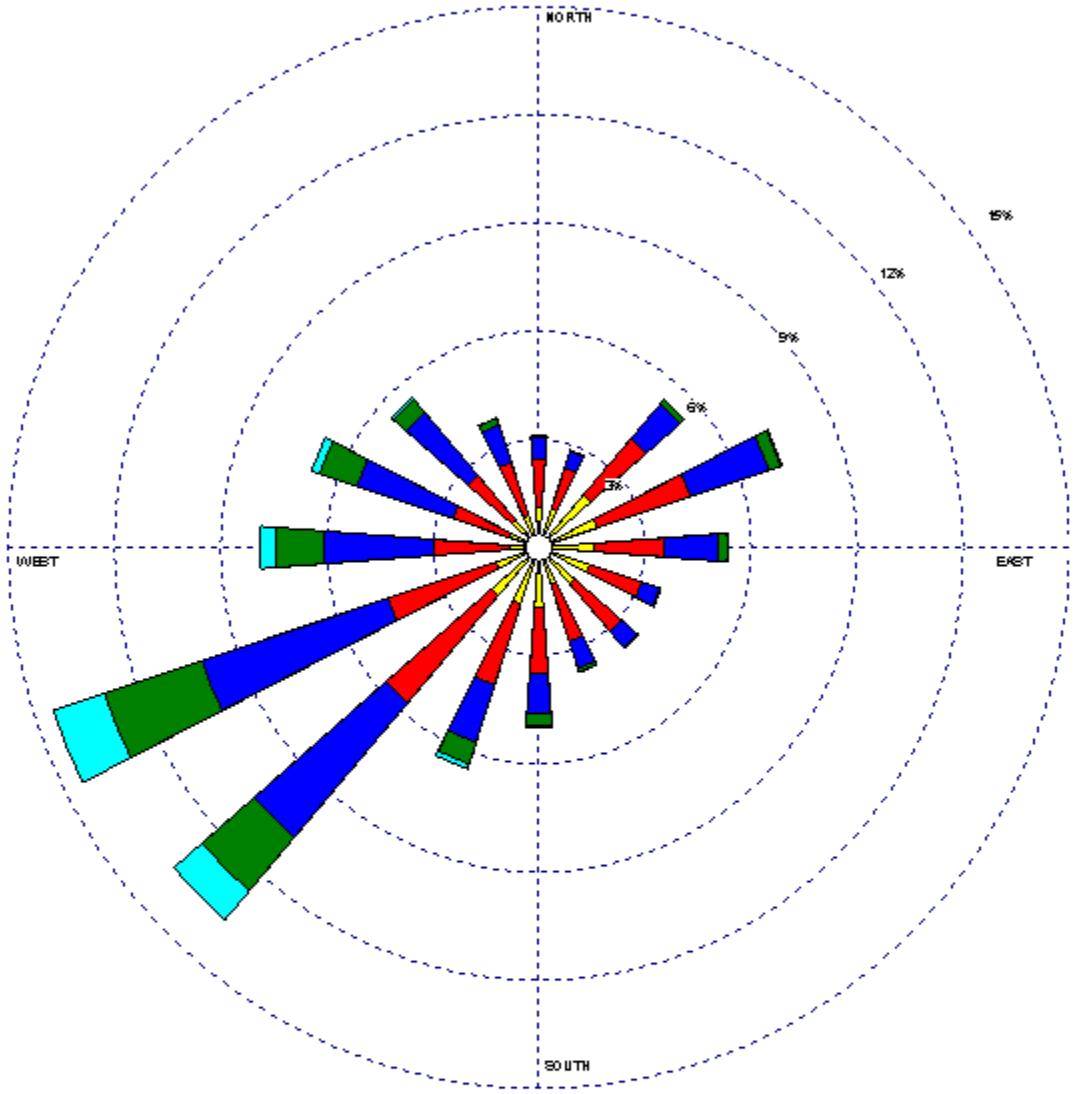


Wind Speed (m/s)	MODELER	DATE	COMPANY NAME
> 11.06 8.49 - 11.06 5.40 - 8.49 3.34 - 5.40 1.80 - 3.34 0.51 - 1.80		11/1/2002	
	DISPLAY Wind Speed	UNIT m/s	COMMENTS
	AVG. WIND SPEED 5.75 m/s	CALM WINDS 1.97%	
	ORIENTATION Direction (blowing from)	PLOT YEAR-DATE-TIME 1961 Feb 1 - Feb 29 Midnight - 11 PM	PROJECT/PLOT NO.

