SCHEDULE 1
SCOPE OF WORK
REMEDIAL INVESTIGATION/FEASIBILITY STUDY FOR THE TIM BAYLY PROPERTY – OFF-SITE
RENSSELAER, NEW YORK

1. BACKGROUND AND PROJECT OBJECTIVES

SITE SETTING

The Tim Bayly Property – Off-Site (the Site) study area surrounds the Tim Bayly Property located at 800 Broadway in the City of Rensselaer, County of Rensselaer, New York. The Tim Bayly Property is approximately 0.081 acre in size. The property is bound by Broadway to the west and Partition Street to the south. Mixed-use zoned properties, including residences, bound the property to the east and north, respectively. The adjoining vacant structure to the north is purportedly being redeveloped into an apartment building. The residential structure to the immediate east is a three-story apartment building. A railyard is located across Broadway and Partition Street from the Tim Bayly Property to the west and south, respectively, and a convenience/retail petroleum store is located across Partition Street to the southeast. The Site and Tim Bayly Property are located approximately 0.2 miles east of the Hudson River. The area of focus identified for the site investigation activities includes the area surrounding, but not including, the Tim Bayly Property. This property is being addressed separately by a Volunteer through the Brownfield Cleanup Program (BCP, Site No. C442043).

SITE FEATURES

The Tim Bayly Property is relatively flat and consists of one two-story commercial building that occupies the majority of the property.

HISTORIC USE

Based on information provided in the Phase I Environmental Site Assessment (ESA) for two parcels of land (one adjoining and the other proximal to the Tim Bayly property), a dry cleaning business operated at the Tim Bayly Property from at least 1958 to 1978 (ARCADIS 2012). The property was vacant until 2017.

PREVIOUS INVESTIGATIONS

A Phase I ESA and Phase II investigation were conducted for two parcels of vacant land (one adjoining the Tim Bayly Property to the east and the other located north of the property) (ARACADIS 2012, ARCADIS 2013). Although the Tim Bayly Property was not the subject of these ESAs, it was designated and assessed as a recognized environmental condition. The Phase II investigation included collection of both surface and sub-surface soil samples, installation and sampling of five monitoring wells (MW-01 through MW-05), and collection of soil vapor and sub-slab soil vapor samples, and indoor and ambient air samples for analysis of volatile organic compounds (VOCs), among other analytes. Per the Phase II ESA, tetrachloroethene (PCE), a chlorinated VOC typically used in the dry cleaning process, was detected in sub-slab soil vapor and indoor air samples from the Tim Bayly Property building at concentrations requiring mitigation under the New York State Department of Health (NYSDOH) guidelines. Additionally, sub-slab soil vapor and indoor air samples collected at the adjacent building located at 810 Broadway contained PCE at concentrations that reportedly require monitoring under NYSDOH guidelines (ARCADIS 2013). Additionally, PCE and its degradation products [trichloroethene (TCE), cis-1,2-dichloroethene (cDCE), and vinyl chloride (VC)] were detected in the groundwater sample collected from monitoring well MW-05, located in the City of Rensselaer right-of-way adjacent to the southeast exterior corner of the Tim Bayly Property building, at concentrations exceeding the New York State Department of Environmental Conservation (NYSDEC) Glass GA Groundwater Standards (*ibid.*)

Subsequent to the completion of the Phase I and Phase II ESAs, a remedial investigation (RI) was completed at the Tim Bayly Property as documented in the Remedial Investigation Report (RIR) dated December 22, 2016. Among other activities, the RI included the performance of a soil gas survey beneath the building, sub-slab vapor

and indoor air sampling, collection of surface and sub-surface soil samples, installation of six additional monitoring wells, and groundwater sample collection from these new wells and the five existing wells. PCE was detected at concentrations of up to 9,800 parts per billion (ppb) during the soil gas survey; 6.3 milligrams per kilogram (mg/kg) in soil; and 200 micrograms per liter (µg/L) in groundwater. Other constituents of concern (COCs) identified by the RIR include chromium, lead, mercury and 4,4'-DDT in surface soils; mercury and manganese in subsurface soils; and TCE, cDCE and VC in groundwater (Hanson Van Vleet 2016).

Remedial actions at the Tim Bayly property have included the installation of a site cover and sub-slab depressurization system.

SITE GEOLOGIC AND HYDROGEOLOGIC CONDITIONS

Soil borings advanced on and in the vicinity of the Tim Bayly Property during the Phase II Investigation and RI were completed to approximately 20 feet below ground surface (bgs). The logs of these borings indicate that overburden materials consist primarily of fill overlying silty clay and/or clay with occasional interbedded fine sand and gravel layers. The fill ranges in thickness from a few feet (beneath the building) to nine feet and consists primarily of fine to coarse sand and gravel with trace amounts of organic material, ash, glass, or brick and concrete fragments. Bedrock was not encountered during the previous investigation activities.

As discussed above, 11 monitoring wells were installed at or in the vicinity of the Tim Bayly Property. The wells were installed up to approximately 20 feet bgs. Groundwater in the vicinity of the property ranges from 5 to 19 feet bgs and is inferred to flow west towards the Hudson River. Based on falling and rising head hydraulic conductivity testing performed at monitoring wells MW-05 and MW-08, hydraulic conductivity ranges from 0.31 to 3.55 gallons per day per square foot (gpd/ft^2).

PROJECT OBJECTIVES

The focus of the off-site Remedial Investigation will be to collect data for the purpose of evaluating the nature and extent of impacts to soil and groundwater so that potential exposure pathways can be evaluated at the Site (i.e., the investigation area surrounding the Tim Bayly Property). The results will then be used to develop a feasibility study to identify remedial alternatives, if warranted.

As identified by NYSDEC, the RI will focus on evaluating the presence and extent primarily of VOCs (other compounds and analytes including semi-volatile organic compounds [SVOCs], target analyte list [TAL] metals, pesticides, polychlorinated biphenyls [PCBs], per- and polyfluoroalkyl substances [PFAS] and 1,4-dioxane will also be evaluated but on a more limited basis) in Site soil and groundwater. The RI will also focus on evaluating the potential migration of VOCs via soil vapor and the potential for vapor intrusion of VOCs into structures surrounding the Tim Bayly Property.

2. PRELIMINARY ACTIVITIES (TASK 1)

Preliminary activities include the following:

- preparation of this scope of work, schedule and associated NYSDEC contract-related forms
- review of available Site-related file information provided by NYSDEC for the project
- Site reconnaissance visit with NYSDEC project manager (completed on February 13, 2018)

Parsons Engineering of New York will be involved with quality control/quality assurance checks, safety reviews, project meetings as warranted, and reviews of draft deliverables related to this task.

3. REMEDIAL INVESTIGATION AND REPORT (TASK 2)

Based on discussions completed to date, the RI will be completed in 2 steps that include surveys, investigations, and environmental sampling. The first step will include the following:

- Coordination with the City of Rensselaer to obtain any available information pertaining to locations and depths of subsurface utilities and structures in the vicinity of the Site
- Subcontracting with a private utility locating company to identify structures and utilities and provide utility clearance for drilling locations
- Coordination with the City of Rensselaer Department of Public Works to obtain a permit for public right-of-way occupation and performance of test borings
- Collection of three surface soil samples for laboratory analysis of TCL VOCs, TCL SVOCs, TCL pesticides, TAL metals and PCBs
- Completion of direct-sensing profiling at five locations to characterize subsurface conditions
- Based on the results of the direct-sensing survey, advance three direct-push technology (DPT) soil borings and up to one additional contingency boring co-located with direct-sensing borings
  - » Up to two soil samples will be collected for laboratory analysis (in addition to QA/QC samples) at each of the DPT soil boring locations. One of the two soil samples selected for laboratory analysis will be collected from the upper 10 feet (to assess potential exposures) and submitted for analysis of TCL VOCs, TCL SVOCs, TCL pesticides, TAL metals, and PCBs. The second soil sample, if warranted based on the direct-sensing results, will be obtained from below the upper 10 feet and submitted for analysis of TCL VOCs only.
  - » Up to two depth-discrete groundwater samples will be collected for laboratory analysis of TCL VOCs (in addition to QA/QC samples) at each of the DPT soil boring locations.

The second step of the program will include the following:

- Installation of up to three shallow groundwater monitoring wells and up to one additional, deep contingency well to assess groundwater quality based on the results of the direct-sensing survey and discrete-interval soil and groundwater sample results
  - » Attempt to locate existing monitoring MW-2 which was reportedly buried under gravel and if found, re-complete the well to grade
  - » Development of the newly installed monitoring wells and existing well MW-2 (if found)
  - » Collection of a set of concurrent groundwater level measurements and groundwater samples using low-flow methods from the newly installed monitoring wells and existing well MW-2 (if found) to evaluate the direction of groundwater flow and groundwater quality in the overburden beneath the Site
  - » Laboratory analysis of each sample for TCL VOCs. In addition, samples collected from a subset of three wells (to be determined in consultation with the NYDEC) submitted for 1,4-dioxane, PFAS, TCL SVOCs, TAL Metals, TCL Pesticides and PCBs analyses
  - » Survey the elevation and location of the new monitoring wells and existing wells. The survey will be completed by a licensed Professional Land Surveyor
- Install up to three soil vapor implants and up to one contingency soil vapor implant up to 15 feet below grade (co-located with new monitoring well locations) and collect soil vapor samples for VOCs analysis (TO-15)

plus collection and analysis of a concurrent ambient air sample. Soil vapor implants will be installed at every new monitoring well or monitoring well couplet (i.e., a shallow and deep well pair).

Additional activities and elements of the RI will include:

- Review soil, groundwater, and soil vapor/soil gas sampling data, and based on the results, coordinate and conduct a soil vapor intrusion (SVI) investigation in consultation with the NYSDEC and New York State Department of Health (NYSDOH)
- Collection, staging, characterization and disposal of investigation-derived waste (IDW)
- Data validation on analyses completed on groundwater, soil, and soil vapor/ambient air samples and preparation of Data Usability Summary Report (DUSR) and loading final data in EQuIS database
- Development of an RI report in general accordance with DER-10 (NYSDEC, 2010)
- Support the NYSDEC with Citizen Participation activities, including public meeting assistance

The RI will be conducted in general accordance with NYSDEC guidelines outlined in DER-10. Field activities will be conducted in accordance with the Field Activities Plan (FAP) (Parsons and O'Brien & Gere, 2011a), Quality Assurance Project Plan (QAPP) (Parsons and O'Brien & Gere, 2011b), and the Health and Safety Plan (HASP) (Parsons and O'Brien & Gere, 2011c) prepared and approved for work conducted under this contract. Information regarding potential site-specific hazards, as well as potential hazards associated with implementation of the work (e.g., drilling and sampling activities) will be provided on Job Safety Analysis (JSA) forms that will accompany the HASP. During implementation of ground-intrusive work, work area breathing zone monitoring will be conducted for VOCs using a PID.

Consistent with the Community Air Monitoring Plan (CAMP) provided in Appendix 1A of DER-10, air monitoring will be conducted during the ground-intrusive work completed during this project (e.g., DPT direct-sensing survey and installation of monitoring wells and soil/groundwater borings). Accordingly, one upwind and one downwind station equipped with PID and particulate monitoring equipment will be housed in enclosures and mounted on tripods. The specific locations of the equipment will be based on wind direction and the location of the potential exposure populations at the time the field activities are completed.

Parsons will be involved with quality control/quality assurance checks, safety reviews and checks, project meetings as warranted, and reviews of draft deliverables related to this task.

The analytical scope of work is summarized in Table 1. More detailed information pertaining to implementation of the scope of work follows.

CITY INFORMATION AND COORDINATION

OBG will contact the City of Rensselaer and request any available information pertaining to locations and depths of subsurface utilities and structures in the vicinity of the Site, including Broadway and Partition Street rights-of-way. OBG will also coordinate with the City of Rensselaer Department of Public Works to obtain a permit for public rights-of-way occupation and performance of test borings.

Assumptions:

- It is assumed that the investigation activities described herein can be performed under a single ROW permit.

UTILITY CLEARANCE

Dig Safely New York (DSNY) will be contacted by the drilling subcontractor prior to invasive work to locate utilities at the Site prior to initiating the field program. It should be noted that DSNY will only coordinate location of utilities for those companies subscribing to the service. Furthermore, the utilities will only identify the locations of subsurface lines on public property and rights-of-way. Therefore, a private utility locator will be contracted to identify potential utilities in the areas where drilling will occur on private property, and as a

secondary identification of potential utilities and subsurface structures on public property and rights-of-way. The identified subsurface utilities and structures will be marked on the surface and approximate locations incorporated in a Site basemap, as appropriate.

An attempt to locate existing monitoring well MW-2 will be performed during this task. This well was reportedly buried under gravel.

Assumptions:

- One 8-hour day has been assumed for the utility locating company to identify utilities and subsurface structures at the Site
- Prior to the survey, NYSDEC will obtain access from respective parcel owners for Site-related drilling locations and equipment/drum staging area (parking lot approximately identified as parcels 143.52-3-20 through 22)
- The utility survey will not require traffic control other than signs and cones
- The utility locating contractor is subject to prevailing wage.

SURFACE SOIL

Three surface soil samples will be collected (in addition to QA/QC samples) at the Site for laboratory analysis of TCL VOCs, TCL SVOCs, TAL metals, TCL pesticides and PCBs as presented in Table 1. Surface soil samples will be collected using disposable samplers. Samples for analysis of VOCs will be collected as discrete samples from the 0 to 6-inch interval below vegetation (or surface if unvegetated). Each sample for analysis of SVOCs, metals, pesticides and PCBs will be collected from the 0 to 2-inch interval below vegetation (or surface if unvegetated), homogenized by placing the soil into a disposable aluminum pan and mixing with disposable scoops.

Assumptions

- A total of three surface soil samples (not including QA/QC samples) will be collected from three vegetated or loose cover (i.e., non-pavement) locations
- Two of the three surface soil samples are located in public rights-of-way and will require a permit issued by the City of Rensselaer Department of Public Works
- Unused surface soil will be returned to the hole
- CAMP monitoring is not required for this task
- Sampling associated with this task is assumed to take one 4-hour day to complete

DIRECT-SENSING PROFILING

Direct-sensing profiling will be performed to develop a semi-quantitative characterization of subsurface conditions in real time. Integrated low-level membrane interface probe (LL-MIP) and hydraulic profiling tool (HPT) (hereafter referred as MiHPT) profiling will be performed to characterize VOCs in the subsurface and create a hydrostratigraphic log to identify potential transmissive zones at each direct-sensing location. The MiHPT will be configured with a flame ionization detector (FID), photoionization detector (PID), and halogen-specific detector (XSD). The detectors output responses in micro volts (µV). The FID and PID detect total VOCs with the PID more sensitive to aromatic compounds. The XSD detects only chlorinated hydrocarbons. The chlorinated solvent detection limit for an optimized LL-MIP configuration can be as low as 10 µg/L.

The integrated HPT system continuously measures the pressure response of the formation to the constant injection of water as the probe is advanced through the subsurface, creating a detailed hydrostratigraphic log at each location. Injection pressure and flow rate are monitored and plotted with depth. In general, low pressure

responses are indicative of higher subsurface permeability while high pressure responses indicate a lower permeability.

An EC sensor is integrated into the MiHPT probe and provides a continuous log of soil conductivity with depth to identify variations in subsurface lithology. In general, EC response is inversely proportional to grain size; that is, high EC values generally correspond with small grain sizes (e.g., silt and clay), and low EC values generally correspond with coarse grain sizes (e.g., sand and gravel). Mineralogy and pore water chemistry (brines, pH and contaminants) can also affect EC.

MiHPT profiling will be completed at up to two locations to a depth of 25 feet bgs (or refusal if shallower), and at up to three locations to a depth of 50 feet bgs (or refusal if shallower). MiHPT refusal will be considered obtained when the probe either stops advancing or slows to a push rate of less than one foot/minute over an interval of a few inches, or DPT rig operator judgment. After completion, MiHPT borings will be tremie grouted from bottom to top (i.e., grout would be added through casing from the terminal depth of the boring to the surface).

Assumptions

- Prior to drilling activities, NYSDEC will obtain access from respective parcel owners for Site-related drilling locations and equipment/drum staging area (parking lot approximately identified as parcels 143.52-3-20 through 22)
- The utility mark out will provide information pertaining to the siting of MiHPT boring locations
- OBG will obtain a permit for public right-of-way occupation and test borings from the City of Rensselaer Department of Public Works prior to subsurface drilling activity mobilization
- The boring locations will not require traffic control other than signage and traffic cones
- MiHPT borings will be hand-cleared up to 8 feet bgs prior to drilling. Hand-clearing activities are anticipated to take up to one working day
- The MiHPT survey can be completed in two working days by the subcontractor in a single mobilization
- Up to two dissipation tests will be performed per MiHPT boring; each test will be performed for a duration of up to 15 minutes
- OBG will provide one person to oversee the advancement of MiHPT borings
- CAMP monitoring will be conducted during advancement of the MiHPT
- Work will be conducted in modified Level D personal protection without Tyvek® coveralls
- The MiHPT contractor is subject to prevailing wage.

DIRECT PUSH TECHNOLOGY SUBSURFACE SOIL AND GROUNDWATER SAMPLING

Data generated as part of the direct-sensing profiling will be used to more optimally identify locations and depths for direct push technology (DPT) subsurface soil and groundwater sampling. Based on the results of the MiHPT survey, three soil borings and up to one conditional contingency soil boring (each co-located with MiHPT borings) will be advanced using DPT in accordance with Section 2.1.1 of the FAP. Two soil borings will be advanced to a depth of up to 25 feet bgs (or refusal if shallower), and the other two soil borings will be advanced to a depth of up to 50 feet bgs (or refusal if shallower). Geological soil samples will be collected continuously, logged and screened with a PID (i.e., Ppb-RAE or equivalent) to allow evaluation of the bulk volatile organic concentration of each soil sample. Upon retrieval, each soil sample will be described for: 1) percent recovery; 2) soil type; 3) color; 4) moisture content; 5) texture; 6) grain size and shape; 7) consistency; 8) evidence of staining or other chemically-related impacts; and 9) any other relevant observations. This descriptive information will be recorded on a soil boring log form.

Based on the results of the MiHPT survey, sample intervals will be selected for soil sample collection. Up to two soil samples will be collected for laboratory analysis at each DPT soil boring location. One of the two soil samples selected for laboratory analysis will be collected from the upper 10 feet (to assess potential exposures) and submitted for analysis of TCL VOCs, TCL SVOCs, TAL metals, TCL pesticides and PCBs. The second soil sample, if warranted based on the MiHPT results, will be obtained from below the upper 10 feet and submitted for analysis of TCL VOCs only. Table 1 identifies the method to be used, the number of samples and associated quality assurance/quality control (QA/QC) samples to be collected and analyzed. PID screening results will supplement MiHPT data for sample depth selection.

Based on the results of the MiHPT survey, up to two depth-discrete groundwater samples will be collected for laboratory analysis of TCL VOCs at each of the DPT soil boring locations. Groundwater samples will be collected from the soil boring using a direct push discrete-interval groundwater sampling system. Table 1 identifies the method to be used, the number of samples and associated QA/QC samples to be collected and analyzed.

After completion, DPT soil/groundwater borings will be tremie grouted from bottom to top (i.e., grout would be added through casing from the terminal depth of the boring to the surface), and completed to match the surrounding surface.

Direct-push sampling equipment will be decontaminated using non-phosphate detergent wash followed by potable water rinse. The decontamination fluids and soil cuttings will be containerized in DOT-approved 55-gallon drums.

Assumptions

- Prior to drilling activities, NYSDEC will obtain access from respective parcel owners for Site-related drilling locations and equipment/drum staging area (parking lot approximately identified as parcels 143.52-3-20 through 22)
- The utility mark out performed prior to this task will provide information pertaining to the siting of the soil/groundwater borings
- OBG will obtain a permit for public right-of-way occupation and test borings from the City of Rensselaer Department of Public Works prior to subsurface drilling activity mobilization
- The boring locations will not require traffic control other than signage and traffic cones
- The DPT discrete interval soil/groundwater sampling will be performed in the same, single mobilization as the MiHPT survey
- Soil/groundwater borings will be hand-cleared up to 8 feet bgs prior to drilling. Hand-clearing activities are anticipated to take up to one working day
- Soil/groundwater borings can be completed within two working days by the subcontractor, not including hand-clearing
- Discrete-interval groundwater samples will be collected using either a narrow-diameter stainless steel bailer, or disposable polyethylene tubing equipped with a check valve at the bottom of the tubing
- If insufficient groundwater is available for sampling one hour per targeted sample depth after screen exposure, then no sample will be collected
- Field parameters will not be measured during discrete-interval groundwater sample collection
- OBG will provide one geologist to oversee the advancement of soil/groundwater borings and collect samples for laboratory analysis
- CAMP monitoring will be conducted during advancement of the soil/groundwater borings
- Work will be conducted in modified Level D personal protection without Tyvek® coveralls

- The drilling contractor (same as MiHPT) is subject to prevailing wage.

OVERBURDEN MONITORING WELL INSTALLATIONS

Based on the results of the MiHPT survey and discrete-interval soil and groundwater sample results, up to three shallow monitoring wells will be installed to a depth of up to 20 feet bgs (targeting the first encountered groundwater). Pending the results of the direct-sensing survey and discrete-interval soil and groundwater sample results, up to one additional contingency monitoring well will be installed to a depth of up to 50 feet bgs. Well locations will be selected in consultation with NYSDEC prior to mobilization and installation.

The overburden monitoring wells will be installed using DPT. However, hollow stem auger drilling methods may be used if subsurface conditions are not conducive to DPT well installation methods to advance a 4.25-inch borehole. Well construction will be 10 feet of 2-inch inner diameter, 0.010-inch slot schedule 40 polyvinyl chloride (PVC), prepacked well screen flush-threaded to appropriate lengths of 2-inch inner diameter schedule 40 PVC riser casing necessary to bring the top of the well to grade. Each well will be completed with keyed-alike padlocks with j-plugs, and a 6-inch flush-mount curb-box with 2-feet diameter concrete pad. If installed, the length of the deep well screen will be selected based on the final well depth and vertical separation from the shallow wells screen interval. Well construction will be completed consistent with FAP Section 2.2.1.2.

Soil cuttings and decontamination fluids will be contained in 55-gallon drums and staged in an area of the Site specified by the owner.

If located during the subsurface utility task, existing monitoring well MW-2, which was reportedly buried under gravel, will be re-completed to grade.

Assumptions

- Prior to drilling activities, NYSDEC will obtain access from respective parcel owners for Site-related drilling locations and equipment/drum staging area (parking lot approximately identified as parcels 143.52-3-20 through 22) and to re-complete monitoring well MW-2 to grade
- The wells will be located within close proximity to previously logged and screened soil borings (i.e., wells to be co-located with soil borings); therefor, soil logging and screening will not be completed during well installation activities
- Monitoring well locations will be hand-cleared up to 8-feet bgs prior to drilling. Hand-clearing activities are anticipated to take one working day
- Prepacked well screen construction is assumed, but standard well construction may be necessary based on conditions
- No bedrock wells will be installed
- Activities associated with overburden well mobilization, set-up, installation and demobilization are anticipated to take approximately two working days, not including hand-clearing
- Installation of groundwater wells will coincide with installation of the soil vapor points
- OBG will provide one person to oversee the installation of the groundwater monitoring wells
- Work will be conducted in modified Level D personal protection without Tyvek® coveralls
- CAMP monitoring will be conducted during drilling and installation of monitoring wells and soil vapor points
- The well locations will not require traffic control other than signage and cones
- The drilling contractor (same as MiHPT) is subject to prevailing wage.

MONITORING WELL DEVELOPMENT

Each newly installed monitoring well, in addition to existing monitoring well MW-2 (if located), will be developed no earlier than 24 hours following installation. Development will be performed by surging and purging the well using either a bailer or pump, as appropriate, to remove the fine-grained material which may have settled within the well and to provide hydraulic communication with the surrounding formation. Groundwater parameters will be measured and recorded prior to development, after removal of each well volume during development, and at the conclusion of development. Parameters will include turbidity, pH, temperature, and specific conductance. Water levels will be measured prior to and at the conclusion of development. Ten well volumes will be removed from each well unless the well goes dry during development and does not sufficiently recharge within a one-hour period to remove 10 well volumes before going dry a second time. Well development will be considered complete after 10 well volumes are removed or the well goes dry a third time, whichever occurs first. Well development data will be recorded on a Well Development Log.

Assumptions

- It is assumed that the up to four new wells and MW-2 can be developed within two days by a one-person crew
- Work will be conducted in modified Level D personal protection without Tyvek® coveralls
- CAMP monitoring will not be conducted during development of monitoring wells
- Work at the well locations will not require traffic control other than signage and cones.

MONITORING WELL GROUNDWATER SAMPLING

One set of groundwater samples will be collected from the newly installed monitoring wells and existing well MW-2 (if found) for laboratory analysis of TCL VOCs. Samples collected from a subset of three wells (to be determined in consultation with NYSDEC) will also be submitted for laboratory analysis of TCL SVOCs, 1,4-dioxane (USEPA Method 8270 selected ion monitoring [SIM]), TAL metals, TCL pesticides and PCBs, and PFAS (USEPA Method 537).

Samples analyzed for PFAS will be collected using field equipment (e.g., field log books, tubing, sample containers) limited to the acceptable sampling equipment for PFAS, as listed on Table 2 included in Attachment 1, unless the equipment has been tested and documented as PFAS-free (e.g., QED Sample Pro bladder pump and tubing).

Prior to the collection of groundwater samples, groundwater levels will be measured to the nearest 0.01 foot from the well to be sampled using an electronic water level probe. The water level measurements will be recorded from a reference point to be marked on each well casing. During each round, groundwater samples will be collected using low flow purge and sample methods as described in FAP Section 2.5.3 using dedicated tubing and a reusable bladder pump. A new set of internal bladder components will be used for each well.

The pump will be decontaminated between each well using soap and water wash with a potable water rinse. decontamination fluids will be contained in 55-gallon drums and staged in an area of the Site specified by the owner.

Assumptions

- Groundwater sampling will not be performed sooner than 14 days following well development
- Groundwater sampling will be conducted over a 2-day period by a two-person crew
- Well yields are conducive for low flow purge and sample methods
- QA/QC samples associated with the PFAS analysis specifically will include a blind field duplicate, a matrix spike and matrix spike duplicate (MS/MSD), an equipment blank, and a field reagent blank. The equipment blank and field reagent blank will be performed using a tested and PFAS-free water
- Purge water generated during groundwater sampling will be collected and transferred to 55-gallon drums staged in an area of the Site specified by the owner
- CAMP monitoring will not be conducted during groundwater sampling
- Work will be conducted in modified Level D personal protection without Tyvek®.

SOIL VAPOR POINT DRILLING AND SAMPLING

To assess the presence and potential migration of soil vapor at the Site, up to three soil vapor implants (i.e., soil vapor points) and up to one contingency soil vapor implant will be installed in the vicinity of each new monitoring well or monitoring well couplet (i.e., a shallow and deep well pair). The soil vapor points will be permanent installations to allow for additional samples to be collected in the future if warranted. The sample points will be installed up to approximately 15 feet bgs (similar to the depth of nearby basements). The soil vapor points will be installed within a 2.25-inch borehole to be advanced using direct-push methods. The soil vapor points will be constructed with a 6-inch long, stainless steel, braided screen implant probe attached to ¼-inch outside diameter Teflon®-lined tubing. Each soil vapor point will be constructed so that the implant probe is situated approximately one to two feet above the water table. The annular space around the probe will be filled with 60-100 mesh glass beads or equivalent to approximately 2 feet above the implant probe. A granular bentonite seal will be placed above the glass beads to surface grade to prevent ambient air infiltration. The well heads will be completed with 4-inch diameter bolt-down, flush-mount road boxes. The road boxes will be set in a 1-foot diameter concrete pad, flush to the existing grade.

Direct-push sampling equipment will be decontaminated using non-phosphate detergent wash followed by potable water rinse. The decontamination fluids will be containerized in DOT-approved 55-gallon drums.

Assumptions

- NYSDEC will obtain access from respective parcel owners for probe locations
- Costs assume that soil vapor point locations will be hand-cleared up to 8 feet bgs prior to conducting each soil vapor boring over a 1-day period. However, air-knife and vacuum excavation techniques will be avoided if possible depending on subsurface conditions to avoid removal of VOCs by the vacuum used for hand clearing.
- Work will be conducted in modified Level D personal protection without Tyvek® coveralls
- Soil vapor points will be installed in one working day by the drillers during the same mobilization as the groundwater monitoring well installations
- OBG will provide two people to complete the soil vapor sampling over one working day
- After installation of the soil vapor points, OBG will conduct tracer gas testing to verify the integrity of the seal on the tubing
- Soil vapor samples will be collected into batch-certified 6 liter SUMMA® canisters

- Soil vapor samples will have a 2-hour integrated sample period at a flow rate not to exceed 200 milliliters per minute (ml/min) in accordance with *New York State Department of Health (NYSDOH) Guidance for Evaluating Soil Vapor Intrusion in the State of New York* (NYSDOH, 2006)
- One field duplicate, and one ambient air sample will be collected as part of the soil vapor sampling as outlined on Table 1
- Samples will be analyzed for the standard list of VOCs by United States Environmental Protection Agency (USEPA) Method TO-15.

LOCATION AND ELEVATION SURVEY

Survey activities will be performed in one event. The survey event will be performed after completion of the direct-sensing survey, soil/groundwater boring, monitoring well installation, and soil vapor point installation field activities.

Each exterior MiHPT boring, new soil/groundwater boring, newly installed and existing overburden monitoring well and soil vapor point location will be surveyed by a New York State-licensed surveyor. Horizontal datum will be referenced to North American Datum (NAD) 83 (2007) New York State Plane Eastern Zone and vertical datum to North American Vertical Datum (NAVD) 88. Elevation will be surveyed to 0.01-foot accuracy. The surveyor will provide a survey drawing signed by a professional surveyor and a spreadsheet listing the sample locations, northings, eastings, and elevations (ground surface, curb box and well casing).

Assumptions

- The interior soil vapor points installed as Task 3 will not be surveyed
- OBG will meet the surveyor on-site to review locations that require surveying and unlock well caps
- The surveying task will take one day to complete
- As a licensed professional, the surveyor is not subject to prevailing wage.

INVESTIGATION DERIVED WASTE MANAGEMENT

IDW, including personal protective equipment (PPE), drill cuttings, decontamination rinsates, well development water, and purge water will be placed in DOT-approved 55-gallon drums and staged in the parking lot approximately identified as parcels 143.52-3-20 through 22, pending approval by the property owner. IDW generated from both private and public property locations will be contained and staged together. Materials will be segregated by media for characterization and disposal.

Based on our understanding of USEPA regulation pertaining to dry cleaning waste (*http://waste.supportportal.com/link/portal/23002/23023/Article/19013/Is-investigation-derived-waste-containing-tetrachloroethylene-otherwise-known-as-perchloroethylene-or-PCE-generated-from-soil-found-beneath-a-former-dry-cleaner-business-a-listed-hazardous-waste*), IDW generated is not classified as a listed waste and will be disposed of as non-hazardous waste unless analysis indicates that is it characteristic waste per TCLP as outlined in 40-CFR Part 261.

Furthermore, in accordance with Article 10 I.v.j. of Contract D007623, O'Brien & Gere is duly authorized and appointed by NYSDEC, as agent-in-fact for the NYSDEC, to act in all circumstances in the name, place and stead of the NYSDEC with respect to the completion and execution of manifests required by law for the storage, transportation and/or disposal of non-hazardous and regulated hazardous, or toxic materials and wastes from the Site as each of those terms is defined by applicable statue and regulation. Manifests will be signed accordingly with the following: "as an agent of NYSDEC".

For waste profiling and manifesting purposes, the generator will be identified as follows:

Generator: NYSDEC – Tim Bayly Off-Site
800 Broadway
Rensselaer, NY 12144

Should additional information generated during the investigation indicate that the IDW would be a regulated Hazardous Waste, a Generator ID Number will be required. Should this need arise, OBG will notify NYSDEC and NYSDEC will provide a Generator ID Number for use.

Assumptions

- Consistent with Section 3.3(e) of DER-10, it is assumed that water IDW transported from Site and off-site locations is non-hazardous until analysis indicates otherwise, precluding the need for a 6 NYCRR Part 364 permit
- One soil sample will be collected from the drummed soil IDW for analysis of TCLP VOCs, metals, pesticides and herbicides, in addition to PCBs, ignitability, corrosivity and reactivity
- OBG will provide one person to collect IDW samples over one, 2-hour sampling event
- The budget includes analysis of a sample of one composite water sample collected from the drums of purged groundwater and decontamination water for TCL VOCs, TCL SVOCs, ignitability, corrosivity and reactivity. Should the receiving disposal facility approve, it may be possible to use analytical results of the groundwater samples collected during the RI sampling event to provide a representation of the remaining constituents in the water IDW
- NYSDEC will obtain approval of the property owner to stage drummed IDW in the parking lot (approximately identified as parcels 143.52-3-20 through 22). The specific staging location will be approved by the property owner
- The drums will be labeled as IDW, pending sampling results, and left on the staging location parking lot (approximately identified as parcels 143.52-3-20 through 22) until picked up for disposal
- OBG will provide one person for oversight of one, 3-hour duration IDW shipment event

LABORATORY ANALYSES AND DATA VALIDATION

Table 1 provides a summary of the environmental media to be sampled, analytical parameters and associated methods, number of samples and associated QA/QC samples. The laboratory will provide NYSDEC-ASP Category B data packages. Analytical data will be submitted as an Electronic Data Deliverable (EDD) in the NYSDEC format.

Per Table 1, environmental sample analyses and associated methods under the RI include:

- Soil (surface soil and subsurface soil)
  - TCL VOCs by USEPA Method 8260C
  - TCL SVOCs by USEPA Method 8270D
  - TAL Metals by USEPA Method 6010B
  - Cyanide by USEPA Method 9010B
  - Mercury by USEPA Method 7471A
  - TCL Pesticides by USEPA Method 8081A
  - TCL PCBs by USEPA Method 8082
- Water (groundwater)
  - TCL VOCs by USEPA Method 8260C
  - TCL SVOCs by USEPA Method 8270D SIM
  - TAL Metals by USEPA Method 6010B
  - Cyanide by USEPA Method 9010B
  - Mercury by USEPA Method 7471A
  - TCL Pesticides by USEPA Method 8081A
  - TCL PCBs by USEPA Method 8082
  - PFAS by USEPA Method 537
  - 1,4-dioxane by USEPA Method 8270D SIM
- Air (soil vapor/indoor air/ambient air)
  - VOCs by USEPA Method TO-15

Laboratory generated analytical data will be validated in accordance with the QAPP and a data usability summary report (DUSR) conforming to Appendix 2B of DER-10 will be prepared.

Assumptions

- Samples will be analyzed within the laboratory's standard turnaround times
- Groundwater samples will be analyzed for 1,4-dioxane using USEPA Method 8270 SIM
- As specifically requested by NYSDEC, select groundwater and soil samples will be analyzed for PFAS using modified USEPA Method 537 for 21 PFAS compounds. A list of the PFAS and their respective reporting limits as provided by TestAmerica Laboratories, Inc. (winning bidder), which is ELAP-Certified for this method, is provided in Attachment 1
- NYSDEC Electronic Data Deliverables (EDD) will include the following files: SubFacility_v3, Location_v3, Drill Activity_v3, Lithology_v3, Well_v3, WellConstruction_v3, WaterLevel_v3, SoilGas_v3, FieldResults_v3 (last three groundwater purge values), Sample_v3, TestResultsQC_v3

REMEDIAL INVESTIGATION REPORT

Upon completion of the tasks detailed in this document, a RIR will be produced in accordance with DER-10. The RIR will summarize the data collected during the RI, as well as relevant on-Site data generated by others as

needed. This RIR will include tables and figures summarizing the data collected. It is expected that the tables will only present detected VOCs, SVOCs, metals, PCBs, pesticides, 1,4-dioxane and PFAS compared to applicable regulatory criteria and figures will illustrate groundwater flow direction and extent of impacts in soil and groundwater. Soil data for detected compounds will be compared to 6 NYCRR Part 375 Unrestricted Use SCOs and one other SCO identified as applicable based on site usage and discussion with NYSDEC and to Protection of Groundwater for those compounds also detected in groundwater. Groundwater data will be compared to Class GA water quality standards and guidance values as presented in Technical and Operational Guidance Series 1.1.1 (NYSDEC, 1998). As the primary focus of this RI is VOCs, the QHHEA will focus on the fate and transport and potential exposure pathways for VOCs. Conclusions based on these data will be provided. The information to be documented will consist of:

- Field investigation results
- Hydrologic interpretation
- Chemical analyses results
- Nature and extent characterization
- Potential migration pathways
- Qualitative Human health exposure assessment (QHHEA)

Assumptions

- A Fish and Wildlife Resource Impact Analysis (FWRIA) will not be required.
- One round of consolidated comments will be received from NYSDEC for incorporation into a final RIR.
- Assumes two compact disks containing the RI documents will be sent to the document repository

CITIZEN PARTICIPATION ACTIVITIES

If requested, OBG will provide assistance to NYSDEC for preparation of visual aids and presentation of RI data at a public meeting.

Assumptions

- OBG's Project Manager will participate in conjunction with NYSDEC at one public meeting. It is assumed that the public meeting will be held during the evening in Rensselaer.
- Visual aids will include 1 figure showing sample locations, 1 groundwater flow figure, and up to 4 figures showing the distribution of detected constituents in affected media sampled (soil, soil vapor, groundwater, and indoor air).

4. SOIL VAPOR INTRUSION SAMPLING (TASK 3)

OBG will review soil, groundwater, and soil vapor/soil gas sampling data, and based on the results, coordinate and conduct a SVI investigation in consultation with the NYSDEC and NYSDOH. Sub-slab and indoor air sampling will be conducted at up to five structures and include the collection of up to five sample pairs (indoor air and sub-slab) and up to two contingent, additional sample pairs (indoor air and sub-slab). Up to three ambient outdoor air samples will be collected during the vapor intrusion investigation based on the assumption that one ambient air sample will be collected during each day of sub-slab and indoor air sampling and a minimum of two structures will be sampled per day.

Sampling will be performed consistent with *New York State Department of Health (NYSDOH) Guidance for Evaluating Soil Vapor Intrusion in the State of New York* (NYSDOH, 2006). Soil vapor and ambient air samples will be collected in 6-liter SUMMA® canisters. The samples will have 24-hour integrated sample periods. Samples

will be submitted for analysis of standard list VOCs by USEPA Method TO-15. OBG will summarize the results in separate tables for each property sampled within two weeks of receipt of validated analytical results.

Assumptions

- NYSDEC or NYSDOH will prepare and distribute letters notifying owners and tenants of the Site history and proposed sampling
- NYSDEC will provide OBG with contact information for all buildings to be sampled
- NYSDEC will prepare access agreements and arrange for the agreements to be signed by owners prior to sampling activities
- OBG will coordinate schedule requirements with the owners/tenants
- For owners that do not respond to NYSDEC's letter or do not return a signed access agreement, NYSDEC or NYSDOH will make up to two additional telephone calls in an attempt to secure access
- With the aid of NYSDEC or NYSDOH, OBG will provide owners/tenants with information on the sampling and instructions for homeowner activities two weeks prior to completing the sampling
- A NYSDEC or NYSDOH representative will be readily available to answer Site-related questions posed by the owners /tenants
- The sampling will be conducted on weekdays, no sampling will take place during weekends. OBG reserves the right to not enter a structure identified for sampling if it presents a potential health and safety hazard
- OBG will complete a building survey and chemical inventory at each property sampled. The standard NYSDOH building survey and chemical inventory documentation will be completed during sample set-up and can take up to two hours to complete. For basements with a large quantity of chemicals, the building survey and chemical inventory may be completed the following day during sample pick-up
- OBG will provide two people to complete the sampling over a three-day period (excluding weekends), the sample team will be available for up to 10 hours each sample set-up day, plus travel
- The sample team will attempt to complete sampling at up to two buildings per day
- Sub-slab samples will be collected in 6-liter batch-certified SUMMA® canisters and indoor/ambient air samples will be collected in individually-certified canisters
- Tracer gas testing will be performed at temporary sub-slab sample points
- The temporary sub-slab sample points will be installed into bare concrete (unfinished surface) that does not require re-finishing
- Following sample collection, sub-slab sample holes will be filled with Geocel 3300 polyurethane caulk.
- OBG will not collect asbestos samples
- Samples will be analyzed for the standard list of VOCs by USEPA Method TO-15
- OBG will collect and analyze one duplicate sample as part of the indoor air and sub-slab air sampling work
- OBG will contract a certified laboratory, coordinate sample delivery, and contract a third-party to provide data validation services for the collected samples as outlined in Task 2
- OBG will summarize the results into separate tables for each property sampled within one week of receipt of validated test results
- NYSDEC will prepare and provide result letters to each owner/tenant transmitting data

- It is assumed that sub-slab/indoor air sampling will be conducted during the Fall 2018 heating season, if possible.