WRPLOT View 3.3 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

Station #14733 - BUFFALO/GREATER BUFFALO INT'L, NY

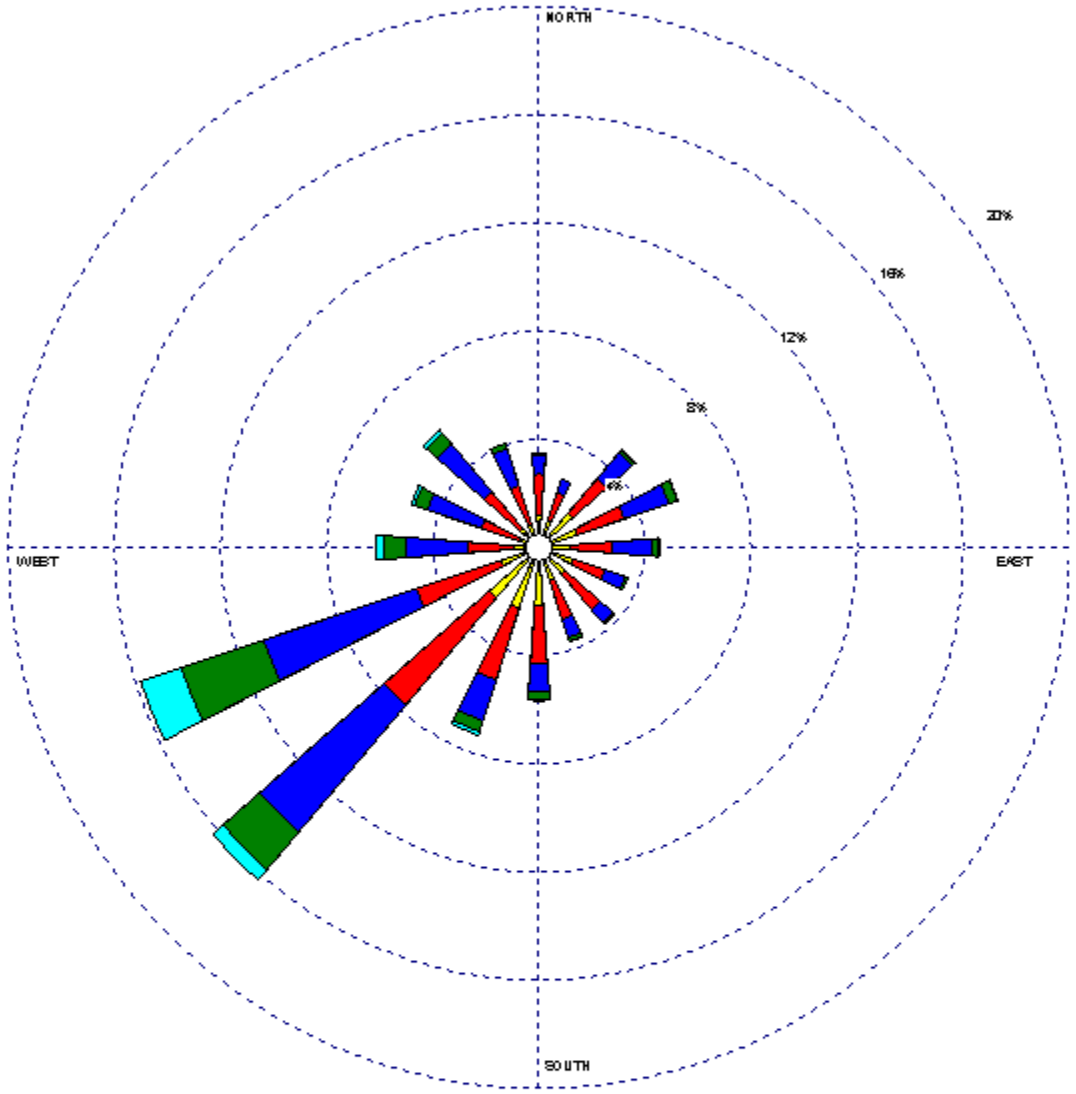


Wind Speed (m/s)	MODELER	DATE	COMPANY NAME
> 11.06 8.49 - 11.06 5.40 - 8.49 3.34 - 5.40 1.80 - 3.34 0.51 - 1.80		11/1/2002	
	DISPLAY Wind Speed	UNIT m/s	COMMENTS
	AVG. WIND SPEED 5.56 m/s	CALM WINDS 1.54%	
	ORIENTATION Direction (blowing from)	PLOT YEAR-DATE-TIME 1961 Mar 1 - Mar 31 Midnight - 11 PM	PROJECT/PLOT NO.

WRPLOT View 3.3 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

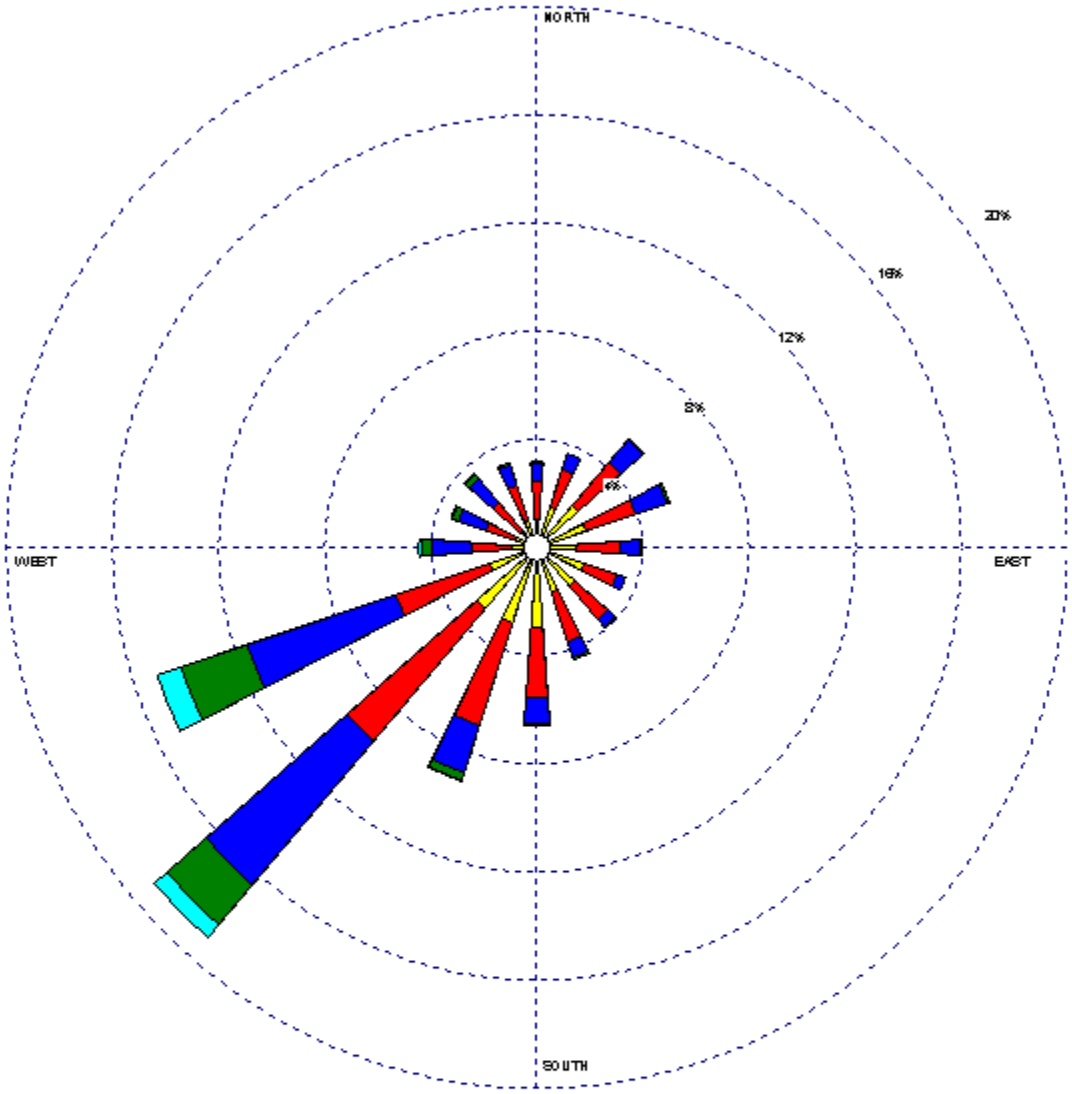
Station #14733 - BUFFALO/GREATER BUFFALO INT'L, NY