5. FEASIBILITY STUDY AND REPORT (TASK 4)

The objective of this task is to develop, screen and evaluate remedial alternatives for the site in order to present sufficient information for decision makers to compare alternatives and select a remedy. The completion of the FS will be in accordance with DER-10 (NYSDEC, 2010).

The FS will be developed in two steps:

- Development of alternatives
- Detailed analysis of alternatives

The FS will be documented in the FS Report. The following describes the steps to be completed for the FS.

Development of Alternatives

The first step in the FS is the development, in a manner consistent with the above referenced guidance, of a range of remedial alternatives that are reflective of appropriate waste management options and which are protective of public health and the environment. The development of alternatives encompasses the following steps:

- Development of remedial objectives
- Development of general response actions
- Identification of volumes or areas of media
- Identification and screening of remedial technologies and process options
- Evaluation of process options
- Assembly of remedial alternatives.

As requested by NYSDEC, it is assumed that a total of up to four alternatives will be developed. It is also assumed that the screening of technologies will be presented in tabular format alone. Consistent with DER-10 (NYSDEC, 2010), one alternative will be the no further action alternative, and one alternative will represent restoration of the Site to pre-disposal conditions. Media of concern to be addressed in this FS are assumed to focus on VOCs in overburden groundwater, soil, and soil vapor. It is assumed that ecological concerns will not need to be addressed given the location of the Site.

Detailed Analysis of Alternatives

The objective of this step is to evaluate the remedial alternatives in detail to provide the basis for selection of a remedy. The detailed analysis will include a technical and statutory assessment and a cost analysis, as presented below. Prior to the detailed analysis of alternatives, a description of each alternative will be prepared.

The alternatives will be evaluated based on specific regulatory requirements, technical, cost, and institutional considerations, and community support and agency acceptance. The detailed analysis will consist of an assessment of each alternative against the evaluation criteria described below. The detailed analysis will also include a comparative evaluation identifying the relative performance of each alternative against the criteria. The following criteria will be used to evaluate the alternatives in detail:

- Overall protection of human health and the environment
- Compliance with Standards, Criteria and Guidance (SCGs)s
- Long-term effectiveness and permanence
- Reduction of toxicity, mobility or volume through treatment
- Short term effectiveness
- Implementability
- Cost
- Land Use
- Community acceptance.

One alternative will be identified which is preferred over the others. In accordance with DER-10, the preferred alternatives must be protective of human health and the environment and must address promulgated standards and criteria that are directly applicable or are relevant and appropriate. The recommended alternative will be documented in the FS Report.

Feasibility Study Report

The report documents the FS process. Consistent with DER-10, the following format will be used to complete the FS Report.

1. Introduction
2. Site Description and History
3. Summary of Remedial Investigation and Exposure Assessment
5. Development of Remedial Alternatives
6. Detailed Analysis of Remedial Alternatives
7. Recommended Alternative

This scope of work and the associated fee estimate assume incorporation of one round of consolidated comments on the FS Report from NYSDEC.

Assumptions

- One round of consolidated comments will be received from NYSDEC for incorporation into a final FS.
- Assumes two compact disks containing the FS documents will be sent to the document repository.

6. SCHEDULE

Field activities will be initiated within 45-days following NYSDEC approval of this Scope of Work provided subcontractors are available and all access agreements and permits are in place. The following provides an estimated schedule assuming no significant delays due to uncontrollable circumstances:

▪ Step 1 RI field work	Completion within 4 weeks following utility clearing
▪ Step 1 RI lab analyses	Completion after 4 weeks of Step 1 RI field work completion
▪ Submit Step 2 proposed wells to NYSDEC	2 weeks following receipt of analytical data
▪ NYSDEC approval of Step 2 well locations	1 week following receipt
▪ Start of Step 2 RI field work	2 to 3 weeks following review of Step 1 data with NYSDEC
▪ Step 2 RI field work	Completion within 5 weeks after start
▪ Complete lab analyses and data validation	10 weeks after completion of Step 2 field work
▪ Complete draft RI Report	8 weeks following receipt of validated data
▪ Complete draft FS Report	12 weeks after NYSDEC approval of RI Report

7. REFERENCES

ARCADIS of New York, Inc. 2012. *Phase I Environmental Site Assessment 824 Broadway and (North of) 1 Partition Street*. September 26, 2012.

ARCADIS of New York, Inc. 2013. *Phase II Environmental Site Assessment Report 824 Broadway and (North of) 1 Partition Street*. August 2, 2013.

Gardner, D., NYSDEC, Albany NY. 2018. Letter, *RE: WA Issuance/Notice to Proceed*. Drachenberg, T. Parsons Engineering of NY, Syracuse, NY. Contract/WA No: D007623-35; Site No./Spill No.: C442043A; January 30, 2018.

Hanson Van Vleet, LLC. 2016. *Remedial Investigation Report, Tim Bayly Property, 800 Broadway, City of Rensselaer, Rensselaer County, New York, Site No.: C442043*. December 22, 2016.

NYSDEC. 1998. *Division of Water Technical and Operational Guidance Series (TOGS) – Ambient Water Quality Standards and Guidance Values and Ground Water Effluent Guidelines (TOGS 1.1.1)*. June 1998.

NYSDEC. 2010. Technical Guidance for Site Investigation and Remediation (DER-10). *Division of Environmental Remediation.*

NYSDOH. 2006. *Guidance for Evaluating Soil Vapor Intrusion in the State of New York*.

Parsons and O'Brien & Gere, 2011a. *Field Activities Plan*. May 2011.

Parsons and O'Brien & Gere, 2011b. *Generic Quality Assurance Project Plan*. May 2011.

Parsons and O'Brien & Gere, 2011c. *Generic/Site-specific Health and Safety Plan*. May 2011.

Table 1
Sample Analysis and QA/QC Summary
Tim Bayly Property - Off-Site
Rensselaer, New York

Task	Matrix	Sub-Matrix	Analyses	Method	Number of Samples	Trip Blank	Field Blank	Field Duplicate	MS	MSD	Estimated Total Number of Samples	Deliverable
Soil Borings	**Soil**	**Subsurface Soil**	TCL Volatiles + 10 TICS	USEPA Method 8260C	8	1		1	1	1	12	
			TCL Semivolatiles + 20 TICS	USEPA Method 8270D	4			1	1	1	7	
			TAL Inorganics + Hg and CN	USEPA Method 6010B	4			1	1	1	7	Category B
			TCL Organochlorine Pesticides	USEPA Method 8081A	4			1	1	1	7	
			TCL PCBs	USEPA Method 8082	4			1	1	1	7	
	Water	**Groundwater**	TCL Volatiles + 10 TICS	USEPA Method 8260C	8	1		1	1	1	12	Category B
Surface Soil Sampling	**Soil**	**Surface Soil**	TCL Volatiles + 10 TICS	USEPA Method 8260C	3	1		1	1	1	7	
			TCL Semivolatiles + 20 TICS	USEPA Method 8270D	3			1	1	1	6	
			TAL Inorganics + Hg and CN	USEPA Method 6010B	3			1	1	1	6	Category B
			TCL Organochlorine Pesticides	USEPA Method 8081A	3			1	1	1	6	
			TCL PCBs	USEPA Method 8082	3			1	1	1	6	
Groundwater Sampling	**Water**	**Groundwater**	TCL Volatiles + 10 TICS	USEPA Method 8260C	5	1		1	1	1	9	
			1,4 Dioxane	USEPA Method 8270D SIM	3			1	1	1	6	
			PFAS	USEPA Method 537**	3		2	1	1	1	8	
			TCL Semivolatiles + 20 TICS	USEPA Method 8270D SIM	3			1	1	1	6	Category B
			TAL Inorganics + Hg and CN	USEPA Method 6010B	3			1	1	1	6	
			TCL Organochlorine Pesticides	USEPA Method 8081A	3			1	1	1	6	
			TCL PCBs	USEPA Method 8082	3			1	1	1	6	
Soil Vapor Implants	**Air**	**Soil vapor**	VOCs	TO-15	5			1			6	Category B
Residential SVI	**Air**	**Soil vapor/ Indoor Air/Ambient Air**	VOCs	TO-15	17			1			18	Category B
Waste Characterization Sampling	**Soil**	**Mixed Soils**	TCLP Method 1311		1						1	
			TCLP Volatiles	USEPA Method 8260C	1						1	Category A
			TCLP Semivolatiles	USEPA Method 8270D								
			TCL PCBs/Pesticides	USEPA Method 8080								
			TCL Chlorinated Herbicides	USEPA Method 8150								
			TCLP Metals + Cyanide	USEPA Method 6010C/9014								
			Corrosivity	USEPA Method 1110	1						1	
			Ignitability	USEPA Method 1030	1						1	
			Reactivity	USEPA Method 9010/9030	1						1	
	Water	**Mixed Waters**	TCL Volatiles	USEPA Method 8260C	1						1	
			TCL Semivolatiles	USEPA Method 8270D	1						1	
			Corrosivity	USEPA Method 1110	1						1	Category A
			Ignitability	USEPA Method 1030	1						1	
			Reactivity	USEPA Method 9010/9030	1						1	

Notes
** - PFAS analysis for expanded list of PFAS (21 analytes)

Table 2. Summary of Prohibited and Acceptable Items for PFAS Sampling

Prohibited	Acceptable
Field Equipment	
Teflon® containing materials	High density polyethylene (HDPE), stainless steel or polypropylene materials
Low density polyethylene (LDPE) materials	Acetate liners
	Silicon tubing
Waterproof field books, waterproof paper and waterproof sample bottle labels	Loose non-waterproof paper and non-waterproof sample labels
Plastic clipboards, binders, or spiral hard cover notebooks	Aluminum field clipboards or with Masonite
Waterproof markers / **Sharpies®**	Pens
Post-It Notes®	
Chemical (blue) ice packs	Regular ice
Field Clothing and PPE	
New cotton clothing or synthetic water resistant, waterproof, or stain-treated clothing, clothing containing Gore-Tex™	Well-laundered clothing made of natural fibers (preferable cotton)
Clothing laundered using fabric softener	No fabric softener
Boots containing Gore-Tex™ or treated with water-resistant spray	Boots made with polyurethane and PVC
Tyvek®	Laundered cotton clothing
No cosmetics, moisturizers, hand cream, or other related products as part of personal cleaning/showering routine on the morning of sampling Sunscreens or insecticides except as noted on right	**Sunscreens** - Alba Organics Natural Sunscreen, Yes To Cucumbers, Aubrey Organics, Jason Natural Sun Block, Kiss My Face, and baby sunscreens that are "chemical free", "toxin free" or "natural" **Insect Repellents** - Jason Natural Quit Bugging Me, Repel Lemon Eucalyptus Insect repellant, Herbal Armor, California Baby Natural Bug Spray, Baby Ganics **Sunscreen and insect repellant** - Avon Skin So Soft Bug Guard Plus - SPF 30 Lotion
Sample Containers	
LDPE or glass containers	HDPE or polypropylene
Teflon®-lined caps	Unlined polypropylene caps
Rain Events	
Waterproof or resistant rain gear	Wet weather gear made of polyurethane and PVC only; field tents that are only touched or moved prior to and following sampling activities
Equipment Decontamination	
Decon 90®	Alconox® and/or Liquinox®
Water from an on-site well Potable water from untested public water supply	Potable water from tested (and PFAS free) public drinking water supply
Food Considerations	
All food and drink, with exceptions noted on right	Bottled water and hydration fluids (i.e., Gatorade® and Powerade®) to be brought and consumed only in the staging areas
Vehicle Considerations	
Vehicle fabrics, carpets and mats may contain PFAS	Avoid utilizing areas inside vehicle as sample staging areas.

Attachment 1

Perfluoroalkyl and Polyfluoroalkyl Substances

Reporting Limits and MDLs

TestAmerica Buffalo
10 Hazelwood Drive
Amherst, NY 14228-2298

Prepared for:
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Prepared by	Massa, Anthony J
Date	3/2/2018
Expiration Date	5/29/2018
Est. Start Date	

Project: NYSDEC - Tim Bayly Property *Quote Number: 48017650 - 0*

Groundwater Samples

Matrix	Method	Test Description	Analyte	RL	MDL	Units
Water	537 (modified)	PFAS, Standard List (21 Analytes)	Perfluorobutanoic acid (PFBA) CAS#: 375-22-4	2.00	0.350	ng/L
			Perfluoropentanoic acid (PFPeA) CAS#: 2706-90-3	2.00	0.490	ng/L
			Perfluorohexanoic acid (PFHxA) CAS#: 307-24-4	2.00	0.580	ng/L
			Perfluoroheptanoic acid (PFHpA) CAS#: 375-85-9	2.00	0.250	ng/L
			Perfluorooctanoic acid (PFOA) CAS#: 335-67-1	2.00	0.850	ng/L
			Perfluorononanoic acid (PFNA)	2.00	0.270	ng/L

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Project: NYSDEC - Tim Bayly Property *Quote Number: 48017650 - 0*

Groundwater Samples

Matrix	Method	Test Description	Analyte	RL	MDL	Units
Continued						
			CAS#: 375-95-1			
			Perfluorodecanoic acid (PFDA)	2.00	0.310	ng/L
			CAS#: 335-76-2			
			Perfluoroundecanoic acid (PFUnA)	2.00	1.10	ng/L
			CAS#: 2058-94-8			
			Perfluorododecanoic acid (PFDoA)	2.00	0.550	ng/L
			CAS#: 307-55-1			
			Perfluorotridecanoic Acid (PFTriA)	2.00	1.30	ng/L
			CAS#: 72629-94-8			
			Perfluorotetradecanoic acid (PFTeA)	2.00	0.290	ng/L
			CAS#: 376-06-7			
			Perfluorobutanesulfonic acid (PFBS)	2.00	0.200	ng/L
			CAS#: 375-73-5			
			Perfluorohexanesulfonic acid (PFHxS)	2.00	0.170	ng/L
			CAS#: 355-46-4			
			Perfluoroheptanesulfonic Acid (PFHpS)	2.00	0.190	ng/L
			CAS#: 375-92-8			
			Perfluorooctanesulfonic acid (PFOS)	2.00	0.540	ng/L
			CAS#: 1763-23-1			
			Perfluorodecanesulfonic acid (PFDS)	2.00	0.320	ng/L
			CAS#: 335-77-3			
			Perfluorooctane Sulfonamide (FOSA)	2.00	0.350	ng/L
			CAS#: 754-91-6			
			N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	20.0	3.10	ng/L
			CAS#: 2355-31-9			
			N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	20.0	1.90	ng/L
			CAS#: 2991-50-6			
			6:2FTS	20.0	2.00	ng/L
			CAS#: 27619-97-2			
			8:2FTS	20.0	2.00	ng/L
			CAS#: 39108-34-4			
		Isotope Dilution				
			13C4 PFBA			
			CAS#: STL00992			
			13C5 PFPeA			
			CAS#: STL01893			

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Prepared by	Massa, Anthony J
Date	3/2/2018
Expiration Date	5/29/2018
Est. Start Date	

Project: NYSDEC - Tim Bayly Property *Quote Number: 48017650 - 0*

Groundwater Samples

Matrix	Method	Test Description	Analyte
Continued		**Isotope Dilution**	
			13C2 PFHxA
			CAS#: STL00993
			13C4-PFHpA
			CAS#: STL01892
			13C4 PFOA
			CAS#: STL00990
			13C5 PFNA
			CAS#: STL00995
			13C2 PFDA
			CAS#: STL00996
			13C2 PFUnA
			CAS#: STL00997
			13C2 PFDoA
			CAS#: STL00998
			13C2-PFTeDA
			CAS#: STL02116
			13C3-PFBS
			CAS#: STL02337
			18O2 PFHxS
			CAS#: STL00994
			13C4 PFOS
			CAS#: STL00991
			13C8 FOSA
			CAS#: STL01056
			d3-NMeFOSAA
			CAS#: STL02118
			d5-NEtFOSAA
			CAS#: STL02117
			M2-6:2FTS
			CAS#: STL02279
			M2-8:2FTS
			CAS#: STL02280

Field Activities Plan (FAP)

Prepared For:

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REVIEWED AND APPROVED BY:

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SECTION 1

PROJECT DESCRIPTION

1.1 INTRODUCTION

O'Brien & Gere Engineers, Inc. (O'Brien & Gere) in association with Parsons has developed this generic Field Activities Plan (FAP) to be used during implementation of field activities associated with Work Assignments issued by the New York State Department of Environmental Conservation (NYSDEC) under Superfund Standby Contract No. D007623.

The objective of this generic FAP is to outline methods and procedures that will allow consistency in investigatory field activities across a potentially broad range of specific project goals and objectives. The methods and procedures described in this FAP have been prepared in accordance with the most recent and applicable NYSDEC and New York State Department of Health (NYSDOH) regulatory guidance and requirements. It is our understanding that individual site-specific Work Plans will not be developed for each Work Assignment.

SECTION 2

ANTICIPATED FIELD ACTIVITIES

Various field activities may be conducted during execution of Work Assignments. These will invariably include the sampling and monitoring of environmental media including soil, groundwater, and air for the purpose of evaluating the quality of the environmental media and potential impacts to human health and/or the environment. Environmental sample data will also be used to evaluate whether remedial activities are necessary. The potentially applicable field activities that may be conducted during execution of Work Assignments, as well as the methods and procedures for each are described in detail in the following sections.

2.1 SOIL BORINGS

Soil borings will be advanced to facilitate the collection of subsurface soil samples and the installation of monitoring wells. Subsurface soil samples will be used to develop an understanding of site-specific geologic conditions, and to document those conditions. Subsurface soil samples will also be submitted for laboratory analysis to evaluate soil quality and potential remedial activities, if necessary.

Depending on site-specific objectives and/or drilling conditions, soil borings may be advanced using direct-push or conventional hollow stem auger drilling methods.

2.1.1 Direct-Push Method

This drilling method is typically used to collect shallow overburden soils and create boreholes for temporary monitoring well installations or soil vapor sampling points. This method is advantageous in that it typically allows for the advancement of numerous borings in a relatively short period of time. The disadvantage of this method is that it is typically limited to shallow overburden soils (less than 50 feet below grade) which exhibit relatively low densities. When used, the following procedures will be followed by field personnel:

- Soil samples will be collected continuously from the ground surface to the bottom of the borings using 4-foot long, MacroCore™ samplers.
- Soil samples retrieved from the borehole will be described for: 1) percent recovery; 2) soil type; 3) color; 4) moisture content; 5) texture; 6) grain size and shape; 7) consistency; 8) evidence of staining or other chemically-related impacts; and 9) any other relevant observations. In addition, soil will be screened with a photoionization detector (PID) to allow evaluation of the bulk volatile organic concentration of each soil sample. Should compound-specific monitoring be required to meet project objectives or by the HASP, then this monitoring will be conducted using appropriate monitoring devices/meter (*i.e.* Drager tubes, mercury vapor analyzer, 4-gas meter, etc.).
- Soils will be described in accordance with the Unified Soil Classification System (USCS). This descriptive information will be recorded on a soil boring log form. An example of the typical soil boring log form is provided in **Appendix A**.
- Samples for headspace screening will be collected. A representative portion of each soil sample will be placed in a re-sealable plastic (e.g., Ziploc®) bag filled approximately half full. The bag will be labeled with the boring number and interval

sampled. After allowing the bagged soil to warm, the tip of the sample probe attached to the PID will be inserted into the bag to measure the headspace for organic vapors.

- Samples for laboratory analysis will be submitted to an approved NYSDOH Laboratories Approval Program (ELAP)-certified laboratory. Analyses will be conducted using U.S. Environmental Protection Agency (USEPA) methodologies as specified in the Work Assignment Scoping Documents. Samples will be managed in accordance with the Quality Assurance Project Plan (QAPP).
- Specific soil sample intervals to be submitted for laboratory analysis will be identified in the Work Assignment Scoping Documents.
- Soils extracted during the advancement of the direct-push borings will be used to backfill the boring, provided that the boring is not to be used for installation of temporary monitoring well. However, soils that exhibit "gross" contamination, as evidenced by staining or free-phase product, or any visual, olfactory, or high PID readings, will be managed in accordance with **Section 2.13**. In this event, bentonite chips or pellets will be used to backfill the boring(s).
- Drilling equipment will be decontaminated between each boring in accordance with methods specified in **Section 2.12**.
- Decontamination water will be handled in accordance with **Section 2.13**.
- The boring will be located using a hand-held global positioning system (GPS) device that is capable of providing coordinates with sub-meter accuracy.

2.1.2 Conventional Hollow Stem Auger Method

This drilling method is typically to collect shallow and deeper overburden soils and create boreholes for permanent monitoring well installations. This method is advantageous in that it typically allows for the advancement of borings through denser soils, and when coupled with split spoon sampling conducted in accordance with ASTM Method D1586, can provide geotechnical information. The disadvantage of this method is that it is typically more time consuming to drill and sample, and to decontaminate the equipment. In addition, this method can generate a high volume of soil cuttings that may require off-site disposal depending on the depth of the boring. When used, the following procedures will be followed by field personnel:

- Soil samples will be collected continuously from the ground surface to the bottom of the borings using 2-inch diameter split-barrel samplers in accordance with ASTM Method D1586.
- Soil samples retrieved from the borehole will be described for: 1) percent recovery; 2) soil type; 3) color; 4) moisture content; 5) density; 6) texture; 7) grain size and shape; 8) consistency; 9) evidence of staining or other chemically-related impacts; and 10) any other relevant observations. In addition, soil will be screened with a photoionization detector (PID) to allow evaluation of the bulk volatile organic concentration of each soil sample. Soils will be described in accordance with the Unified Soil Classification System (USCS). This descriptive information will be recorded on a soil boring log form. An example of the typical soil boring log form is provided in **Appendix A**.
- Samples for headspace screening samples will be collected. A representative portion of each soil sample will be placed in a re-sealable plastic (e.g., Ziploc®) bag filled

approximately half full. The bag will be labeled with the boring number and interval sampled. After allowing the bagged soil to warm, the tip of the sample probe attached to the PID will be inserted into the bag to measure the headspace for organic vapors.

- Samples for laboratory analysis will be submitted to an approved NYSDOH Laboratories Approval Program (ELAP)-certified laboratory. Analyses will be conducted using USEPA methodologies as specified in the Work Assignment Scoping Documents. Samples will be managed in accordance with the QAPP.
- Specific soil sample intervals to be submitted for laboratory analysis will be identified in the Work Assignment Scoping Documents.
- Soils extracted during the advancement of the hollow stem auger borings will be used to backfill the boring, provided that the boring is not to be used for installation of permanent monitoring well. However, soils that exhibit "gross" contamination, as evidenced by staining or free-phase product, or any visual, olfactory, or high PID readings, will be managed in accordance with **Section 2.13**. In this event, a cement/bentonite grout will be used to backfill the boring. The grout will be tremied through the auger string as the auger sting is removed.
- Drilling equipment will be decontaminated between each boring in accordance with methods specified in **Section 2.12**.
- Decontamination water will be handled in accordance with **Section 2.13**.
- The boring will be located using a hand-held GPS device that is capable of providing coordinates with sub-meter accuracy.

2.2 MONITORING WELL INSTALLATION AND CONSTRUCTION

Monitoring wells will be used to evaluate the hydrogeologic conditions and groundwater quality. Monitoring wells will be installed to allow characterization of groundwater levels, groundwater flow systems, and groundwater quality. The specific groundwater monitoring objectives will be defined in the Work Assignment Scoping Documents.

2.2.1 Types of Monitoring Wells

Monitoring wells may be installed in overburden or bedrock and may be temporary or permanent depending on the project objectives defined in the Work Assignment Scoping Documents.

2.2.1.1 Temporary Overburden Monitoring Well Installation and Construction

Temporary monitoring wells are typically installed in shallow overburden using direct-push drilling methods and may be used when short-term, cursory groundwater data is to be collected.

Temporary wells will be constructed using 1-inch inside diameter (I.D.), Schedule 40 PVC, 0.010-inch slotted screen, flush-threaded to 1-inch I.D. Schedule 40 PVC riser casing. The screened interval will be selected based on site-specific project objectives defined in the Work Assignment Scoping Documents. A filter pack will be installed within the annular space between the well screen and borehole, as the direct-push rod assembly is retracted. A bentonite seal will be installed on top of the filter pack to the ground surface.

If dense non-aqueous phase liquid (DNAPL) is encountered in the well bore, a permanent monitoring well will be installed and constructed as described in the following section.

2.2.1.2 Permanent Overburden Monitoring Well Installation and Construction

Permanent monitoring wells will be used when long-term monitoring data or hydraulic conductivity testing is required. The monitoring well borings will be advanced using 4.25-inch inner diameter (ID) hollow-stem augers if 2-inch wells are to be installed or 6.25-inch ID hollow stem augers if 4-inch wells are to be installed. During auger advancement, soil samples will be collected at continuous 2-ft intervals using 2-inch diameter split barrel samplers in accordance with ASTM Method D1586.

Permanent monitoring wells will be constructed with 2-inch ID, threaded, flush-joint, PVC casings and screens. The well screen, plug, and riser should be certified clean from the manufacturer. If they are not, they will be cleaned using a high pressure steam cleaner. If DNAPL is encountered in the well bore, then fiberglass reinforced epoxy (FRE) well materials will be used in-lieu of PVC.

In general, well screens will be 10-feet long for shallow water table wells and 5-feet long for deeper overburden wells, unless greater lengths are required to meet project objectives. The screen slot size will be determined based on visual evaluation of grain-size of soil samples, unless project objectives require quantitative grain-size distribution by sieve analysis. In general, it is anticipated that a slot size of 0.010-inch will be used.

The annulus around the screens will be backfilled with clean silica sand having appropriate size in comparison to the screen slot size. The volume of filter pack required to fill the annular space will be calculated and compared to the volume installed. This information will be recorded in the field log book. The filter pack will be installed in increments as the augers are withdrawn to enable monitoring of progress and to prevent bridging. If bridging occurs, break the bridge before proceeding with installation. The filter pack should extend a minimum of 2 ft above the top of the screen.

A bentonite chip or pellet seal with a minimum thickness of 2 feet will be placed above the filter pack. If the seal is installed above the water table, it will be manually hydrated using potable water. The remainder of the annular space will be filled with cement-bentonite grout to ground surface. The grout will be allowed to set for a minimum of 24 hours before wells are developed.

Well heads may be completed either above grade, or flush with grade. For above grade completions, the well heads will extend approximately 3-ft above grade and will be fitted with a protective casing with a lockable lid. An approximate 2-ft diameter concrete well pad will be installed around the protective casing. The well pad will be sloped away from the protective casing to shed surface water away from the well head. The well identification will be clearly visible on the inside and outside of the lid of the protective casing.

Well heads in parking lots, roadways, or other areas accessed by vehicular traffic will be completed flush with grade. Flush-mount curb boxes will be fitted over the well head and will be flush to the surrounding grade. The curb box will be set in an approximate 2-ft diameter concrete pad. A locking J-plug will be installed on top of the well.

The top of the well casing and ground surface will be marked and surveyed to 0.01 foot, and the elevation will be determined relative to a fixed benchmark or datum. The measuring point on all wells will be on the innermost PVC casing.

Soil cuttings generated during the advancement of the monitoring well borings will be containerized for characterization and disposal in accordance with **Section 2.13**.

A Well Completion Log will be completed for each well installed. An example of the Well Completion Log is provided in **Appendix B**.

2.2.1.3 Permanent Bedrock Monitoring Well Installation and Construction

Bedrock monitoring wells will be installed using a combination of hollow stem auger and rock coring, air rotary, or fluid rotary drilling methods. Initially, borings will be advanced through the overburden material using 6-1/4 inch inside diameter (I.D.) hollow-stem augers or similar equipment dictated by site conditions. Soil samples will be collected using 2-inch diameter split-barrel samplers in accordance with ASTM Method D1586.

Once bedrock is encountered, a 6- inch "rock socket" will be installed into the competent rock, assuming that rock cores are not to be collected. If rock cores are to be collected, the bedrock will be cored using NX or HQ core barrels. Information to be recorded during the collection of core samples are indicated on the Core Log provided in **Appendix C**.

Open bedrock monitoring wells may be used if they meet the objectives specified in the Work Assignment Scoping Documents. Bedrock monitoring wells may also be constructed with at least a ten foot section of appropriate slot size PVC (or other suitable well screen material) well screen and schedule 40 PVC flush-joint casing (or other suitable riser casing material)to ground surface. The length and slot size of the well screen will be determined by site-specific geologic conditions and the zones from which samples will be taken. The annular space between the bedrock wall and the PVC riser pipe will be backfilled with the appropriately sized clean silica sand to at least 2 feet above the top of the screened interval. A two foot layer of bentonite chips will be placed on top of the filter pack and hydrated. The remaining annular space will be backfilled with a cement/bentonite grout mixture to the ground surface.

Well heads may be completed either above grade, or flush with grade. For above grade completions, the well heads will extend approximately 3-ft above grade and will be fitted with a protective casing with a lockable lid. An approximate 2-ft diameter concrete well pad will be installed around the protective casing. The well pad will be sloped away from the protective casing to shed surface water away from the well head. The well identification will be clearly visible on the inside and outside of the lid of the protective casing.

Well heads in parking lots, roadways, or other areas accessed by vehicular traffic will be completed flush with grade. Flush-mount curb boxes will be fitted over the well head and will be flush to the surrounding grade. The curb box will be set in an approximate 2-ft diameter concrete pad. A locking J-plug will be installed on top of the PVC well.

2.3 MONITORING WELL DEVELOPMENT

Subsequent to installation, monitoring wells will be developed to remove the fine material which may have settled within the filter pack and monitoring wells, to remove introduced drilling fluids (if used during installation), and to improve/restore the hydraulic communication with the surrounding formation.

- Monitoring well development will be performed or overseen by a field geologist.
- Development will be performed by surging and purging the well, as appropriate, using either a bailer or pump. Groundwater parameters will be recorded before, during, and after well development. Parameters will include turbidity, pH, temperature, and specific conductance.
- Water levels will be measured in each well to the nearest 0.01 foot prior to development.

- Monitoring wells will be developed until the water discharge from the well is 50 NTU or less, or until pH, temperature, and specific conductivity stabilize, or until a maximum of 10 borehole volumes of the water have been removed.
- Well development information will be recorded on a Well Development Log. An example of the Well Development Log is provided in **Appendix D**.
- Ideally, dedicated and/or disposable equipment will be used for well development. However, if non-dedicated well development equipment is used, it will be decontaminated after use in accordance with **Section 2.12**.
- Development water will be containerized for characterization and disposal in accordance with **Section 2.13**.
- Following development, the monitoring wells will be allowed to equilibrate for a minimum of 24 hours prior to groundwater sampling.

2.4 MONITORING WELL ABANDONMENT

There may be occasions when monitoring wells will require abandonment. For temporary monitoring wells, the approach will be to pull the PVC well materials from the borehole, and backfill the remaining open portion of the borehole with cement/bentonite grout to approximately 0.5 feet below the ground surface. The ground surface will be restored to a similar condition as the surrounding grade (*i.e.* topsoil, asphalt, etc.). For permanent overburden and bedrock monitoring wells, depending on the site-specific subsurface geologic conditions and nature of contamination, the abandonment approach will be in accordance with NYSDEC Policy CP-43 – Groundwater Monitoring Well Decommissioning Policy. Details regarding the well abandonment will be documented on the Well Decommissioning Record provided in **Appendix E**.

2.5 GROUNDWATER MONITORING AND SAMPLING

Groundwater samples may be collected using various methods depending on specific project objectives. These methods may include hand bailing, pumping, or low-flow purging and sampling.

2.5.1 Hand Bailing

2.5.1.1 Equipment and Supplies

- Field book;
- Project plans;
- PPE in accordance with the HASP;
- PID, or other monitoring equipment if required by HASP;
- Water level probe;
- Electronic oil/water interface probe;
- Disposable polyethylene bailers and/or stainless steel bailers;
- Polypropylene rope;
- Temperature, conductivity, and pH meter;
- Turbidity meter;
- Graduated 5-gallon buckets plus lids;
- Decontamination supplies;

- Plastic sheeting;
- Clear tape, duct tape;
- Coolers and ice;
- Laboratory sample bottles; and
- Shipping labels.

2.5.1.2 Purging

- Prior to sampling, the static water level and thickness of any light non-aqueous phase liquid (LNAPL) or dense non-aqueous phase liquid (DNAPL) will be measured to the nearest 0.01 foot from the surveyed well elevation mark on the top of the PVC casing with a decontaminated oil/water interface probe. NAPL thickness will be confirmed using a clear bailer or a weighted string. The measurement will be recorded in the field book.
- Prior to commencing sampling activities and daily thereafter, the groundwater quality monitoring probes/meters including pH, conductivity, and turbidity will be calibrated in accordance with the manufacturer's instructions. At a minimum, two-point calibrations will be conducted for pH, conductivity, and turbidity. Calibration results will be recorded in the field log notebook.
- Lower the bailer to the bottom of the well. Move the bailer up and down to suspend any material that may have settled to the bottom of the well.
- Initiate bailing of the well from the bottom. Keep the polypropylene rope on the plastic sheet. Pour the groundwater from the bailer into a graduated 5-gallon bucket to measure the volume withdrawn from the well.
- Continue bailing the well until at least three well volumes have been removed or until the well is dry. If the well is dry, allow sufficient time for the well to recover before proceeding. Record this information on the Standard Groundwater Sampling Log. An example of the Standard Groundwater Sampling Log is provided in **Appendix F**.
- During the removal of successive well volumes, measure the water temperature, pH, conductivity, and turbidity with calibrated meters. Record the data on the Groundwater Sampling Field Log.

2.5.1.3 Sampling

- Keep sample bottles cool and with their caps on until they are ready to receive samples. The type of analysis for which a sample is collected determines the type of container, preservative, holding time, and filtering requirement as specified in the QAPP. Samples are transferred directly from the bailer to the container. The container should hold any necessary preservative and should be correctly labeled before the sample is transferred to it.
- When you are ready to fill the bottles, remove them from their transport containers. Prepare them to receive the samples.
- Inspect labels to see that the samples are properly identified.
- Arrange the sampling containers to allow for convenient filling.

- The volatile organic compounds VOC containers should be filled first with zero headspace, from one bailer, and then securely capped.
- Minimize agitation of the water in the well; begin sampling by lowering the bailer slowly into the well. Lower it only far enough to fill it completely.
- Fill each sample container in accordance with the QAPP or other sampling outline.
- Return each sample bottle to its proper transport container.
- Record the appearance of the groundwater on the Standard Groundwater Sampling Log (**Appendix F**).
- If the sample bottle cannot be filled quickly, keep them cool with the caps on until they are filled.
- Samples must not be allowed to freeze.
- Record the date and time.
- Place a sample of well water in a container and measure and record the water temperature, pH, conductivity, and turbidity with calibrated meters. Record the data on the Groundwater Sampling Field Log.
- Secure the well head.
- The sample containers will be labeled, placed in a laboratory-supplied cooler, with protective packaging (i.e. bubble wrap) and packed on ice (to maintain a temperature of 4˚ C). The cooler will be shipped overnight or delivered to the ELAP-certified laboratory for analysis.
- Samples for laboratory analysis will be submitted to an approved NYSDOH Laboratories Approval Program (ELAP)-certified laboratory. Analyses will be conducted using U.S. Environmental Protection Agency (USEPA) methodologies as specified in the Work Assignment Scoping Documents. Samples will be managed in accordance with the Quality Assurance Project Plan (QAPP). COC procedures will be followed as outlined in the QAPP.

2.5.2 Pumping

2.5.2.1 Equipment and Supplies

- Field book;
- Project plans;
- PPE in accordance with the HASP;
- PID, if required by HASP;
- Water level probe;
- Electronic oil/water interface probe;
- Disposable polyethylene bailers;
- Polypropylene rope;
- Temperature, conductivity, and pH meter;
- Turbidity meter;

- Graduated 5-gallon buckets;
- Generator;
- Extension cords;
- Decontamination supplies;
- Peristaltic or submersible pump;
- Plastic tubing (appropriately sized for the chosen peristaltic or submersible pump);
- Plastic sheeting;
- Clear tape, duct tape;
- Coolers and ice;
- Laboratory sample bottles; and
- Shipping labels.

2.5.2.2 Purging

- Prior to sampling, the static water level and thickness of any light non-aqueous phase liquid (LNAPL) or dense non-aqueous phase liquid (DNAPL) will be measured to the nearest 0.01 foot from the surveyed well elevation mark on the top of the PVC casing with a decontaminated oil/water interface probe. NAPL thickness will be confirmed using a clear bailer or a weighted string. The measurement will be recorded in the field book.
- Prior to commencing sampling activities and daily thereafter, the groundwater quality monitoring probes/meters including pH, conductivity, and turbidity will be calibrated in accordance with the manufacturer's instructions. At a minimum, two-point calibrations will be conducted for pH, conductivity, and turbidity. Calibration results will be recorded in the field log notebook.
- Prepare the pump for operation. Follow the manufacturer's directions.
- Lower the pump intake to just below the top of the water column.
- Pump the groundwater into a graduated 5-gallon bucket. Continue pumping until at least three well volumes have been removed or the well is pumped dry. Lower the pump's intake as necessary.
- If the well is pumped dry, allow sufficient time for the well to recover before proceeding. Record this information on the Standard Groundwater Sampling Log (**Appendix F**).
- During the removal of successive well volumes, measure the water temperature, pH, conductivity, and turbidity with calibrated meters. Record the data on the Groundwater Sampling Field Log.

2.5.2.3 Sampling

- Keep sample bottles cool and with their caps on until they are ready to receive samples. The type of analysis for which a sample is collected determines the type of container, preservative, holding time, and filtering requirement as specified in the QAPP. Samples are transferred directly from the pump discharge to the container. The

container should hold any necessary preservative and should be correctly labeled before the sample is transferred to it.

- When you are ready to fill the bottles, remove them from their transport containers. Prepare them to receive the samples.
- Inspect labels to see that the samples are properly identified.
- Arrange the sampling containers to allow for convenient filling.
- Fill the containers that will undergo analysis for volatile organic compounds (VOC) first. The VOC containers should be filled with zero headspace from one bailer, and then securely capped
- Minimize agitation of the water in the well; begin sampling by slowly lowering the pump intake to just below the top of the water column.
- Fill each sample container in accordance with the QAPP or other sampling outline.
- Return each sample bottle to its proper transport container.
- Record the appearance of the groundwater on the Standard Groundwater Sampling Log (**Appendix F**).
- If the sample bottle cannot be filled quickly, keep them cool with the caps on until they are filled.
- Samples must not be allowed to freeze.
- Record the date and time.
- Place a sample of well water in a container and measure and record the water temperature, pH, conductivity, and turbidity with calibrated meters. Record the data on the Groundwater Sampling Field Log.
- Secure the well head.
- The sample containers will be labeled, placed in a laboratory-supplied cooler with protective packaging (i.e. bubble wrap), and packed on ice (to maintain a temperature of 4˚ C). The cooler will be shipped overnight or delivered to the ELAP-certified laboratory for analysis.
- Samples for laboratory analysis will be submitted to an approved NYSDOH Laboratories Approval Program (ELAP)-certified laboratory. Analyses will be conducted using U.S. Environmental Protection Agency (USEPA) methodologies as specified in the Work Assignment Scoping Documents. Samples will be managed in accordance with the Quality Assurance Project Plan (QAPP). COC procedures will be followed as outlined in the QAPP.