Wind Speed (m/s)	MODELER	DATE	COMPANY NAME
> 11.06 8.49 - 11.06 5.40 - 8.49 3.34 - 5.40 1.80 - 3.34 0.51 - 1.80		11/1/2002	
	DISPLAY Wind Speed	UNIT m/s	COMMENTS
	AVG. WIND SPEED 5.43 m/s	CALM WINDS 1.93%	
	ORIENTATION Direction (blowing from)	PLOT YEAR-DATE-TIME 1961 Apr 1 - Apr 30 Midnight - 11 PM	PROJECT/PLOT NO.

WIND ROSE PLOT

Station #14733 - BUFFALO/GREATER BUFFALO INT'L, NY

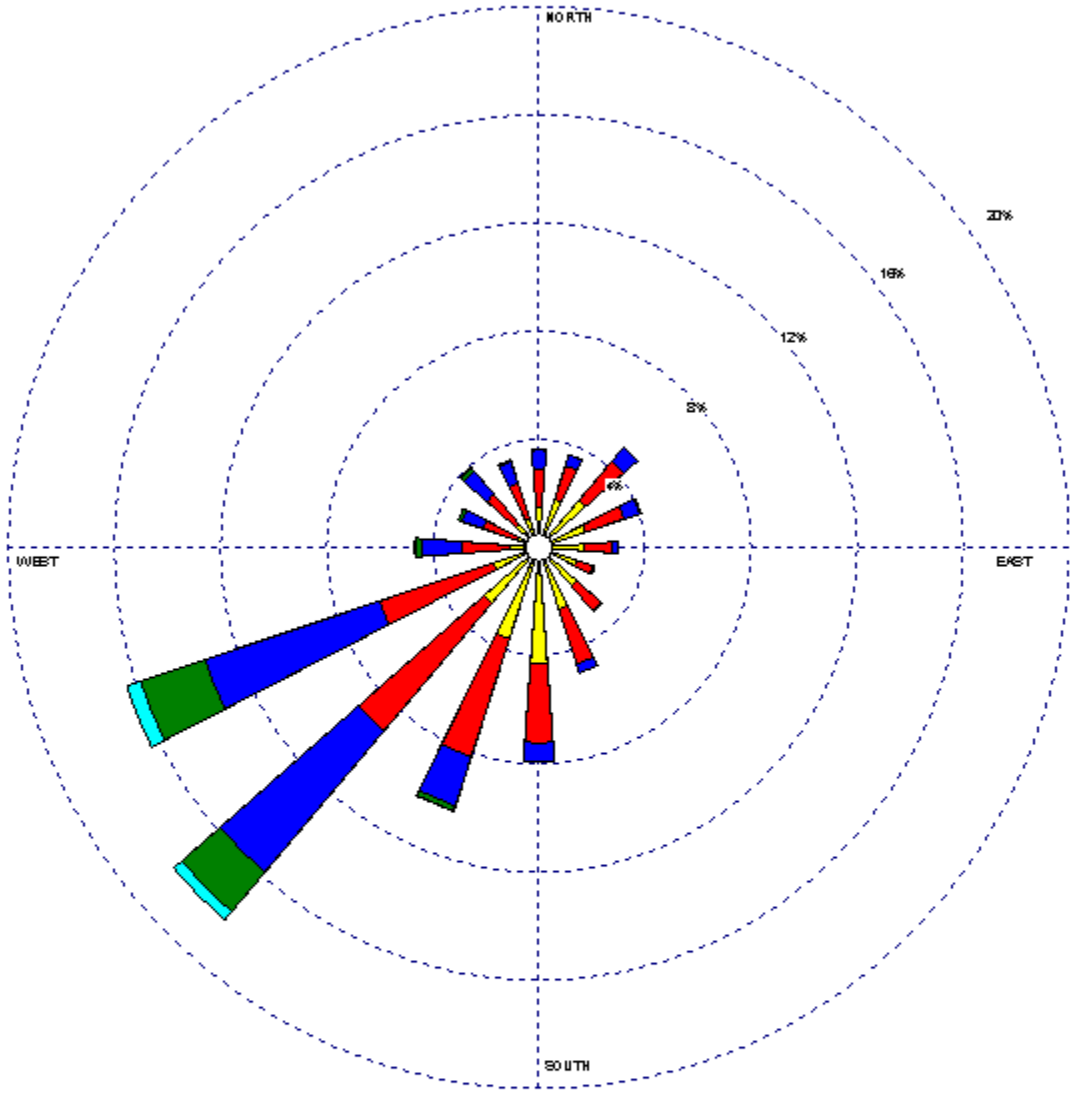


Wind Speed (m/s) > 11.06 8.49 - 11.06 5.40 - 8.49 3.34 - 5.40 1.80 - 3.34 0.51 - 1.80	MODELER	DATE 11/1/2002	COMPANY NAME
	DISPLAY Wind Speed	UNIT m/s	COMMENTS
	AVG. WIND SPEED 4.92 m/s	CALM WINDS 2.15%	
	ORIENTATION Direction (blowing from)	PLOT YEAR-DATE-TIME 1961 May 1 - May 31 Midnight - 11 PM	PROJECT/PLOT NO.

WRPLOT View 3.3 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

Station #14733 - BUFFALO/GREATER BUFFALO INT'L, NY



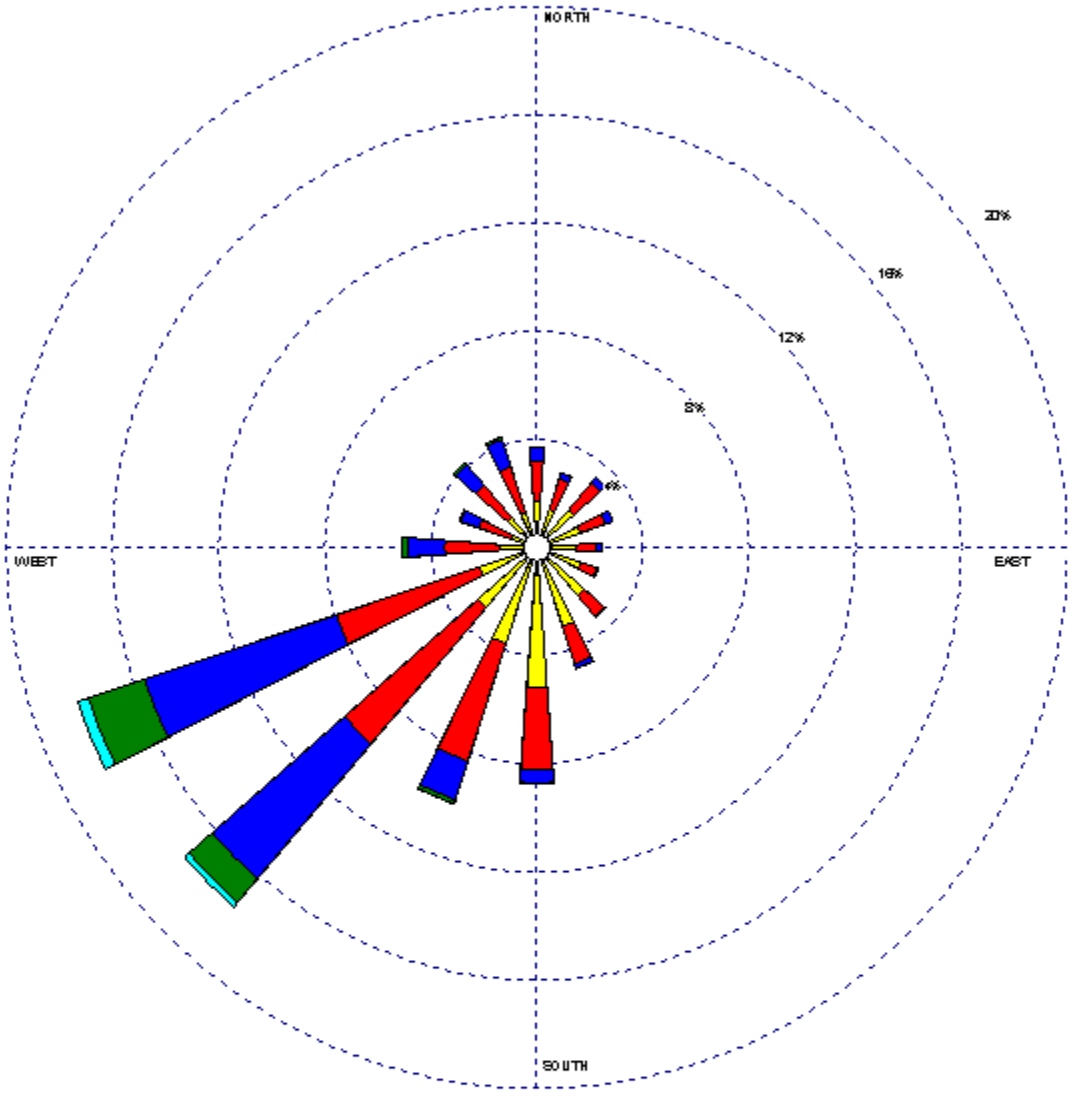
Wind Speed (m/s)

- > 11.06
- 8.49 - 11.06
- 5.40 - 8.49
- 3.34 - 5.40
- 1.80 - 3.34
- 0.51 - 1.80

MODELER	DATE	COMPANY NAME
	11/1/2002	
DISPLAY	UNIT	COMMENTS
Wind Speed	m/s	
AVG. WIND SPEED	CALM WINDS	
4.69 m/s	2.47%	
ORIENTATION	PLOT YEAR-DATE-TIME	PROJECT/PLOT NO.
Direction (blowing from)	1961 Jun 1 - Jun 30 Midnight - 11 PM	