2.5.3 Low Flow Purging and Sampling

2.5.3.1 Equipment and Supplies

- Field book;
- Project plans;
- PPE in accordance with the HASP;
- PID, if required by HASP;

- Water level probe;
- Electronic oil/water interface probe;
- Disposable polyethylene bailers and low-flow sampling pump;
- Polypropylene rope;
- Temperature, conductivity, and pH meter;
- Turbidity meter;
- Graduated 5-gallon buckets;
- Flow-through cell;
- Generator;
- Extension cords;
- Decontamination supplies;
- Peristaltic or submersible pump capable of achieving flow rates of 0.5 liters per minute or less;
- Plastic tubing (appropriately sized for the chosen peristaltic or submersible pump);
- Plastic sheeting;
- Clear tape, duct tape;
- Coolers and ice;
- Laboratory sample bottles; and
- Shipping labels.

2.5.3.2 Purging

- Equipment will be decontaminated prior to use at each location.
- Prior to sampling, the static water level and thickness of any light non-aqueous phase liquid (LNAPL) or dense non-aqueous phase liquid (DNAPL) will be measured to the nearest 0.01 foot from the surveyed well elevation mark on the top of the PVC casing with a decontaminated oil/water interface probe. NAPL thickness will be confirmed using a clear bailer or a weighted string. The measurement will be recorded in the field book.
- Prior to commencing sampling activities and daily thereafter, the groundwater quality monitoring probes/meters including pH, conductivity, ORP, dissolved oxygen, and turbidity will be calibrated in accordance with the manufacturer's instructions. At a minimum, two-point calibrations will be conducted for pH, conductivity, and turbidity. The dissolved oxygen probe will be checked against a zero-dissolved oxygen solution. In addition, the dissolved oxygen calibration will be corrected for local barometric pressure and elevation. Calibration results will be recorded in the field log notebook.
- The intake of the peristaltic or submersible pump will be positioned in the center of the screened interval and the upper end of the tubing will be connected to the flow through cell. Flow rate shall not exceed 0.5 liters/min (500 ml/min). Initially, a flow rate between 200 ml/min and 500 ml/min will be used. The drawdown will be monitored

using a water level probe and the flow rate will be reduced if the drawdown exceeds 0.3 ft. Efforts should be made to minimize the generation of air bubbles in the sample tubing by either increasing the flow rate as appropriate, or restricting the flow by clamping the tubing

- During purging, pH, specific conductivity, temperature, oxidation-reduction potential (redox), dissolved oxygen, and turbidity will be monitored and recorded at time intervals sufficient to evacuate the volume of the flow-through cell. This information along with water level readings to monitor drawdown will be recorded on the Low Flow Groundwater Sampling Log. An example of the Low Flow Groundwater Sampling Log is provided in **Appendix G**.
- Well sampling will commence after equilibration of water quality parameters. The equilibration guidelines are as follows:

  - Temperature ± 3% of measurement
  - pH ± 0.1 pH units
  - Specific conductance ± 3% of measurement
  - Redox ±10 mV
  - DO ±10% of measurement
  - Turbidity ± 10% of measurement

- If the water level will not stabilize even at lower flow rates then the well will not be able to be sampled using the low flow method. In this situation, the well will be pumped to dryness and the water will be allowed to recover prior to collection of the sample. Purge water will be containerized for characterization and disposal in accordance with **Section 2.13**.

2.5.3.3 Sampling

- Prior to filling the sample bottles, the temperature, pH, dissolved oxygen, conductivity, and oxidation reduction potential (ORP) will be measured within a flow-through cell. Turbidity will be measured with a hand-held turbidity meter. All measurements will be recorded on the Low Flow Groundwater Sampling Log (**Appendix G**).
- Prior to collecting the sample, the flow-through cell will be disconnected from the tubing.
- Laboratory provided sample containers appropriate to meet USEPA requirements for each analysis will be used. Groundwater will be allowed to flow from the tubing into the sample container carefully so as to limit aeration of the sample. If preservative is present in a container, the container will not be overfilled. Containers will be filled in the following order:
  - VOCs containers
  - SVOCs containers

  - Pesticides containers
  - PCBs containers
  - Metals containers
  - Cyanide containers
- The sample containers will be labeled, placed in a laboratory-supplied cooler with protective packaging (i.e. bubble wrap) and packed on ice (to maintain a temperature of 4˚ C). The cooler will be shipped overnight or delivered to the ELAP-certified laboratory for analysis.
- Samples for laboratory analysis will be submitted to an approved NYSDOH Laboratories Approval Program (ELAP)-certified laboratory. Analyses will be conducted using U.S. Environmental Protection Agency (USEPA) methodologies as specified in the Work Assignment Scoping Documents. Samples will be managed in accordance with the Quality Assurance Project Plan (QAPP). COC procedures will be followed as outlined in the QAPP.

2.6 HYDRAULIC CONDUCTIVITY TESTING

2.6.1 Equipment and Supplies

- Field book;
- Project plans;
- PPE in accordance with the HASP;
- PID or other monitoring equipment, if required by HASP;
- Water level probe;
- Slug made of inert material;
- Pressure transducer(s) and cables;
- Pocket-PC or laptop;
- Polypropylene rope;
- Graduated 5-gallon buckets;
- Decontamination supplies;
- Plastic sheeting;
- Clear tape, duct tape;

2.6.2 Test Procedures

These tests involve observing the recovery of water levels toward an equilibrium level after an initial perturbation. The perturbation may be either a sudden rise or fall in water level. During a slug test, an inert rod of known volume will be quickly introduced into the well to cause a water level rise. Following equilibration of the water level the slug is removed to lower the water level. Procedures and equipment requirements may vary depending on the rate of the water-level recovery. Each well will be tested in accordance with the following procedures:

- Determine the type of test to be performed based on the following:

  - If the screened interval of the well straddles the water table, only use a rising head test;
  - If the screened interval of the well is submerged within water, then a rising and falling head test will be conducted
- Record appropriate data on the K-Test Log. An example of the K-Test Log is provided in **Appendix H**.
- Clean the downhole equipment (e.g., pressure transducer, associated cable and, if used, the bailer or slug and associated line) following the decontamination procedures provided in **Section 2.12** before initiating test(s) at each well.
- Measure and record the static water level in the well (only wells which have fully recovered to static level conditions after drilling and development should be tested).
- Connect the pressure transducer to the data logger and lower the transducer into the well to a depth that will not interfere with the insertion of the slug but does not exceed the operating range of the transducer. Secure the position of the transducer by clamping the transducer cable to the well casing using a rubber-covered clamp. If the edges of the well casing are sharp, cover them with cloth or duct tape to protect the transducer cable.
- Quickly create the water level perturbation by inserting the slug into the well. While there is no fixed requirement for the magnitude of the change in water level, it is suggested that a minimum of 20% instantaneous hydraulic head differential be created to allow collection of a suitable database.
- If another test is to be performed, allow the well to re-equilibrate prior to performing the next test. Repeat the procedures, changing settings as appropriate.

2.7 EXPLORATORY TEST PITS/EXCAVATIONS

2.7.1 Equipment and Supplies

- Log book, sampling forms, project plans, camera
- Stakes/flagging and/or GPS;
- PPE in accordance with the HASP;
- PID or other monitoring equipment if required by the HASP;
- Stainless steel bowl and spoons, plastic scoops
- Decontamination chemicals and supplies;
- Waterproof markers, clear tape, duct tape;
- Laboratory sample containers, labels, coolers and ice;
- Chains-of custody; shipping labels, custody seals.

2.7.2 Procedures

Test pits will allow for visual characterization of subsurface soil conditions and the collection of grab soil samples. Prior to soil sample collection, headspace screening will be conducted to evaluate whether analysis of soil samples is warranted, and if so, which soils should be collected.

At no time will field personnel or NYSDEC personnel enter a test pit/excavation unless it has been deemed safe to enter by an Excavation Competent person. The test pit/excavation may be classified as a confined space. If so, confined space entry procedures must be followed and proper personnel training in confined space procedures must be documented.

The sampling approach from test pits/excavations will be to bring soil samples to the surface to avoid entry into the test pit/excavation. A representative portion of each soil sample will be placed in a re-sealable plastic (e.g., Ziploc®) bag filled approximately half full. The bag will be labeled with the boring number and interval sampled. After allowing the bagged soil to warm, the tip of the sample probe attached to the PID will be inserted into the bag to measure the headspace for organic vapors.

Descriptions of the materials encountered in the test pit/excavation will be recorded on the Test Pit Log. An example of the Test Pit Log is provided in **Appendix I**.

Samples for laboratory analysis will be submitted to an approved NYSDOH Laboratories Approval Program (ELAP)-certified laboratory. Analyses will be conducted using U.S. Environmental Protection Agency (USEPA) methodologies as specified in the Work Assignment Scoping Documents. Samples will be managed in accordance with the Quality Assurance Project Plan (QAPP).

2.8 SURFACE WATER SAMPLING

- Water depths will be obtained at each surface water sample location.
- Surface water samples will be collected from the most downstream location proceeding to the most upstream location.
- A new pair of clean disposable latex or nitrile gloves will be donned at each sampling location.
- The water column samples will be collected facing upstream in flowing surface water systems.
- For water depths less than two feet, a surface water sample will be collected by submerging a sample bottle below the water surface taking care not to overfill the sample bottle and expelling the sample preservatives.
- For water depths between two and four feet, a water column sample will be collected using a Kemmerer® sampler, or equivalent, submerged below the water surface to an approximate depth of 60% of the total depth. The surface water sample will then be transferred from the Kemmerer® sampler, or equivalent sampler, to the laboratory sample containers.

2.9 SEDIMENT SAMPLING

Procedures for obtaining samples of sediment are described in this section.

2.9.1 Equipment and Supplies

- Log book, sampling forms, project plans, camera
- Stakes/flagging and/or GPS;
- PPE in accordance with the HASP;
- Coring device, polycarbonate tubing, end caps
- Ponar dredge (or equivalent), stainless steel auger and shovel

- Stainless steel bowl or disposable aluminum pans, and spoons, plastic scoops
- Decontamination chemicals and supplies;
- Waterproof markers, clear tape, duct tape;
- Laboratory sample containers, labels, coolers and ice;
- Chains-of custody; shipping labels, custody seals.
- Boat, if required.

2.9.2 Sediment Sampling Method

- Sediment sampling may be performed by boat or wading. For each core collected, observations of sediment type will be recorded in field logs (Attachment 6).
- Sediment samples will be collected from 0-6 inch, 6-12 inch, and 12-24 inch intervals, in areas where sediment depth allows. If sediment is greater than 24 inches thick, additional samples collected at 1-ft intervals may be warranted.
- Sediment samples will be collected using push core techniques or a technique that is appropriate for the site-specific sediment type.
- Push core sampling techniques employ manual penetration of sediment using a sampling device that contains a polycarbonate tube to collect the sediment core. The device includes a check valve to allow air to escape during sediment penetration and develops a vacuum to retain the core as it is recovered. It is anticipated that 2.75 or three-inch diameter polycarbonate tubes will be used. The push cores will be manually advanced to approximately 3-ft or refusal, whichever comes first. Generally, refusal represents the full sediment column consisting of the unconsolidated material.
- A Ponar dredge may be used to collect sediment samples from areas that contain coarse sediment.
- An auger and/or stainless steel shovel may be used in areas where the coring device or dredge will not penetrate (e.g., substrate primarily of rock and cobble) and the water column is thick enough to access the sediment.
- Upon retrieval, sediment cores will be processed in the field. Samples will be obtained from the inner portion of the core, avoiding sediment that has contacted the tube or sampling device, when possible.
- First, volatile organic compound samples will be obtained from the center of the core and placed in sample containers without headspace. The remainder of the interval will be extruded from the core, removing the outer portion of the core from the sample. The sample will be homogenized in a stainless steel mixing bowl or dedicated/disposable aluminum pan and distributed to the appropriate sample jars. Subsequent depth intervals will be processed in the same manner for each interval collected.
- Equipment will be decontaminated prior to use at each location.

2.10 SOIL VAPOR SAMPLING

2.10.1 Equipment and Supplies

- Slide hammer

- Stainless steel drive points
- Teflon® tubing
- Tubing plug or cap
- Glass beads or clean silica sand
- Bentonite chips or powder
- Sampling forms
- Helium
- Helium tracer cell
- Helium chamber
- Vacuum pump
- Temporary soil vapor probes will be installed using the procedure outlined below and will be recorded on the Vapor Intrusion forms.

2.10.2 Soil Vapor Probe Installation

- Install soil vapor probes using a direct-push drill rig (e.g., GeoProbe® or similar) or manually using a slide hammer. Probes will consist of stainless-steel drive points with stainless steel screens attached to food-grade (inert) Teflon® tubing through which the soil vapor sample will be drawn.
- Attach the drive points to a drive rod (stainless-steel tube) and drive the rod to the target depth, as define in the Work Assignment Scoping Documents.
- Withdraw the drive rods from the hole, leaving the drive point and tubing.
- Place filter pack material, such as glass beads or clean silica sand, in the annular space surrounding the tubing directly above the sample point to a height of approximately 1 to 2 foot. The depth of the filter pack material should always be adequate to prevent the bentonite slurry above from going over the drive point and sample inlet screen.
- Place bentonite slurry in the annulus above the filter pack material to provide a seal in the borehole. Ideally, place the bentonite annular seal at least 3 feet thick, although adjustments to this thickness may be required based on site-specific conditions. The entire borehole must be filled to the ground surface with either entirely bentonite or with natural fill between two bentonite seals (one above the filter pack material and one at the ground surface).
- For permanent installations, install flush mounted protective covers to protect the probe and the tubing.
- Cut the end of the tubing to allow proper closure of the flush-mounted protective cover, but with a sufficient length of tubing exposed at the surface to facilitate connection of sampling equipment.
- Close or cap the sample tubing following installation and following collection of each sample.

2.10.3 Collection of Soil Vapor Samples

Record weather information (i.e., temperature, barometric pressure, rainfall, wind speed, and wind direction) at the beginning of the sampling event. Also, record substantial changes to these conditions that may have occurred over the past 24 to 48 hours and that do occur during the course of sampling. The information may be measured with on-site equipment or obtained from a reliable source of local measurements (e.g., a local airport).

- Sampling personnel must avoid activities immediately before and during the sampling that may contaminate the sample (e.g., using markers, fueling vehicles, etc.).
- Identify sampling locations on a plot plan that also identifies buildings, other landmarks, and potential sources of VOC contamination to both the surface and outdoor air. Record the depth of the probe screen below grade.
- If necessary, connect additional tubing to the tubing extending from the soil vapor probe to allow for connection to sample collection equipment.
- Calculate the volume of air in the probe, tubing (volume = $\pi r^2 h$), including any additional tubing added in the step above and the annular space between the probe and the native material if sand or glass beads were used.
- Connect a vacuum pump or gas-tight syringe (~60 cubic centimeters [cc]) to the sample tubing. At a flow rate of no more than 0.2 liter per minute (lpm), purge air from the tubing until one to three of the above-calculated air volumes are removed.
- During purging, evaluate the potential for ambient air to be introduced in the soil vapor sample through the annulus of the soil vapor probe or tubing connections using a tracer gas such as helium. The procedures for the tracer gas evaluation are described below. Note that the bentonite used in the probe installation should have sufficient time to seal before the samples are collected. The tracer gas evaluation will verify if the seal is sufficient.
- Use an evacuated Summa® passivated (or equivalent) stainless-steel canister to collect the soil vapor sample. The canister will be provided by the laboratory, along with a flow controller equipped with an in-line particulate filter and a vacuum gauge. The flow controller will be pre-calibrated by the laboratory for the desired flow rate or duration of sample collection. The sampling flow rate should always be less than 0.2 lpm. The canisters will be batch certified as clean by the laboratory.
- Remove the protective brass plug from the canister. Connect the pre-calibrated flow controller to the canister.
- Record the identification numbers for the canister and flow controller. Record the initial canister pressure on the vacuum gauge (check equipment-specific instructions for taking this measurement). A canister with a significantly different pressure than originally recorded by the testing laboratory should not be used for sampling. Record these numbers and values on the chain-of-custody form for each sample.
- Connect the tubing from the soil vapor probe to the flow controller.
- Completely open the valve on the canister. Record the time that the valve was opened (beginning of sampling) and the canister pressure on the vacuum gauge.
- Photograph the canister and the area surrounding the canister.

- Monitor the vacuum pressure in the canister routinely during sampling.
- Stop sample collection when the canister still has a minimum amount of vacuum remaining. Check with the laboratory supplying the canister and flow controller for the ideal final vacuum pressure. Typically, the minimum vacuum is between 2 and 5 inches of mercury, but not zero. If there is no vacuum remaining, the sample will be rejected and collected again in a new canister.
- Complete the Soil Vapor (Canister) Sample Collection Field Form. An example of the Soil Vapor (Canister) Sample Collection Field Form is provided in **Appendix J**.
- Remove the flow controller from the canister and replace the protective brass plug.
- Attach labels/tags (sample name, time/date of sampling, etc.) to the canister as directed by the laboratory.
- Air samples will be analyzed by an ELAP-certified laboratory. Detection limits for the analyzed compound list will be defined by the NYSDEC and NYSDOH prior to sample submittal and outlined in the Work Assignment Scoping Documents. For specific parameters identified by NYSDOH, where the selected parameters may have a higher detection limit (e.g., acetone), the higher detection limits will be designated by NYSDOH.
- Place the canister and other laboratory-supplied equipment in the packaging provided by the laboratory.
- Enter the information required for each sample on the chain-of-custody form, making sure to include the identification numbers for the canister and flow controller, and the initial and final canister pressures on the vacuum gauge.
- Include the required copies of the chain-of-custody form in the shipping packaging, as directed by the laboratory. The field crew will retain a copy of the chain-of-custody for the project file.
- Deliver or ship the samples to the laboratory within one business day of sample collection and via overnight delivery (when shipping).

Provided that no additional sampling is expected to be conducted, either pull out (if practical) or abandon in place the sampling probe. When abandoning, cut the tubing back as far down as practical and cover to surface with native soil.

2.10.4 Tracer Gas Evaluation

The tracer gas evaluation provides a means to evaluate the integrity of the soil vapor probe seal and assess the potential for introduction of ambient air into the soil vapor sample. A tracer gas evaluation should be conducted on all soil vapor probes. After the initial round of sampling and with the approval of the regulating agency, the use of tracer gas may be reduced to a minimum of 10 percent for permanent and semi-permanent probes if the initial round results showed installations with competent seals.

The following tracer gas evaluation procedure uses in-field tracer gas measurements and tracer gases (e.g., helium) that can be measured by portable detectors.

- Retain the tracer gas around the sample probe by filling an air-tight chamber (such as a plastic bucket) positioned over the sample location.
- Make sure the chamber is suitably sealed to the ground surface.

- Introduce the tracer gas into the chamber. The chamber will have tubing at the top of the chamber to introduce the tracer gas into the chamber and a valved fitting at the bottom to let the ambient air out while introducing tracer gas. A tracer gas detector will be attached to the valved fitting at the bottom of the chamber to verify the presence of the tracer gas. Close the valve after the chamber has been enriched with tracer gas at concentrations >50%.
- The chamber will have a gas-tight fitting or sealable penetration to allow the soil vapor sample probe tubing to pass through and exit the chamber.
- After the chamber has been filled with tracer gas, attach the sample probe tubing to a pump that will be pre-calibrated to extract soil vapor at a rate of no more than 0.2 lpm. Purge the tubing using the pump. Calculate the volume of air in the tubing and probe and purge one to three tubing/probe volumes prior measuring the tracer gas concentration.
- Use the tracer gas detector to measure the tracer gas concentration in the pump exhaust.
- Record the tracer gas concentrations in the chamber and in the soil vapor sample.

If the evaluation indicates a high concentration of tracer gas in the sample (>10% of the concentration of the tracer gas in the chamber), then the surface seal is not sufficient and requires improvement via repair or replacement prior to commencement of the sample collection. A non-detectable level of tracer gas is preferred; however, if the evaluation indicates a low potential for introduction of ambient air into the sample (<10% of the concentration of the tracer gas in the chamber), then proceed with the soil vapor sampling. While lower concentrations of tracer gas are acceptable, the impact of the detectable leak on sample results should be evaluated in the sampling report.

2.11 INDOOR AIR SAMPLING

Three (3) types of air samples will be collected for laboratory analysis during the vapor intrusion investigation: 1) indoor air, 2) sub-slab air sample, and 3) background air sample. Procedures for obtaining these air samples are described in this section. During the vapor intrusion sampling, complete the Indoor Air Quality Questionnaire and Building Inventory. An example of the Indoor Air Quality Questionnaire and Building Inventory is provided in **Appendix K**.

2.11.1 Equipment and Supplies

- Hand drill with concrete bit
- Teflon® tubing
- Beeswax or permagum®
- Vacuum pump or syringe
- Sampling form
- Inventory form
- Camera
- Caulk (if needed to seal hole following sample collection)

2.11.2 Sub-slab Samples

2.11.2.1 Sub-slab Vapor Probe Installation

Temporary sampling probes will be installed using the following procedures:

- If appropriate, record weather information (*i.e.,* temperature and wind direction) at the beginning of the sampling event. Record substantial changes to these conditions that may occur during the course of sampling. The information may be measured with on-site equipment or obtained from a reliable source of local measurements (e.g., a local airport).
- Insert a section of food-grade Teflon® or other appropriate tubing through a 3/8-inch (approx.) hole drilled through the slab. If necessary, advance the drill bit 2 to 3 inches into the sub-slab material to create an open cavity.
- Install the tubing inlet to the specified sampling depth below the slab, no further than two inches into the sub-slab material.
- Seal the annular space between the hole and tubing using 100% beeswax or another inert, non-shrinking sealing compound such as permagum®.

2.11.2.2 Sub-slab Vapor Sample Collection

Sub-slab vapor samples will be collected by following the steps outlined below.

- Purge the tubing using a vacuum pump or gas-tight syringe (~60 cc). Calculate the volume of air (volume = π r^2h) in the tubing and purge one to three tubing volumes prior to sample collection at a rate no greater than 0.2 liter per minute (lpm).
- Use an evacuated Summa® passivated (or equivalent) canister to collect the sub-slab vapor sample. The canister will be provided by the laboratory, along with a flow controller equipped with an in-line particulate filter and a vacuum gauge. The flow controller will be pre-calibrated by the laboratory for the desired flow rate or duration of sample collection. The canisters will be batch certified as clean by the laboratory.
- Record the identification numbers for the canister and flow controller. Remove the protective brass plug from canister. Record the initial canister pressure using a digital vacuum gauge (check equipment-specific instructions for taking this measurement). A canister with a significantly different pressure than originally recorded by the testing laboratory should not be used for sampling. Record these numbers and values on the chain-of-custody form for each sample.
- Close the valve, remove the digital vacuum gauge and connect the pre-calibrated flow controller to the canister.
  - Connect the tubing from the sub-slab vapor sampling probe to the flow controller.
  - Open the valve on the canister. Record the date and time that the valve is opened (beginning of sampling) and the canister pressure on the vacuum gauge provided with the canister by the laboratory.
  - Photograph the canister and the area surrounding the canister.
- Close the valve on the vacuum pressure in the canister after the scheduled duration of sample collection. Record the date and time that the valve was closed (completion of sampling).
- Remove the flow controller from the canister. Record the final canister pressure using a digital vacuum gauge (check equipment-specific instructions for taking this measurement).

- Complete the Sub-slab Vapor (Canister) Sample Collection Field Form. An example of the Sub-slab Vapor (Canister) Sample Collection Field Form is provided in **Appendix L**.

Note: Make sure that the canister still has a minimum amount of vacuum remaining. Check with the laboratory supplying the canister and flow controller for the ideal final vacuum pressure. Typically, the minimum vacuum is between 2 and 5 inches of mercury, but not zero. If there is no vacuum remaining, the sample will be rejected and collected again in a new canister.

- After closing the valve, remove the digital vacuum gauge from the canister and replace the protective brass plug.
- Seal (with caulk) all holes made through the slab and remove debris, materials and or waste that may be produced during the sampling activities.
- Attach labels/tags (sample name, time/date of sampling, etc.) to the canister as directed by the laboratory.
- Air samples will be analyzed by an ELAP-certified laboratory. Detection limits for the analyzed compound list will be defined by the NYSDEC and NYSDOH prior to sample submittal and outlined in the Work Assignment Scoping Documents. For specific parameters identified by NYSDOH, where the selected parameters may have a higher detection limit (e.g., acetone), the higher detection limits will be designated by NYSDOH.
- Place the canister and other laboratory-supplied equipment in the packaging provided by the laboratory.
- Enter the information required for each sample on the chain-of-custody form, making sure to include the identification numbers for the canister and flow controller, and the initial and final canister pressures on the vacuum gauge.
- Include the required copies of the chain-of-custody form in the shipping packaging, as directed by the laboratory. The field crew will retain a copy of the chain-of-custody for the project file.
- Deliver or ship the samples to the laboratory as soon as practical.

2.11.3 Indoor Air Samples

Prior to initiating the indoor air survey a detailed chemical survey should be completed within the structure where the samples will be collected. Potential sources of VOCs should be identified and photographed as appropriate. Labels of indoor products should be reviewed for VOC contents; any findings must be recorded on the NYSDOH Indoor Air Quality (IAQ) Questionnaire and Building Inventory Field Form. If potential indoor air sources are present, the sources should be removed and the sampling should be postponed for a period of time.

As part of the indoor air sampling it should be established establish whether the building has a positive or negative pressure with respect to outdoors. Smoke pens may be used to help with this assessment. This may be done immediately before and immediately after indoor air sampling, but not during sampling. Indoor air samples will be collected following the steps outlined below:

- Record outdoor weather information (*i.e.,* temperature and wind direction) and indoor temperature at the beginning of the sampling event. Record substantial changes to these conditions that may occur during the course of sampling. The information may

be measured with on-site equipment or obtained from a reliable source of local measurements (e.g., a local airport).

- Use an evacuated Summa® passivated (or equivalent) stainless-steel canister to collect the indoor air sample. The canister will be provided by the laboratory, along with a flow controller equipped with an in-line particulate filter and a vacuum gauge. The flow controller will be pre-calibrated by the laboratory for the desired flow rate or duration of sample collection. The canisters will be individually certified as clean by the laboratory.
- Place the canister at the sampling location. If the sample should be collected from breathing height (e.g., 3 to 5 feet above ground), then mount the canister on a stable platform such that the sample inlet will be at the proper height.
- Record the identification numbers for the canister and flow controller. Remove the protective brass plug from canister. Record the initial canister pressure using a digital vacuum gauge (check equipment-specific instructions for taking this measurement). A canister with a significantly different pressure than originally recorded by the testing laboratory should not be used for sampling. Record these numbers and values on the chain-of custody form for each sample.
- Close the valve, remove the digital vacuum gauge and connect the pre-calibrated flow controller to the canister.
- Open the valve on the vacuum pressure in the canister. Record the date and time that the valve was opened (beginning of sampling) and the canister pressure on the vacuum gauge provided with the canister by the laboratory.
- Photograph the canister and the area surrounding the canister.
- Close the valve on the vacuum pressure in the canister after the scheduled duration of sample collection. Record the date and time that the valve was closed (completion of sampling).
- Remove the flow controller from the canister. Record the final canister pressure using a digital vacuum gauge (check equipment-specific instructions for taking this measurement).
- Complete the Indoor Air (Canister) Sample Collection Field Form. An example of the Indoor Air (Canister) Sample Collection Field Form is provided in **Appendix M**.

Note: Make sure that the canister still has a minimum amount of vacuum remaining. Check with the laboratory supplying the canister and flow controller for the ideal final vacuum pressure. Typically, the minimum vacuum is between 2 and 5 inches of mercury, but not zero. If there is no vacuum remaining, the sample will be rejected and collected again in a new canister.

- After closing the valve, remove the digital vacuum gauge from the canister and replace the protective brass plug.
- Attach labels/tags (sample name, time/date of sampling, etc.) to the canister as directed by the laboratory.
- Place the canister and other laboratory-supplied equipment in the packaging provided by the laboratory.

- Air samples will be analyzed by an ELAP-certified laboratory. Detection limits for the analyzed compound list will be defined by the NYSDEC and NYSDOH prior to sample submittal and outlined in the Work Assignment Scoping Documents. For specific parameters identified by NYSDOH, where the selected parameters may have a higher detection limit (e.g., acetone), the higher detection limits will be designated by NYSDOH.
- Enter the information required for each sample on the chain-of-custody form, making sure to include the identification numbers for the canister and flow controller, and the initial and final canister pressures on the vacuum gauge.
- Include the required copies of the chain-of-custody form in the shipping packaging, as directed by the laboratory. The field crew will retain a copy of the chain-of-custody for the project file.
- Deliver or ship the samples to the laboratory as soon as practical.

2.11.4 Ambient Air Samples

The following procedures will be followed for the collection of ambient air samples:

- Select a location upwind of the building or other area that is being evaluated.
- Record weather information (*i.e.,* temperature and wind direction) at the beginning of the sampling event. Record substantial changes to these conditions that may occur during the course of sampling. The information may be measured with on-site equipment or obtained from a reliable source of local measurements (e.g., a local airport).
- Use an evacuated Summa® passivated (or equivalent) stainless-steel canister to collect the ambient air sample. The canister will be provided by the laboratory, along with a flow controller equipped with an in-line particulate filter and a vacuum gauge. The flow controller will be pre-calibrated by the laboratory for the desired flow rate or duration of sample collection. The canisters will be individually certified as clean by the laboratory.
- Place the canister at the sampling location. If the sample should be collected from breathing height (e.g., 3 to 5 feet above ground), then mount the canister on a stable platform such that the sample inlet will be at the proper height.
- Record the identification numbers for the canister and flow controller. Remove the protective brass plug from canister. Record the initial canister pressure using a digital vacuum gauge (check equipment-specific instructions for taking this measurement). A canister with a significantly different pressure than originally recorded by the testing laboratory should not be used for sampling. Record these numbers and values on the chain-of custody form for each sample.
- Close the valve, remove the digital vacuum gauge and connect the pre-calibrated flow controller to the canister.
- Open the valve on the vacuum pressure in the canister. Record the date and time that the valve was opened (beginning of sampling) and the canister pressure on the vacuum gauge provided with the canister by the laboratory.

- Photograph the canister and the area surrounding the canister.
- Close the valve on the vacuum pressure in the canister after the scheduled duration of sample collection. Record the date and time that the valve was closed (completion of sampling).
- Remove the flow controller from the canister. Record the final canister pressure using a digital vacuum gauge (check equipment-specific instructions for taking this measurement).
- Complete the Ambient Air (Canister) Sample Collection Field Form. An example of the Ambient Air (Canister) Sample Collection Field Form is provided in **Appendix N**.

Note: Make sure that the canister still has a minimum amount of vacuum remaining. Check with the laboratory supplying the canister and flow controller for the ideal final vacuum pressure. Typically, the minimum vacuum is between 2 and 5 inches of mercury, but not zero. If there is no vacuum remaining, the sample will be rejected and collected again in a new canister.

- After closing the valve, remove the digital vacuum gauge from the canister and replace the protective brass plug.
- Attach labels/tags (sample name, time/date of sampling, etc.) to the canister as directed by the laboratory.
- Air samples will be analyzed by an ELAP-certified laboratory. Detection limits for the analyzed compound list will be defined by the NYSDEC and NYSDOH prior to sample submittal and outlined in the Work Assignment Scoping Documents. For specific parameters identified by NYSDOH, where the selected parameters may have a higher detection limit (e.g., acetone), the higher detection limits will be designated by NYSDOH.
- Place the canister and other laboratory-supplied equipment in the packaging provided by the laboratory.
- Enter the information required for each sample on the chain-of-custody form, making sure to include the identification numbers for the canister and flow controller, and the initial and final canister pressures on the vacuum gauge.
- Include the required copies of the chain-of-custody form in the shipping packaging, as directed by the laboratory. The field crew will retain a copy of the chain-of-custody for the project file.
- Deliver or ship the samples to the laboratory as soon as practical.

2.12 DECONTAMINATION OF SAMPLING EQUIPMENT

2.12.1 Decontamination Area

A temporary decontamination area lined with polyethylene sheeting will be constructed on site for use during decontamination of the drilling equipment. Water collected from decontamination activities will be collected in 55-gallon drums and managed as described in **Section 2.13**.

2.12.2 Equipment Decontamination

The following procedures will be used to decontaminate equipment used during the field activities.

- Drilling equipment including the backhoe, bucket, and drilling rig; augers; bits; rods; tools; split-spoon samplers; and tremie pipes will be cleaned with a high-pressure,

steam-cleaning unit before beginning work, following the completion of borings, wells, test pits/excavations, and prior to exiting the site.

- Tools, drill rods, and augers will be placed on polyethylene plastic sheets following pressure washing. Direct contact with the ground will be avoided.
- Augers, rods, and tools will be decontaminated between each drilling location according to the above procedures.
- The back of the drill rig and all tools, augers, and rods will be decontaminated at the completion of the work and prior to leaving the site.

2.12.3 Sampling Equipment Decontamination

2.12.3.1 Equipment and Supplies

- Potable water;
- Phosphate-free detergent (such as Alconox™ or Simple Green™);
- Distilled water;
- Aluminum foil;
- Plastic/polyethylene sheeting;
- Plastic buckets and brushes; and
- Personal protective equipment (PPE) in accordance with the HASP.

2.12.3.2 Decontamination Procedures

- Prior to sampling, non-dedicated sampling equipment (e.g., bailers, bowls, spoons, interface probes, etc.) will be washed with potable water and a phosphate-free detergent (such as Alconox™). Decontamination may take place at the sampling location as long as all liquids are contained in pails, buckets, etc.
- The sampling equipment will then be rinsed with potable water followed by a distilled water rinse.
- Between rinses, equipment will be placed on polyethylene sheets or aluminum foil, if necessary. At no time will washed equipment be placed directly on the ground.
- Equipment will be wrapped in polyethylene plastic or aluminum foil for storage or transportation from the designated decontamination area to the sampling location.

2.13 MANAGEMENT OF INVESTIGATION-DERIVED WASTE

Field activities will generate soil and water that will require proper management. Management of these materials will comply with DER-10.

2.13.1 Soils Generated From On-Site Activities

Drill cuttings and other soils generated on-site will be presumed to be contaminated in accordance with DER-10. If these soils are to be left on ground at the end of the work day, they must be placed on protective sheeting and covered with protective sheeting in a manner that does not allow rainwater or snow melt to contact the soils thus potentially causing transport of contaminants. These soils may be disposed of within the borehole from which they were generated to within 12 inches of the ground surface, or if the site is a residential site, backfilled to within 24 inches of the ground surface. These soils will not be used as backfill if:

- they contain free-product, NAPL, or are otherwise grossly contaminated;
- the borehole is to be used for monitoring well installation;
- the borehole has penetrated an aquitard, aquiclude, or other confining layer, or has been advanced into bedrock;
- backfilling the borehole will create a significant pathway for vertical movement of contaminants. Bentonite can be added to reduce permeability.
- Soils that are not used for backfill will be containerized and characterized for disposal. If the soil is considered characteristic hazardous waste, or a solid waste, it must be managed and disposed at a properly permitted treatment, storage or disposal facility.
- Soils that are not characterized as a solid or hazardous waste may be placed at the site, or returned to the off-site location where it originated, in a manner set forth in the Work Assignment Scoping Documents.
- The soil removed from test pits will be placed back into the excavation in the same general strata from which it was removed. Soils removed from test pits/excavations will be placed on protective sheeting to minimize potential contamination of the ground surface. If drums or other containers are encountered or free product, or NAPL are present, these materials will be over-packed or otherwise containerized for appropriate off-site disposal.

2.13.2 Soil Generated Off-Site From Off-Site Activities

Soils should be containerized as they are generated. In accordance with DER-10, soils will not be allowed to be stored on an off-site location unless they are containerized. All efforts should be made to transport containerized soils back to the on-site storage area at the end of each work day.

Soils generated off-site may be disposed of within the borehole from which they were generated to within 12 inches of the ground surface, or if the site is a residential site, backfilled to within 24 inches of the ground surface. These soils will not be used as backfill if:

- they contain free-product, NAPL, or are otherwise grossly contaminated;
- the borehole is to be used for monitoring well installation;
- the borehole has penetrated an aquitard, aquiclude, or other confining layer, or has been advanced into bedrock;
- backfilling the borehole will create a significant pathway for vertical movement of contaminants. Bentonite can be added to reduce permeability.

Soils that are not used for backfill will be containerized and characterized for disposal. If the soil is considered characteristic hazardous waste, or a solid waste, it must be managed and disposed at a properly permitted treatment, storage or disposal facility.

Soils that are not characterized as a solid or hazardous waste may be placed at the site, or returned to the off-site location where it originated, in a manner set forth in the Work Assignment Scoping Documents.

2.13.3 Water

Water generated during an investigation must be initially containerized upon production. Liquids generated during field activities that exhibit visible staining, sheen, discernable odors, or free product will

remain containerized for off-site disposal. These containers will be stored in a staging area designated by the NYSDEC Project Manager. The staging area will have secondary containment.

Water that does not exhibit any of these characteristics may be discharged to an unpaved area of the site as approved by the NYSDEC Project Manager.

2.13.4 Disposable Sampling Equipment and Personal Protective Equipment

Dedicated sampling equipment (soil sample liners, disposable polyethylene bailer, polypropylene line, sample tubing) and personal protective equipment (PPE) will be handled and managed as solid waste.

2.14 SITE SURVEY AND BASE MAP PREPARATION

A site survey will be conducted by a New York State licensed surveyor which incorporates soil boring locations, monitoring well locations, test pit/excavation locations, surface water and sediment locations, surface soil locations, and soil vapor locations. Horizontal locations of these sample points will be tied to New York State Plane Coordinate System using North American Datum of 1983 (NAD 83). Elevations will be tied to North American Vertical Datum of 1988 (NAVD 88). Ground elevations at the sample points will be measured to the nearest 0.1 ft. Elevations of monitoring well casings will be measured to the nearest 0.01 ft.

Unless specifically request by the NYSDEC Project Manager, detailed topographic surveys of project sites will not be conducted, nor used for base map purposes. Rather, available aerial photography will be used as the base map onto which sampling points and other mapping elements (*i.e.* groundwater contours, contaminant plumes, etc.) will be displayed.