WIND ROSE PLOT

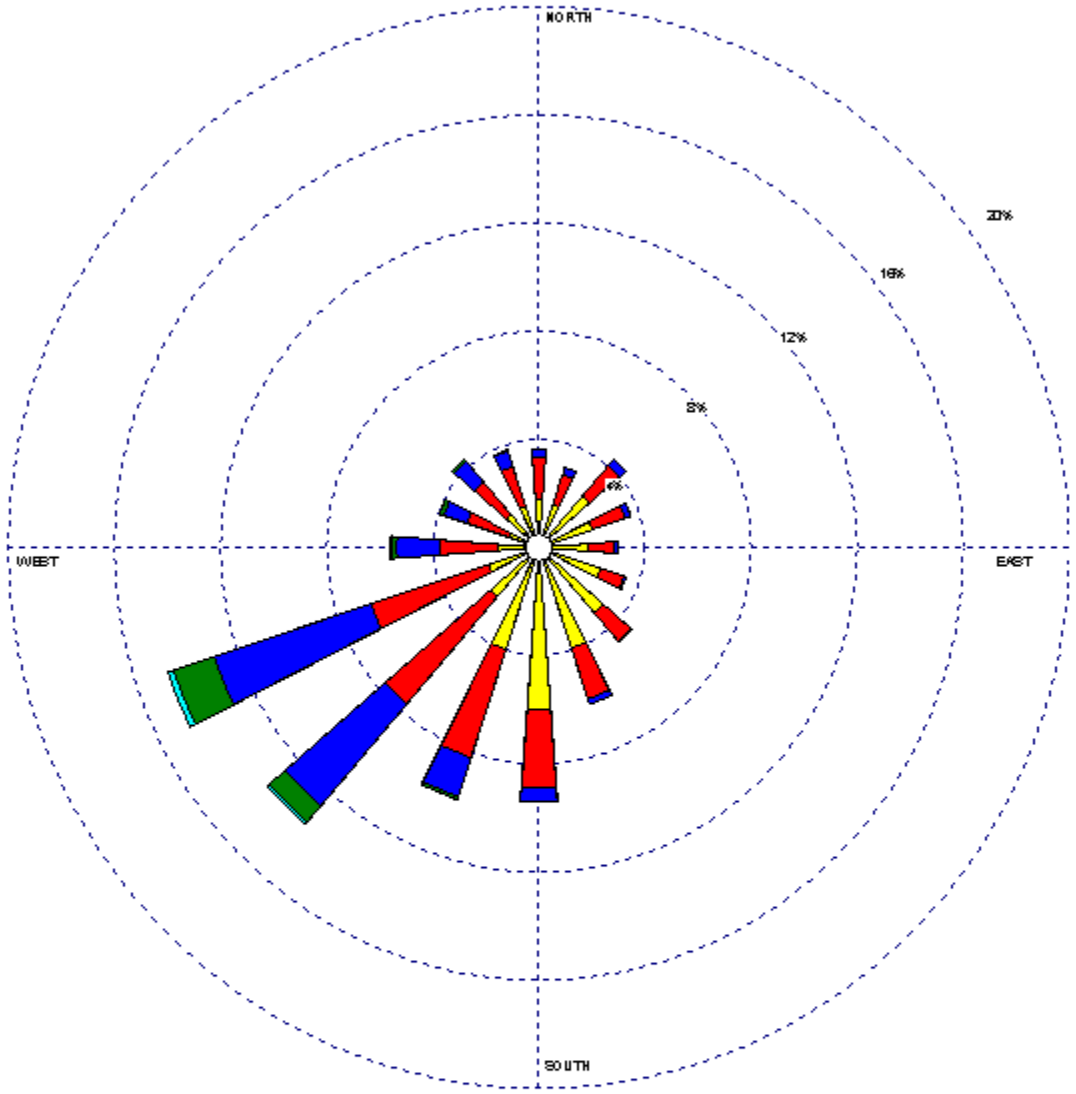
Station #14733 - BUFFALO/GREATER BUFFALO INT'L, NY



Wind Speed (m/s) > 11.06 8.49 - 11.06 5.40 - 8.49 3.34 - 5.40 1.80 - 3.34 0.51 - 1.80	MODELER	DATE 11/1/2002	COMPANY NAME
	DISPLAY Wind Speed	UNIT m/s	COMMENTS
	AVG. WIND SPEED 4.47 m/s	CALM WINDS 2.75%	
	ORIENTATION Direction (blowing from)	PLOT YEAR-DATE-TIME 1961 Jul 1 - Jul 31 Midnight - 11 PM	PROJECT/PLOT NO.