APPENDIX A

TEST BORING LOG

	TEST BORING LOG	REPORT OF BORING
Client: Proj. Loc: File No.:	Sampler: 2" split Spoon Hammer: 140-lb Fall: 30"	Page 1 of Location: Start Date: End Date:
Boring Company: Foreman: OBG Geologist:		Screen = \ Grout Riser Sand Pack Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing PID (ppm)	Field Testing Time

APPENDIX B

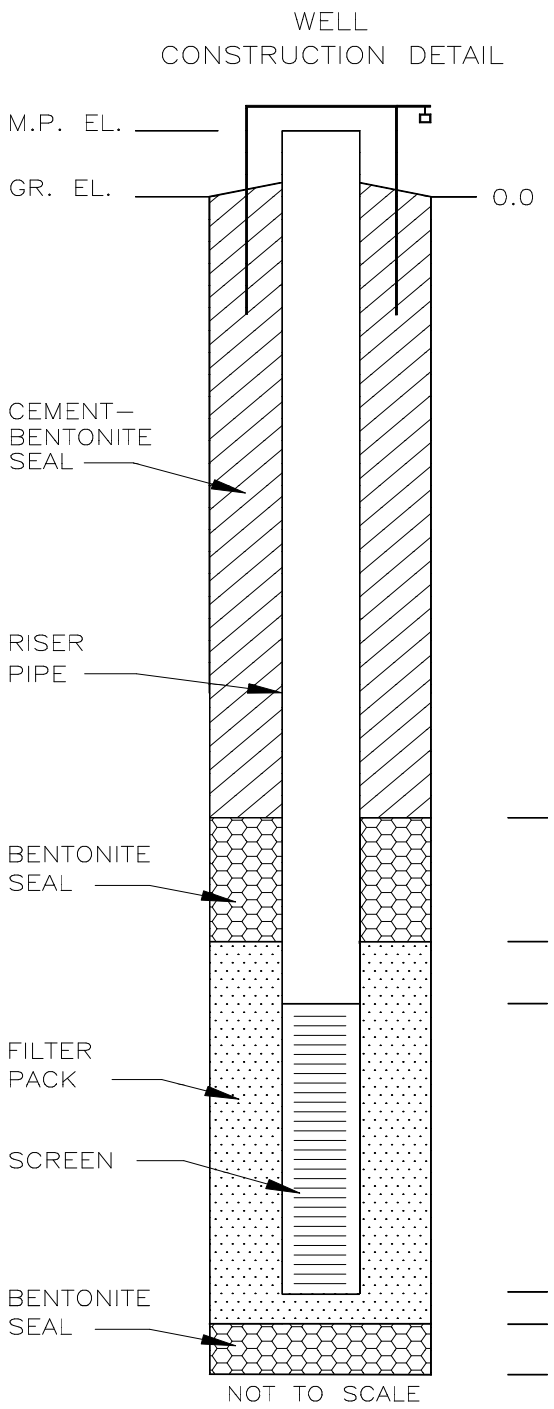
WELL COMPLETION LOG

WELL COMPLETION LOG

Well ID: _____

Project: _____
Location: _____
Project No.: _____

Client: _____
Date Drilled: _____
Date Developed: _____



Inspection Notes:

Inspector: _____
Drilling Contractor: _____
Type of Well: Environmental Monitoring Well

Static Water Level (ft bmp): _____ Date: _____
Measuring Point: Top of PVC
Total Depth of Well (ft bmp): _____

Drilling Method - Overburden:

Type: HSA Diameter: 4 1/4 " ID
Casing: NA

Sampling Method - Overburden:

Type: Split-Spoon Diameter: 2" OD
Weight: 140 # Fall: 30"
Interval: _____

Riser Pipe Left in Place:

Material: Sch 40 PVC Diameter: 2" ID
Length: _____ Joint Type Flush Thread

Screen:

Material: Sch 40 PVC Diameter: 2" ID
Slot Size: _____ Joint Type Flush Thread

Filter Pack:

Type: Sand Grade: _____
Interval: _____

Seal(s):

Type: Cement-Bentonite Interval: _____
Type: Bentonite Pellets Interval: _____
Type: Bentonite Pellets Interval: _____

Locking Casing: [X] Yes [ ] No

APPENDIX C

CORE LOG

File: Corelog.xls

CORE LOG

Hole No.:

Job No.:

Sheet 1 of 1

Date Started:

Project:

Drilling Contractor: Parratt-Wolff

Date Finished:

Client:

Driller: Glenn Lansing

Total Depth:

Purpose:

Geologist:

Ground Elev.:

Location:

Length of Casing:

S.W.L.:

Hole Location:

Casing Size:

Core Size: HQ

Inclination/Bearing: NA

Formation Member / Unit	Run No. / Depth	Pen. Rate (min. per foot)	Depth Scale	Lithologic Description (include in order: ROCK TYPE, color, grain size, texture, bedding, fracture & minerals.)	Core Recovery Length	Core Recovery Percent	RQD

APPENDIX D

WELL DEVELOPMENT LOG

WELL DEVELOPMENT LOG

Well ID:

Date		Field Personnel		Weather	
Site Name		Contractor		Project No.	
Site Location		Evacuation Method			

Well information:

Depth to Bottom (Initial) *	ft.	Date(s) Installed		Date(s) Developed	
Depth to Bottom (Final)*	ft.	Driller		Development Time	Start:
Depth to Water (Initial)*	ft.	Well Diameter	in.		Stop:
Depth to Water (Final)*	ft.	Casing Volume	gal.		Total:
* Measuring point		Pump setting* (intake)			

Well Volumes	Volume of Water Removed (Gallons)	Temperature ^{O}C	pH s.u	Conductivity mS/cm	Turbidity (NTU)	Approximate Flow Rate (gal/min)	Depth to Water (ft.)	Appearance of Water
Start								
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								

Development Water Characteristics:

Total volume of Development water removed:

Physical appearance at start		Physical appearance at end	
Color		Color	
Odor		Odor	
Sheen/Free Product		Sheen/Free Product	

NOTES:

Geologist Signature:

APPENDIX E

WELL DECOMMISSIONING RECORD

FIGURE 3

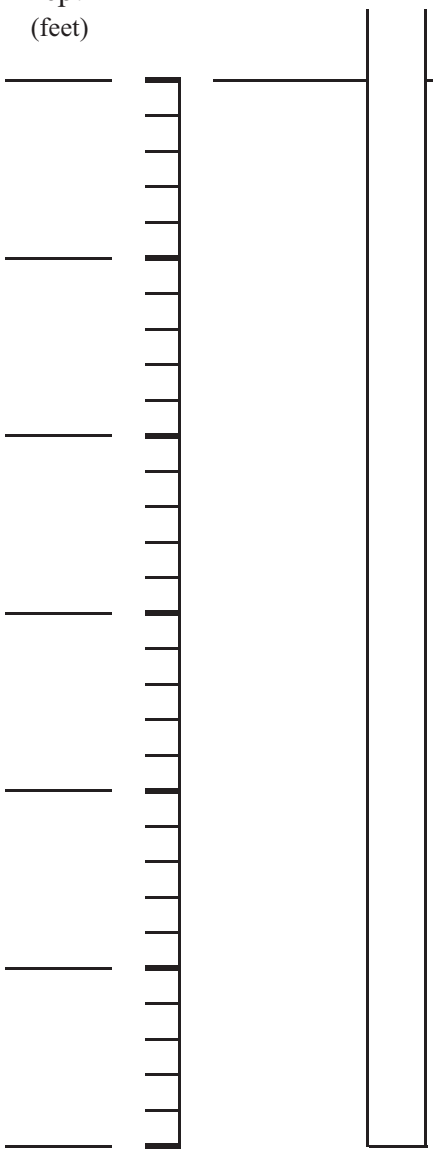
WELL DECOMMISSIONING RECORD

Site Name:	Well I.D.:
Site Location:	Driller:
Drilling Co.:	Inspector:
	Date:

DECOMMISSIONING DATA
(Fill in all that apply)

OVERDRILLING	
Interval Drilled	
Drilling Method(s)	
Borehole Dia. (in.)	
Temporary Casing Installed? (y/n)	
Depth temporary casing installed	
Casing type/dia. (in.)	
Method of installing	
CASING PULLING	
Method employed	
Casing retrieved (feet)	
Casing type/dia. (in)	
CASING PERFORATING	
Equipment used	
Number of perforations/foot	
Size of perforations	
Interval perforated	
GROUTING	
Interval grouted (FBLS)	
# of batches prepared	
For each batch record:	
Quantity of water used (gal.)	
Quantity of cement used (lbs.)	
Cement type	
Quantity of bentonite used (lbs.)	
Quantity of calcium chloride used (lbs.)	
Volume of grout prepared (gal.)	
Volume of grout used (gal.)	

WELL SCHEMATIC*



COMMENTS:

* Sketch in all relevant decommissioning data, including: interval overdrilled, interval grouted, casing left in hole, well stickup, etc.

Drilling Contractor

Department Representative

APPENDIX F

STANDARD GROUNDWATER SAMPLING LOG

Standard Ground Water Sampling Log

Date _____
Site Name _____ Weather _____
Location _____ Well # _____
Project No. _____ Evacuation Method _____
Personnel _____ Sampling Method _____

Well Information:

Depth of Well * _____ ft.
Depth to Water * _____ ft.
Length of Water Column _____ ft.
Volume of Water in Well _____ gal.(s)
3X Volume of Water in Well _____ gal.(s)

Water Volume /ft. for:
_____ 2" Diameter Well = 0.163 X LWC
_____ 4" Diameter Well = 0.653 X LWC
_____ 6" Diameter Well = 1.469 X LWC

Volume removed before sampling _____ gal.(s)
Did well go dry? _____

* Measurements taken from [ ] Well Casing [ ] Protective Casing [ ] (Other, Specify) _____

Instrument Calibration:

pH Buffer Readings		Conductivity Standard Readings	
4.0 Standard		84 S Standard	
7.0 Standard		1413 S Standard	
10.0 Standard			

Water parameters:

Gallons Removed	**Temperature Readings**	**pH Readings**	**Conductivity Readings uS/cm**	**Turbidity Readings Ntu**
initial	initial	initial	initial	initial

Water Sample:
Time Collected _____

Physical Appearance at Start		Physical Appearance at Sampling	
Color		Color	
Odor		Odor	
Turbidity (> 100 NTU)		Turbidity (> 100 NTU)	
Sheen/Free Product		Sheen/Free Product	

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH

Notes:

APPENDIX G

LOW FLOW GROUNDWATER SAMPLING LOG

Low Flow Ground Water Sampling Log

Date _____ Personnel _____ Weather _____

Site Name _____ Evacuation Method _____ Well # _____

Site Location _____ Sampling Method _____ Project # _____

Well information:

Depth of Well * _____ ft.

Depth to Water * _____ ft.

Length of Water Column _____ ft.

Depth to Intake * _____ ft.

* Measurements taken from

_____ Top of Well Casing

_____ Top of Protective Casing

_____ (Other, Specify)

Start Purge Time: _____

		10.0%	0.1	3%	10 mV	10%	10%	100-500 ml/min
Elapsed Time (min)	**Depth To Water (ft)**	**Temperature (celsius)**	**pH**	**Conductivity (ms/cm)**	**Oxidation Reduction Potential**	**Dissolved Oxygen (mg/l)**	**Turbidity (NTU)**	**Flow Rate (ml/min).**

End Purge Time: _____

Water sample:

Time collected: _____

Total volume of purged water removed: _____

Physical appearance at start

Color _____

Odor _____

Sheen/Free Product _____

Physical appearance at sampling

Color _____

Odor _____

Sheen/Free Product _____

Field Test Results:

Dissolved ferrous iron: _____

Dissolved total iron: _____

Dissolved total manganese: _____

Analytical Parameters:

Sample	Container Type	# Collected	Field Filtered	Preservative	Container pH

APPENDIX H

K-TEST LOG

	K-TEST LOG	WELL ID

Site:	**Project #**	**Personnel:**	**Page 1 of**
Client:			
Project Loc.:	**File #**		**Start date**
Test Objective:		**Weather:**	**End date**

Well information		**K-Test Information**		**Minitroll/Transducer Info**	
DTW (static head)		Screen:		Type	
Well depth		Interval (ft)		SN #	
LWC		Length (ft)		Model #	
Measurements:		Fully submerged		PSI	
TOC Casing Other		Partially submerged*			
Slug type:		Lithology:		Pocket PC: SN #	
Solid PVC		Test Method:		Laptop: SN #	
Length (ft)		Falling head			
		Rising head		Depth reading (ft)	
Water		Head change during test (ft):		Depth minitroll (ft)	
Length (ft)		Falling head		Time start	
		Rising head		Time end	
Well condition:		Recovery %: (95% optimal)		Time interval (sec/min)	
Obstructions		Falling test			
Siltation		Rising test		* If partially submerged only rising test recommended.	

Manually conducted K-Test:

Falling Test				Rising Test			
Date/Time	ET	Depth (ft)	Drawdown	Date/Time	ET	Depth (ft)	Drawdown

over →

Manually conducted K-Test:

Falling Test				Rising Test			
Date/Time	ET	Depth (ft)	Drawdown	Date/Time	ET	Depth (ft)	Drawdown

APPENDIX I

TEST PIT LOG

TEST PIT LOG

SITE: _____ **JOB #:** _____

OBG FIELD SUPERVISOR: _____ **TEST PIT:** _____

WEATHER: _____ **DATE:** _____

DEPTH (FT)	HNU (ppm)	DESCRIPTION
0		
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		

NOTES:

TEST PIT PLOT PLAN:

APPENDIX J

SOIL VAPOR (CANISTER) SAMPLE COLLECTION FIELD FORM

Soil Vapor (Canister) Sample Collection Field Form

Project # _____ Consultant _____

Project Name _____ Collector _____

Sample ID _____

Start Date/Time _____ Vacuum gauge "zero" ("Hg) _____

End Date/Time _____ Start Pressure ("Hg) _____

Canister ID _____ End Pressure ("Hg) _____

Flow controller ID _____ End pressure > "zero"? _____

Associated ambient air sample ID _____ Sampling duration (intended) _____

Depth of sample point below grade _____

Tubing type used _____ Length of tubing _____ cm Tubing volume _____ cc

Volume purged _____ cc @ _____ min 1 to 3 volumes purged @ < 200cc/min? _____

Chamber tracer gas conc. _____ Tracer gas conc. during purging _____

Weather Conditions during Probe Installation:

Air temperature (^{o}F) _____ Rainfall _____ Wind direction _____

Barometric pressure _____ Wind speed (mph) _____

Substantial changes in weather conditions during sampling or over the past 24 to 48 hrs:

Weather Conditions at Start of Sampling:

Air temperature (^{o}F) _____ Rainfall _____ Wind direction _____

Barometric pressure _____ Wind speed (mph) _____

Substantial changes in weather conditions during sampling or over the past 24 to 48 hrs:

Site Plan showing sample location, buildings, landmarks, potential soil vapor and outdoor air sources, preferential pathways

Comments: _____

APPENDIX K

INDOOR AIR QUALITY QUESTIONNAIRE AND BUILDING INVENTORY

NEW YORK STATE DEPARTMENT OF HEALTH
INDOOR AIR QUALITY QUESTIONNAIRE AND BUILDING INVENTORY
CENTER FOR ENVIRONMENTAL HEALTH

This form must be completed for each residence involved in indoor air testing.

Preparer's Name _____ Date/Time Prepared _____

Preparer's Affiliation _____ Phone No._____

Purpose of Investigation_____

1. OCCUPANT:

Interviewed: Y / N

Last Name: _____ First Name: _____

Address: _____

County: _____

Home Phone: _____ Office Phone: _____

Number of Occupants/persons at this location _____ Age of Occupants _____

2. OWNER OR LANDLORD: (Check if same as occupant ___)

Interviewed: Y / N

Last Name: _____First Name: _____

Address: _____

County: _____

Home Phone: _____ Office Phone: _____

3. BUILDING CHARACTERISTICS

Type of Building: (Circle appropriate response)

Residential	School	Commercial/Multi-use
Industrial	Church	Other: _____

If the property is residential, type? (Circle appropriate response)

Ranch	2-Family	3-Family
Raised Ranch	Split Level	Colonial
Cape Cod	Contemporary	Mobile Home
Duplex	Apartment House	Townhouses/Condos
Modular	Log Home	Other:_____

If multiple units, how many? _____

If the property is commercial, type?

Business Type(s) _____

Does it include residences (i.e., multi-use)? Y / N If yes, how many? _____

Other characteristics:

Number of floors_____ Building age_____

Is the building insulated? Y / N How air tight? Tight / Average / Not Tight

4. AIRFLOW

Use air current tubes or tracer smoke to evaluate airflow patterns and qualitatively describe:

Airflow between floors

_____

_____

_____

Airflow near source

_____

_____

_____

Outdoor air infiltration

_____

_____

_____

Infiltration into air ducts

_____

_____

_____

5. BASEMENT AND CONSTRUCTION CHARACTERISTICS (Circle all that apply)

a. Above grade construction:	wood frame	concrete	stone	brick
b. Basement type:	full	crawlspace	slab	other _____
c. Basement floor:	concrete	dirt	stone	other _____
d. Basement floor:	uncovered	covered	covered with _____	
e. Concrete floor:	unsealed	sealed	sealed with _____	
f. Foundation walls:	poured	block	stone	other _____
g. Foundation walls:	unsealed	sealed	sealed with _____	
h. The basement is:	wet	damp	dry	moldy
i. The basement is:	finished	unfinished	partially finished	
j. Sump present?	Y / N			
k. Water in sump?	Y / N / not applicable			

Basement/Lowest level depth below grade: _____(feet)

Identify potential soil vapor entry points and approximate size (e.g., cracks, utility ports, drains)

_____

_____

6. HEATING, VENTING and AIR CONDITIONING (Circle all that apply)

Type of heating system(s) used in this building: (circle all that apply – note primary)

Hot air circulation	Heat pump	Hot water baseboard	
Space Heaters	Stream radiation	Radiant floor	
Electric baseboard	Wood stove	Outdoor wood boiler	Other _____

The primary type of fuel used is:

Natural Gas	Fuel Oil	Kerosene
Electric	Propane	Solar
Wood	Coal	

Domestic hot water tank fueled by: _____

Boiler/furnace located in:	Basement	Outdoors	Main Floor	Other_____
Air conditioning:	Central Air	Window units	Open Windows	None

Are there air distribution ducts present? Y / N

Describe the supply and cold air return ductwork, and its condition where visible, including whether there is a cold air return and the tightness of duct joints. Indicate the locations on the floor plan diagram.

_____

_____

_____

_____

7. OCCUPANCY

Is basement/lowest level occupied? Full-time Occasionally Seldom Almost Never

Level	**General Use of Each Floor (e.g., familyroom, bedroom, laundry, workshop, storage)**
Basement	_____
1st Floor	_____
2nd Floor	_____
3rd Floor	_____
4th Floor	_____

8. FACTORS THAT MAY INFLUENCE INDOOR AIR QUALITY

a. Is there an attached garage? Y / N

b. Does the garage have a separate heating unit? Y / N / NA

c. Are petroleum-powered machines or vehicles stored in the garage (e.g., lawnmower, atv, car) Y / N / NA Please specify_____

d. Has the building ever had a fire? Y / N When?_____

e. Is a kerosene or unvented gas space heater present? Y / N Where? _____

f. Is there a workshop or hobby/craft area? Y / N Where & Type? _____

g. Is there smoking in the building? Y / N How frequently? _____

h. Have cleaning products been used recently? Y / N When & Type? _____

i. Have cosmetic products been used recently? Y / N When & Type? _____

j. Has painting/staining been done in the last 6 months? Y / N Where & When? _____

k. Is there new carpet, drapes or other textiles? Y / N Where & When? _____

l. Have air fresheners been used recently? Y / N When & Type? _____

m. Is there a kitchen exhaust fan? Y / N If yes, where vented?_____

n. Is there a bathroom exhaust fan? Y / N If yes, where vented?_____

o. Is there a clothes dryer? Y / N If yes, is it vented outside? Y / N

p. Has there been a pesticide application? Y / N When & Type?_____

Are there odors in the building? Y / N
If yes, please describe: _____

Do any of the building occupants use solvents at work? Y / N
(e.g., chemical manufacturing or laboratory, auto mechanic or auto body shop, painting, fuel oil delivery, boiler mechanic, pesticide application, cosmetologist

If yes, what types of solvents are used? _____

If yes, are their clothes washed at work? Y / N

Do any of the building occupants regularly use or work at a dry-cleaning service? (Circle appropriate response)

Yes, use dry-cleaning regularly (weekly) No
Yes, use dry-cleaning infrequently (monthly or less) Unknown
Yes, work at a dry-cleaning service

Is there a radon mitigation system for the building/structure? Y / N Date of Installation: _____
Is the system active or passive? Active/Passive

9. WATER AND SEWAGE

Water Supply:	Public Water	Drilled Well	Driven Well	Dug Well	Other: _____
Sewage Disposal:	Public Sewer	Septic Tank	Leach Field	Dry Well	Other: _____

10. RELOCATION INFORMATION (for oil spill residential emergency)

a. Provide reasons why relocation is recommended: _____

b. Residents choose to: remain in home relocate to friends/family relocate to hotel/motel

c. Responsibility for costs associated with reimbursement explained? Y / N

d. Relocation package provided and explained to residents? Y / N

11. FLOOR PLANS

Draw a plan view sketch of the basement and first floor of the building. Indicate air sampling locations, possible indoor air pollution sources and PID meter readings. If the building does not have a basement, please note.

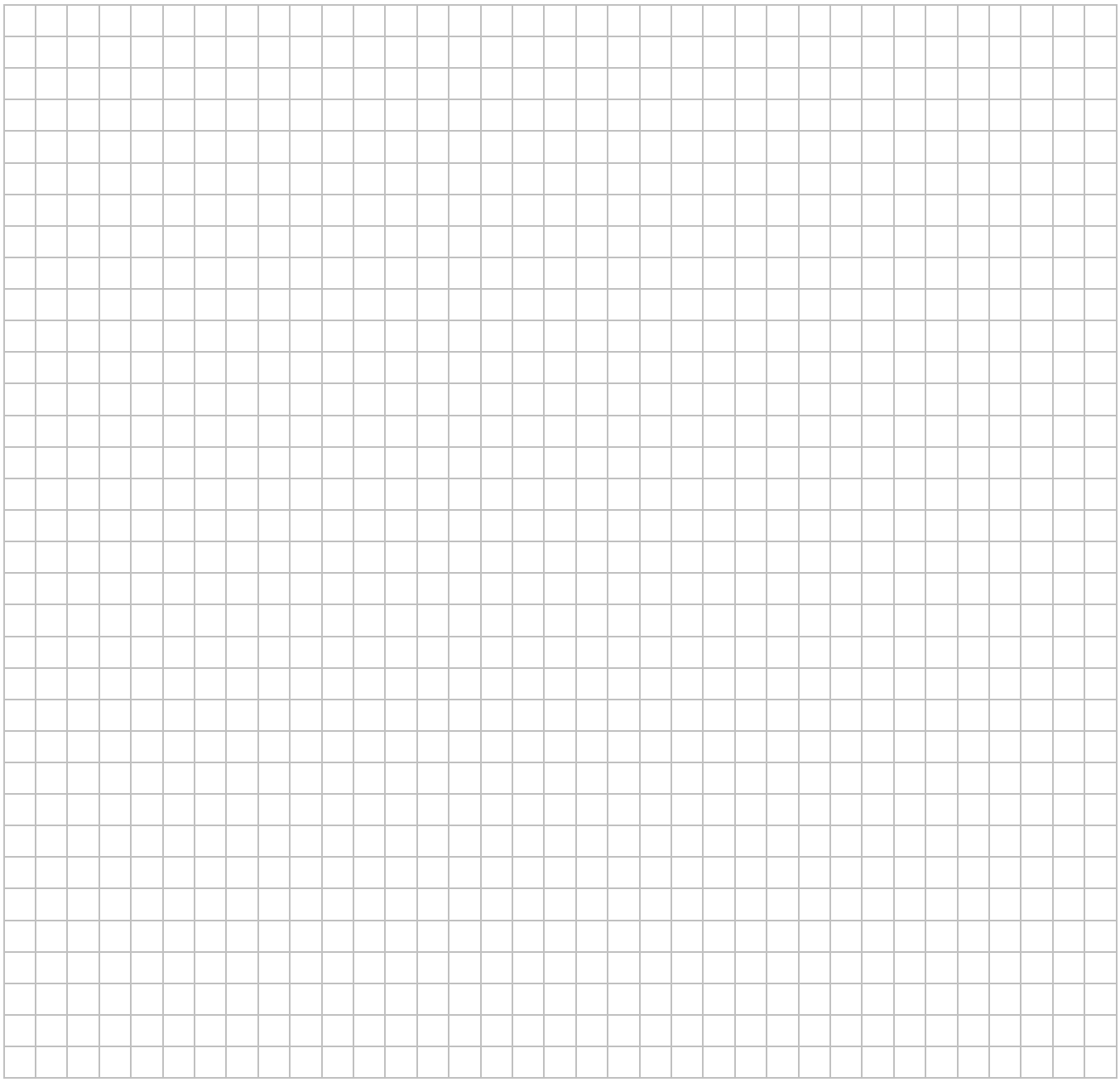
Basement:

First Floor:

12. OUTDOOR PLOT

Draw a sketch of the area surrounding the building being sampled. If applicable, provide information on spill locations, potential air contamination sources (industries, gas stations, repair shops, landfills, etc.), outdoor air sampling location(s) and PID meter readings.

Also indicate compass direction, wind direction and speed during sampling, the locations of the well and septic system, if applicable, and a qualifying statement to help locate the site on a topographic map.



13. PRODUCT INVENTORY FORM

Make & Model of field instrument used: _____

List specific products found in the residence that have the potential to affect indoor air quality.

Location	Product Description	Size (units)	Condition*	Chemical Ingredients	Field Instrument Reading (units)	Photo** Y / N

* Describe the condition of the product containers as **Unopened (UO), Used (U),** or **Deteriorated (D)**
** Photographs of the **front and back** of product containers can replace the handwritten list of chemical ingredients. However, the photographs must be of good quality and ingredient labels must be legible.

APPENDIX L

SUB-SLAB VAPOR (CANISTER) SAMPLE COLLECTION FIELD FORM

Sub-slab Vapor (Canister) Sample Collection Field Form

Project # _____ Consultant _____

Project Name _____ Collector _____

Sample ID _____

Vacuum gauge "zero" ("Hg) _____

Start Date/Time _____ Start Pressure ("Hg) _____

End Date/Time _____ End Pressure ("Hg) _____

Canister ID _____ End pressure > "zero"? _____

Flow controller ID _____ Sampling duration (intended) _____

Associated indoor air sample ID _____ Associated ambient air sample ID _____

Tubing type used _____ Length of tubing _____ cm Tubing volume _____ cc

Volume purged _____ cc @ _____ min 1 to 3 volumes purged @ < 200cc/min? _____

Weather Conditions at Start of Sampling:

Air temperature (^{o}F) _____ Rainfall _____ Wind direction _____

Barometric pressure _____ Wind speed (mph) _____

Substantial changes in weather conditions during sampling or over the past 24 to 48 hrs:

_____

_____

Indoor air temp (^{o}F) _____ Indoor relative humidity (%) _____

Building Survey and Chemical Inventory Form Completed? _____ Photograph IDs _____

Floor Plan showing sample location, HVAC equipment, indoor air sources, preferential pathways

Comments: _____

_____

_____

_____

_____

APPENDIX M

INDOOR AIR (CANISTER) SAMPLE COLLECTION FIELD FORM

Indoor Air (Canister) Sample Collection Field Form

Project # _____ Consultant _____

Project Name _____ Collector _____

Sample ID _____

Vacuum gauge "zero" ("Hg) _____

Start Date/Time _____ Start Pressure ("Hg) _____

End Date/Time _____ End Pressure ("Hg) _____

Canister ID _____ End pressure > "zero"? _____

Flow controller ID _____ Sampling duration (intended) _____

Associated ambient air sample ID _____ Associated sub-slab vapor sample ID _____

Tubing type used _____ Length of tubing _____ cm Tubing volume _____ cc

Volume purged _____ cc @ _____ min 1 to 3 volumes purged @ < 200cc/min? _____

Weather Conditions at Start of Sampling:

Air temperature (^{o}F) _____ Rainfall _____ Wind direction _____

Barometric pressure _____ Relative humidity _____ Wind speed (mph) _____

Substantial changes in weather conditions during sampling or over the past 24 to 48 hrs:

Indoor air temp (^{o}F) _____ Indoor relative humidity (%) _____

Building Survey and Chemical Inventory Form Completed? _____ Photograph IDs _____

Floor Plan showing sample location, HVAC equipment, indoor air sources, preferential pathways

Comments: _____

APPENDIX N

AMBIENT AIR (CANISTER) SAMPLE COLLECTION FIELD FORM

Ambient Air (Canister) Sample Collection Field Form

Project # _____ Consultant _____

Project Name _____ Collector _____

Sample ID _____

Vacuum gauge "zero" ("Hg) _____

Start Date/Time _____ Start Pressure ("Hg) _____

End Date/Time _____ End Pressure ("Hg) _____

Canister ID _____ End pressure > "zero"? _____

Flow controller ID _____ Sampling duration (intended) _____

Tubing type used _____ Length of tubing _____ cm Tubing volume _____ cc

Volume purged _____ cc @ _____ min 1 to 3 volumes purged @ < 200cc/min? _____

Weather Conditions at Start of Sampling:

Air temperature (^{o}F) _____ Rainfall _____ Wind direction _____

Barometric pressure _____ Relative humidity _____ Wind speed (mph) _____

Substantial changes in weather conditions during sampling or over the past 24 to 48 hrs:

Site Plan showing sample location, building(s) being sampled, building HVAC inlet, outdoor air sources, wind direction

Comments: _____

Generic Quality Assurance Project Plan (QAPP)

Prepared For:

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

625 Broadway, 12th floor
Albany, NY 12233-7012

Prepared By:

PARSONS

301 Plainfield Road, Suite 350
Syracuse, NY 13212

O'BRIEN & GERE

333 W. Washington Street
Syracuse, NY 13202

REVIEWED AND APPROVED BY:

Program Manager: _____ _____

Date

May 2011

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LIST OF FIGURES

LIST OF ATTACHMENTS

LIST OF ACRONYMS

ASTM	American Society for Testing and Materials
BFB	4-Bromofluorobenzene
ºC	Degrees Celsius
CAR	Corrective Action Request
CCV	Continuing Calibration Verification
CERCLA	Comprehensive Emergency Response, Compensation, Liability Act
CFR	Code of Federal Regulations
CLP	Contract Laboratory Program
cm/s	centimeter per second
COC	Chain-of-Custody
CPOI	Chemical Parameter of Interest
CVAA	Cold Vapor Atomic Absorption
cy	cubic yards
DFTPP	decafluorotriphenylphosphine
DOT	Department of Transportation
DQO	Data Quality Objective
DUO	Data Use Objective
DUSR	Data Usability Summary Report
EDD	Electronic Data Deliverable
FS	Feasibility Study
GC	Gas Chromatography
GC/ECD	Gas Chromatography/Electron Capture Detection

LIST OF ACRONYMS (CONTINUED)

GC/MS	Gas Chromatography/Mass Spectroscopy
HSC	Health and Safety Coordinator
ICP	Inductively Coupled Plasma
ICV	Initial Calibration Verification
IDL	Instrument Detection Limit
ICP/AES	Inductively Coupled Plasma/Atomic Emission Spectroscopy
LCS	Laboratory Control Sample
LIMS	Laboratory Information Management System
LNAPL	Light Non-aqueous Phase Liquid
LPM	Laboratory Project Manager
MD	Matrix Duplicate
mg/kg	milligram per kilogram
mL	milliliter
MS	Matrix Spike
MSB	Matrix Spike Blank
MS/MD	Matrix Spike/Matrix Duplicate
MS/MSD	Matrix Spike/Matrix Spike Duplicate
MSD	Matrix Spike Duplicate
NCM	Nonconformance Memo
ng	nanograms
NIOSH	National Institute of Safety and Health
NIST	National Institute of Standards and Technology
NYSDEC	New York State Department of Environmental Conservation
OM	Operations Manager
OSHA	Occupational Safety and Health Administration
PARCCS	Precision, Accuracy, Representativeness, Completeness, Comparability, and Sensitivity
PCB	Polychlorinated Biphenyl

LIST OF ACRONYMS
(CONTINUED)

PE	Performance Evaluation
PID	Photoionization Detector
PRRL	Project Required Quantitation Limit
PT	Performance Testing
QA	Quality Assurance
QA/QC	Quality Assurance/Quality Control
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
QC	Quality Control
QL	Quantitation Limit
RL	Reporting Limit
ROD	Record of Decision
RPD	Relative Percent Difference
SAP	Sampling and Analysis Plan
SDG	Sample Delivery Group
SMU	Sediment Management Unit
SOP	Standard Operating Procedure
SVOC	Semivolatile Organic Compound
TAL	Target Analyte List
TCL	Target Compound List
ug	Micrograms
USEPA	Unites States Environmental Protection Agency
VOC	Volatile Organic Compound

SECTION 1

PROJECT DESCRIPTION

1.1 INTRODUCTION

This generic Quality Assurance Project Plan (QAPP) has been prepared to support activities and specifies the quality assurance/quality control (QA/QC) procedures for field and laboratory sampling and measurements for work assignments awarded by the New York State Department of Environmental Conservation (NYSDEC) under Standby Engineering Contract #D007623. The specific objectives of the QAPP are:

- Foster data quality that is sufficient to meet the investigation objectives and to support the decision-making process
- Provide a standard for control and review of measurement data to confirm that the data are scientifically sound, representative, comparable, defensible, and of known quality.

This QAPP has been prepared in accordance with USEPA guidance (USEPA, 2000a, 2002b). Project or site specific work plans for each work assignment awarded will have additional scope and quality requirements that may not be addressed in this QAPP. Addendums to this QAPP may be required for each work assignment.

Project scope and descriptions of the work assignment are provided in the Work Assignment Scoping Documents and Field Activities Plan (FAP).

SECTION 2

PROJECT ORGANIZATION

2.1 PROJECT AND TEAM ORGANIZATION

The project organization and the function and responsibility of each group affected by the QAPP are presented in the Work Assignment Scoping Documents for each assignment. The project organization is designed to promote the exchange of information and for efficient project operation. Key contact information is also summarized in the Work Assignment Scoping Documents.

2.1.1 Analytical Services

The analytical laboratory (or laboratories) will analyze environmental samples collected for the specified project. Laboratory operations will be conducted under the supervision of a general manager or laboratory director and a quality assurance manager. A project manager and alternate will be assigned to each project. The project manager will be the primary point of contact and will be responsible for coordination and quality of all laboratory activities associated with the project. The laboratory's project manager will manage project sample receipt, analysis scheduling, and data reporting. In case of temporary absence, the direct supervisor will assume the responsibilities of the absent employee or delegate the responsibility to qualified personnel. Sample Management Staff is responsible for receiving, logging, and maintaining internal custody of samples during the sample's residence in the laboratory. In addition, the laboratory will ensure that project analytical requirements are met; monitor project analytical compliance and immediately notify Parsons if conflict or discrepancies arise; initiate and implement appropriate corrective actions; ensure adequate quality review of deliverables prior to release; and participate in coordination meetings.

2.2 SPECIAL TRAINING/CERTIFICATION

Management and field personnel must review the requirements of this QAPP to make certain that persons assigned to specific tasks have appropriate credentials and experience. The Field Team Leaders will check that all onsite personnel have read and understood the QAPP.

Field personnel will be required to adhere to the generic Health and Safety Plan (HASP) and FAP. They must also follow applicable task-specific health and safety plans that project subcontractors develop before they begin investigation activities.

Laboratories will have trained and experienced staff capable of performing the analyses specified in this QAPP. Laboratories will have New York State Department of Health (NYSDOH) Environmental Laboratory Accreditation Program (ELAP) certification for all analyses pertaining to solid and hazardous waste categories. Laboratories performing Level IV analyses (as described in QAPP Section 3.2.1) should have Contract Laboratory Program (CLP) category certification. Additionally, the laboratories must be able to demonstrate that they have analyzed performance-evaluation or proficiency-testing samples within 12 months of beginning the analyses.

All personnel independent of the laboratory generating the data who are performing data validation and verification must have experience in data validation, quality assurance oversight, and auditing. The data validator must have a Bachelors degree in chemistry or natural sciences with a minimum of 20 credit hours in chemistry; one year experience in the implementation and application of analytical laboratory methodologies; and one year experience evaluating data packages of all matrices (e.g., soil, water, air, tissue) for compliance and usability with respect to the NYSDEC Analytical Services Protocol (ASP) and the USEPA National Functional Guidelines with regional modifications.

SECTION 3

DATA QUALITY OBJECTIVES AND DATA QUALITY CRITERIA

3.1 INTRODUCTION

A systematic planning process will develop site-specific data quality objective (DQOs). These DQOs will clarify study objectives, define the appropriate type of data, and specify tolerable levels of potential errors. These parameters, in turn, will be the basis for establishing the quality and quantity of data needed to support the utility of the data. This section was prepared in accordance with USEPA Guidance for the Data Quality Objectives Process (USEPA, August 2000). Project DQOs will be developed using the "seven-step" DQO process, consisting of the following steps:

Step 1: State the problem
Step 2: Identify the decision
Step 3: Identify inputs to the decision
Step 4: Define the study boundaries
Step 5: Define the decision rule
Step 6: Specify tolerable limits of decision error
Step 7: Optimize the design

Data quality objectives specify the underlying reason for collecting the data and the data type, quality, quantity, and uses needed to make decision, and they provide the basis for designing data collection activities. DQOs and quality assurance objectives are related data quality planning and evaluation tools for all sampling and analysis tools.

The purpose of this QAPP is to provide a standard for control and review of measurement data to ensure they are scientifically sound, representative, comparable, defensible, and of known quality. The data will be used to evaluate the physical and chemical attributes of samples collected. The project objective for analytical testing is to characterize the physical characteristics and chemical constituents and to provide data to support the decision-making process.

The data produced during sampling activities will be compared with the defined QA objectives and criteria for precision, accuracy, representativeness, completeness, comparability, and sensitivity (PARCCS) to see that the data reported are representative of actual conditions at the site.

This data assessment activity is an on-going coordinated process with data production and is intended to assure that data produced during the project are acceptable for use in subsequent evaluations. Both statistical and qualitative evaluations will be used to assess the quality of the data. The primary evaluation of the data will be based upon the field quality control samples described in Section 8.1.1 and the laboratory quality control samples described in Section 8.1.2. The "blank" samples (laboratory QC blank samples and field QC blank samples) will be used to

evaluate whether or not the laboratory and/or field sample handling represent a possible source of sample contamination. Laboratory duplicate sample results will be used to evaluate analytical precision. Field duplicate sample results will be used to evaluate the overall precision of the sampling and analysis process, as well as sample representativeness and site heterogeneity. Laboratory control samples will be used to evaluate the accuracy of analytical results, as will other analysis-specific criteria, such as surrogate compound recoveries for VOCs, SVOCs, pesticides, PCBs and herbicides. Matrix spike/matrix spike duplicate (MS/MSD) analysis of project samples will be used to evaluate potential sample matrix effects on the analytical results (both of the sample utilized for MS/MSD and of other samples collected from the site). For all sample results, the impact of sample-specific, analysis-specific, and site-specific factors will be evaluated and an assessment will be made as to their impact, if any, on the data. Duplicate sample (field and laboratory QC samples) results will be used to evaluate data precision.

3.1.1 Data Use Objectives

Data use objectives define why analyses are being conducted and how ultimately the data will be used to meet the overall project objectives. For the work assignment activities, these project objectives are stated in the Work Assignment Scoping Documents.

3.2 DATA QUALITY OBJECTIVES (PARCCS PARAMETERS)

3.2.1 Introduction

DQOs are based on the premise that different data uses require different levels of data quality. The term *data quality* refers to a degree of uncertainty with respect to PARCCS data quality indicators. Specific objectives are established to develop sampling protocols and identify applicable documentation, sample handling procedures, and measurement system procedures. These DQOs are established by onsite conditions, objectives of the project, and knowledge of available measurement systems. Overall work assignment DQOs are presented and discussed in detail in this QAPP. A wide range of data quality is achieved through the use of various analytical methods. The following data quality levels are widely accepted as descriptions of the different kinds of data that can be generated for various purposes:

- **Level I, Field screening or analysis using portable instruments (e.g., photoionization detector [PID]):** Results are often not compound-specific but results are available in real time. Depending on the analysis being performed and the instrumentation used, the results may be considered qualitative, semi-quantitative, or quantitative.
- **Level II, Field analysis using more sophisticated portable analytical instruments (e.g., on-site mobile laboratory):** There is a wide range in the quality of data that can be generated depending on the use of suitable calibration standards, reference materials, and sample preparation equipment. Results are available in real-time or typically within hours of sample collection.
- **Level III, All analyses performed in an off-site analytical laboratory using methods other than USEPA-approved analytical methods**: These data generally do not include the level of formal documentation required under Level IV and are not

subject to formal data validation. These data are typically used for engineering studies (e.g., treatability testing), site investigations and remedial design.

- **Level IV, Data generated using USEPA methods and enhanced by a rigorous QA program, supporting documentation, and data validation procedures:** These data are typically used for engineering studies (e.g., treatability testing), risk assessment, site investigations, and remedial design, and may be suitable for litigation/enforcement activities. Results are both qualitative and quantitative.

3.2.2 PARCCS Parameters (Data Quality Indicators)

3.2.2.1 Precision

Precision is an expression of the reproducibility of measurements of the same parameter under a given set of conditions. Specifically, it is a quantitative measurement of the variability of a group of measurements compared to their average value (USEPA, 1987). Precision is usually stated in terms of standard deviation, but other estimates such as the coefficient of variation (relative standard deviation), absolute difference (D), range (maximum value minus minimum value), relative range, and relative percent difference (RPD) are common.

The objectives for precision for each chemical are based on the capabilities of the approved EPA analytical method with respect to laboratory performance. For this project, field-sampling precision will be determined by analyzing coded (blind) duplicate samples for the same parameters, and then, during data validation, calculating the %RPD for duplicate sample results. The laboratory will determine analytical precision by calculating the %RPD or %D, as applicable to the analytical method being used, e.g., pH will be evaluated using %D.

The laboratory will determine analytical precision by calculating the RPD for the results of the analysis of the laboratory duplicates and matrix spike duplicates. The formula for calculating %RPD is as follows:

$$\%RPD = \frac{|V1 - V2|}{(V1 + V2)/2} \times 100$$

where:

RPD	=	Relative percent difference
V1, V2	=	Values to be compared
|V1 - V2|	=	Absolute value of the difference between the two values
(V1 + V2)/2	=	Average of the two values

For data evaluation purposes, in instances where both sample concentrations are less than five times (<5x) the RL, duplicate precision will be evaluated using the calculated %D result. In this instance, the applicable precision criterion will be two times the RL (2xRL). If a value is not detected, the %RPD criterion will be considered to be not applicable and the %RPD will not be calculated (i.e. precision will not be quantitatively determined).

3.2.2.2 Accuracy

Accuracy is a measure of the degree of agreement of a measured value with the true or expected value of the quantity of concern (Taylor, 1987) or the difference between a measured value and the true or accepted reference value. The accuracy of an analytical procedure is best determined by the analysis of a sample containing a known quantity of material and is expressed as the percent of the known quantity that is recovered or measured. The recovery of a given analyte depends on the sample matrix, method of analysis, and the specific compound or element being determined. The concentration of the analyte relative to the detection limit of the analytical method is also a major factor in determining the accuracy of the measurement. Concentrations of analytes that are less than the quantitation limits are less accurate because they are more affected by such factors as instrument "noise." Higher concentrations will not be as affected by instrument noise or other variables and, thus, will be more accurate.

The objectives for accuracy for each chemical are based on the capabilities of the approved USEPA analytical method with respect to laboratory performance. Analytical accuracy is typically assessed by examining the percent recoveries of surrogate compounds that are added to each sample (organic analyses only), the percent recoveries of matrix spike compounds added to selected samples, and the percent recoveries of spike compounds added to laboratory control samples (LCS), or matrix spike blanks (MSB). An LCS (or MSB) will be analyzed to provide additional information on analytical accuracy. Additionally, initial and continuing calibrations must be performed and accomplished within the established method control limits to define the instrument accuracy before analytical accuracy can be determined for any sample set.

Accuracy is normally measured as the percent recovery (%R) of a known amount of analyte, called a *spike*, added to a sample (matrix spike or laboratory control). The accuracy on a per sample basis will be measured using surrogates for the organics analyses. Positive detects from the PCB analysis will be confirmed using second column confirmation. The laboratory will report the lower of the two values with respect to the dual GC column analysis performed. When the percent difference (%D) between the results for the two columns exceeds 25%, the laboratory will qualify the reported result with the *P* qualifier. The %R is calculated as follows:

Matrix Spike Recovery:

$$\% \text{ Recovery} = \frac{SSR - SR}{SA} \times 100$$

where:

%R	=	Percent recovery
SSR	=	Spike sample result: concentration of analyte obtained by analyzing the sample with the spike added

SR	=	Sample result: the background value; *i.e.,* the concentration of the analyte obtained by analyzing the sample
SA	=	Spiked analyte: concentration of the analyte spike added to the sample

Surrogate Recovery: % Recovery = $\frac{\text{Concentration (or amount) found}}{\text{Concentration (or amount) spiked}}$ x 100

LCS (or MSB) Recovery: % Recovery = $\frac{\text{Concentration (or amount) found}}{\text{Concentration (or amount) spiked}}$ x 100

3.2.2.3 Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point or an environmental condition. Representativeness is a qualitative parameter and is most concerned with the proper design of the sampling program (USEPA, 1987). Samples must be representative of the environmental media being sampled. An important factor in the selection of sample locations and sampling procedures will be obtaining representative samples.

Field and laboratory procedures will be performed in such a manner as to ensure, to the degree technically possible, that the data derived represents the in-place quality of the material sampled. Care will be exercised to see that chemical compounds are not introduced to the sample from sample containers, handling, and analysis. Field blanks, trip blanks, and laboratory method/prep blanks will be analyzed to monitor for potential sample contamination from field and laboratory procedures.

The assessment of representativeness also must consider the degree of heterogeneity in the material from which the samples are collected. Sampling heterogeneity will be evaluated during data validation through the analysis of coded (blind) field duplicate samples. The analytical laboratory will also follow acceptable procedures to assure the samples are adequately homogenized prior to taking aliquots for analysis such that the reported results are representative of the sample received. Chain-of-custody procedures will be followed to document the possession of sample containers from the time of container preparation through sample collection and receipt back at the laboratory. Field QC samples will be collected and analyzed to provide information to evaluate sample representativeness. Details of field QC sample collection (rinse blanks, trip blanks, temperature blanks, field duplicates) and chain-of-custody procedures are presented in Section 4.2 and Section 8.1.1.

3.2.2.4 Completeness

Completeness is defined as the percentage of measurements that meet the project's data quality objectives (USEPA, 1987). Completeness is calculated for each method (or analyte) and sample matrix for an assigned group of samples. Completeness for a data set represents the results usable for data interpretation and decision making. The completeness objective for the

analytical and field data is 90%. Completeness is defined as follows for all sample measurements:

$$\%C = \frac{V}{T} \times 100$$

where:

%C = Percent completeness

V = Number of measurements judged valid (not rejected during data validation)

T = Total number of measurements

Completeness, which is expressed as a percentage, is calculated by subtracting the number of rejected and unreported results from the total planned results and dividing by the total number of results. Results rejected because of out-of-control analytical conditions, severe matrix effects, broken or spilled samples, or samples that could not be analyzed for any other reason, negatively affect influence completeness and are subtracted from the total number of results to calculate completeness.

3.2.2.5 Comparability

Comparability expresses the degree of confidence with which one data set can be compared to another (USEPA, 1987). The comparability of all data collected for this project will be managed by:

- Using identified standard methods (including laboratory standard operating procedures) for both sampling and analysis phases of this project
- Requiring traceability of all analytical standards and/or source materials to the USEPA or National Institute of Standards and Technology (NIST)
- Requiring that calibrations be verified with an independently prepared standard from a source other than that used for calibration (if applicable)
- Using standard reporting units and reporting formats including the reporting of QC data
- Performing data validation on the analytical results, including the use of data qualifiers in all cases where appropriate
- Evaluating the sample collection information and analytical QC sample results
- Requiring that the significance of all validation qualifiers be assessed any time an analytical result is used for any purpose.

By taking these steps during the investigation, future users of either the data or the conclusions drawn from them will be able to judge the comparability of these data and conclusions.

3.2.2.6 Sensitivity and Quantitation Limits

When selecting an analytical method during the DQO process, the achievable detection limit (MDL) and method reporting limit (RL) must be evaluated to verify that the method will meet the project quantitation limits necessary to support project decision making requirements. This process ensures that the analytical method sensitivity has been considered and that the methods used can produce data that satisfy users' needs while making the most effective use of resources. The concentration of any one target compound that can be detected and/or quantified is a measure of sensitivity for that compound. Sensitivity is instrument-, compound-, method-, and matrix-specific and achieving the required project quantitation limit (RL) and/or method detection limit (MDL) objectives depends on instrument sensitivity and potential matrix effects. With regard to instrument sensitivity, it is important to monitor the instrument performance to ensure consistent instrument performance at the low end of the calibration range. Instrument sensitivity will be monitored through the analysis of method/prep blanks, calibration check samples, and low standard evaluations.

Laboratories generally establish limits that are reported with the analytical results; these results may be called reporting limits, detection limits, quantitation limits, or other terms. These laboratory-specific limits, apply undiluted analyses and must be less than or equal to the project RLs. The RL, also known as the practical quantitation limit (PQL), represents the concentration of an analyte that can be routinely measured in the sampled matrix within stated limits and with confidence in both identification and quantitation. Throughout various documents RL and PQL may be interchanged, but they effectively have the same meaning. The RLs are established based on specific knowledge about the analyte, sample matrix, project specific requirements, and regulatory requirements. The RL is typically established by the laboratory at the level of the lowest calibration standard and is generally in the range of two to ten times the MDL.

The method detection limit (MDL) is defined as "the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero" (40 CFR 136 Appendix B). The MDL is the lowest concentration at which a specific analyte in a matrix can be measured and reported with 99% confidence that the analyte concentration is greater than zero. MDLs are experimentally determined and verified for each target analyte of the methods in the sampling program. The laboratory will determine MDLs for each analyte and matrix type prior to analysis of project samples. In addition, when multiple instruments are employed for the analysis of the same method, each individual instrument will maintain a current MDL study. MDLs are based on the results of seven matrix spikes at the estimated MDL, and are statistically calculated in accordance with the Title 40, Code of Federal Regulations Part 136 (40 CFR 136) Appendix B. The standard deviation of the seven replicates is determined and multiplied by 3.14 (i.e., the 99% confidence interval from the one-sided student t-test). If risk-based project objectives are developed, then where practicable, MDLs must be lower than the risk-based criteria determined for the project.

The MDLs to be used are intended to allow that both nondetected and detected target compound results will be usable to the fullest extent possible for the project. An MDL check sample an (interference-free MS with all method target compounds) must be analyzed following the MDL study to determine if reasonable MDL concentrations have been achieved. The MDL

check sample should be at a concentration in the range of two to four times the MDL. If any target compound is not recovered, the MDL study must be repeated. In this case, the repeated MDL should be performed with a higher concentration, based on the analyst's judgment, of the target compounds that failed in the MDL check sample. MDLs must be determined annually at a minimum, and verified by analyzing an MDL check sample on each instrument used for the applicable method.

Laboratory RLs and MDLs for all analyses will meet at a minimum the standards criteria specified in the NYSDEC 6 NYCRR Part 375 Soil Cleanup Objectives for Unrestricted Use and/or the NYSDEC Division of Water Technical and Operational Guidance Series (TOGS) "Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations."

All analytical results will be reported to the MDL. Analytical results below the MDL will be flagged with a *U* at the RL for organics and MDL for metals to indicate the data are non-detect. However, the laboratory will flag analytes detected at a level less than the RL but greater than the MDL (or the laboratory's determined minimum reportable concentration) with a *J* to denote an estimated concentration.

When results are corrected for dry weight, the reporting limits are then elevated accordingly. To compensate for the low solids, modifications are made either to increase the initial volume extracted/digested or to reduce the final volume of extract/digestate.

For samples that do not meet the project-specified RLs or MDLs, (taking into consideration elevated detection limits due to percent solids or percent moisture and aliquots used for the designated analysis), the laboratory must make available compelling documentation (e.g., screening data) and a justifiable explanation for its inability to meet the specified limits using the project protocols. It must also provide an appropriate, justifiable explanation of the issues and resolution in the analytical report/data package (dilution factor, interference, etc.). Excessive, unnecessary dilutions on any sample for a project are unacceptable. The laboratory will analyze all samples initially undiluted, unless for GC/MS analyses (i.e., SW8260B and SW8270C), a preliminary GC-screen is performed and indicates that GC/MS instrument damage or compromise may occur if the sample is not analyzed initially at dilution. In this instance, the sample will be analyzed at the lowest possible dilution factor. If multiple extractions/ analyses are performed (such as undiluted and diluted analyses), resulting in several data sets for the same sample, the laboratory will report all data and results from each of the multiple analyses in the data package.

Quantitation limits for all definitive data quality level laboratory analytical methods, compounds, and matrices are to be addressed for each work assignment in the Work Assignment Scoping Documents. Individual soil sample RLs and MDLs will be adjusted accordingly based on moisture and aliquots used for analysis.

SECTION 4

DATA ACQUISITION

4.1 SAMPLING METHODS

Any non-disposable sampling equipment used for chemical sampling will be cleaned and decontaminated prior to use to prevent potential cross-contamination between each use. Additionally, this QAPP describes management, handling, and tracking procedures for investigation-derived waste, including solid and liquid materials, and personal protective equipment.

The special precautions described here will be taken to confirm that each sample collected is representative of the conditions at that location and that the sampling and handling procedures neither alter nor contaminate the sample. If failure in the sampling or measurement system occurs, the procedures specified in Section10.3 of this QAPP will be followed to identify who is responsible for implementing the appropriate corrective action. This section presents sample container preparation procedures, sample preservation procedures, and sample holding times.

For this program, the laboratory will purchase and distribute certified clean sample containers with chemical preservatives. The sample containers used for chemical analysis must be virgin bottleware, I-Chem™ Series 300 (or equivalent). Vendors are required to provide documentation of analysis for each lot of containers, and the documentation will be kept on file at the laboratory. Alternatively, the laboratory may perform testing to certify that the sample containers are not contaminated. Since the containers supplied by the laboratory will be certified clean, the bottles will not be rinsed in the field prior to use.

Laboratory-supplied sample kits (coolers containing field chain-of-custody forms, custody seals, sample containers, preservatives, and packing material) will be prepared by the laboratory's Sample Management Staff and shipped to the Field Team Leader. The type of containers, required sample volumes, preservation techniques, and holding times for specific analyses are presented in the NYSDEC ASP.

Samples requiring chemical preservation will be collected in sample containers provided by the analytical laboratory that already contain sufficient quantities of the appropriate preservative(s) to ensure that the sample is kept in accordance with the method requirements. The laboratory must provide an adequate amount of pre-preserved bottles with traceable high-purity preservatives, and additional preservative for use if the added amount is not sufficient, based on request by the Field Team Leader and on an as-needed basis if additional bottleware is needed during the field activities. The field team must verify that the preservative has been added appropriately.

4.2 SAMPLE HANDLING AND CUSTODY

This section presents sample handling and custody procedures for both the field and laboratory. Implementation of proper handling and custody procedures for samples generated in the field is the responsibility of field personnel. Both laboratory and field personnel involved in

the chain of custody and transfer of samples will be trained as to the purpose and procedures prior to implementation. For transfer of samples within the laboratory, an internal chain of custody will be required.

4.2.1 Sample Handling

Samples to be collected for each work assignment will be specified in the Work Assignment Scoping Documents and FAP. After the samples are collected, they will be split as necessary among preserved containers appropriate to the parameters to be analyzed. Each container will be provided with a sample label that will be filled out at the time of collection. The sampler will print label information, specified below, on each label either before or immediately after collecting the sample with an indelible writing instrument. The label will be protected from water and solvents with clear label packing tape.

The following information, at a minimum, is required on each sample label (note: the location ID and the sample ID as described in the Data Management section below inherently identify some of this information, see below):

- Client
- Project name
- Sampling location
- Sample number
- Date and time of sample collection
- Parameters to be analyzed
- Preservative(s) added, if any
- Initials of the sampler.

Following sample collection, excess soil, water, etc., will be wiped from the outside of the sample containers with a paper towel and the lids will be checked to verify they are tightly closed. Each glass container will be wrapped with bubble wrap to minimize breakage during transport. Bottles containing soil, sediment, and water samples will be placed in separate Ziploc® bags (one bag) and set on ice (ice bath not necessary). Documentation of equipment and methods used in the field for treating the samples will be maintained in the field logbooks, and a chain of custody will be initiated to document transfer of the samples from the field team to the laboratory. In preparation for shipment to the analytical laboratory, the shipment cooler will be packaged as follows:

- Fill a dry shipment cooler with inert cushioning to a depth of 1 inch to prevent bottle breakage.
- Place the bagged samples and the laboratory-provided temperature blank upright in the sample cooler. The temperature blank should be placed in the center (horizontally and vertically) with the samples surrounding.
- Place additional cushioning material around the sample bottles as necessary.
- Place bags of ice in the remaining void space to keep the samples cooled to 4°C.

- Complete the chain-of-custody form (see Section 4.2.2). Place the chain-of-custody form in a polyethylene, sealable bag (such as a 1-gal Ziploc® bag or equivalent) and tape the bag to the interior of the cooler lid. Field personnel retain a copy of the chain-of-custody form; another copy is transmitted to the QAO and the Project Manager specified in the Work Assignment Scoping Documents.
- Prior to sealing for shipment, the list of samples will be checked against the container contents to verify the presence of each sample listed on the chain-of-custody record including the temperature blank.
- Affix a custody seal to the cooler.
- Seal the cooler securely with packing tape, taking care not to cover labels if already present.
- Label the cooler appropriately in accordance with the Department of Transportation (DOT) regulations (49 CFR 171 through 179).
- Ship the samples in accordance with the DOT requirements outlined in 49 CFR 171 through 179. Complete the carrier bill of lading, and retain a copy on file.
- Samples will be delivered to the laboratory by the most expedient means to meet holding times. Whenever practicable, samples will be shipped on the day of collection for delivery to the laboratory the morning of the day after collection. The laboratory will be required to adhere to the holding times as stated in the NYSDEC ASP for sample analyses. Laboratory performance requirements for analysis turnaround time will be established using the validated time of sample receipt (VTSR) in accordance to NYSDEC requirements. The field team will carefully coordinate sampling activities with the laboratory to see that holding times are met.

The required holding times must be adhered to for the initial sample preparation/analysis. If subsequent reanalysis or re-extraction becomes necessary because of method requirements or additional requirements stated here, the laboratory will make every effort to perform those re-extractions and/or reanalysis within the primary holding times. Any holding time that is exceeded will be reported immediately to the Project Manager and the QAO by the laboratory QA manager.

4.2.2 Field Sample Custody

The primary objective of sample custody procedures is to create an accurate written record that can be used to trace the possession and handling of samples from the moment of their collection through analysis until their final disposition. A sample (or sample container) will be considered under custody if:

- In a person's possession
- Maintained in view after possession is accepted and documented
- Locked and tagged with custody seals placed on the sample cooler so that no one can tamper with it after having been in physical custody
- In a secured area that is restricted to authorized personnel.

The sample custody flowchart is shown in Figure 4.1.

DATA REQUIRED ON CHAIN-OF-CUSTODY*
Project name and client
Signatures of samplers
Sample number, date and time of collection, and grab or composite sample designation
Signatures of individuals involved in sample transfer
If applicable, the air bill or other shipping number
ADDITIONAL ITEMS THAT SHOULD BE INCLUDED:
Sample matrix
Number of sample containers
Analyses to be performed,
Preservative(s)
Name of the analytical laboratory to which the samples are sent
Method of sample shipment
Project number.
*Required by guidance in SW846 Test Methods for Evaluating Solid Waste, Physical and Chemical (USEPA, 1997)

A chain-of-custody record will accompany the samples from the time the samples leave the original sampler's possession through the sample shipments' receipt at the laboratory. Triplicate copies of the chain-of-custody record must be completed for each sample set collected. See chart for data requirements.

If samples are split and sent to different laboratories, a copy of the chain-of-custody record is sent with each sample.

The REMARKS space on the chain-of-custody form is used to indicate if the sample is a matrix spike/matrix spike duplicate (MS/MSD) or matrix spike/matrix duplicate (MS/MD), or any other sample information for the laboratory. Since they are not specific to any one-sample point, blanks are indicated on separate rows. Immediately prior to sealing the sample cooler, the sampler will sign the chain-of-custody form and write the date and time on the first RELINQUISHED BY space. The sampler will also write the method of shipment, the shipping cooler identification number, and the shipper air bill number on the top of the chain-of-custody form. Mistakes will be crossed out with a single line in ink and initialed by the author.

Sampling personnel will retain one copy of the chain-of-custody form, and the other two copies are put into a sealable plastic bag and taped inside the lid of the shipping cooler. The cooler lid is closed, custody seals provided by the laboratory are affixed to the latch and across the back and front lids of the cooler, and the person relinquishing the samples signs his or her name across the seal. The seal is taped, and the cooler is wrapped tightly with clear packing tape. Field personnel then relinquish the cooler to personnel responsible for shipment, typically an overnight carrier.

The chain-of-custody seal must be broken to open the sample cooler. Breakage of the seals before receipt at the laboratory may indicate tampering. If tampering is apparent, the laboratory will contact the Field Team Leader for direction on whether to proceed with the analyses.

Sampling personnel record the information placed on the chain-of-custody record in the field logbook. They also include in the log book a detailed description of the exact locations from which the samples were collected, any pertinent conditions under which the samples were obtained, and the lot number of the containers used.

4.2.3 Laboratory Sample Management

The laboratory has a designated Sample Management Staff responsible for receiving samples in the laboratory, opening the coolers, checking the sample integrity and custody seals, logging samples into the laboratory information management system (LIMS), and controlling the handling and storage of samples while in the laboratory. The laboratory is a secure facility and only authorized laboratory personnel are allowed to handle active samples. The laboratory maintains an SOP for sample management.

4.2.4 Sample Receipt and Logging

Upon receipt at the laboratory, sample-receiving personnel inspect the samples for integrity of the custody seal, check the shipment against the chain-of-custody form, and note any discrepancies. Specifically, the sample-receiving personnel note any damaged or missing sample containers. At this time, the field chain-of-custody record is completed and signed by the Sample Management Staff.

Using the temperature blank in each cooler, the temperature of each incoming sample cooler is measured and recorded during the sample receipt and log-in procedures before samples are placed in laboratory cold storage. Similarly, the laboratory documents that its cold storage facilities are being maintained through daily (at a minimum) documented temperature measurements using a thermometer.

Upon receipt, Sample Management Staff measure and record on the preservation documentation sheet the pH of acid- or base-preserved aqueous samples. Any problems observed during sample receipt must be communicated to the Field Team Leader and/or the QAO verbally and either by fax transmission or email within 24 hr (preferably 3 hr beginning with the normal business day or immediately following for problems noted during second shifts or weekends) after discovery and before samples are released to the laboratory for analysis. Problems may include but are not limited to broken bottles, errors or ambiguities in paper work, insufficient sample volume or weight, inappropriate pH, and elevated temperature.

When the shipment is inspected and the chain-of-custody record agree, the sample receiving personnel enter the sample and analysis information into the LIMS and assign each sample a unique laboratory number. This number is affixed to each sample bottle.

4.2.5 Sample Storage Security

While in the laboratory, the samples and aliquots that require cold storage will be stored and will be maintained in a secured refrigerator unless they are being used for preparation and/or analysis. All of the refrigerators in the laboratory used for storage of samples have restricted access and are numbered. In addition, dedicated refrigerators are designated for extracts and analytical standards. The sample storage areas are in the laboratory, and access is limited to laboratory personnel. Specific requirements for sample storage are described below:

- Samples will be removed from the shipping container and stored in their original containers unless damaged.
- Damaged samples will be disposed in an appropriate manner, and the disposal will be documented or repacked as necessary and appropriate.
- Samples and extracts will be stored in a secure area designed to comply with the storage method(s) defined in the contract.
- The storage area will be kept secure at all times. The sample custodian or designated personnel will monitor access to the storage area.
- Standards or reagents will not be stored with samples or sample extracts.

The following standard operating procedures for laboratory sample security will be implemented to confirm that the laboratory satisfies sample chain-of-custody requirements:

- Samples will be stored in a secure area.
- Access to the laboratory will be through a monitored area. Other outside access doors to the laboratory will be kept locked.
- Visitors must sign a visitor's log and will be escorted while in the laboratory.
- Refrigerators, freezers, and other sample storage areas will be securely maintained.

Storage blanks will be initiated and analyzed on a weekly basis for each cold storage unit used to hold samples submitted for the analysis of VOCs. Field QC samples must be stored in the same cold storage units as the samples that they are associated with (even if the matrices are different). All soil samples must undergo thorough sample homogenization (stirred within the original sample container) using inert utensils and mixing platforms that will not interfere with the target analytes being requested for analysis with the exception of soil samples submitted for the analysis of VOCs. Samples for VOC determinations will be stored in a secure refrigerator separate from other samples, sample extracts, reagents, and standards.

4.2.6 Retention and Disposal of Samples

The laboratory must retain all excess samples within their original sample bottles for a minimum of 30 days in cold storage (below 4 degrees Celsius) following submission of the validated data to NYSDEC. At that time, the laboratory must contact the Field Team Leader for authorization for responsible disposal or further storage instructions. At the point at which the laboratory is provided authorization to dispose of the samples, the laboratory will be responsible, and will assume all liability for proper characterization and disposal of samples and bottleware in accordance with all local, state, and federal regulations.

FIGURE 4.1

SAMPLE CUSTODY FLOW CHART

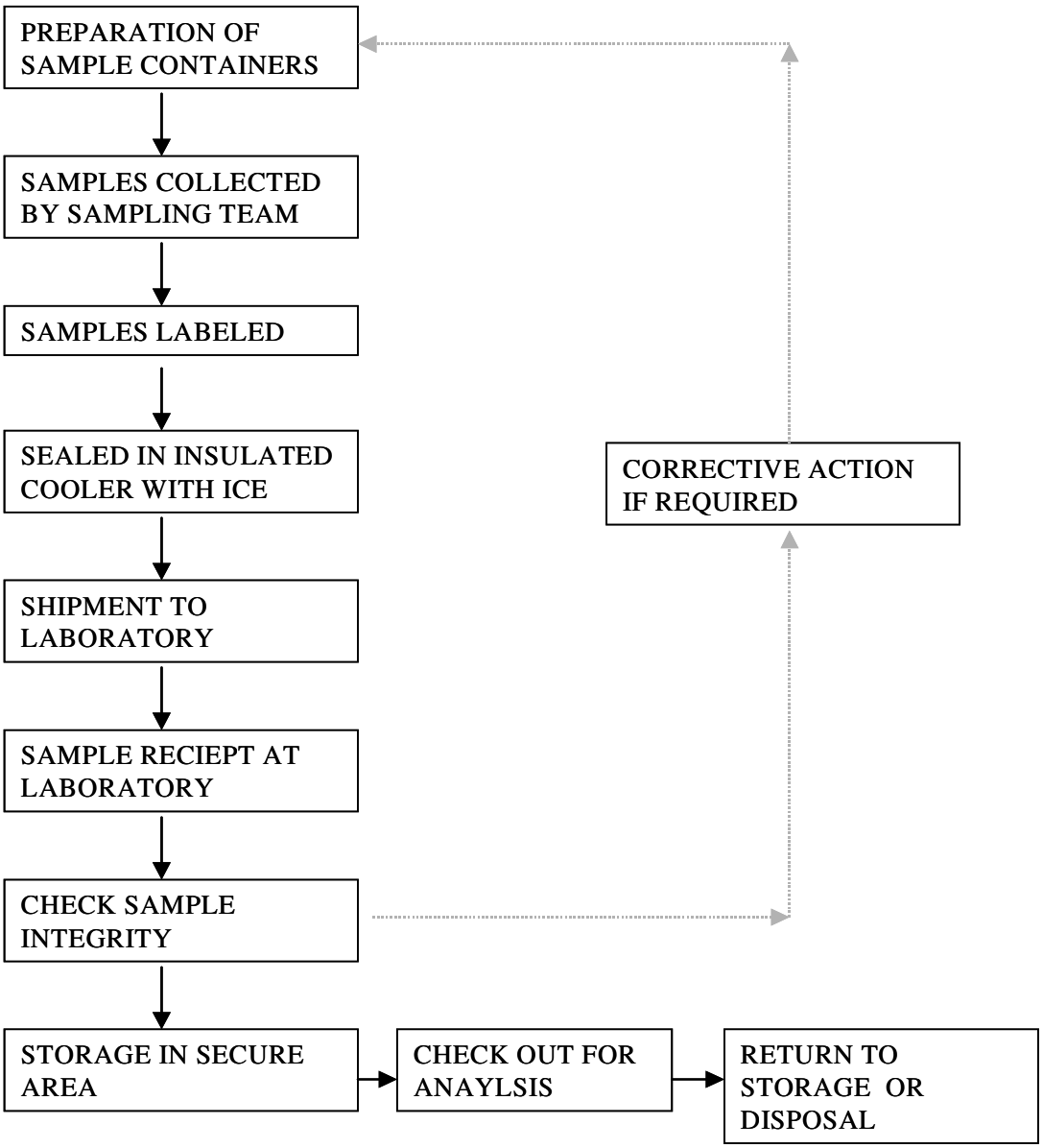

FIGURE 4.2 EXAMPLE CHAIN-OF-CUSTODY RECORD

Submitted to:	Chain Of Custody / Analysis Request	AESI Ref:
		COC #:
		Lab Use Only
	Privileged & Confidential	Site Name:	Lab Proj #
	EDD To:	Location of Site:	Lab ID
Client Contact: (name, co., address)	Sampler:		
	P O #		Job No.
	Analysis Turnaround Time:		
	Standard - Y		Column Study Sediment
	2 weeks -		
Hardcopy Report To:	1 week -		
Invoice To:	Next Day -		

Sample Identification													Preservative													
	Location ID	Start Depth (ft)	End Depth (ft)	Field Sample ID	Sample Date	Sample Time	Sample Type	Sample Matrix	Sample Purpose	# of Cont.	Grab/Composite	Field Filtered Sample ?	Units	0	0	2										
1																										
2																										
3																										
4																										
5																										
6																										
7																										
8																										
9																										
10																										
11																										
12																										

Special Instructions:				Notes:

Relinquished by	Company		Received by	Company		Condition		Custody Seals Intact	
	Date/Time			Date/Time		Cooler Temp.			
Relinquished by	Company		Received by	Company		Condition		Custody Seals Intact	
	Date/Time			Date/Time		Cooler Temp.			

Preservatives: 0 = None; [1 = HCL]; [2 = HNO3]; [3 = H2SO4]; [4 = NaOH]; [5 = Zn. Acetate]; [6 = MeOH]; [7 = NaHSO4]; 8 = Other (specify):

SECTION 5

DATA MANAGEMENT

5.1 INTRODUCTION

The electronic data management systems for each work assignment will be implemented to process the information effectively without loss or alteration. As of April 1, 2011, the New York State Division of Environmental Remediation (DER) has implemented an Environmental Information Management System (EIMS). The EIMS uses the database software application EQuIS$_{TM}$ from EarthSoft® Inc. In an effort to improve the management of environmental data and reduce paper quantities, all laboratory analytical data minus instrument raw data must be submitted in the DEC-approved Electronic Data Deliverable (EDD).

Data providers must download and install the EQuIS Data Processor (EDP) to check their properly formatted EDD as well as the NYSDEC DER Format file. The EDP performs a series of formatting checks on the EDD and identifies any errors in the data file prior to submission. All EDDs are to be error free when submitted. It is important that the most recent version of the EDP and NYSDEC format file are employed since the valid values used by EIMS are periodically updated for the EDP.

5.2 FIELD DATA MANAGEMENT

The Field Team Leader will manage data generated in the field. He or his designee will be responsible for recording and documenting sampling activities in the field logbook, on sampling records (as appropriate), and on chain-of-custody forms (when samples are collected) as described in Section 4.2.2. The records may be photocopied and stored in the project file along with the original.

A sample nomenclature system will be coordinated with the Data Management Team. Each sample name will be unique to include location ID and field sample ID. The Database Manager will add data to EIMS through the input module of the system.

DATA INPUT TO EIMS MAY INCLUDE:
–Sample planning information (e.g., sample depth) –Chain-of-custody data –Sediment coring logs –Geotechnical data –Location and geographic data –Field measurements –Meteorological data –Waste characterization data –Groundwater levels –Radiodating data –Laboratory analytical data

5.3 LABORATORY DATA MANAGEMENT

Laboratory data management involves several important stages that include data transformation, review, verification, and validation, as well as data storage, retrieval, and security. The laboratory will implement a data management system to manage the data from its generation in the laboratory to its final reporting and storage. The data management system will include, but not be limited to, the use of standard record-keeping practices, standard document control systems, and the electronic data management system.

The laboratory data reduction, verification, validation, and reporting procedures and project data management activities, data/information exchange procedures ensure that complete documentation is maintained, transcription and reporting errors are minimized, and data are properly review.

Specific laboratory data management requirements and procedures are discussed in Sections 6 and 9 of this QAPP.

SECTION 6

DOCUMENTS AND RECORDS

6.1 INTRODUCTION

Records will be maintained to document accurately the data generation process during investigation in the field, sample analysis in the lab, and during data validation. Project documentation will be maintained in general accordance with guidelines in the National Enforcement Investigation Center Policies and Procedures (USEPA, 1986). A project file will be maintained that will contain appropriate project documentation; see components in chart. Some of this documentation may be retained electronically in lieu of paper copies. Table 6.1 summarizes the types of project documents and records.

MINIMUM COMPONENTS OF PROJECT FILE
- Project plans and specifications - Field logbooks and data records - Photographs, maps, and drawings - Sample identification documents - Chain-of-custody records - Data review notes - Report notes and calculations - Progress and technical reports and - Correspondence and other pertinent information - Full analytical data deliverables package provided by the lab, including QC documentation and electronic data deliverable

6.2 FIELD RECORDS

Field personnel are responsible for documenting sample handling activities, observations, and data in field sampling records including field logbooks, chain-of-custody records, photographs, and pre-design investigation records. The Field Team Leader is responsible for maintaining these documents. Each record is described below.

6.2.1 Field Logbook

A Field Logbook will be used to document pre-design investigation activities. The field logbook will have consecutively numbered pages, and documentation will be recorded using waterproof ink. Incomplete lines, pages, and changes in the logbook will be lined out with a single line, dated, and initialed. More detailed procedures for documenting investigation

activities (such as field sampling records and boring log forms) and type of information to include in the field logbook may be developed.

MINIMUM REQUIREMENT FOR INFORMATION IN FIELD LOG
- Responsible person's name - Date and time of activity - Equipment and methods used for field preparation of samples - Field measurements of samples (*e.g.,* pH, temperature) - Information coordinating sample handling activities with appropriate field activities and chain-of-custody documentation *Daily calibration activities:* Calibrator's name Instrument name and model Date and time of calibration Standards used and their source Temperature (if appropriate) Results of calibration Corrective actions taken (if any)

6.2.2 Electronic Field Data Management

The field sampling program will have an electronic data management component. The system will be designed to specify the necessary samples taken at any given location and to provide the ability to be updated and amended in the field. This will provide a management system that efficiently tracks the needs of the sampling scope. As the samples are taken, log entries are put in the database, and sample labels are printed. At any given time a chain-of-custody record can be printed as well.

6.2.3 Chain-of-Custody Record

The chain of custody record establishes the documentation necessary to trace sample possession from the date and time of sample collection, through sample shipment, to the date and time of arrival at the laboratory designated to perform analysis. The ability to trace the history of a sample is essential to show that the sample collected was, indeed, the sample analyzed and that the sample was not subjected to biasing influences. Evidence of sample traceability and integrity is provided by chain-of-custody procedures. These procedures are necessary to support the validity of the data and will accompany each shipping container.

A copy of the chain-of-custody record will be detached and kept with the field logbook or placed in the project file; the original record will accompany the shipment.

6.3 LABORATORY RECORDS

Laboratories providing analytical support for this project must maintain records to ensure that all aspects of the analytical processes are adequately documented to ensure legal defensibility of the data.

When a mistake is made, the wrong entry is crossed out with a single line, initialed, and dated by the person making the entry, and the correct information recorded. Obliteration of an incorrect entry or writing over it is not allowed, nor is the use of correction tape or fluid on any laboratory records.

Overwriting or disposal of any electronic media prior to a 5-yr expiration period is strictly prohibited. All electronic and hardcopy data must be stored in an easily accessible climate-controlled environment. The laboratory will exercise "best practices" in terms of frequent, redundant electronic backup procedures on proper long-term storage media to assure that all electronic data representing Honeywell sample analyses will be maintained for the 5-yr storage period. Electronic data must be stored in a secure, limited-access area with redundant copies stored in fireproof vaults and/ or stored off-site of the laboratory facilities.

Sample preparation in the laboratory must be fully documented and include sample preparation conditions (such as digestion temperatures). In addition, documentation must allow complete traceability to all prepared or purchased reagents, acids and solvents, and reference solutions. All spike solutions and calibration standards must be used prior to labeled expiration dates and stored in accordance with manufacturers recommended conditions. Complete and unequivocal documentation must exist to enable traceability of all prepared spike solutions, calibration standards, and prepared reagents back to the reference materials utilized. Organic extracts must be stored in the same type of vials (amber or clear) as the associated standards at the appropriate storage temperatures.

The unit conventions set forth in the figures for reported data will be consistent with standard laboratory procedures. Reporting units used are those commonly used for the analyses performed. Concentrations in soil and sediment samples will be expressed in terms of weight per unit dry weight, with moisture content reported for each sample.

Laboratory records used to document analytical activities in the laboratory will include reagent and titrant preparation records, standard preparation logs, sample preparation logs, bench data sheets, instrument run logs, and strip chart recordings/chromatograms/computer output. Additional records will include calibration records, maintenance records, nonconformance memos, and Corrective Action Request (CAR) forms.

LAB RECORDS SHOULD CONVEY:
- What was done - When it was done - Who did it and - What was found

REQUIREMENTS FOR LAB RECORDKEEPING
- Data entries must be made in indelible water-resistant ink - Date of each entry and observer must be clear - Observer uses his or her full name or initials - Initial and signature log is maintained so the recorder of every entry can be identified - Information must be recorded in notebook or on other records when the observations are made - Recording information on loose pieces of paper not allowed

6.3.1 Operational Calibration Records

Operational calibration records will document the calibration of instruments and equipment that are corrected on an operational basis. Such calibration generally consists of determining instrumental response against compounds of known composition and concentration or the preparation of a standard response curve of the same compound at different concentrations. Records of these calibrations are maintained in the following documents:

- Standard preparation information, to trace the standards to the original source solution of neat compound, is maintained in LIMS or laboratory standard preparation logs.
- Instrument logbook provides an ongoing record of the calibration for a specific instrument. The logbook should be indexed in the laboratory operations records and should be maintained at the instrument by the chemist. The chemist must sign and date all entries, and the QM or his designee must review them.
- For Level IV data packages, copies of the raw calibration data will be kept with the analytical sample data so the results can readily be processed and verified as one complete data package. If samples from several projects are processed together, the calibration data is copied and included with each group of data. The laboratory will maintain all calibration, analysis, and corrective action documentation (both hard copy and electronic data) for a minimum of 7 years. The documentation maintained must be sufficient to show all factors used to derive the final (reported) value for each sample. Documentation must include all calculation factors such as dilution factor, sample aliquot size, and dry-weight conversion for solid samples. The individual who performs hand calculations must sign and date them. This documentation must be stored with the raw data. Calculations performed by the data system will be documented and stored as electronic and hard copy data. The instrument printouts will be kept on file, and the electronic data will be stored by the laboratory for a minimum of 7 years

6.3.2 Maintenance Records

Maintenance records will be used to document maintenance activities, service procedures, and schedules. They must be traceable to each analytical instrument, tool, or gauge. The individual responsible for the instrument must review, maintain, and file these records. These records may be audited by the QAO to verify compliance. Logs must be established to record and control maintenance and service procedures and schedules.

6.3.3 Nonconformance Memos

Nonconformance Memos (NCM) may be either a hard copy record or an electronic database record. In either case, review and release of the record must be documented by the initiator, the analytical group leader where appropriate, the laboratory project manager, and the laboratory QA manager. All internal laboratory nonconformance documentation will be communicated to the Field Team Leader by the laboratory project manager verbally and summarized in the report narrative. The NCM will be used to document equipment that fails calibration and will identify any corrective actions taken.

6.3.4 Corrective Action Request (CAR) Forms

The laboratory must use CAR forms to document any incidents requiring corrective action. The CAR form will be issued to the personnel responsible for the affected item or activity. A copy will also be submitted to the laboratory project manager. The individual to whom the CAR is addressed will return the requested response promptly to the QA personnel and will affix his or her signature and date to the corrective action block after stating the cause of the conditions and corrective action to be taken. QA personnel will maintain a log for status of CAR forms to confirm the adequacy of the intended corrective action and to verify its implementation. CARs will be retained in the project record file.

6.3.5 Analytical Data Reports

Analytical data will be reported as an Electronic Data Deliverable (EDD) and as an analytical data package (two copies on CD-Rom and one hard copy). The analytical laboratories are required to submit all data, preliminary and final, in formatted EDDs in accordance with NYSDEC's requirements. The laboratory must meet 100% compliance with these requirements. The Parsons Database Manager will submit written requests dictating the requirements and appropriate files to be supplied by the laboratory. The specifications of the EDD are presented in Section 5.

Analytical data reports will be provided by the laboratory within 28 calendar days following receipt of a complete Sample Delivery Group (SDG) and will include the specifications identified in Attachment 1. An SDG is considered to include all samples received for the same project or site, to a maximum of twenty investigative samples not to exceed 5 consecutive days of sampling. The data package provided by the laboratory will be Level IV, unless an alternative requirement is specified in a laboratory statement of work (SOW) and will contain all information to support the data validation in accordance with the USEPA Region II Standard Operating Procedures (SOP) as described in Section 9. Additionally, the completed copies of the chain-of-custody records, accompanying each sample from the time of initial bottle preparation to completion of analysis, must be attached to the analytical reports.