WIND ROSE PLOT

Station #14733 - BUFFALO/GREATER BUFFALO INT'L, NY

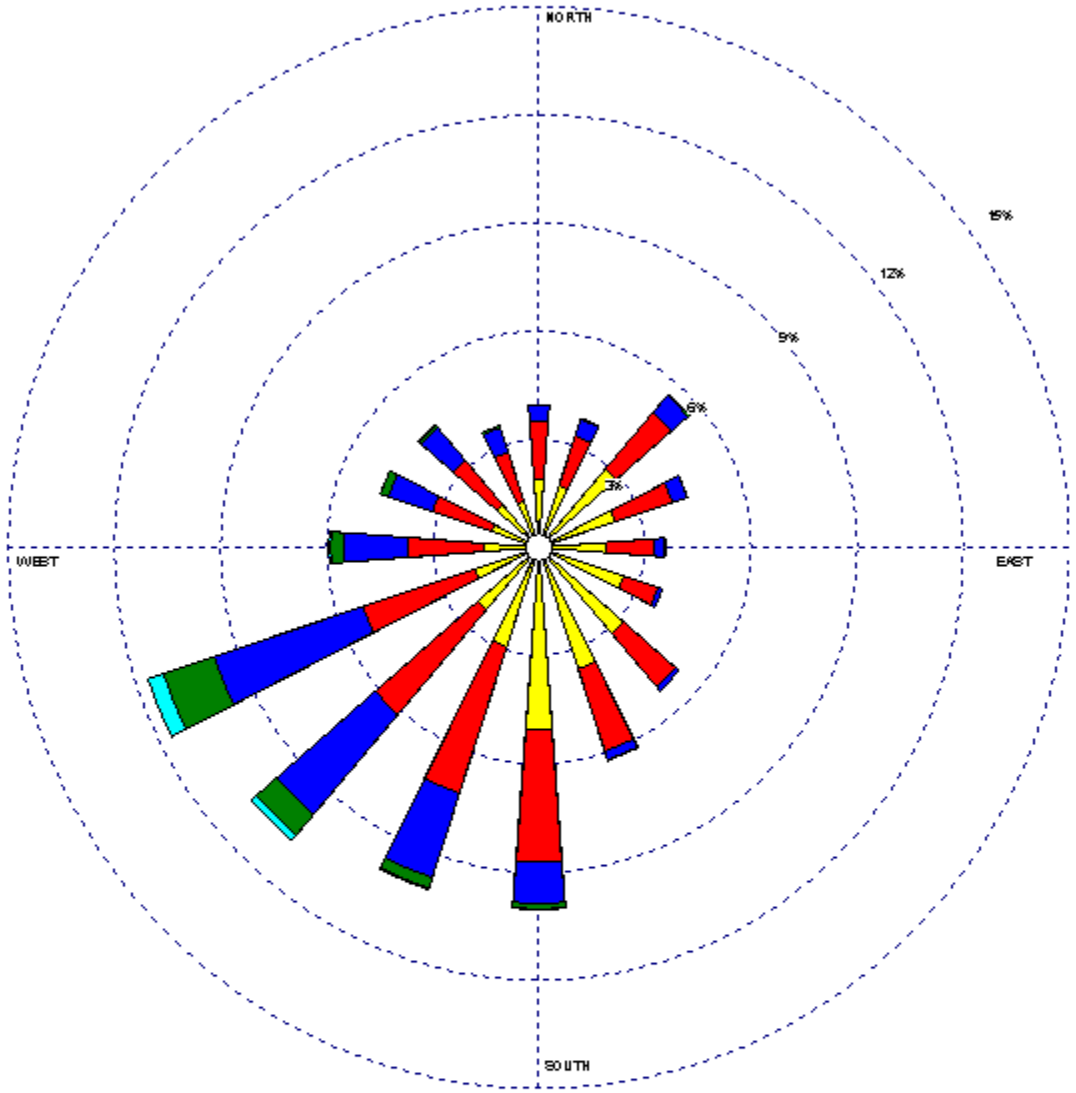


Wind Speed (m/s)	MODELER	DATE	COMPANY NAME
> 11.06 8.49 - 11.06 5.40 - 8.49 3.34 - 5.40 1.80 - 3.34 0.51 - 1.80		11/1/2002	
	DISPLAY Wind Speed	UNIT m/s	COMMENTS
	AVG. WIND SPEED 4.21 m/s	CALM WINDS 2.83%	
	ORIENTATION Direction (blowing from)	PLOT YEAR-DATE-TIME 1961 Aug 1 - Aug 31 Midnight - 11 PM	PROJECT/PLOT NO.