6.4 DATA VALIDATION AND AUDIT RECORDS

Data validation personnel are responsible for documenting validation procedures and results in the form of a data usability summary report (DUSR). The QAO will be responsible for maintaining this report and the QAO will be responsible for its distribution. Additionally, audit reports will be prepared and distributed by the QAO. A brief description of each record is described below.

6.4.1 Data Usability Summary Reports

The DUSR will be prepared as required by NYSDEC Draft DER-10 Technical Guidance for Site Investigation and Remediation, Appendix 2B, May, 2010. The DUSR will summarize the impacts of using data that do not achieve overall data quality objectives or that do not meet PARCC and sensitivity criteria identified in Section 3.3. Additionally, the report will be used to identify, assess and present issues associated with the overall data.

6.4.2 Audit Reports

Among other QA audit reports, which may be generated during the conduct of activities, a final audit report for this project may be prepared by the QAO. The report will include:

- Periodic assessment of measurement data accuracy, precision, and completeness
- Results of performance audits and/or system audits
- Significant QA problems and recommended solutions for future projects
- Status of solutions to any problems previously identified

TABLE 6.1
SUMMARY OF FIELD, LABORATORY, AND DATA MANAGEMENT RECORDS

REPORT	PERSON RESPONSIBLE FOR: MAINTENANCE	PERSON RESPONSIBLE FOR: DISTRIBUTION	STORAGE
PROJECT FILES AND FIELD SAMPLING RECORDS			
Field Logbook	Field Team Leader	Project Manager	Job File at Primary Contractor's Location
Photographs	Field Team Leader	Project Manager	Job File at Primary Contractor's Location
Chain-of-Custody	Field Team Leader	Project Manager	Job File at Primary Contractor's Location
Field Sampling Records	Field Team Leader	Project Manager	Job File at Primary Contractor's Location
LABORATORY RECORDS			
Reagent and Titrant Preparation Records	Quality Assurance Manager	Laboratory Project Manager	Job File at Laboratory
Standards Preparation Logs	Quality Assurance Manager	Laboratory Project Manager	Job File at Laboratory
Sample Preparation Logs	Quality Assurance Manager	Laboratory Project Manager	Job File at Laboratory
Bench Data Sheets	Quality Assurance Manager	Laboratory Project Manager	Job File at Laboratory
Instrument Run Logs	Quality Assurance Manager	Laboratory Project Manager	Job File at Laboratory

TABLE 6.1
SUMMARY OF FIELD, LABORATORY, AND DATA MANAGEMENT RECORDS (CONT.)

REPORT	PERSON RESPONSIBLE FOR		STORAGE
	MAINTENANCE	DISTRIBUTION	
Strip Chart Recordings/ Chromatograms/Computer Output	Quality Assurance Manager	Laboratory Project Manager	Job File at Laboratory
Analytical Data Reports	Quality Assurance Manager	Laboratory Project Manager	Job File at Laboratory
Log-in Sheets	Quality Assurance Manager	Laboratory Project Manager	Job File at Laboratory
Maintenance Records	Quality Assurance Manager	Laboratory Project Manager	Instrument Maintenance Logbook at Laboratory
Periodic Calibration Records	Quality Assurance Manager	Laboratory Project Manager	QA Files at Laboratory
Operational Calibration Records	Quality Assurance Manager	Laboratory Project Manager	Job File at Laboratory
Nonconformance Memos	Quality Assurance Manager	Laboratory Project Manager	Maintained in Datbase File at Laboratory
Corrective Action Request Forms	Quality Assurance Manager	Laboratory Project Manager	Client Correspondence Records at Laboratory
DATA VALIDATION AND AUDIT RECORDS			
Data Validation Reports	Quality Assurance Officer	Quality Assurance Officer	Job File at Primary Contractor's Location
Audit Reports	Quality Assurance Officer	Quality Assurance Officer	Job File at Primary Contractor's Location

SECTION 7

ANALYTICAL PROCEDURES

7.1 INTRODUCTION

To meet program specific regulatory requirements for chemicals of concern, all methods will be followed as stated, with some specific requirements noted below. Chemical analyses for inorganics, organics, and wet chemistry parameters will be conducted in accordance with the QAPP, the Work Assignment Scoping Documents, NYSDEC ASP, laboratory's SOPs (maintained "on-file" at the laboratory), and with referenced analytical methods including USEPA SW846 Test Methods for Evaluating Solid Waste, Physical, and Chemical (USEPA, 1997), and Methods for Chemical Analysis of Water and Wastes (USEPA, 1983). Where requirements conflict, the technical and QA/QC requirements in this QAPP, or the Work Assignment Scoping Documents take precedence.

7.2 STANDARD OPERATING PROCEDURES

Standard Operating Procedures (SOPs) are a written step-by-step description of laboratory operating procedures exclusive of analytical methods. Laboratories providing analytical support for this project will be required to document all procedures in SOPs. The SOPs must address the following areas:

- Storage containers and sample preservatives
- Sample receipt and logging
- Sample custody
- Sample handling procedures
- Sample transportation
- Glassware cleaning
- Laboratory security
- QC procedures and criteria
- Equipment calibration and maintenance
- Documentation
- Safety
- Data handling procedures
- Document control
- Personnel training and documentation
- Sample and extract storage
- Preventing sample contamination
- Traceability of standards

- Data reduction and validation
- Maintaining instrument records and logbooks
- Nonconformance
- Corrective actions
- Records management

SECTION 8

QUALITY CONTROL

8.1 INTRODUCTION

A QC program is a systematic process that controls the validity of analytical results by measuring the accuracy and precision of method and matrix, developing expected control limits, using these to detect anomalous events, and requiring corrective action techniques to prevent or minimize the recurrence of these events. QC measurements for analytical protocols are designed to evaluate laboratory performance, and measurement biases resulting from the sample matrix and field performance.

- **Field performance:** QC samples are used to evaluate the effectiveness of the sampling program to obtain representative samples, eliminating any cross contamination. These samples will include trip blanks, field duplicates and rinse blanks.
- **Sample performance:** Factors associated with sample preparation and analysis influence accuracy and precision. Such factors are monitored by the use of internal QC samples. QC field samples are analyzed to evaluate measurement bias due to the sample matrix based on evaluation of matrix spike (MS), matrix spike duplicate (MSD), and/or matrix duplicate (MD) samples. If acceptance criteria are not met, matrix interferences are confirmed either by reanalysis or by inspection of the LCS (or MSB) results to verify that laboratory method performance is in control. Data are reported with appropriate qualifiers or discussion.
- **Laboratory method performance:** All QC criteria for method performance should be met for all target analytes for data to be reported. These criteria generally apply to instrument detector assessment (such as, tunes, ICP interference check sample), calibration, method blanks, and LCS (or MSB). Variances will be documented and noted in the case narrative of the report.

8.1.1 Field Quality Control Samples

QC samples will be collected in the field as part of the sampling program to allow evaluation of data quality. Field QA/QC samples will consist of the collection and analysis of rinse blanks, field duplicates, and “extra volume samples”, to be used for matrix spike/matrix spike duplicate (MS/MSD) samples, at a frequency of 1:20 for each sample media (sediment, porewater, and soil borings). Temperature blanks will accompany each sample shipment container (cooler) shipped to the laboratory for sample analysis. A rinse blank will be collected from disposable sampling equipment at a frequency of once per lot. Standard sample identifiers will identify field QA/QC samples and they may provide no indication of their nature as QA/QC samples.

A summary of the type and collection frequency of field QC sample to be collected respective to the sampling programs specified in this QAPP, is included in Table 8.1. A description of each QC sample is included below.

8.1.1.1 Equipment Rinse Blanks

To assess field sampling and decontamination performance, rinse blanks will be used to evaluate the effectiveness of the decontamination procedures for chemical sampling equipment. Rinse blanks will be collected as part of all chemical sampling programs, except for waste characterization. An equipment rinse blank (rinse blank) is a sample of deionized water provided by the laboratory that is poured over or through the sampling equipment (such as split spoon, wipe template), into the sample container. A rinse blank will be collected at a frequency of 1:20 samples per type of sample collection activity using non-disposable sampling equipment. A rinse blank will be collected from disposable sampling equipment at a frequency of once per lot.

8.1.1.2 Field Duplicates

Coded (blind) field duplicates will be used to assess the precision of field sampling procedures. Precision of a sample is calculated by quantifying the RPD between two sample measurements (Section 3.2.2.1). If the RPD of field duplicate results is greater than the precision criterion, environmental results for the field duplicate pair will be qualified as estimated. The Field Leader responsible for sample collection and processing should be notified to identify the source of variability (if possible), and corrective action should be taken (Section 10.3).

Coded (blind) field duplicates will be collected to evaluate the representativeness and effectiveness of homogenization and proper mixing for soil and aqueous samples. The field duplicate will be analyzed for all of the parameters for which the associated samples are being analyzed. The samples will be labeled in such a manner that the laboratory will not be able to identify the sample as a duplicate sample. This will eliminate bias that could arise by laboratory personnel.

8.1.1.3 Trip Blanks

During field sampling and sample shipping, contamination may be introduced to the samples that could affect the accuracy of analysis results. Trip blanks will be used during sample shipment to detect cross-contamination. Each cooler of aqueous samples sent to the laboratory for analysis of VOCs will contain one trip blank. Trip blanks are prepared only when VOCs samples are taken and are analyzed for VOCs analytes. The trip blank consists of a VOC sample vial filled in the laboratory with ASTM Type II reagent grade water, transported to the sampling site, handled like an environmental sample, and returned to the laboratory for analysis. Trip blanks are not opened in the field.

8.1.1.4 Temperature Blank

The temperature blank is used to indicate the temperature of the sample cooler upon receipt at the laboratory. A temperature blank consists of laboratory reagent in a 40-ml glass vial sealed with a Teflon® septum. Any cooler temperature exceeding the allowable 4 ± 2 degrees Celsius (°C) must be noted and the QAO notified prior to sample analyses.

8.1.2 Laboratory Quality Control Samples

QC data from the laboratory are necessary to determine precision and accuracy of the analyses and to demonstrate the absence of interferences and contamination of glassware and reagents. The laboratory will analyze QC samples routinely as part of the laboratory QC procedures. Laboratory QC results will consist of analysis of MS/MSD or MS/MD, LCS (or MSB), method/preparation blanks, and surrogate spikes. The frequency of the analysis of laboratory QC is summarized in Table 8.2. QC samples will be prepared and analyzed utilizing the same preparation and analysis procedures as the field samples. These laboratory QC sample analyses will be run independently of the field QC samples. Results of these analyses will be reported with the sample data and kept in the project QC data file. The QC checks, their frequency, acceptance criteria, and corrective actions for noncompliance are summarized for each analytical method in the NYSDEC ASP.

QC samples will be prepared and analyzed utilizing the same preparation and analysis procedures as the field samples. Re-preparation and/or reanalysis of the laboratory QC samples due to a failing recovery and/or precision failure without the re-preparation and reanalysis of the associated samples is prohibited. In all events, QC failures, holding time exceedances, or any other non-standard occurrence must be communicated immediately to the QAO and prior to reporting and then, with approval to report the data, summarized in the case narrative. If the criteria are not met, appropriate corrective action must be taken as specified in Section 9.1 and Section 10.

8.1.2.1 Matrix Spike/Matrix Spike Duplicate/ Matrix Duplicates

MS/MSD, or matrix duplicates (MD) for methods not requiring MS/MSD, samples for organics, metals, and wet chemistry parameters will be taken at a frequency of 1 per 20 field samples (per SDG) per matrix per method. MD samples will be analyzed by the laboratory at frequency required by the analytical method. A “batch” is considered up to twenty samples from the same matrix, of the same extraction/digestion type, prepared and/or analyzed by a given analyst, within 12-hr, within an extraction/digestion event, whichever is more frequent. These samples are used to assess the effect of the sample matrix on the recovery of target compounds or target analytes by spiking a normal field sample with a known concentration of the analyte of interest. Samples identified as rinse blanks will not be used for the MS/MSD or MS/MD preparation or analysis.

Spiked samples will be analyzed, and the percent recovery will be calculated. Results of the analysis will be used to evaluate accuracy and precision of the actual sample matrix. For MS/MSD or MD, the result will be compared and used to evaluate the precision of the actual sample matrix. The percent recovery for each analyte in the MS and MSD should fall within the limits established by laboratory QC protocol. The percent recovery and RPD control limits between the MS and MSD and the sample and the duplicate concentrations are provided in the NYSDEC ASP.

The original sample, MS/MSD, and MD sample aliquots will be treated exactly the same throughout the sample preparation and analysis and will not be homogenized more than any other project sample (either in the field or at the laboratory). The spike samples will be analyzed for the same parameters as the sample. Field personnel must indicate on the chain-of-custody

form which sample(s) are designated as MS/MSD (or MS/MD). If samples are not designated for these QC purposes and/or insufficient sample is available the Project Manager and/or QAO will be notified for resolution.

8.1.2.2 Laboratory Control Samples

Laboratory Control Samples (LCS), or matrix spike blanks (MSB) are designed to check the accuracy of the analytical procedure by measuring a known concentration of an analyte of interest. An LCS (or MSB) will be analyzed for each analytical batch requested for sample preparation and analysis. LCSs (or MSBs) must be prepared at a frequency of one per batch for all analytical methods. If high LCS (or MSB) recoveries are observed and the associated samples are reported as "not detected" for the requested target analytes, no action is necessary other than to note the issue in the case narrative of the final analytical report. LCS (or MSB) recoveries must meet the criteria specified in NYSDEC ASP.

8.1.2.3 Method and Preparation Blanks

Laboratory blank samples (also referred to as method or preparation blanks) are designed to detect contamination resulting from the laboratory environment or sample preparation procedure. Method blanks verify that method interferences caused by contaminants in solvents, reagents, glassware, or in other sample processing hardware, are known. Method blanks will be analyzed for each analytical batch using similar preparation techniques (separatory funnel and liquid/liquid extraction) to assess possible contamination and evaluate which corrective measures may be taken, if necessary.

Method blanks associated with field samples must undergo all of the processes performed on investigative samples, including but not limited to pre-filtration and sample cleanups. The blank will be deionized water for water samples or a purified solid matrix such as sodium sulfate for extractable soil samples. Where all the field samples in a batch do not require an additional cleanup procedure, an additional blank may be prepared to check the performance of the additional cleanup and will be associated with the field samples getting the specific additional cleanup. Where this is done, both blanks will be reported, and the procedure described in the case narrative. Method blanks must be prepared at a frequency of one per analytical batch.

8.1.2.4 Surrogate Spike Analyses

Surrogate spikes (applicable to organic analysis only) are used to determine the efficiency of analyte recovery in sample preparation and analysis. Calculated percent recovery of the spikes is used to measure the accuracy of the analytical method. A surrogate spike is prepared by adding a known amount of a compound similar in type to the analytes of interest. Surrogate compounds will be added to all samples analyzed by USEPA Methods, including method blanks, MS/MSDs, project environmental samples, and duplicate samples in accordance with the method. Surrogate spike recoveries should fall within the limits established by laboratory QC protocol and the NYSDEC ASP.

8.2 INSTRUMENT/EQUIPMENT TESTING, INSPECTION, AND MAINTENANCE

8.2.1 Field Equipment

Equipment failure will be minimized by routinely inspecting all field equipment to ensure that it is operational and by performing preventative maintenance procedures. Field sampling equipment will be inspected prior to sample collection activities, and repairs will be made prior to decontamination and reuse of the sampling equipment. Equipment, instruments, tools, gauges, and other items requiring preventive maintenance will be serviced in accordance with the manufacturer's specified recommendations and written procedure, based on the manufacturer's instructions or recommendations. Maintenance will be performed in accordance with the schedule specified by the manufacturer to minimize the downtime of the measurement system. Qualified personnel must perform maintenance work.

MINIMUM ROUTINE PREVENTIVE MAINTENANCE
Removal of foreign debris from exposed surfaces
Storage in a cool dry place protected from the elements
Daily inspections
Verification of instrument calibrations (Section 8.3.1)

A list of critical spare parts will be developed prior to the initiation of fieldwork. Field personnel will have ready access to critical spare parts to minimize downtime while fieldwork is in progress. A service contract for rapid instrument repair or backup instruments may be substituted for the spare part inventory.

Non-routine maintenance procedures require field equipment to be inspected prior to initiation of fieldwork to determine whether or not it is operational. If it is not operational, it will be serviced or replaced. Batteries will be fully charged or fresh, as applicable.

8.2.2 Laboratory Instrumentation

Periodic preventive maintenance is required for all sensitive equipment. Instrument manuals will be kept on file for reference if equipment needs repair. The troubleshooting section of factory manuals may be used in assisting personnel in performing maintenance tasks.

Major instruments in the laboratory are covered by annual service contracts with manufacturers or other qualified personnel (internal or external). Under these agreements, trained service personnel make regular preventive maintenance visits. Maintenance is documented and maintained in permanent records by the individual responsible for each instrument.

The laboratory manager is responsible for preparation, documentation, and implementation of the program. The laboratory QA manger reviews implementation to verify compliance during scheduled internal audits.

Written procedures will establish the schedule for servicing critical items to minimize the downtime of the measurement system. The laboratory will adhere to the maintenance schedule and arrange any necessary and prompt service. Qualified personnel will perform required service.

8.3 INSTRUMENT/EQUIPMENT CALIBRATION AND FREQUENCY

Instruments (field and laboratory) used to perform chemical measurements will be properly calibrated prior to use to obtain valid and usable results. The requirement to properly calibrate instruments prior to use applies equally to field instruments as it does to fixed laboratory instruments to generate appropriate data to meet DQOs.

8.3.1 Field Instruments

All field analytical equipment will be calibrated immediately prior to each day's use. The calibration procedures of field instruments (such as PID, pH, temperature), will conform to manufacturer's standard instructions to ensure that the equipment functions within the allowable tolerances established by the manufacturer and required by the project. Personnel performing instrument calibrations must be trained in its proper operation and calibration. Records of all instrument calibration will be maintained by the Field Team Leader in the field logbook (Section 6.2) and will be subject to audit by the QAO or authorized personnel. The Field Team Leader will maintain copies of all the instrument manuals on the site.

8.3.2 Laboratory Instruments

A formal calibration program will control instruments and equipment used in the laboratory. The program will verify that equipment is of the proper type, range, accuracy, and precision to provide data compatible with specified requirements. Instruments and equipment that measure a quantity or whose performance is expected at a stated level will be subject to calibration. Laboratory personnel or external calibration agencies or equipment manufacturers will calibrate the instruments using reference standards. Upon request, the laboratory will provide all data and information to demonstrate that the analytical system was properly calibrated at the time of analysis including calibration method, frequency, source of standards, concentration of standards, response factors, linear range, check standards, and all control limits. This data will be documented in a calibration record (Section 6.3.1). Calibration records will be prepared and maintained for each piece of equipment subject to calibration.

This section provides an overview of the practices used by the laboratory to implement a calibration program. Detailed calibration procedures, calibration frequencies, and acceptance criteria are specified in the laboratory's analytical method SOPs. The requirements for the calibration of instruments and equipment depend on the type and expected performance of individual instruments and equipment. Therefore, the laboratory will use the guidelines provided here to develop a calibration program.

Two types of calibration are described in this section: periodic calibration and operational calibration. The results of the calibration activities will be documented in the analytical data package and the calibration records (Section 6.3.1).

- **Periodic calibration:** Performed at prescribed intervals for equipment, such as balances and thermometers. In general, equipment which can be calibrated periodically is a distinct, singular purpose unit and is relatively stable in performance.
- **Operational calibration:** routinely performed as part of an analytical procedure or test method, such as the development of a standard curve for use with an atomic

absorption spectrophotometer. Operational calibration is generally performed for instrument systems.

Equipment that cannot be calibrated or becomes inoperable will be removed from service. Such equipment must be repaired and satisfactorily recalibrated before reuse. For equipment that fails calibration, analysis cannot proceed until appropriate corrective action is taken, and the analyst achieves an acceptable calibration. This type of failure will be documented in an NCM (Section 10).

8.3.3 Calibration System

The calibration system includes calibration procedures, equipment identification, calibration frequency, calibration reference standards, calibration failure, and calibration records. These elements are described next.

8.3.3.1 Calibration Procedures

Written procedures will be used by the laboratory for all instruments and equipment subject to calibration. Whenever possible, recognized procedures, such as those published by ASTM or USEPA, will be adopted. If established procedures are not available, a procedure will be developed considering the type of equipment, stability characteristics of the equipment, required accuracy, and the effect of operational error on the quantities measured. Calibration procedure established by the laboratory must, at a minimum, meet the calibration requirements of the method on which the SOP is based.

MINIMUM CALIBRATION PROCEDURES
Equipment to be calibrated
Reference standards used for calibration
Calibration technique and sequential actions
Acceptable performance tolerances
Frequency of calibration
Calibration documentation format

8.3.3.2 Equipment Identification

Equipment that is subject to calibration is identified by a unique number assigned by the laboratory. Calibration records reference the specific instrument identification.

8.3.3.3 Calibration Frequency

Instruments and equipment will be calibrated at prescribed intervals and/or as part of the operational use of the equipment. Calibration frequency will be based on the type of equipment, inherent stability, manufacturer's recommendations, values provided in recognized standards, intended data use, specified analytical methods, effect of error upon the measurement process, and prior experience.

8.3.3.4 Calibration Reference Standards

Two types of reference standards will be used by the laboratory for calibration:

- **Physical standards**, such as weights for calibrating balances and certified thermometers for calibrating working thermometers, refrigerators and ovens, are generally used for periodic calibration. Physical reference standards that have known relationships to nationally recognized standards (such as NIST) or accepted values of natural physical constants will be used whenever possible. If national standards do not exist, the basis for the reference will be documented. Physical reference standards will be used only for calibration and will be stored separately from equipment used in analyses. In general, physical standards will be recalibrated annually by a certified external agency, and documentation will be maintained. Balances will be calibrated against class "S" weights by an outside source annually. Physical standards such as the laboratory's class "S" weights will be recertified annually.
- **Chemical standards,** such as vendor certified stock solutions and neat compounds, will generally be used for operational calibration. The laboratory, to provide traceability for all standards used for calibration and QC samples, will document standard preparation activities.

8.3.4 Operational Calibration

Operational calibration will generally be performed as part of the analytical procedure and will refer to those operations in which instrument response (in its broadest interpretation) is related to analyte concentration. Formulas used for calibration are listed in Table 8.3.

8.3.4.1 Preparation of a Calibration Curve

Preparation of a standard calibration curve will be accomplished by analyzing calibration standards that are prepared by adding the analyte(s) of interest to the solvent that is introduced into the instrument. The concentrations of the calibration standards will be chosen to cover the working range of the instrument or method. All sample measurements will be made within this working range. Average response factors will be used or a calibration curve will be prepared by plotting or regressing the instrument responses versus the analyte concentrations. Where appropriate a best-fit curve may be used for nonlinear curves and the concentrations of the analyzed samples will be back-calculated from the calibration curve.

8.3.4.2 Periodic Calibration

Periodic calibrations are performed for equipment (such as balances and thermometers), that is required in the analytical method, but that is not routinely calibrated as part of the analytical procedure. Table 8.4 lists the periodic calibration requirements used by the laboratories.

8.4 INSPECTION/ACCEPTANCE OF SUPPLIES AND CONSUMABLES

In the laboratory, personnel qualifying reagents and standards must be trained to perform the associated instrumental analysis, including instrument calibration, calculations, and data interpretation. Laboratory personnel must document the purchase, receipt, handling, storage, and tracking of supplies and consumables used during analysis. For example, analytical standards, source materials, and reference materials used for instrumental calibration/tunes/checks must be

certified and traceable to the USEPA or NIST through reference numbers documented directly in each analytical sequence. Calibration for all requested analyses must be verified by an independent second source reference. Adhering to these procedures precludes the use of expired supplies and consumables or supplies and consumables that do not meet standard acceptance criteria.

Records must be maintained on reagent and standard preparation in the LIMS reagent system or laboratory standard preparation logs. The records should indicate traceability of the standards to their original source solution or neat compound, the name of the material, concentration, the method and date of preparation, the expiration date, storage conditions, and the preparer's initials. Each prepared reagent or standard should be labeled with a unique identifier that links the solution to the preparation documentation that specifies an expiration and/or re-evaluation date for the solution.

TABLE 8.1

SUMMARY OF FIELD QC SAMPLE TYPES AND COLLECTION FREQUENCY

Field QC Sample Type	Sample Type	Collection Frequency
Rinse	Soil, Water	Once per week for non-disposable sampling equipment. Once per lot for disposable sampling equipment.
Field Duplicates	Soil, Water, Air	1:20 Samples
Extra Volume Sample (collected for MS/MSD)	Soil, Water, Air	1:20 Samples

Field QA/QC samples will be identified by using standard sample identifiers that will provide no indication of their nature as QA/QC samples.

TABLE 8.2

LABORATORY QUALITY CONTROL SAMPLE FREQUENCY

QC Sample	Frequency
Method/prep Blanks	1 per analytical batch of 1-20 samples, per preparation event
Laboratory Control Sample	1 per analytical batch of 1-20 samples, per preparation event
Surrogates	Spiked into all field and QC samples (Organic Analyses)
Matrix Spike/Matrix Spike Duplicate or Matrix (Laboratory) Duplicate	1 per batch of 1-20 samples

TABLE 8.3

OPERATIONAL CALIBRATION FORMULAS

Application	Formula	Symbols
Linear calibration curves	$C = (R - a_0)/a_1$	C = analytical concentration R = instrument response a_0 = intercept of regression curve (instrument response when concentration is zero) a_1 = slope of regression curve (change in response per change in concentration)
Calibration factors [1]	$CF = A_x / C$	C = concentration (µg/L) CF = calibration factor Ax = peak size of target compound in sample extract
Response factors [2]	$RF = C_{is} A_x / C A_{is}$	C = concentration (µg/L) RF = internal standard response factor Cis = concentration of the internal standard (µg/L) Ax = area of the characteristic ion for the target compound Ais = area of the characteristic ion for the internal standard

1. Used for quantitation by the external standard technique
2. Used for quantitation by the internal standard technique

Note: For organic analysis, the laboratory will make efforts to use the best curve technique for each analyte. This practice is described in detail in the laboratory calibration criteria documents for GC analysis. This may require the use of a quadratic curve for some compounds.

TABLE 8.4

PERIODIC CALIBRATION REQUIREMENTS

Instrument	Calibration Frequency		Corrective Actions
Analytical Balances	Daily: Annually:	Sensitivity (with a Class S-verified weight) Calibrated by outside vendor against certified Class S weights	Adjust sensitivity Service balance
Thermometers	Annually:	Calibrated against certified NIST thermometers	Tag and remove from service
Automatic Pipettors	Quarterly:	Gravimetric check	Service or replacement

TABLE 8.5

SAMPLE CONCENTRATION CALCULATION FORMULAS

Application	Formula	Symbols
Linear regression calibration curves	$C = (R - a_0)/a_1$	C = analytical concentration R = instrument response a_0 = intercept of regression curve (instrument response when concentration is zero) a_1 = slope of regression curve (change in response per change in concentration)
Calibration factors [1]	$C = A_x V_f / CF V_i$	C = concentration (µg/L) CF = calibration factor A_x = peak size of target compound in sample extract V_f = final volume of extracted sample (mL) V_i = initial volume of sample extracted (mL)
Response factors [2]	$C = C_{is} A_x V_f / RF A_{is} V_I$	C = concentration (µg/L) RF = internal standard response factor C_{is} = concentration of the internal standard (µg/L) A_x = area of the characteristic ion for the target compound V_f = final volume of extracted sample (mL) A_{is} = area of the characteristic ion for the internal standard V_i = initial volume of sample extracted (mL)
Residues [3]	R = (W – T)/V x 1,000,000	R^6 = residue concentration (mg/L) W = weight of dried residue + container (g) T = tare weight of container (g) V = volume of sample used (mL)
Solid samples [4]	K = C V D / W (%S/100)	K = dry-weight concentration (mg/kg) C = analytical concentration (mg/L) V = final volume (mL) of processed sample solution D = dilution factor W = wet weight (g) of as-received sample taken for analysis %S = percent solids of as-received sample

1. Used for quantitation by the external standard technique
2. Used for quantitation by the internal standard technique
3. Used for total, filterable, nonfilterable, and volatile residues as well as gravimetric oil and grease
4. Used to calculate the dry-weight concentration of a solid sample from the analytical concentration of the processed sample.
5. Conversion factor to convert g/mL to mg/L:

$$\frac{mg}{L} = \frac{g}{mL} \times \frac{10^3 mL}{L} \times \frac{10^3 mg}{g}$$

SECTION 9

DATA VALIDATION AND USABILITY ELEMENTS

9.1 DATA REVIEW, VERIFICATION, AND VALIDATION

The data collected during this project will undergo a systematic review for compliance with the DQOs and performance objectives as stated in Section 3. In particular, field, laboratory, and data management activities will be reviewed to confirm compliance with the method QC criteria for performance and accuracy and to show that data were collected in a manner that is appropriate for accomplishing the project objectives. These data will be evaluated as to their usability during data verification. In particular, data outside QC criteria, but not rejected, will be reviewed for possible high and low bias. All data will be validated following verification and reduction.

Qualified data validation personnel will assess and verify data; they will review the data against QC criteria, DQOs (Sections 3 and 9.2.2), NYSDEC ASP, and USEPA Region 2 SOPs for data review to identify outliers or errors and to flag suspect values. Field and laboratory activities that should be reviewed include, at a minimum, sample collection, handling, and processing techniques; field documentation records; verification of proper analytical methods; analytical results of QC samples; and calibration records for laboratory instruments and field equipment. A review of such elements is necessary to demonstrate whether the DQOs outlined in 3 were met. Samples that deviate from the experimental design and affect the project objectives must be reported to the QAO and data validation personnel.

Departures from standard procedures (in the FAP, this QAPP, or the laboratory SOPs, may lead to exclusion of that data from the project database or validation process, based on discussions with and approval of the NYSDEC. However, routine field audits involving thorough reviews of sample collection procedures and sample documentation should preclude such deviations from occurring. Additionally, routine laboratory audits will be used to document proper sample receipt, storage, and analysis; instrument calibration; use of the proper analytical methods; and use of QC samples specified in Section 8 to assist in appropriately qualifying the data.

The laboratory's analytical report for each sample delivery group (SDG) will be assembled by collecting and incorporating all the data for each analysis associated with the reported samples; the analytical narratives; and other report-related information such as copies of chain-of-custody forms, communication records, and nonconformance forms. The information included in the analytical data report is summarized in Attachment 1.

Before the laboratory submits data, the laboratory's data review process will include a full first level "technical" review by the laboratory's analyst during sample analysis and data generation. The review must include a check of all QC data for errors in transcription, calculations, and dilution factors and for compliance with QC requirements. Failure to meet method performance QC criteria may result in the reanalysis of the sample or analytical batch.

After the initial review is completed, the data will be collected from summary sheets, workbooks, or computer files and assembled into a data package.

The laboratory's first review will be followed by a second-level technical review of the data package. The second level review may be performed by a peer trained in the procedures being reviewed or by the appropriate analytical group supervisor. The reviewer will check the data packages for completeness and compliancy with the project requirements and will certify that the report meets the DQOs for PARCCS specifications. The report narrative will be generated at this stage of the data review. Any problems discovered during the review and the corrective actions necessary to resolve them will be communicated to the responsible individual, who will discuss the findings with the laboratory QA manager for resolution.

The first and second review will be conducted throughout sample analysis and data generation to validate data integrity during collection and reporting of analytical data. Data review checklists will be used to document the performance and review of the QC and analytical data.

Before the laboratory's final release to the client, the data will undergo a final review by the laboratory's QA officer or his/her designee. This third level review is to confirm that the report is complete and meets project requirements for performance and documentation. The laboratory's QA officer must review reports involving non-conforming data issues. A summary of all non-conformances will be included in the case narrative. The report will then be released to the client for data validation, and a copy will be archived by the laboratory for a period of 7 yrs.

The laboratory analytical data will be validated using project-specific data validation procedures to confirm that data meet the applicable data quality objectives. Depending on the type of data and the intended data uses, the data validation process for a given SDG (or a specific percentage of sample analyses) or analytical method may be performed following an EPA Level IV protocol (full validation), or an EPA Level III protocol (sample plus QC summary data only, no raw data review). The project-specific Level III data validation protocol will provide a level of review resulting in the generation of a data usability summary report (DUSR), as defined by NYSDEC. Level III validation will be performed on all DQO Level III and all DQO Level IV data. Ten percent (10%) of the DQO Level IV Data for each analytical method will undergo a Level IV validation. Certain geotechnical and field screening data may be evaluated in a manner suitable for the intended data uses.

A data validation report will be issued and reviewed by the QAO before finalization. The data validation report will present the results of data validation, including a summary assessment of laboratory data packages, sample preservation and chain-of-custody procedures, and a summary assessment of PARCCS criteria for each analytical method. The validation criteria are objective and are not sample dependent, except for consideration of sample matrix effects. The criteria specify performance requirements that should be under the control of the field-sampling contractor or analytical laboratory. This QAPP will be the primary reference for evaluating the data.

After data validation, the data will be evaluated for consistency with site conditions and developed conceptual models. Data validation personnel will prepare a project DUSR that summarizes the implications of the use of any data out of criteria. In addition, the data usability

report will include the percentage of sample completeness for critical and non-critical samples and a discussion of any issues in representativeness of the data that may develop as a result of validation. The data usability report will address overall data quality and achievement of PARCCS criteria and assess issues associated with the overall data and data quality for all validated Level III and Level IV data.

9.2 VERIFICATION AND VALIDATION METHODS

9.2.1 Laboratory

The laboratory will verify and assess analytical data against the stated requirements on the chain-of-custody record, the sample handling procedures (Section 4), and the QC parameters. The laboratory data reviewers will also check that transcriptions of raw or final data and calculations were performed correctly and are verified.

Following data verification, analytical data generated by the laboratory will be reduced and managed based on the procedures specified in this QAPP and analytical methodologies. Data reduction includes all processes that change either the values or numbers of data items. The data reduction processes used in the laboratory includes establishment of calibration curves, calculation of sample concentrations from instrument responses, and computation of QC parameters. Table 8.5 lists the formulas used to calculate sample concentrations.

The reduction of instrument responses to sample concentrations takes different forms for different types of methods. For most analyses, the sample concentrations are calculated from the measured instrument responses using a calibration curve. The sample concentrations can be back-calculated from a regression equation fitted to calibration data. For gravimetric and titrimetric analyses, the calculations are performed according to equations given in the method. For chromatographic analyses, the unknown concentrations are determined using either calibration factors (external standard procedure) or relative response factors (internal standard procedure). GC analyses are generally quantitated using the external standard technique; GC/MS analyses are quantitated using the internal standard technique. These calculations are generally performed by the associated computerized data systems.

Validated analytical data will be loaded into a database and reported in tabular format. Database fields will include the field sample identification, laboratory sample identification, blinded sample number, analytical results, detection limits, and validation qualifiers. The usability of the data will be evaluated by the QAO or designee.

9.2.2 Analytical Data Validation

The data review process is performed in two phases:

1. **Initial phase, contract compliance screening (CCS)**: Review of sample data deliverables for completeness. Completeness is evaluated by ensuring that all required data deliverables are received in a legible format with all required information. The CCS process also includes a review of the chain-of-custody forms, case narratives, and RLs. Sample resubmission requests, documentation of nonconformances with respect to data deliverable completeness, and corrective actions often are initiated during the CCS review. The results of the CCS process are incorporated into the data validation process.

2. **Second phase, data validation:** A project-specific data validation procedure based on a "Level III" or the "Level IV" validation protocol will be performed on the analytical results from the fixed-base laboratory or laboratories, with the exception of the bench-scale testing data. The EPA Level III validation protocol, which be applied to Level III data packages and Level IV data packages not receiving "full" Level IV validation, includes a review of summary information to determine adherence to analytical holding times; results from analysis of field duplicates, method blanks, field blanks, surrogate spikes, MS/MSDs, LCSs (or MSBs), and sample temperatures during shipping and storage. Data qualifiers are applied to analytical results during the data validation process based on adherence to method protocols and laboratory-specific QA/QC limits. The EPA Level IV validation protocol incorporates the Level III validation protocol and adds calculation checks from the raw data of reported and summarized sample data and QC results.

FULL VALIDATION (USEPA LEVEL IV EQUIVALENT)	
Organic Analytical Methods	**Inorganic Constituents, Wet Chemistry Parameters**
Percentage of solids	Percentage of solids
Sample preservation and holding times	Sample preservation and holding times
Instrument tuning	Calibrations
Instrument calibrations	Blank results
Blank results	Interference check samples (inorganics only)
System monitoring compounds or surrogate recovery compounds (as applicable)	LCSs
Internal standard recovery results	Project Required Reporting Limit (PRRL) standard check samples
MS and MSD (or MD) results	Duplicates
LCS (or MSB) results	MSs (pre-digestions and post-digestions for inorganics only)
Target compound identification	ICP serial dilutions and
Chromatogram quality	Results verification and reported detection limits
Duplicate results	
Compound quantitation and reported RLs	
System performance and	
Results verification	

The laboratory will send the required analytical data package deliverables, consisting of CD-ROM and hardcopy versions and the EDD, following completion of the laboratory's validation process (Section 9.2.2). Data validation will be performed in accordance with the USEPA Region 2 RCRA and CERCLA Data Validation SOPs for organic and inorganic data review. In addition, Parsons will refer to this QAPP and the Work Assignment Scoping Documents to verify that DQOs were met. If problems are identified during data validation, the QAO and the laboratory QA manager will be alerted, and corrective actions will be requested. The LPM and

data validation chemists will maintain close contact with the QAO to ensure all nonconformance issues are acted upon prior to data manipulation and assessment routines.

USEPA Region II SOPs also used as guidance for data validation	
Herbicides	Validating Chlorinated Herbicides by GC (SOP HW-17, Rev. 2, September 2006)
PCBs	Data Validation SOP of Organic Analysis of PCBs by GC SW-846 Method 8082A (HW-45, Rev. 1.0, October 2006)
Pesticides	Data Validation SOP of Organic Analysis of Pesticides by GC SW-846 Method 8081B (SOP HW-44, Revision 1, October 2006)
Metals and Cyanide	Evaluation of Metals Data for the CLP Program (SOP HW-2, Rev. 13, September 2006)
VOCs	Validating Volatile Organic Compounds by SW-846 Method 8260B (HW-24, Rev. 2, October 2006)
SVOCs	Validating Semivolatile Organic Compounds by SW-846 Method 8270 (HW-22, Rev. 3, October 2006)

Data validation will be conducted using the USEPA guidelines (USEPA, 1999a/2005 and USEPA, 2004) as supplementary guidelines. Where CLP guidelines and SW-846 disagree, this QAPP and data validation professional judgment will prevail.

Trained and experienced data validation chemists will perform the data validation work. The QAO will review the data validation report before it is finalized. The data validation report will present the results of data validation, including a summary assessment of laboratory data packages, sample preservation and chain-of-custody procedures, and a summary assessment of PARCCS criteria for each analytical method. A detailed assessment of each SDG will follow. Based on the results of data validation, the validated analytical results reported will be assigned a usability flag (see chart below).

USABILITY FLAGS FOR VALIDATED RESULTS	
U	Not detected at given value
UJ	Analyte not detected; associated quantitation limit is an approximate (estimated) values.
J	Estimated value
N	Presumptive evidence at the value given
NJ	Analysis indicates presence of analyte tentatively identified; the associated numerical value is its approximate concentration
R	Result not useable and
No flag	Result accepted without qualification

9.3 RECONCILIATION WITH USER REQUIREMENTS

Following data validation by qualified personnel, the data will be evaluated by the QAO and the project manager as to consistency with site conditions and developed conceptual models to determine whether field and analytical data meet the requirements for decision making. Specifically, the results of the measurements will be compared to the DQOs (Section 3).

The DQOs will be considered complete and satisfied if the data are identified as usable and if no major data gaps are identified. For example, the objective for data collected under the characterization program is to further refine the limits of dredging and/or capping. If the collected data sufficiently characterizes these limits in a manner that is acceptable for remedial action, then the DQO is satisfied. In cases where data may be considered not usable (for example, rejected during data validation), resampling may be required at a specific location. If resampling is not possible, the data will be identified and noted in the project database to make data users aware of its limitations.

SECTION 10

ASSESSMENT AND OVERSIGHT

10.1 ASSESSMENTS AND RESPONSE ACTIONS

Performance and system audits of both field and laboratory activities may be performed. Any such audits will be performed at a frequency to be determined to ensure that sampling and analysis activities are completed in accordance with the procedures specified in the FAP and this QAPP.

Quality assurance audits will be carried out under the direction of the QAO on field activities, including sampling and field measurements. They will be implemented to verify that established procedures are being followed and to evaluate the capability and performance of project and subcontractor personnel, items, activities, and documentation of the measurement system(s).

The QAO will plan, schedule, and approve system and performance audits based on procedures customized to the project requirements. If required, the QAO may request additional personnel with specific expertise from company and/or project groups to assist in conducting performance audits. Quality auditing personnel will not have responsibility for field or laboratory project work.

10.2 PROJECT-SPECIFIC AUDITS

Project-specific audits include system and performance audits of sampling and analysis procedures, and of associated recordkeeping and data management procedures. Project-specific audits will be performed on a discretionary basis at a frequency determined by the project manager.

10.2.1 System Audits

The QAO may perform system audits. Such audits will encompass a qualitative evaluation of measurement system components to ascertain their appropriate selection and application. In addition, field and laboratory QC procedures and associated documentation may be system-audited including the field logbook, field sampling records, laboratory analytical records, sample handling, processing, and packaging in compliance with the established procedures, maintenance of QA procedures, and chain-of-custody procedures. These audits may be carried out during execution of the project to confirm that sampling crews employ consistent procedures. However, if conditions adverse to quality are detected additional audits may occur.

Findings from the audit will be summarized and provided to the PM and/or designated personnel so that necessary corrective action can be monitored from initiation to closure.

10.2.2 Performance Audits

The laboratory may be required to conduct an analysis of PE samples or provide proof that PE samples were submitted by an approved USEPA or NYSDEC performance testing provider

within the past 12 months. If necessary, proof that applicable PE samples have been analyzed at the laboratory within the past 12 months will be included in the laboratory procurement package.

10.2.3 Formal Audits

Formal audits are any system or performance audit that the QAO documents and implements. These audits encompass documented activities performed by qualified lead auditors to a written procedure or checklist to verify objectively that QA requirements have been developed, documented, and instituted in accordance with contractual and project criteria. At the discretion of the project manager, the QAO or designated personnel may conduct formal audits on project and subcontractor work during the course of the project.

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

The QAO has overall responsibility to see that all corrective actions necessary to resolve audit findings are acted upon promptly and satisfactorily. Audit reports will be submitted to the PM after completion of the audit. Serious deficiencies will be reported to the PM on an expedited basis. Audit checklists, audit reports, audit findings, and acceptable resolutions will be approved by the QAO prior to issue. Verification of acceptable resolutions may be determined by re-audit or documented surveillance of the item or activity. Upon verification acceptance, the QAO will close out the audit report and findings.

10.2.4 Laboratory Audits

Internal laboratory audits will be performed routinely to review and evaluate the adequacy and effectiveness of the laboratory's performance and QA program, to ascertain if the QAPP is being completely and uniformly implemented, to identify nonconformances, and to verify that identified deficiencies are corrected. The laboratory QA manager is responsible for such audits and will perform them according to a schedule planned to coincide with appropriate activities on the project schedule and sampling plans. Such scheduled audits may be supplemented by additional audits for one or more of the following reasons:

- When significant changes are made in the QAPP
- When necessary to verify that corrective action has been taken on a nonconformance reported in a previous audit
- When requested by the laboratory's project manager or QA manager.

10.2.4.1 Laboratory Performance Audits

Performance audits are independent sample checks made by a supervisor or auditor to arrive at a quantitative measure of the quality of the data produced by one section or the entire measurement process. Performance audits are conducted by introducing control samples, in addition to those used routinely, into the data production process. These control samples include PE samples of known concentrations. The results of performance audits will be evaluated against

acceptance criteria. The results will be summarized and maintained by the laboratory QA manager and distributed to the supervisors who must investigate and respond to any results that are outside control limits.

10.2.4.2 Laboratory Internal Audits

The laboratory QA manager conducts routine internal audits of each laboratory section for completeness, accuracy, and adherence to SOPs. The laboratory audit team will verify that the laboratory's measurement systems are operated within specified acceptable control criteria and that a system is in place to confirm that out-of-control conditions are efficiently identified and corrected.

10.2.4.3 Laboratory Data Audits

The laboratory will maintain raw instrument data for sample analyses on magnetic tape media or optical media in a secured fireproof safe. During routine audits, the audit team will verify the processing of the raw data file by reviewing randomly selected electronic data files and comparing the results with the hardcopy report. Tapes will be archived for a period of 7 yr. Tapes will be also available for audit by the QAO upon request.

10.2.4.4 Laboratory Audit Procedures

Prior to an audit, the designated lead auditor will prepare an audit checklist. During an audit and upon its completion, the auditor will discuss the findings with the individuals audited and discuss and agree on corrective actions to be initiated. The auditor will prepare and submit an audit report to the designated responsible individual of the audited group, the PM, and the QAO. Minor administrative findings that can be resolved to the satisfaction of the auditor during an audit need not be cited as items requiring corrective action. Findings that are not resolved during the course of the audit and findings affecting the overall quality of the project will be included in the audit report.

The designated responsible individual of the audited group will prepare and submit to the QAO a reply to the audit. This reply will include, at a minimum, a plan for implementing the corrective action to be taken on nonconformances indicated in the audit report, the date by which such corrective action will be completed, and actions taken to prevent reoccurrence. If the corrective action has been completed, supporting documentation should be attached to the reply. The auditor will ascertain (by re-audit or other means) if appropriate and timely corrective action has been implemented.

Records of audits will be maintained in the project files. Audit files will include, as a minimum, the audit report, the reply to the audit, and any supporting documents. It is the responsibility of the designated responsible individual of the audited group to conform to the established procedures, particularly as to development and implementation of such corrective action.

10.2.4.5 Laboratory Documentation

To confirm that the previously defined scope of the individual audits is accomplished and that the audits follow established procedures, a checklist will be completed during each audit.

The checklist will detail the activities to be executed and ensure that the auditing plan is accurate. Audit checklists will be prepared in advance and will be available for review.

AUDIT CHECKLIST (AT MINIMUM)
Date and type of audit
Name and title of auditor
Description of group, task, or facility being audited
Names of lead technical personnel present at audit
Checklist of audit items according to scope of audit
Deficiencies or non-conformances

Following each system, performance, and data audit, the QAO or his designee will prepare a report to document the findings of the specific audit. The report will be submitted to the designated individual of the audited group to ensure that objectives of the QA program are met.

MINIMUM CONTENT OF AUDIT REPORT
Description and date of audit
Name of auditor
Copies of completed, signed, and dated audit form and/or checklist
Summary of findings including any nonconformance or deficiencies
Date of report and appropriate signatures
Description of corrective actions

The QAO will maintain a copy of the signed and dated report for each audit. If necessary, a second copy will be placed in project files.

10.3 CORRECTIVE ACTIONS

Corrective action procedures have been established to ensure that conditions adverse to quality, such as malfunctions, deficiencies, deviations, and errors, are promptly investigated, documented, evaluated, and corrected. Corrective action enables significant conditions adverse to quality to be noted promptly at the site, laboratory, or subcontractor location. Additionally, it allows for the cause of the condition to be identified and corrective action to be taken to rectify the problem and to minimize the effect on the data set. Further, corrective action is intended to minimize the possibility of repetition.

Condition identification, cause, reference documents, and corrective action planned to be taken will be documented and reported to the QAO, PM, FTL, and involved subcontractor management, at a minimum. Implementation of corrective action is verified by documented follow-up action. Any project personnel may identify noncompliance issues; however, the designated QA personnel are responsible for documenting, numbering, logging, and verifying the close out action. The designated responsible individual of the audited group will be responsible for ensuring that all recommended corrective actions are implemented, documented, and approved.

Events that trigger corrective actions
When predetermined acceptance standards are not attained
When a deviation from SOP is required or observed
When procedure or data compiled are determined to be deficient
When equipment or instrumentation is found to be faulty
When samples and analytical test results are not clearly traceable
When QA requirements have been violated
When designated approvals have been circumvented
As a result of system and performance audits
As a result of a management assessment
As a result of laboratory/field comparison studies
As required by analytical method

All project personnel have the responsibility, as part of normal work duties, to promptly identify, solicit approved correction, and report conditions adverse to quality. Specifically, the laboratory must designate the assigned individual to act as the primary laboratory contact responsible for timely identification and resolution of any and all issues including contract and administrative issues. Any phone calls initiated by personnel or designated representatives to the laboratory with respect to corrective actions must be returned in a timely manner on a normal business day if the designate individual (or alternate) is not available at the initiation of the phone call.

Project management and related staff, including field investigation teams, remedial design planning personnel, and laboratory groups will monitor on-going work performance as part of daily responsibilities. Work may be audited at the site, the laboratories, or subcontractor locations. Activities or documents ascertained to be noncompliant with QA requirements will be documented. Corrective actions will be mandated through audit finding sheets attached to the audit report. Audit findings are logged, maintained, and controlled by the QAO, PM, or designated personnel.

Personnel assigned to QA functions will have the responsibility to issue and control CAR forms (Figure 10.1). The CAR identifies the out-of-compliance condition, reference document(s), and recommended corrective action(s) to be administered.

Similar to the CAR, the laboratory will record and report nonconformances internally using the laboratory's nonconformance documentation tracking system in the form of an NCM. Each NCM is traceable so that it can be cross-referenced with its resolution to the associated project records. The laboratory QA manager summarizes critical nonconformances, such as reissued reports and client complaints, in a monthly report to the laboratory management staff. Management of the NCM is described in Section 6.3. Corrective action procedures applicable to QC requirements that do not meet the criteria of this QAPP are described in the following

sections. Consistent, frequent contacts between laboratory personnel, the QAO, or designated personnel are required.

TYPICAL CONTENT OF NCM FORMS
Problem description and root cause
Corrective action
Client notification summary
QA verification
Approval history action

FIGURE 10.1

CORRECTIVE ACTION REQUEST FORM

CORRECTIVE ACTION REQUEST

Number _____ Date:_____

TO: _____

You are hereby requested to take corrective actions indicated below and as otherwise determined by you (a) to resolve the noted conditions and (b) to prevent it from recurring. Your written response is to be returned to the Project quality assurance manager by _____.

Condition:

Reference Documents:

_____	_____	_____	_____	_____
Originator	Date	Approval	Date	Approval Date

Response

Cause of Condition:

Corrective Action

Resolution:

(B) Prevention

(B2) Affected Documents

Signature_____ Date_____

CA Follow-up

Corrective Action verified by:_____ Date _____

SECTION 11

REPORTS TO MANAGEMENT

11.1 QA REPORTS

Management personnel receive QA reports appropriate to their level of responsibility. The PM receives copies of all QA documentation. QC documentation is retained within the department that generated the product or service except where this documentation is a deliverable for a specific contract. QC documentation is also submitted to the project QAO for review and approval. Previous sections detailed the QA activities and the reports, which they generate. Among other QA audit reports that may be generated during the conduct of activities, a final audit report for this project will be prepared by the QAO. The report will include:

- Periodic assessment of measurement data accuracy, precision, and completeness
- Results of performance audits and/or system audits
- Significant QA problems and recommended solutions for future projects
- Status of solutions to any problems previously identified.

Additionally, any incidents requiring corrective action will be fully documented.

SECTION 12

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ATTACHMENT 1

SUMMARY OF ANALYTICAL DATA PACKAGE (DQO LEVEL IV)

1.0 INTRODUCTION

In order for data to be used for decision-making purposes it is essential that it be of known and documented quality. Verification and validation of data requires that appropriate quality assurance and quality control (QA/QC) procedures be followed, and that adequate documentation be included for all data generated both in the laboratory and in the field.

The QA/QC documentation provided by any laboratory, in conjunction with sample results, allows for evaluation of the following indicators of data quality:

- Integrity and stability of samples;
- Instrument performance during sample analysis;
- Possibility of sample contamination;
- Identification and quantitation of analytes;
- Analytical precision; and
- Analytical accuracy.

General laboratory documentation requirements discussed in this document are formatted into two sections, organic and inorganic analyses. These specifications are intended to establish general, analytical documentation requirements that laboratories should meet when generating data for this project.

2.0 GENERAL DOCUMENTATION REQUIREMENTS

2.1 Data Package Format

Each data package for Level IV data submitted will consist of five sections:

- Case narrative;
- Chain-of-custody documentation
- Summary of results for environmental samples;
- Summary of QA/QC results; and
- Raw data.

Level II data packages will not contain the raw data.

Data packages will be consistent with, and will supply the data and documentation required for NYSDEC ASP-defined deliverables (i.e. Category B and Category A). Summaries of data and results may be presented in a Contract Laboratory Program (CLP) type format or an equivalent format that supplies the required information as stated below. All laboratory data qualifiers shall be defined in the deliverable.

In cases where the laboratory has varied from established methodologies, they will be required to provide the Standard Operating Procedures (SOPs) for those methods and added as an attachment to the Work Assignment Scoping Documents or as variances to this QAPP. Inclusion of these SOPs will aid in final review of the data by data reviewers and users.

2.2 Case Narrative

The case narrative will be written on laboratory letterhead and the release of data will be authorized by the laboratory manager or their designee. The Case Narrative will consist of the following information:

- Client's sample identification and the corresponding laboratory identification;
- Parameters analyzed for each sample and the methodology used. EPA method numbers should be cited when applicable;
- Whether the holding times were met or exceeded;
- Detailed description of all analytical and/or sample receipt problems encountered;
- Discussion of reasons for any QA/QC sample result exceedances; and
- Observations regarding any occurrences which may adversely impact sample integrity or data quality.

2.3 Chain-of-Custody

Legible copies of all Chain-of-Custody forms for each sample shall be submitted in the data package. Copies of any internal laboratory tracking documents should also be included. It is anticipated that Chain-of-Custody forms and/or internal laboratory tracking documents will include the following information:

- Date and time of sampling and shipping;
- Sampler and shipper names and signatures;
- Type of sample (grab or composite);
- Analyses requested;
- Project, site, and sampling station names;
- Date and time of sample receipt;
- Laboratory sample receiver name and signature;
- Observed sample condition at time of receipt;
- Sample and/or cooler temperatures at time of receipt;
- Air bill numbers;
- Custody seal; and
- Sample numbers.

3.0 ORGANIC ANALYSES DOCUMENTATION REQUIREMENTS

These requirements are applicable to organic methods (e.g., VOCs, SVOCs, pest/PCBs).

3.1 Summary of Environmental Sample Results

The following information is to be included in the summary of sample results for each environmental sample.

- Client's sample identifications and corresponding laboratory identifications;

- Sample collection dates;
- Dates and times of sample extraction and/or analysis;
- Weights or volumes of sample used for extraction and/or analysis;
- Identification of instruments used for analysis;
- Gas Chromatography (GC) column and detector specifications;
- Dilution or concentration factor for the sample;
- Percent Difference between columns, if applicable;
- Percent Moisture or Percent Solids for soil samples;
- Method Detection Limits (MDLs) or sample Reporting Limits (RLs);
- Analytical results and associated units;
- Discussion of any manual integrations; and
- Definitions for any laboratory data qualifiers used.

3.2 Summary of QA/QC Sample Results (as applicable)

The following QA/QC sample results shall be presented on QC summary forms. They shall also include the date and time of analysis. Additional summary forms may be required for some methods. Therefore, when reporting data, laboratories should defer to specific method requirements.

All summary forms should, at a minimum, include in the header:

- Form Title;
- Project Identifier (e.g., Batch QC ID, Site Name, Case Number, Sample Delivery Group);
- Laboratory Name; and
- Sample Matrix.

3.2.1 Instrument Calibration (for each instrument used)

- **GC/MS Tuning**. Report mass listings, ion abundance criteria, and percent relative abundances. List the instrument identification (ID) and the date and time of analysis. Ensure that all ion abundances have been appropriately normalized.
- **Initial Calibration**. Report analyte concentrations of initial calibration standards and the date and time of analysis. List the instrument identification (ID), response factors (RF), relative response factors (RRF), or calibration factors (CF), percent relative standard deviation (%RSD), and retention time (RT) for each analyte. The initial calibration (IC) report must also include a sample identifier (ID), associated injection volume or quantity of sample analyzed, the acceptance criteria, such as minimum RF values, and associated maximum %RSD values.
- **Continuing Calibration**. Report the concentration of the calibration standard used for the continuing calibration and for the mid-level standard, and the date and time of analysis. List the ID, RF, RRF, CF, percent difference (%D), and RT for each analyte.

- **Quantitation Limit** or Project Required Reporting Limit (PRRL) Verification (if applicable). Report results for standards that are used to verify instrument sensitivity. Report the source for the verification standards. Report the concentration for the true value, the concentration found, the percent recovery, and control limits for each analyte analyzed. The date and time of analysis must also be reported.

3.2.2 Method Blank Analysis

List environmental samples and QC analyses associated with each method blank. Report concentrations of any analytes found in method blanks above the instrument detection limit.

3.2.3 Surrogate Standard Recovery

Report the name and concentration of each surrogate compound added. List percent recoveries of all surrogates in the samples, method blanks, matrix spike/matrix spike duplicates and other QC analyses. Also include acceptance ranges that the laboratory used for the analysis.

3.2.4 Internal Standard Summary

Report internal standard area counts of the associated calibration standard and retention times, include upper and lower acceptance limits. List internal standard area counts and retention times for all samples, method blanks, matrix spike/matrix spike duplicates and other QC analyses. Include the ID and the date and time of analysis.

3.2.5 Compound Confirmation

Report retention times of each compound on both columns as well as retention time windows of the associated standard. In addition, report determined concentrations from each column and percent differences between results. List the ID and the date and time of analysis. A summary should be generated for each sample, including dilutions and reanalyses, blanks, MSs, and MSDs.

3.2.6 Peak Resolution Summary

For primary and secondary columns report retention times of any target compounds and/or surrogates that coelute in the standards (ie. the Performance Evaluation Mixture for Contract Laboratory Program pesticides). Calculate and report the percent resolution between each pair of compounds which coelute. Include the ID, column ID, and the date and time of analysis.

3.2.7 Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analysis

Report the name and concentration of each spiking compound. Samples are to be spiked with specified compounds of potential concern. List sample results, spiked sample results, duplicate spiked sample results, percent recovery (%R) and the relative percent difference (RPD) between the MS and MSD (if applicable). Acceptance criteria that the laboratory used for the analysis must also be presented.

3.2.8 Laboratory Duplicate Analysis

When performed, report the RPD between duplicate analyses, along with the associated acceptance criteria.

3.2.9 Laboratory QC Check Sample Analysis

Also known as the Laboratory Control Sample (LCS) or Matrix Spike Blank (MSB). Report the name and concentration of each spiking compound. List the QC check sample and duplicate (if applicable) results, %R, and RPD, if performed in duplicate. The acceptance criteria that the laboratory used for the analysis must also be presented.

3.2.10 Other QC Criteria

- **Retention time windows determination**. Report the retention time window for each analyte, for both primary and confirmation analyses.
- **Compound identification**. Report retention times and concentrations of each analyte detected in samples.
- **MDL determination**. List most recent method detection limits, with dates determined maintained in laboratory file. MDL summary forms may be submitted at start of project and not included in individual data packages.
- **Additional method suggested QC parameters, if required**.
- **Any Performance Evaluation (PE) samples** (if identified) associated with the environmental samples.

3.3 Raw Data

Legible copies of the raw data shall be organized systematically, each page shall be numbered, and a table of contents must be included with each package. Raw data for compound identification and quantitation must be sufficient to verify each result.

3.3.1 Gas Chromatographic (GC) Analyses

This section shall include legible copies of raw data for the following:

- Environmental samples arranged in sequential order by laboratory sample number, include dilutions and reanalyses;
- Instrument calibrations; and
- QC analyses (i.e., method blanks, LCS, etc.).

Raw data for both primary and confirmation analyses are to be included. Raw data for each analysis shall include the following:

- Appropriately scaled chromatograms (label all analyte peaks, internal standards and surrogate standards with chemical names). All chromatograms shall be scaled such that individual peaks can be readily resolved from any neighboring peaks;
- Appropriately scaled before and after manual integrations;
- Area print-outs or quantitation reports;

- Instrument analysis logs for each instrument used;
- Sample extraction and cleanup logs;
- Standards preparation logs and manufacturer certificates of analyses for standards, if applicable, sufficient to document traceability of all standards (including surrogates, internal standards, and spike solutions) maintained in "job file" in laboratory, unless otherwise requested;
- Percent Moisture or Percent Solids for soil samples; and
- GC/MS confirmation, as applicable.

Note: Additional raw data may be required for some methods. Therefore, when reporting data, laboratories should defer to specific method requirements.

3.3.2 Gas Chromatographic / Mass Spectrometric (GC/MS) Analyses

This section shall include legible copies of raw data for the following:

- Environmental samples arranged in sequential order by laboratory sample number, include dilutions and reanalyses;
- Mass spectrometer tuning and mass calibration (BFB, DFTPP);
- Initial and continuing instrument calibrations; and
- QC analyses (i.e., method blanks, LCS, etc.).

Raw data for each analysis shall include the following:

- Appropriately scaled chromatograms (label all analyte peaks, internal standards and surrogate standards with chemical names). All chromatograms shall be scaled such that individual peaks can be readily resolved from any neighboring peaks;
- Appropriately scaled before and after manual integrations;
- Ion scans and enhanced spectra of target analytes and tentatively identified compounds (TICs), with the associated best-match spectra;
- Area print-outs and quantitation reports;
- Instrument analysis logs for each instrument used;
- Sample extraction and cleanup logs;
- Standards preparation logs and manufacturer certificates of analyses for standards, if applicable, sufficient to document traceability of all standards (including surrogates, internal standards, and spike solutions) maintained in "job file" in laboratory, unless otherwise requested; and
- Moisture Content (Percent Moisture) for sediment samples.

Note: Additional raw data may be required for some methods. Therefore, when reporting data, laboratories should defer to specific method requirements.

4.0 INORGANIC ANALYSES DOCUMENTATION REQUIREMENTS

4.1 Summary of Environmental Sample Results

The following information is to be included in the summary of sample results for each environmental sample:

- Client's sample identifications and corresponding laboratory identifications;
- Sample collection dates;
- Dates and times of sample digestion and/or analysis;
- Weights or volumes of sample used for digestion and/or analysis;
- Identification of instruments and analytical techniques used for analysis;
- Instrument specifications;
- Dilution or concentration factor for the sample;
- Percent Moisture or Percent Solids for soil samples;
- Detection Limits: MDLs, RLs;
- Analytical results and associated units; and
- Definitions for any laboratory data qualifiers used.

4.2 Summary of QA/QC Results

The following QA/QC sample results shall be presented on QC summary forms. They shall also include the date and time of analysis. Additional summary forms may be required for some methods. Therefore, when reporting data, laboratories should defer to specific method requirements.

All summary forms shall, at a minimum, include in the header:

- Form Title;
- Project Identifier (e.g., Batch QC ID, Site Name, Case Number, Sample Delivery Group);
- Laboratory Name; and
- Sample Matrix.

4.2.1 Instrument Calibration Verification (if applicable)

The order for reporting of calibration verifications for each analyte must follow the chronological order in which the standards were analyzed.

- **Initial Calibration Verification.** Report the source for the calibration verification standards. Report the concentration for the true value, the concentration found, the percent recovery, and control limits for each element analyzed. The date and time of analysis must also be reported.
- **Continuing Calibration Verification**. Report the source for calibration verification standards. Report the concentration for the true value, the concentration found, the

percent recovery, and control limits for each element analyzed. The date and time of analysis must also be reported.

- **Quantitation Limit** or PRRL Verification (if applicable). Report results for standards that are used to verify instrument sensitivity. Report the source for the verification standards. Report the concentration for the true value, the concentration found, the percent recovery, and control limits for each element analyzed. The date and time of analysis must also be reported.

4.2.2 Blank Analysis

Report analyte concentrations above the instrument detection limits found in the initial calibration blanks (ICBs), continuing calibration blanks (CCBs), and in method/ preparation blanks. The date and time of analysis must also be reported. The order for reporting ICB and CCB results for each analyte must follow the chronological order in which the blanks were analyzed.

4.2.3 Matrix Spike (MS) Analysis

Report concentrations of the unspiked sample result, the spiked sample result and the concentration of the spiking solution added to the pre-digestion spike for each analyte. Calculate and report the %R and list control limits. If performed in duplicate, provide the %R for the MSD and the RPD.

4.2.4 Post Digestion Spike Analysis (if applicable)

In addition to matrix spikes, post-digestion spikes are often required by the method. Report concentrations of the unspiked sample results, spiked sample results, and the concentration of the spiking solution added. Calculate and report the %R and list control limits.

4.2.5 Laboratory Duplicate Analysis

Report concentrations of original and duplicate sample results. Calculate and report the RPD and list control limits.

4.2.6 Laboratory Control Sample

Identify the source for the LCS. Report the found concentration of the laboratory control sample and the true concentration for all analytes. Calculate and report the %R and list control limits.

4.2.7 Other QC Criteria (if applicable)

- **Method of Standard Additions (MSA)**. This summary must be included if MSA analyses are performed. Report absorbance values with corresponding concentration values. Report the final analyte concentration and list the associated correlation coefficient and control limits.
- **ICP-AES Serial Dilution**. Report initial and serial dilution results, associated %D, and control limits.

- **ICP-AES Linear Dynamic Ranges.** For each instrument and wavelength used, report the date on which linear ranges were established, the integration time, and the upper limit concentration.
- **MDL Determination**. List most recent method detection limits, with dates determined maintained in laboratory file. MDL summary forms may be submitted at start of project and not included in individual data packages.
- **Any Performance Evaluation (PE) Samples** (if identified) associated with the environmental samples.

4.3 Raw Data

Legible copies of the raw data shall be organized systematically, each page shall be numbered, and a table of contents must be included with each package. Data should be organized sequentially by method and analysis date. Raw data for compound identification and quantitation must be sufficient to verify each result.

4.3.1 Atomic Absorption (AA) and Atomic Emission (AE) Spectrometric Analyses

This section shall include legible copies of raw data for the following:

- Environmental sample results, include dilutions and reanalyses;
- Instrument calibrations; and
- QC analyses (i.e., method blanks, LCS, etc.).
- Measurement print-outs for all instruments used or copies of logbook pages for analyses that do not provide instrument print-outs;
- Absorbance units, emission intensities, or other measurements for all analyses;
- Sample preparation and digestion logs that include reagents used, standards referenced to standards preparation logs, volumes of reagents, digestion times, etc.;
- Instrument analysis logs for each instrument used or summary of sample analyses;
- Standards preparation logs and manufacturer certificates of analyses for standards, if applicable, sufficient to document traceability of all standards (including spike solutions) maintained in "job file" in laboratory, unless otherwise requested;
- Wavelengths used for the analyses; and
- Percent Moisture or Percent Solids for soil samples.

Note: Additional raw data may be required for some methods. Therefore, when reporting data, laboratories should defer to specific method requirements.

4.3.2 Titrimetric and Colorimetric Analyses

This section shall include legible copies of raw data for the following:

- Environmental sample results, include dilutions and reanalyses;
- Calibrations; and
- QC analyses (i.e., method blanks, LCS, etc.).

Raw data for each analysis shall include the following:

- Copies of logbook pages for analyses that do not provide instrument print-outs and calculations used to derive reported sample concentrations;
- Titrant volumes, titration end-points, absorbance units, or other measurements for all analyses;
- Sample preparation and digestion logs that include reagents used, standards referenced to standards preparation logs, volumes of reagents, digestion times, sample volumes, solution normalities, etc.;
- Standards preparation logs and manufacturer certificates of analyses for standards, if applicable, sufficient to document traceability of all standards (including spike solutions) maintained in "job file" in laboratory, unless otherwise requested; and
- Wavelengths used for the analyses.

Note: Additional raw data may be required for some methods. Therefore, when reporting data, laboratories should defer to specific method requirements.

4.3.3 Gravimetric Analyses

This section shall include legible copies of raw data for the following:

- Environmental sample results, include dilutions and reanalyses;
- Calibrations; and
- QC analyses (i.e., method blanks, LCS, etc.).

Raw data for each analysis shall include the following:

- Copies of logbook pages for analyses that do not provide instrument print-outs and calculations used to derive reported sample concentrations;
- Weights, sample volumes, or other measurements for all analyses;
- Sample preparation and digestion logs that include reagents used, standards referenced to standards preparation logs, volumes of reagents, drying times, drying temperatures, etc.; and
- Standards preparation logs and manufacturer certificates of analyses for standards, if applicable, sufficient to document traceability of all standards maintained in "job file" in laboratory, unless otherwise requested.

Note: Additional raw data may be required for some methods. Therefore, when reporting data, laboratories should defer to specific method requirements.

SUMMARY OF REQUIRED LABORATORY DELIVERABLES FOR LEVEL IV DQO DATA PACKAGE (REQUIREMENTS WILL VARY BY METHOD)

Method Requirements	Laboratory Deliverables
Requirements for all methods:	
Parsons project identification number	Case narrative
Discussion of unusual circumstances or problems	Case narrative
Analytical method description and reference citation	Case narrative
Field sample identification	Signed chain-of-custody forms and sample results form
Laboratory assigned sample number	Signed chain-of-custody forms and sample results form
Sample matrix description	Signed chain-of-custody forms and sample results form
Date of sample collection	Signed chain-of-custody forms and sample results form
Date of sample receipt at laboratory	Signed chain-of-custody forms
Analytical method description and reference citation	Signed chain-of-custody forms and case narrative
Sample analysis results	USEPA CLP form or equivalent sample analysis results summary form (e.g., ASP Form I-VOA)
Dates of sample preparation and analysis (including first run and any subsequent runs)	Specific deliverable depends on type of analysis
Laboratory analytical QC batch info and sample analysis associations	Specific deliverable depends on type of analysis
Instrument analysis sequence log	Specific deliverable depends on type of analysis
Analytical holding times compliance	USEPA CLP form or equivalent holding time summary form
Method detection limit (MDL) determination	USEPA CLP form or equivalent MDL summary form
Method reporting limits (RLs) achieved	Specific deliverable depends on type of analysis (see below)
Dilution or concentration factors	Specific deliverable depends on type of analysis
Discussion of unusual circumstances or problems	Case narrative
Laboratory Control Sample (LCS) results	USEPA CLP form or equivalent LCS results summary form
"Raw" analytical data sufficient to recreate and check analysis results for all calibrations, QC sample results, and sample results	Sequentially numbered pages with tabulated index

REQUIRED LABORATORY DELIVERABLES (Continued)

Method Requirements	Laboratory Deliverables
Matrix spike / matrix spike duplicate	USEPA CLP form or equivalent MS/MSD summary form (e.g., NYSDEC ASP Form III-SV
Method blank analysis	USEPA CLP form or equivalent method blank summary form (e.g., NYSDEC ASP Form IV-SV)
GC/MS instrument performance check. Tuning and mass calibration (abundance) using 4-bromofluorobenzene (BFB) for method SW8260B and decafluoro-triphenyphosphine (DFTPP) for method SW8270C	USEPA CLP form or equivalent instrument tuning/performance check summary form
Internal Standard Area Counts and Retention Time, as applicable	USEPA CLP form or equivalent internal standard summary form (e.g., NYSDEC ASP Form VIII-SV)
GC/MS initial calibration data	USEPA CLP form or equivalent initial calibration summary form (e.g., NYSDEC ASP Form VI-SV)
GC/MS continuing calibration data.	USEPA CLP form or equivalent continuing calibration summary form (e.g., NYSDEC ASP Form VII-SV)
GC/MS calibration verification (initial and continuing)/2nd source calibration verification (ICV/CCV)	USEPA CLP form or equivalent calibration verification summary form
GC continuing calibration data for volatile and semivolatile analyses. If calibration factors are used, calibration factors and their percent differences from the initial calibration must be reported. Retention time windows and analyte retention times must be included in this form	USEPA CLP form or equivalent calibration verification summary form
GC/MS internal standard area and retention time summary data	USEPA CLP form or equivalent internal standard summary form
GC second column confirmation, as applicable. To be done for all compounds that are detected above method detection limits	Chromatograms of all confirmations of all samples and the standard laboratory form for all positive results
Surrogate Compound percent recovery summary	USEPA form or equipment percent recovery summary form (e.g., NYSDEC ASP Form II-SV)
"Raw" analytical data sufficient to recreate and check analysis results for all calibrations, QC sample results, and sample results	Sequentially numbered pages with tabulated index
Requirements for inorganic analytical methods:	
Initial and Continuing Calibration Verification	USEPA CLP form or equivalent calibration verification summary form(s) (e.g., NYSDEC ASP Form II-IN)

REQUIRED LABORATORY DELIVERABLES (Continued)

Method Requirements	Laboratory Deliverables
ICP Interference Check Sample (ICS), as applicable	USEPA CLP form or equivalent ICS standard summary form (e.g., NYSDEC ASP Form IV-IN)
ICP Interelement Correction Factors, as applicable	USEPA CLP form or equivalent internal standard summary form (e.g., NYSDEC ASP Form XII-IN
IDL or MDL determination	USEPA CLP form or equivalent IDL or MDL summary form(s)
Post-digestion spike, as applicable	USEPA CLP form or equivalent post-digestion spike summary form(s) (e.g., NYSDEC ASP Form V-IN)
ICP linear range	USEPA CLP form or equivalent linear range summary form(s) (e.g., NYSDEC ASP Form XII-IN)
ICP serial dilution, as applicable	USEPA CLP form or equivalent serial dilution summary form(s) (e.g., NYSDEC ASP Form IX-IN)
Method of standard addition (MSA), as applicable	USEPA CLP form or equivalent MSA summary form(s)
Laboratory duplicate results, as applicable	USEPA CLP form or equivalent duplicate analysis summary form(s) (e.g., NYSDEC ASP Form VI-IN)
Requirements for other methods:	
Preparation and analysis logs	No format
Sample results	No format
MS/MSD results	No format
Lab duplicate sample results	No format
Laboratory control sample	Control limits
Method blank results	No format
Initial calibration results	No format
Continuing calibration check (calibration verification)	No format. Report percent relative standard deviation or percent difference from initial calibration

Generic/Site-Specific Health and Safety Plan (HASP)

Prepared For:

New York State
Department of Environmental Conservation
625 Broadway, 12th floor
Albany, NY 12233-7012

Prepared By:

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O'BRIEN & GERE

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REVIEWED AND APPROVED BY:

Program Manager: _____ _____
Date

May 2011

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LIST OF ATTACHMENTS

SECTION 1 – INTRODUCTION

This Project Safety Plan (PSP) addresses the work activities associated with Standby Contract No. D007623 between the State of New York Department of Environmental Conservation and Parsons Engineering of New York, Inc. for engineering services (September 2010).

This PSP addresses both the physical and chemical hazards that may be encountered during completion of the SOW. This PSP is based upon the *Environmental Division Model Project Safety Plan (PSP)/HASP*; the *Parsons Safety, Health and Risk Program (SHARP) Management Manual, Version 3.0*, June 2008; and the *Parsons Corporate Safety and Health Manual* (CHSM, July, 2010). The Parsons Workplace Health and Safety Policy is provided in Exhibit 1-1.

This PSP addresses rules and regulations set forth in Title 29 of the Code of Federal Regulations part 1910 - Safety and Health Regulations for General Industry and part 1926 – Safety and Health Regulations for Construction. In addition, modifications to the PSP to comply with applicable federal, state, and local codes, rules, and regulations may be necessary.

This generic HASP will be used as a template for all HASPs written for Standby Contract D007623. The attachments include blanks, TBDs, or other placeholders to show appropriate detail. The Project Manager must update this generic HASP with work assignment specific details before it becomes the work assignment's HASP.

A HASP can be issued with some items remaining TBD, particularly elements that are not relevant until a future phase of work. The Project Manager must maintain and update the HASP as a living document (i.e. posted on ParShare) that reflects changes in personnel, hazards, or strategies.

1.1 WORKPLACE HEALTH & SAFETY POLICY

Exhibit 1-1 – Parsons Workplace Health and Safety Policy

CORPORATE POLICY
Workplace Health & Safety

POLICY: WORKPLACE HEALTH AND SAFETY

STATEMENT OF POLICY:

As an industry-leading engineering, construction and technical services firm, Parsons is firmly committed to maintaining a safe and healthy working environment at all its offices and project facilities. We share the National Safety Council's Safety and Health Code of Ethics as the principles guiding our commitment to safety.

- We will hold safety and health as our highest core value.
- Executive management will lead the safety improvement process.
- Safety will be a responsibility shared by everyone in our organization.
- Safety performance will be a key indicator of our organizational excellence and will be incorporated into our business processes.
- We will communicate safety performance openly with employees.
- All employees will be given the knowledge and skills necessary to safely perform their jobs.
- We will extend our safety efforts beyond the workplace to include transportation, homes and communities.
- We will continually strive to improve our safety and health processes.

To meet its health and safety objectives, all Parsons employees are expected to act proactively with regard to health and safety issues. This requires the combined efforts of a concerned management, responsible and knowledgeable supervision, and conscientious, well-trained employees.

Parsons will take all reasonable action to meet or exceed the applicable occupational health and safety requirements, domestically and internationally, and will continuously monitor and improve operations, procedures, technologies and programs that are conducive to maintaining a safe and healthy working environment.

RESPONSIBILITIES:

Parsons GBU management and supervisory personnel are responsible to:

- Comply with this policy and ensure that the applicable health and safety requirements at each domestic and international office and project facility are effectively implemented and monitored at all times.

1 of 3

The Company may change, rescind or add to any policies, benefits or practices described on the PWEB, other than employment-at-will policies, from time to time in its sole and absolute discretion with or without prior notice. The Company will advise employees of material changes within a reasonable time.

Exhibit 1-1 – Parsons Workplace Health and Safety Policy (Cont'd)

RESPONSIBILITIES: (cont'd.)

- Ensure that the applicable health and safety requirements at each domestic and international project facility are effectively integrated with the preparation of proposals, project planning, and project execution.
- Monitor subcontractor safety performance in accordance with contract specifications as required by the contract with client.
- Ensure that safety information and statistics are reported to Parsons Corporate Safety Manager on a consistent and regular basis, as shown in Appendix.1, *Safety Monthly Report*.

Parsons Corporate Safety personnel are responsible to:

- Develop, communicate, and oversee Parsons health and safety programs at all Parsons business units.
- Provide assistance to Parsons business unit managers regarding health and safety regulations, reporting requirements, safety training, and other related issues.
- Monitor the effectiveness of Parsons health and safety programs, conduct investigations, develop OSHA reporting and worker's compensation claim procedures.
- Collect and maintain safety information and statistics for all Parsons business units and operations, as shown in corporate policy Workplace Health and Safety, Appendix.2, *OSHA Safety and Health Statistics*.
- Keep senior management informed of significant internal and external developments regarding health and safety.

Parsons employees are responsible to:

- Exercise maximum appropriate care and good judgment at all times regarding health and safety, and adhere to safety procedures to prevent accidents and injuries.
- Promptly report all accidents and injuries to supervisory personnel.
- Promptly report any near misses, unsafe conditions, equipment, or practices to supervisory personnel.

Exhibit 1-1 – Parsons Workplace Health and Safety Policy (Cont'd)

CORPORATE POLICY
Workplace Health & Safety

REFERENCES:

National Safety Council Safety and Health Code of Ethics
Parsons Construction Health and Safety Manual
Parsons Injury and Illness Prevention Program (Cal-OSHA IIPP)
Parsons Safety Monthly Reports, Workplace Health and Safety - Appendix.1
Parsons Health and Safety Statistics, Workplace Health and Safety – Appendix 2

DATE: 7/23/04

1.2 THE PROJECT SAFETY PLAN/PROGRAM (PSP)

Parsons/O'Brien & Gere goal is zero accidents and zero injuries with work tasks designed to minimize or eliminate hazards to personnel, process, equipment, environment and the general public. No employees should ever perform tasks that may endanger their own safety and health or that of others.

This Project Safety Plan/Program (PSP) outlines safety and health requirements and guidelines developed by Parsons/O'Brien & Gere for project work. When implemented, these requirements will help protect site personnel, visitors, the public and environment from exposure to potential safety and health hazards.