WRPLOT View 3.3 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

Station #14733 - BUFFALO/GREATER BUFFALO INT'L, NY

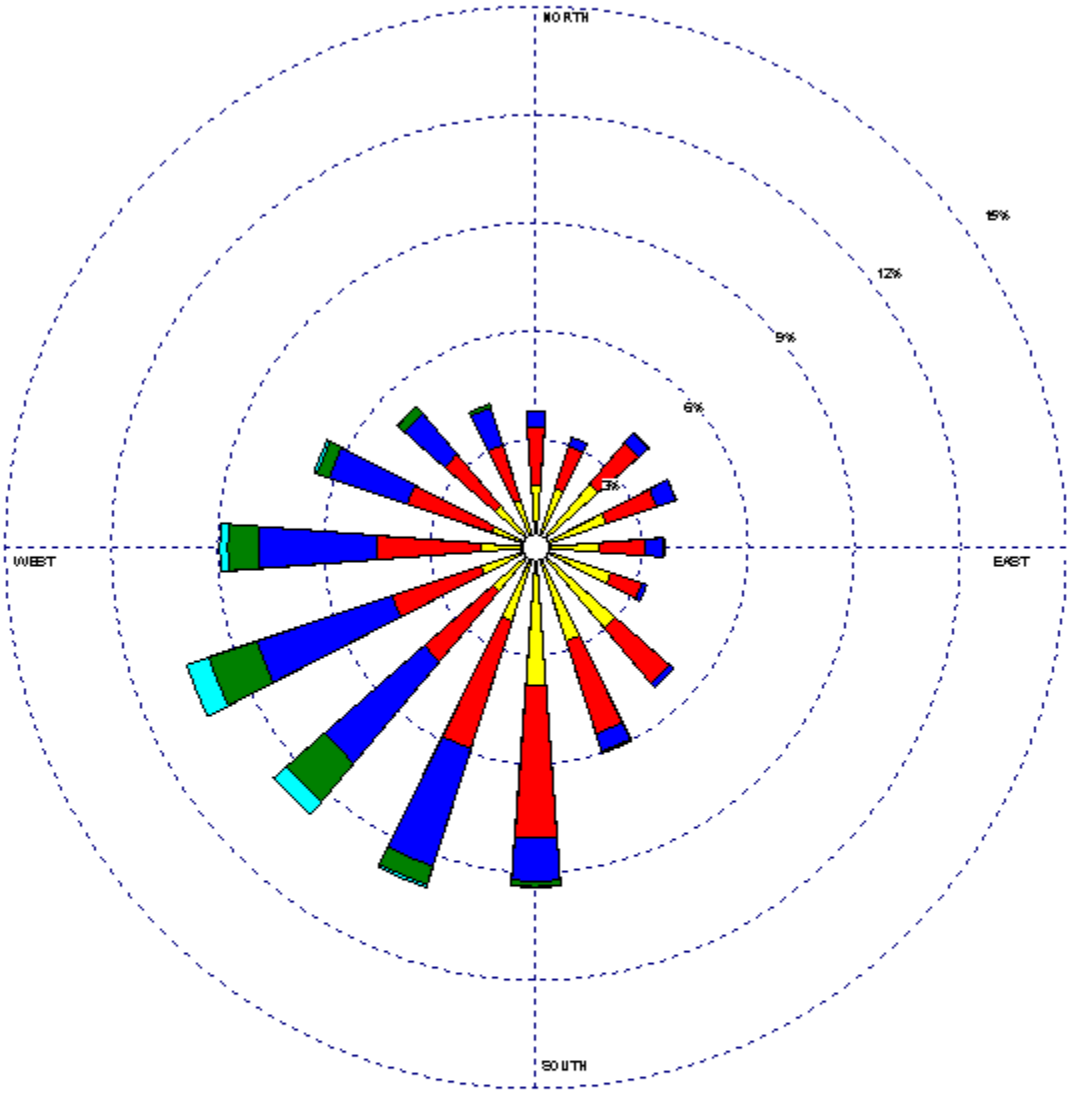


Wind Speed (m/s)	MODELER	DATE	COMPANY NAME
> 11.06 8.49 - 11.06 5.40 - 8.49 3.34 - 5.40 1.80 - 3.34 0.51 - 1.80		11/1/2002	
	DISPLAY Wind Speed	UNIT m/s	COMMENTS
	AVG. WIND SPEED 4.33 m/s	CALM WINDS 2.36%	
	ORIENTATION Direction (blowing from)	PLOT YEAR-DATE-TIME 1961 Sep 1 - Sep 30 Midnight - 11 PM	PROJECT/PLOT NO.

WRPLOT View 3.3 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

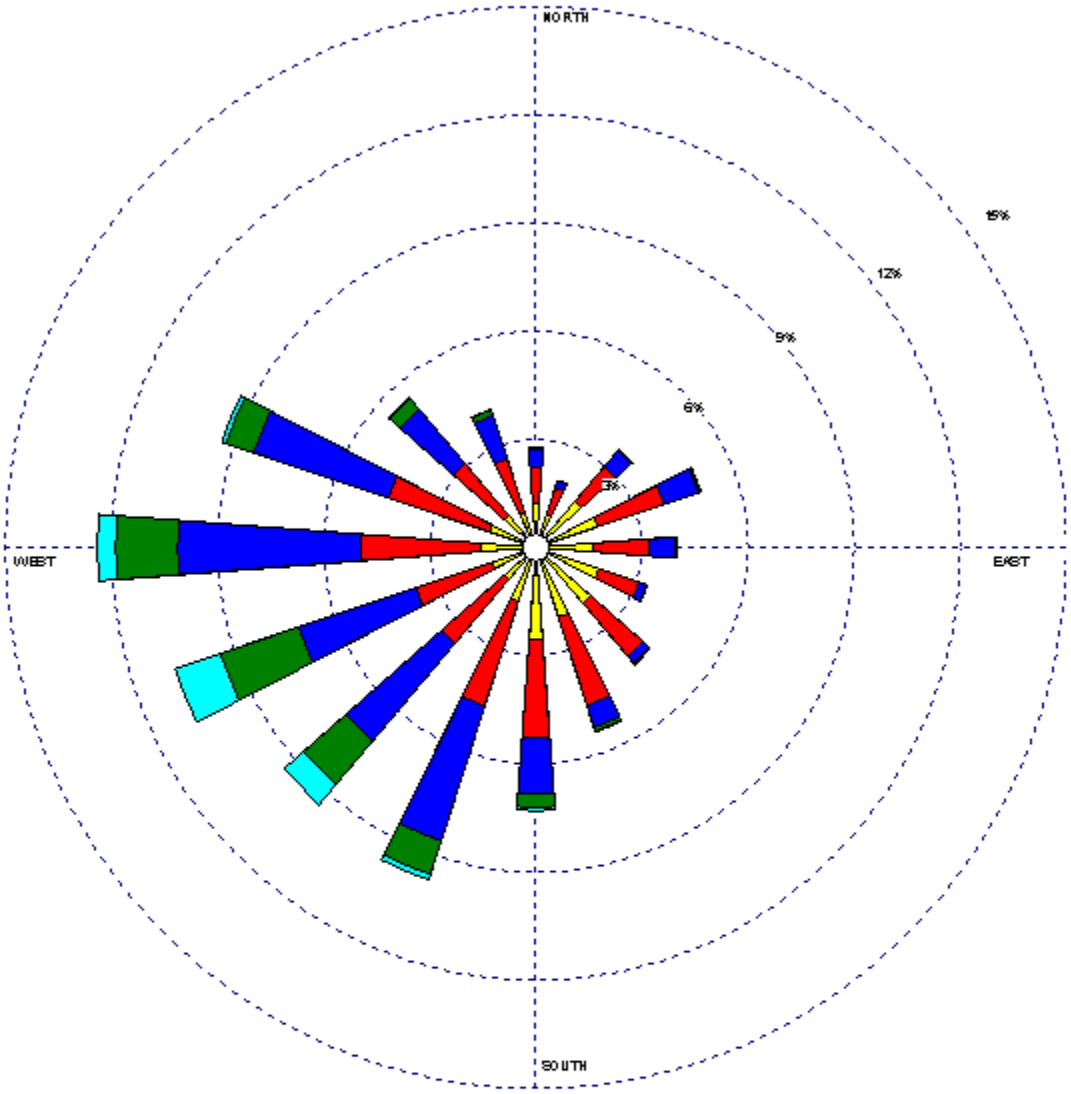
Station #14733 - BUFFALO/GREATER BUFFALO INT'L, NY



Wind Speed (m/s) > 11.06 8.49 - 11.06 5.40 - 8.49 3.34 - 5.40 1.80 - 3.34 0.51 - 1.80	MODELER	DATE 11/1/2002	COMPANY NAME
	DISPLAY Wind Speed	UNIT m/s	COMMENTS
	AVG. WIND SPEED 4.72 m/s	CALM WINDS 1.97%	
	ORIENTATION Direction (blowing from)	PLOT YEAR-DATE-TIME 1961 Oct 1 - Oct 31 Midnight - 11 PM	PROJECT/PLOT NO.

WIND ROSE PLOT

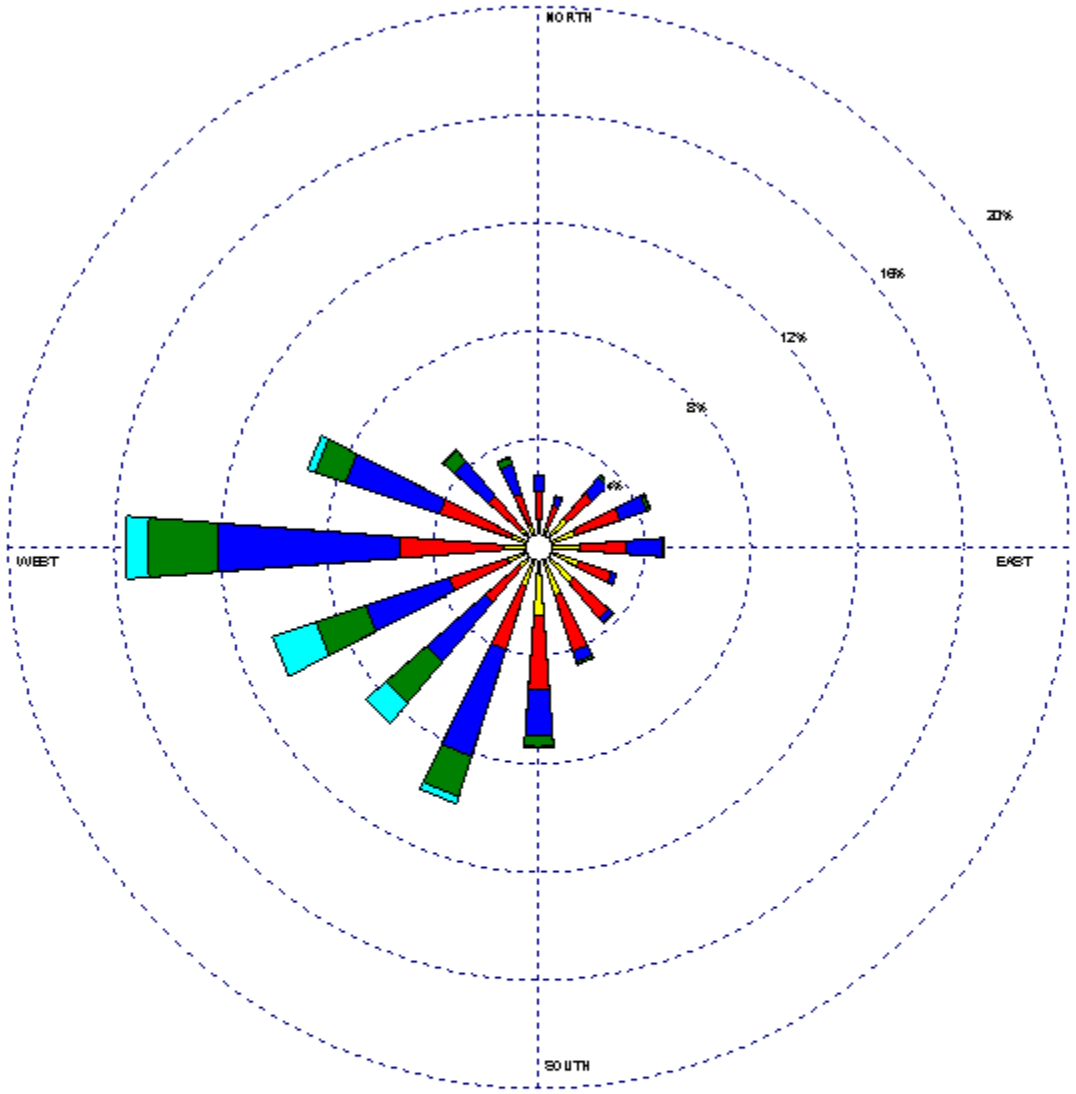
Station #14733 - BUFFALO/GREATER BUFFALO INT'L, NY



Wind Speed (m/s) > 11.06 8.49 - 11.06 5.40 - 8.49 3.34 - 5.40 1.80 - 3.34 0.51 - 1.80	MODELER	DATE 11/1/2002	COMPANY NAME
	DISPLAY Wind Speed	UNIT m/s	COMMENTS
	AVG. WIND SPEED 5.33 m/s	CALM WINDS 1.28%	
	ORIENTATION Direction (blowing from)	PLOT YEAR-DATE-TIME 1961 Nov 1 - Nov 30 Midnight - 11 PM	PROJECT/PLOT NO.

WIND ROSE PLOT

Station #14733 - BUFFALO/GREATER BUFFALO INT'L, NY



Wind Speed (m/s) > 11.06 8.49 - 11.06 5.40 - 8.49 3.34 - 5.40 1.80 - 3.34 0.51 - 1.80	MODELER	DATE 11/1/2002	COMPANY NAME
	DISPLAY Wind Speed	UNIT m/s	COMMENTS
	AVG. WIND SPEED 5.68 m/s	CALM WINDS 1.47%	
	ORIENTATION Direction (blowing from)	PLOT YEAR-DATE-TIME 1961 Dec 1 - Dec 31 Midnight - 11 PM	PROJECT/PLOT NO.