This Plan will be updated as conditions change or situations change, usually by addenda to the PSP. All Parsons/O'Brien & Gere and subcontractor personnel must understand and implement the PSP and any addenda. Parsons/O'Brien & Gere documents this by having employees sign an acknowledgement form stating that they understand the plan and its requirements.

1.3 SUBCONTRACTOR SAFETY PLANS

Parsons/O'Brien & Gere subcontractors must establish a safety program for their work and employees. Contract specifications require all subcontractors to accept Parsons/O'Brien & Gere PSP, but also prepare their own Subcontractor Safety Plan (SSP) for presentation to Parsons/O'Brien & Gere Project Manager at least 10 days before site mobilization. At a minimum, subcontractor safety plans must provide safety equipment and safeguards suitable for the hazards involved. This PSP/HASP may not cover all potential hazards on the project and subcontractors must ensure that appropriate safety and health information is available for all project tasks.

All PSP/HASP requirements for Parsons/O'Brien & Gere personnel (e.g., training, substance abuse screening, and incident reporting) also apply to subcontractor personnel. Since the SSP is part of the site-specific HASP, subcontractor personnel will be required to receive a HASP Orientation and sign off accepting the site-specific HASP.

1.4 MANAGEMENT OF CHANGE (MOC)

Field modifications may be made to this HASP document after discussion and approval by the Parsons Division Safety Manager. Make note of any pertinent notations in the comment section below (insert additional rows as necessary).

HASP Section	SSO Initials	Date	Comments

SECTION 2 – SCOPE OF WORK

2.1 SCOPE OF WORK

Parsons/O'Brien & Gere, in their contracted role with New York State Department of Environmental Conservation (NYSDEC) is providing Standby Engineering services for the work as specified in the Contract #D002736.

The specific scope of work for this Work Assignment is contained in the Work Assignment Scoping Document (Attachment 1).

2.2 PROJECT SAFETY PLAN APPLICATION

This HASP and referenced documents applies to all locations, facilities, operations, and projects associated with contract work performed by Parsons, O'Brien & Gere and their subcontractors. Locations/sites covered under this contract will be provided in individual Work Assignments.

SECTION 3 – PROJECT SAFETY MANAGEMENT RESPONSIBILITIES AND AUTHORITY

3.1 SAFETY RESPONSIBILITY MATRIX

Exhibit 3-1 summarizes the responsibilities of selected roles for Parsons/O'Brien & Gere Project, Division, GBU and Corporate personnel related to the primary safety activities identified in this PSP. Whenever they observe anything that raises a safety concern, every Program participant has the authority and responsibility to STOP WORK until that activity can be further evaluated and completed safely as outlined in Section 10.2.

(An additional Safety Responsibility Matrix can be included as an Exhibit, which outlines the responsibilities for all of the Project Team (i.e. Client, Parsons/O'Brien & Gere, Contractors, Agencies, etc.)

Exhibit 3-1 – Roles and Responsibilities

	Work Elements	Project Manager	Project Safety Manager	Project Controls Manager	Project HR Manager	Sector Manager	Division Manager	GBU Safety Manager	GBU QC Manager	GBU Risk Manager	GBU President	Corporate Workers Compensation Analyst	Corporate Safety	Resident Engineer/ Superintendent	GBU BD Manager	Parsons CEO/President
	1. Zero Incident Techniques and SHARP Management	X	D	P	P	R	R	R	E	S	E		E	S	S	E
	2. Business Development Phase	X	P	P	P	R	E	S		S	E		E	P	D	E
Startup Phase	3. Initial Hazards Analysis and Planning	X	P	P	P	R	E	R	E	P	E	P		P		
Startup Phase	4. Project Safety Plan (PSP)	X	D		P	R	E	R		R	E		C			E
Startup Phase	5. Stakeholder PSP Alignment Meeting	X	D			E	E	P					C	P		
Administration/ Design Phase	6. Awareness Campaign	X	D	P	P	E	A	R					C	P		
Administration/ Design Phase	7. Employee Orientation	P	P	P	D	R	A	E					C	P		
Administration/ Design Phase	8. Training	X	D	P	P	R	A	E					C			E
Administration/ Design Phase	9. Health and Safety Committee	X	D	P	P	R	A	R					C			
Administration/ Design Phase	10. Incident Investigations	X	P	P	P	R	R	A				P	E			E
Administration/ Design Phase	11. Measurement and Reporting	X	D	P	P	R	R	S				P	E			E
Administration/ Design Phase	12. Audits, Inspections and Record Keeping	X	X	P	P	R	R	S	R	R			E			E
Construction or Field Phase	13. Preconstruction Safety Activities	X	X			E	E	R					C			
Construction or Field Phase	14. Project Site Orientation	X	D	P	P	E	E	S					C			
Construction or Field Phase	15. Meet Local OSHA, Building Trades, and Other Agencies	X	D			E	E	S					C			
Construction or Field Phase	16. Review Contractor/Subcontractor Safety Programs	E	X			E	E	S					C	P		
Construction or Field Phase	17. Subcontractor Premobilization Meeting	X	P	P		E	E	S					C	P		
Construction or Field Phase	18. Risk Mitigation Planning (Two-week Look-ahead)	P	P			E	E	S					E	X		
Construction or Field Phase	19. Activity Hazard Analysis	E	P			E	E	S					E	X		
Construction or Field Phase	20. Recurring Field Safety Meetings/Training	X	D	P	P			S					E	P		
Construction or Field Phase	21. Project Management Site Safety Inspections	X	D					S					E	P		
	Testing, Commissioning, Operations, and Decommissioning Phases	(to be developed)														
Closeout Phase	22. Lessons Learned and Final Safety Report	E	X		X	E	E	S	R				E	P		
Closeout Phase	23. Records Retention	E	X		P	A	A	R					E			

Legend:

A – Approves tools, plans, etc. established by the project.

C – Consultant providing expert advice to the development leader.

D – Development leader tasked to establish the tools, plans, etc. needed for the work element.

E – Sponsor responsible to reinforce the need to comply with the established requirements.

P – Participants in team or group implementation efforts, supporting the implementation leader.

R – Reviews and comments on tools, plans, etc. established by the project to achieve the goal of the work element.

S – Establishes requirements applicable to the project.

X – Accountable and responsible to ensure that the project develops and implements the work element in accordance with established requirements.

SECTION 4 – ADMINISTRATIVE PHASE

4.1 PROGRAM SAFETY COMMITTEE

A program safety committee that includes representation from all project stakeholders has been formed. Quarterly safety committee meetings will take place in accordance with Section 12 in the SHARP Management manual.

Charter of a Safety Committee: The project safety committee represents the mutual interests of all project participants in completing the work with zero injuries. The committee meets quarterly to consider incentive programs, recent near-miss incidents or injuries, potential unsafe conditions, training programs, safety awareness, audit results, and other safety related issues. The committee advises the Program Manager, who retains sole decision-making authority.

The committee consists of equal numbers of Parsons/O'Brien & Gere and subcontractors personnel, professional/ management and craft/trade personnel, and/or exempt and non-exempt personnel. The Project Manager appoints the professional members (including subcontractor personnel) while the Subcontractor Foreman, Shop Steward or Lead Craft/Trade person appoints the other members. Committee members serve for six months. Members may serve two consecutive terms.

For calendar year 2011, safety committee members are as follows:

- Pete Petrone (Parsons Program Manager)
- Bill Moon (Parsons Safety Representative)
- Deb Wright (O'Brien & Gere Program Manager)
- Jane Doe (Subcontractor Management)
- Jane Doe (Subcontractor Craft/Trade)
- Additional members as needed

The chairperson schedules quarterly meetings, develops the agenda, and displays meeting minutes on the safety bulletin board. Workers may submit suggestions and topics for discussion to the chairperson at any time.

4.2 EMPLOYEE ORIENTATION

The Human Resources Department has a comprehensive employee orientation program and annual refresher. All new Parsons/O'Brien & Gere employees, including new hires and transfers, must attend the orientation program on their first day and sign an acknowledgment form indicating they attended and understood the orientation. Any employee who is unsure of any information presented in the orientation must request clarification. Employees who do not participate in the orientation or refuse to sign the acknowledgment cannot work on site. Site-specific safety procedures and requirements are covered in Section 7.

4.3 AWARENESS CAMPAIGN

The program has established an awareness program consistent with the Parsons safety awareness campaign in accordance with Section 6.4 of the SHARP Management manual (e.g., stickers, signs, posters, banners, whiteboards and guest speakers). This program promotes worker awareness of safety goals and daily risks, hazards, and exposures in the field. In addition to topics selected by corporate safety each month, the program will supplement the awareness program with information specifically applicable to the scope of work. Individual work Assignment Safety Representatives may also provide training, presentations, or informational materials as part of the awareness campaign.

The Safety Bulletin board will be maintained by the Work Assignment Safety Representative as the primary information point for the project awareness campaign, which shall be in accordance with Section 6.3 of the SHARP Management manual. If the project does not have a field office/trailer, then the project will refer to the Parsons' or O'Brien & Gere facility that is responsible for the project, as a resource for safety awareness. For this program, safety bulletin boards used for safety awareness will be located at the Parsons and O'Brien & Gere participating offices.

A "Safety Incentive Program" will be implemented for this Contract. The Program Safety Representative (or Facility Health and Safety Representative, if applicable) will be responsible for tracking the Safety Incentive Program information on a monthly basis to determine whether the target has been met to receive any reward or recognition.

The project has a "Rewards and Recognition" program to foster continuous improvement in safety performance. Rewards and Recognition will be based on the Project Safety Incentive Program (see Appendix).

Examples of Rewards and Recognition that will be implemented on this project include, but are not limited to the following:

- Commendations (written and/or verbal) for: Employees who demonstrate above average safety performance or generate safety improvement ideas that are implemented
- Scratch and win card or candy as an impromptu reward for: Employees who take positive action to prevent injury to themselves or their co-workers; Employees that know and share the Safety Message from the Weekly Bulletin distributed to all employees and posted on ParShare
- Parsons/O'Brien & Gere logo hats, shirts, duffle bags, etc. for: A random drawing for eligible personnel when the monthly or quarterly target has been achieved on the Project Safety Incentive Program. **NOTE:** Parsons/O'Brien & Gere personnel that are not on schedule with completing their Parsons/O'Brien & GereU modules or do not know the Weekly Safety Message if randomly selected during the designated period, will not be eligible for the random drawing.
- Project breakfast for: Reporting and investigating near misses to share lessons learned (i.e. one near miss report per month per worker); Having improvement in a safety audit or achieving 100% compliance; Developing an AHA and training site personnel

- Project lunch for: Milestone achieved without an incident involving first aid treatment, property damage or environmental release, but not near misses (i.e. 3 months or 15,000 hours); Achieving the monthly or quarterly target on the Project Safety Incentive Program
- Project barbeque for: Milestone achieved without an OSHA recordable injury (i.e. six months or 50,000 hours; Milestone achieved without an OSHA lost time injury (i.e. one year or 100,000 hours); Achieving the annual target on the Project Safety Incentive Program

Experience and statistical data indicate that Rewards and Recognition aimed at promoting desired safe behaviors have the highest level of success and sustainability. The Project Manager should consult with the Sector or Division Manager and the GBU Safety Director in structuring the project-specific Rewards and Recognition program.

NOTE: The use of gift cards or certificates shall be avoided since this money is considered income and taxable according to the IRS.

4.4 STAKEHOLDER PSP ALIGNMENT MEETING

A stakeholder PSP alignment meeting must be held before beginning any field work. The meeting includes key personnel from each organization, so the PSP can be reviewed and comments provided in order to obtain concurrence from all stakeholders.

4.5 TRAINING

The Program has a comprehensive health and safety training program tailored to the scope of work. All employees receive a HASP Orientation as outlined in Section 7 upon assignment to a Work Assignment.

All personnel shall be listed in the HASP Training-Medical Records spreadsheet (see Appendix), which will identify the site-specific training requirements and expiration dates for applicable certifications. Safety training for project personnel will be based primarily on their work activities and corresponding exposure to hazardous substances and health hazards. The Parsons/O'Brien & Gere Corporate Safety and Health Manual (CSHM) and applicable sections will be used as a reference for determining minimum training requirements based on the project scope of work. Individual Work Assignment requirements will be evaluated and compared to the CSHM sections to determine applicable training requirements.

Corporate Safety and Health Manual Section/Topic

CSHM-1 Medical Qualification and Surveillance
CSHM-2 First Aid - list all site personnel in the PSP Training-Medical spreadsheet that will be a first responder due to the insufficient response time of EMS personnel. See Section 6.9 of the PSP for additional information on first responders.
CSHM-3 Ergonomics
CSHM-4 Concrete and Masonry Construction
CSHM-5 Field and Office Facilities
CSHM-6 Personal Protective Equipment

CSHM-7 Hearing Conservation – list all site personnel in the PSP Training-Medical spreadsheet that will be exposed to noise at levels greater than 85 decibels over an 8 hour time period, which require annual training and audiograms. Include the work activities generating the noise in Section 4.11.6 of this PSP.

CSHM-8 Respiratory Protection – list all site personnel in the PSP Training-Medical spreadsheet that will have a theoretical potential exposure to contaminants above a permissible exposure limit (PEL) based on known soil or water analysis results, or when there is known contamination with no exposure data. Personnel are required to have annual training, medical clearance and a fit test in order to wear a respirator.

CSHM-9 Air Monitoring – complete Exhibit 6-1 that identifies chemicals of concern, air monitoring equipment, action levels (based on OSHA PELs) and corresponding PPE/Action Taken.

CSHM-10 Hazard Communication

CSHM-11 Emergency Procedures

CSHM-12 Fire Protection

CSHM-13 Hazardous Waste Operations – list all site personnel in the PSP Training-Medical spreadsheet that will be engaged in hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards (such as entering an exclusion zone), which are required to receive appropriate training as required by 29 CFR 1910.120, including, but not limited to, initial 40-hour, 8-hour Supervisor and annual 8-hour refresher training.

CSHM-14 Process Safety Management

CSHM-15 Confined Space - list all site personnel in the PSP Training-Medical spreadsheet that will be involved with confined spaces, which will require proof of training.

CSHM-16 Signs, Barricades and Traffic Control

CSHM-17 Hazardous Materials Handling, Transportation, Storage and Disposal – list all site personnel in the PSP Training-Medical spreadsheet that will be involved with handling or preparing (i.e. package, label, sign shipping papers, etc.) or packaging (i.e. soil and water samples, compressed gases or chemicals) materials listed in the DOT Hazardous Materials Table (49 CFR 172.101), which are required to receive DOT training every three years in accordance with HM126F, or annual RCRA training in accordance with 40 CFR 265.16 (small or large quantity generators of hazardous waste). **NOTE:** Samples being sent for analysis to determine whether they are hazardous are considered non-hazardous, but classified as "Other Regulated Material" in the Hazardous Materials Table.

CSHM-18 Walking/Working Surfaces

CSHM-19 Ladders

CSHM-20 Scaffolds - list all site personnel in the PSP Training-Medical spreadsheet that will be involved with erecting, moving, dismantling, or altering scaffolds, which are required to show a scaffold competent person certification.

CSHM-21 Aerial Lifts - list all site personnel in the PSP Training-Medical spreadsheet that will be involved with operating an aerial lift, which will require proof of training and competency.

CSHM-22 Fall Protection - list all site personnel in the PSP Training-Medical spreadsheet that will be involved with activities at heights greater than six feet, which will require proof of training.

CSHM-23 Lockout/Tagout (LOTO) - list all site personnel in the PSP Training-Medical spreadsheet that will be involved with operating or performing maintenance on equipment that has stored, pneumatic, hydraulic or electrical energy, which will require proof of training and competency.
CSHM-24 Electrical
CSHM-25 Motor Vehicles and Equipment – list all Parsons/O'Brien & Gere site personnel in the PSP Training-Medical spreadsheet that will operate a Parsons/O'Brien & Gere company vehicle, which are required to complete the online Parsons/O'Brien & GereU module on the Vehicle Safety Policy - Fleet Drivers. List all site personnel that are required by the client to complete a hands-on/behind-the-wheel Defensive Driving training course.
CSHM-26 Cranes, Hoists, and Lifts
CSHM-27 Pressure Vessels
CSHM-28 Welding, Cutting and Brazing
CSHM-29 Tools
CSHM-30 Underground Construction
CSHM-31 Blasting
CSHM-32 Demolition
CSHM-33 Excavations - list all site personnel in the PSP Training-Medical spreadsheet that will be involved daily inspections of excavations greater than 4 feet in depth, the adjacent areas, and protective systems shall be made by a competent person for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions.
CSHM-34 Steel Erection
CSHM-35 Asbestos and Lead - list all site personnel in the PSP Training-Medical spreadsheet that will be involved
CSHM-36 Temperature Extremes – see Section 9.2 for mandatory information on all projects in California that must be reviewed prior to starting work
CSHM-37 Ventilation
CSHM-38 Substance Abuse
CSHM-39 Bloodborne Pathogens - see Section 6.9 for additional information
CSHM-40 Recordkeeping

For this project, the client does not require specific training for site personnel.

4.6 AUDITS AND INSPECTIONS

The Program Safety Representative has implemented an audit and inspection program in conjunction with the GBU and corporate safety and quality assurance departments. The Work Assignment Project Manager, together with the Work Assignment Safety Representative or their designee, conducts a safety inspection each month. Office work areas (including field trailers) are audited according to the corporate office audit checklist posted on ParShare (Home > Office Safety) – see Appendix.

Additional information on audits and inspections during field activities is detailed in Section 6.5 of this HASP.

4.7 MEETINGS

All Program meetings that include five or more people must begin with a safety topic. The meeting chairperson may present the safety topic or ask for a volunteer to open the discussion. In general, the "safety moment" is only one or two minutes long and is directly relevant to the work at hand or applicable to most individuals outside the workplace. The safety message from the Parsons/O'Brien & Gere Weekly Bulletin is a good resource.

During weekly progress meetings, all Parsons/O'Brien & Gere Field Team Leaders/Supervisors or subcontractors submit written summaries of upcoming work tasks and associated risks and control measures to the Project Manager. Progress meetings discuss the risks of the upcoming work tasks and the planned mitigation measures. The weekly summaries identify upcoming mobilization or demobilization tasks, audits and inspections, competent person changes, and training requirements. Subcontractors add activities to these summaries at least two weeks in advance of the work. The Risk Mitigation Two-Week Look-Ahead Form in the Appendix should be used to plan mitigation strategies at weekly progress meetings.

All hands safety meetings (if applicable) are held to review critical safety procedures, discuss safety incidents, and celebrate milestones. The work Assignment Project Manager announces the time and schedule of these meetings.

4.8 REPORTING AND MEASUREMENT

4.8.1 Reporting

To accurately measure performance and comply with corporate and regulatory requirements, Parsons utilizes an online safety reporting system to report monthly work hours, personnel injuries, property damage, environmental releases and near-miss incidents for its employees and subcontractors. A wallet card containing Incident Reporting Guidelines is also available on ParShare, which should NOT be modified.

4.8.2 Measurement

The Program Manager establishes a measurement system to provide indicators of safety performance, including the following metrics for the Program:

- *Days without a recordable injury (including project start date – updated every month)*
- *Date of last OSHA recordable injury (if applicable)*
- *Percent of safe observations from each monthly audit*

If the Work Assignment does not have a field office/trailer, then the Program Manager will verbally communicate the metrics above to the field personnel each month.

Subcontractors must submit a monthly report of exposure hours (hours worked on the project, paid or unpaid) to the Parsons/O'Brien & Gere Work Assignment Project Manager within three (3) days after the end of each month. The Project Manager compiles the figures and submits them to the Program Manager (or via the online safety reporting system if instructed by the Program Manager) by the first Friday of each month. Where necessary, estimated figures are acceptable. If a Work Assignment involves air monitoring or personnel wearing any type of

respirator, a monthly Field Project Report is also completed and submitted to the Division Safety Manager by the 3rd calendar day after the end of each month.

4.8.3 Incident Notification

An incident is any unplanned or unexpected event involving a Parsons or O'Brien & Gere employee or subcontractor that results (or could have resulted, in the case of a near-miss) in a personal injury, property damage or environmental release. Employees involved in or witnessing an incident or near-miss incident must immediately report it to the responsible supervisor or foreman, who in turn immediately relays the report to Parsons Program Manager, Pete Petrone (315) 430-0156. Near-miss incidents that could cause significant injury or loss of life must be immediately reported, in the same manner as an actual incident. No supervisor may decline to accept or relay a report of injury or significant near-miss incident from a subordinate.

The Parsons Program Manager must ensure that all incidents are reported to the Global Business Unit (GBU) Safety Manager and other management personnel (as required) within four hours. The Program Manager or hid designee (who has been trained on Parsons' reporting requirements and Online Safety Reporting System) then prepares and submits the incident information.

For this project, there are not client specific reporting procedures when an incident or near miss occurs.

The GBU Safety Manager or their designee must notify the local OSHA office immediately if an accident involves the death of an employee or hospitalization of three or more workers.

4.9 INCIDENT INVESTIGATIONS

All incidents and significant near-miss incidents are investigated by an individual or team with training in accident investigation and root cause analysis. Subcontractors (if applicable) must investigate incidents involving their employees or activities and submit an investigation report to the Parsons Program Manager within 48 hours of an incident.

In Parsons, the GBU Safety Manager investigates or assigns an investigator to each significant incident. The investigator submits a final investigation report using the online safety reporting system within 72 hours of the incident. The Project Safety Manager maintains the investigation file.

4.10 RESPONSIBILITY/IDENTIFICATION OF KEY LINE PERSONNEL

A listing of the personnel that have the authority and responsibility for implementing the provisions of the Safety, Health, and Risk Program (SHARP) Management program for individual Work Assignments are provided in Attachment 2.

4.11 MEDICAL REQUIREMENTS AND WORKERS COMPENSATION

In accordance with corporate requirements the GBU Safety Director has established and implemented the following medical requirements for the project:

4.11.1 Functional Capacity Exams (FCEs)

The applicability of FCEs for project personnel will be determined based on the scope of work for each individual work Assignment. When required, FCEs will be conducted at a facility determined by the performing office.

4.11.2 Substance Abuse and Alcohol Testing

The Division Safety Manager administers required substance abuse tests, including random drug and alcohol testing. As per the Corporate Policy on Substance Abuse (05/30/03), random testing may be necessary to comply with contracted mandated requirements, or governmental regulations, or if performing work where there is a potential for serious injury. A link to the corporate policy is posted on ParShare: Corporate Substance Abuse Policy

For this project, the client does not require drug and/or alcohol testing.

4.11.3 Medical Services and Panel of Physicians

See Attachment 3.

4.11.4 Emergency Response Procedures/Emergency Action Plan

See Attachment 4.

4.11.5 Workers Compensation Program

The Corporate Risk Management Department establishes the workers compensation carrier. If a workers compensation loss occurs, the Corporate Workers Compensation Analyst handles all communication with the carrier.

This project does participate in an OCIP or project-specific insurance program. The workers compensation policy covering Parsons employees on this project is as follows:

Insurance Company of the State of PA – Policy Number WC206-35-110

The workers compensation policy covering O'Brien & Gere employees on this project is as follows:

American Zurich Insurance Company – Policy Number WC 386738903

4.11.6 Medical Surveillance and/or Monitoring Programs

See Attachment 5.

SECTION 5 – PRE-FIELD WORK PHASE

5.1 RISK ANALYSIS AND SAFETY SPECIFICATION DEVELOPMENT

Procurement procedures require that a site-specific risk analysis be conducted before issuance of investigation and remediation RFPs. Using the pre-bid risk analysis checklist (attached), the work Assignment Project Manager leads this analysis, which documents existing exposures that may impact the work, surrounding facilities, equipment, workers, or the public at large. The analysis includes locating, documenting, and photographing items such as:

- Overhead and underground utilities (i.e. electrical, water, sewer, telephone)
- Existing building interferences
- Crane access ways
- Traffic
- Security
- Fences
- Water hazards
- Existing geographical and environmental conditions
- Investigation of Derived Waste (IDW) Disposal
- Confined spaces

Upon completion of the site risk analysis, high-risk activities are listed in the RFPs (as applicable), and bidders must describe controls and mitigation strategies in their proposals. The RFP notes that the list is representative and that the selected contractor must identify and control all work-related hazards.

Pre-field work activities include a detailed analysis of the scope of work and safety specifications in the prime contract, Parsons/O'Brien & Gere project schedule and HASP, draft RFPs, and proposed subcontractor agreements. The Program's standard safety specifications are given below as per Section 17 and 21 in the SHARP Management manual.

- Project Technical and General Conditions Specification Review (see Appendix)
- Subcontractor Premobilization Safety Meeting (see Appendix)
- Site-Specific Risk Review Checklist (see Appendix)

5.2 DESIGN, INVESTIGATION AND/OR REMEDIAL ACTION REVIEW

Periodic investigation and remedial action reviews are held in accordance with the project management plan. The Project Safety Representative participates in the review to ensure that safety issues are adequately addressed. During the investigation/remedial action review, the discussion focuses on how work is sequenced, interferences with continuing operations, and safe work approaches. Specific activity hazards analyses conducted before the scheduled work can mitigate identified/presumed risks.

5.3 PRE-BID MEETING

Pre-bid meetings are required to ensure that subcontractors understand the RFP, including expectations for safety and health performance. Subcontractors must complete the Parsons online Contractor Safety Evaluation package as outlined in Section 5.4, prior to attending a pre-bid meeting. During the pre-bid meeting, the Project Manager uses the Pre-Field Work Safety Meeting Checklist (see Appendix) to review project safety philosophy, principles, and Parsons/O'Brien & Gere requirements with all prospective bidders. Although this information is included in the RFP, the meeting reinforces the message.

5.4 CONTRACTOR SAFETY EVALUATION

Project procurement procedures require that all contractors (and any sub-tier contractor) submit prequalification documentation for evaluation on an annual basis. The Procurement Manager or Project Manager coordinates the safety evaluation in accordance with the Parsons Contractor Safety Evaluation process posted on ParShare.

For this program, there will be subcontractors directly hired by Parsons and/or O'Brien & Gere. The standby or MSA subcontractors directly hired by Parsons and O'Brien & Gere that will be working on the project are included in Exhibit 5-1. Additional specialty subcontractors may be required for individual work assignment and will be required to complete the CSE prior to being sent an RFP.

Exhibit 5-1 – Hired Subcontractors

SUBCONTRACTOR	WORK ACTIVITIES	DATE OF EVALUATION
TBD	Soil boring and monitoring well installation	TBD
TBD		

NOTE: Each contractor hired by Parsons or O'Brien & Gere, regardless of whether they are performing intrusive work activities, must have completed the Parsons online Contractor Safety Evaluation Program in the current calendar year before being eligible to work for Parsons/O'Brien & Gere. The names of contractors, a Summary E-mail that identifies potential risks, and feedback from Parsons/O'Brien & Gere personnel that have used the contractor is available at the online Contractor Safety Evaluation web site.

5.5 PRE-FIELD WORK MEETING

The Work Assignment Project Manager holds a pre-field work safety meeting before the subcontractor begins work in accordance with Section 17 of the SHARP Management manual. The meeting includes subcontractor representatives, contracts manager, and representatives from all disciplines, including safety. During the safety review, the meeting participants review specific safety site/area, pre-bid risk analysis, and competent person and site-specific safety plan requirements. In addition, the Project Manager obtains a safety point of contact and emergency management information. The Pre-Field Work Safety Meeting Checklist is used by the Project Manager to document the meeting (see Appendix).

5.6 COMPETENT PERSON SUBMISSION REVIEW

Parsons, O'Brien & Gere and their subcontractors must identify OSHA-regulated and certified competent persons for work or tasks requiring that level of certification. The personnel listed in the PSP Training-Medical Records spreadsheet (see Appendix) have been assigned to the project and have the designated competencies in accordance with Section 20 of the SHARP Management manual. Contractor supervisors shall submit Subcontractor Competent Person Forms (see Appendix).

If a subcontractor is performing activities that require specialized training (i.e. confined space entry, excavation/trenching, scaffold use, HAZWOPER, etc.), then copies of training certifications must be provided for applicable employees and the supervisors.

Subcontractor supervisors must possess the following certifications for applicable operations – HAZWOPER 8-hour Supervisor (29 CFR 1910.120(e)(4) - not to be confused with 8-hour annual refresher), confined space entry [29 CFR 1910.146(j)], excavation competent person [29 CFR 1926.651(k)] and scaffold competent person [29 CFR 1926.451(f)].

5.7 SUBCONTRACTOR SAFETY PLAN (SSP) SUBMISSION REVIEW

Contractors must submit a Subcontractor Safety Plan (SSP) to the work Assignment Project Manager for review before they begin work on site, unless a SSP Waiver Request Form has been submitted and approved by the Program Manager. The Plan will be reviewed for adequacy in accordance with the Technology Division Model SSP template and/or PSP/SSP Review Checklist posted on ParShare (Policies and Manuals > SHARP Management Manual). The Project Manager notifies the Division Safety Manager when the SSP has been reviewed and is posted in the appropriate Project Safety Plan folder on ParShare. All Subcontractor Safety Plans (SSPs) are included in Section 10 – Appendix).

5.7.1 Contractor Site-Specific Safety Plans

At least 10 days before work begins, each contractor must submit a subcontractor safety plan (SSP) to the Parsons/O'Brien & Gere Project Manager for review. If a contractor needs assistance developing an SSP, an electronic copy of Parsons/O'Brien & Gere' HAZWOPER Model SSP template is posted on ParShare (Policies and Manuals > SHARP Management Manual).

5.8 MOBILIZATION/KICKOFF SAFETY MEETING

Work Assignment Project Managers conduct the Mobilization/Kickoff Safety Meeting (see Appendix) on the first day of subcontractor mobilization in the field and at the work site in accordance with Section 21 in the SHARP Management manual. The meeting includes the completion of a Site-Specific Risk Review Checklist combined with a walkthrough of the work area to locate items on the pre-bid risk analysis checklist.

SECTION 6 – REMEDIATION PHASE

6.1 SITE RISK ANALYSIS

Before work begins, Work Assignment Project Managers lead a team that performs a risk analysis in accordance with Attachment 6.

6.2 FIVE HAZARD CONTROL MEASURES – ORDER OF PRECEDENCE

Site hazards and hazards resulting from investigation and remediation activities are controlled using one or more of the control measures listed in Attachment 7.

6.3 ACTIVITY HAZARDS ANALYSIS

Parsons/O'Brien & Gere and its subcontractors are required to conduct an activity hazards analysis for all aspects of the work. The activity hazards analyses consist of the following three steps:

- Identify the task and break it down into steps.
- Identify the hazards associated with each step.
- Identify the specific hazard control measure used for each step in accordance with the order-of-precedence method of control.

The US Army Corps of Engineers website www.swl.usace.army.mil/safety/asaindex.html contains a library of sample AHAs that may be useful on projects. The Project collaboration Website should also be checked for AHAs. Attachment 8 contains a number of AHAs that may be applicable to various activities that may be conducted under this contract. A new AHA will be prepared by project staff and approved by the Program Safety Manager for any new activities not covered by an existing AHA. A blank activity hazards analysis form is shown below.

PARSONS/O'Brien & Gere

Activity Hazards Analysis

Page____ of _____

Project Name & Number:	AHA No.	Date:	New:
Location:	Contractor:		Revised:
Required Personal Protective Equipment		Analysis by:	Date:
	Superintendent/Competent Person	Reviewed by:	Date:
Work Task/Activity:		Approved by:	Date:

Job Step	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements

Training Requirements:

All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity and review it with their Supervisor during their Daily Safety Huddle.

6.4 SAFETY SYSTEMS ANALYSIS

Parsons/O'Brien & Gere Safety Managers use the safety systems analysis for field staff and subcontractors whose work requires that they be on site for more than six months. The analysis provides management with a rating that reflects the safety and health program effectiveness. Appendix B1 to the SHARP Management manual provides the program, protocol, and methodology.

6.5 REMEDIATION SITE INSPECTION

The remediation site inspection is a protocol designed to identify and correct unsafe acts or conditions in the scope of work conducted by either Parsons/O'Brien & Gere or any subcontractor.

The Parsons/O'Brien & Gere Project Manager or designee must conduct regular safety inspections. The Project Safety Representative maintains the original audit documentation on file.

The Parsons/O'Brien & Gere Project Manager, Field Engineer, or Safety Representative tours the work area and makes daily observations and notes noncompliance on a daily inspection report in accordance with Section 25 of the SHARP Management manual. Items found to be out of compliance must be assigned corrective action and tracked to completion.

Appendix B2 in the SHARP Management Manual provides a Construction Site Audit Guide which can be modified to site conditions.

6.6 DAILY SITE WALK CHECKLIST

Depending on the scope of work, type of activities (i.e. low risk versus high risk) and duration of the project, the Project Manager or their designee shall conduct a daily safety site walk using the Remediation Safety and Health Inspection Checklist (see Appendix) to identify problem areas. Items found to be out of compliance must be assigned corrective action and the corrective action tracked to completion.

6.7 SAFETY AND HEALTH ENFORCEMENT

Parsons/O'Brien & Gere and its subcontractors enforce all applicable requirements of OSHA 1910 and 1926 as well as EM 385.1, where applicable. In addition, subcontractors must comply with and enforce Parsons/O'Brien & Gere site requirements.

Parsons/O'Brien & Gere and its subcontractors have written progressive disciplinary systems available for review in the respective Human Resources departments.

6.8 NOTICE OF VIOLATION OF SAFETY AND HEALTH REGULATIONS

The project has a formal notice of subcontractor violation of safety and health regulations program to ensure that violations are issued in an immediately dangerous to life and health (IDLH) situation or when the subcontractor repeatedly fails to comply with safety and health requirements.

The notice (see Appendix) documents poor performance and requires a response from subcontractor senior management. The notice contains five distinct levels of discipline, from submission of a recovery plan to contract termination.

6.9 COMPETENT FIRST AID PERSON

The OSHA Regulations (29 CFR 1910.151 and 1926.50) state the employer shall ensure the ready availability of medical personnel for advice and consultation on matters of occupational health. In the absence of an infirmary, clinic, hospital, or physician, that is reasonably accessible in terms of time and distance to the worksite (i.e. 4 minutes for activities that can be expected to result in an accident involving suffocation, severe bleeding, or other life threatening or permanently disabling injury or illness and 15 minutes for other types of injuries), which is available for the treatment of injured employees, a person who has a valid certificate in first-aid training from the U.S. Bureau of Mines, the American Red Cross, or equivalent training that can be verified by documentary evidence, shall be available at the worksite to render first aid. First-aid supplies must be accessible for immediate use and be of sufficient size and number to handle common first aid incidents.

There are an estimated 5.6 million workers in the health care industry and related occupations that are at risk of occupational exposure to bloodborne pathogens, including human immunodeficiency virus (HIV), hepatitis B virus (HBV), hepatitis C virus (HCV), and others. All occupational exposure to blood or other potentially infectious materials (OPIM) place workers at risk for infection with bloodborne pathogens. OSHA defines blood to mean human blood, human blood components, and products made from human blood. Other potentially infectious materials (OPIM) means: (1) The following human body fluids: semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid, saliva in dental procedures, any body fluid that is visibly contaminated with blood, and all body fluids in situations where it is difficult or impossible to differentiate between body fluids; (2) Any unfixed tissue or organ (other than intact skin) from a human (living or dead); and (3) HIV-containing cell or tissue cultures, organ cultures, and HIV- or HBV-containing culture medium or other solutions; and blood, organs, or other tissues from experimental animals infected with HIV or HBV.

If you are designated as a competent first aid person, you need to know how to effectively protect yourself against potential bloodborne pathogens, because understanding simple precautions can greatly minimize your chances of contracting a bloodborne disease. Practicing universal (standard) precautions refers to assuming that any and all blood or body fluids are contaminated and taking all safety measures to avoid transmission of a disease. Properly cover open cuts and skin abrasions. Never eat, drink, store food, smoke, handle contact lenses or apply cosmetics or lip balm in potential exposure areas. Wash hands and exposed skin immediately after an exposure incident, and after removing gloves. Utilize engineering controls to reduce exposure to bloodborne pathogens by removing, eliminating or isolating the hazard. Wear gloves, eye/face protection and mask when working with blood or a splash potential. Check gloves for tears, holes or punctures, and remove immediately when penetrated. Clean up spills and body fluids by carefully covering with a paper towel, gently pouring a 10% bleach solution over towels, and leaving it in place for 10 minutes. Use mechanical means, not your hands to pick up broken glass that is tainted with blood. Dispose of blood products, medical waste, gloves and equipment in properly labeled and approved biohazard containers. Clean wounds with soap and water. Flush eyes and mucous membranes with water or normal saline solution. Notify the site safety representative or your supervisor immediately and complete an incident report. Also, see Attachment 4.

SECTION 7 – SAFETY TRAINING

7.1 PROJECT SAFETY ORIENTATION

All personnel, including subcontractors and visitors, on a project must receive a HASP orientation (see Appendix) prior to starting work or accessing the site and sign an acknowledgment form indicating they received and understood the orientation. Any individual who is unsure of any information presented in the orientation must request clarification. Individuals who do not participate in the orientation or refuse to sign the acknowledgment cannot work on or access the site.

Topics covered in the PSP orientation include:

- Names of personnel responsible for site safety and health
- Reporting emergencies, incidents and unsafe conditions
- Emergency/evacuation plans
- Safety, health and other hazards at the site
- Review of all activities on site and related Activity Hazard Analyses (AHAs)
- Proper use of personal protective equipment
- Work practices by which a worker can minimize risk from hazards
- Safe use of engineering controls and equipment on site
- Acute effects of compounds at the site
- Decontamination procedures

The PSP Training-Medical Records spreadsheet (see Appendix) shall include personnel that receive a PSP Orientation. Orientations will be required every 12 months

All visitors must receive a brief orientation as described in Section 4.2, and be escorted by the Project Manager, Project Engineer, Project Safety Representative or a designee familiar with the potential hazards on the project and has received an orientation.

Subcontractors must conduct similar orientations for their staff and craft employees and must document all orientations using the Employee/Subcontractor Training Acknowledgement and sample form (see Appendix). The Project Manager maintains the orientation documents and acknowledgement forms.

The PSP Orientation template (Attachment 9) shall be used to develop a site-specific HASP Orientation. The HASP Orientation is designed to be a stand-alone document so that the same information would be discussed no matter who provides the Orientation. It must be specific and developed prior to starting the work and included with this HASP as Attachment 9.

7.2 PARSONSU SAFETY MODULES AND START TRAINING – ZERO INCIDENT TECHNIQUES

Consistent with Parsons corporate initiatives in safety training, the work Assignment Project Manager will identify all Parsons personnel that shall be current in the completion of safety modules on ParsonsU. The Project Manager will also identify Parsons/O'Brien & Gere and subcontractor personnel that should receive START training to further Parsons/O'Brien & Gere' goal of zero incidents. The GBU and Division Safety Manager serve as the certified trainers for

periodic START training sessions for new personnel. They should be contacted if personnel need to receive training.

7.3 DAILY TOOLBOX SAFETY MEETINGS

Daily toolbox safety meetings are held with all personnel at the beginning of each shift to review current site conditions, incidents or injuries from the previous shift activities, safe or at-risk observations from the previous shift, work activities planned for the current shift, anticipated hazards, engineering controls-work practices-PPE to protect against hazards and any additional safety topic or comments. Supervisors should always ask whether any workers have questions before they are released for work.

Toolbox safety meetings shall be documented and signed by all individuals accessing the site using a Safety Meeting Sign-In Sheet.

7.4 ACTIVITY HAZARD ANALYSIS TRAINING

When the activity hazards analysis is complete, the Parsons/O'Brien & Gere Project Manager/Engineer/Supervisor or subcontractor conducts a training session with all employees involved with the analyzed task. The training may be informal and at the site where the task is performed. Employees should be given an opportunity to provide input regarding task steps, hazards identified, and appropriate control measures.

The Activity Hazard Analyses (AHAs) to be reviewed will be determined on a work assignment basis.

7.5 REGULATORY TRAINING PROGRAMS

OSHA regulations require specific training in certain circumstances. Based on the scope of work and meetings with regulatory officials, the following training topics are provided on the Program:

Hazard Communication – as per 29 CFR 1910.1200

HAZWOPER – all workers engaged in activities which are potentially exposed to hazardous substances and health hazards must be trained to meet 1910.120(e)(1). Annual 8-hour refresher training as per 29 CFR 1910.120(e)(3) is required for workers and supervisors must be trained to meet 29 CFR 1910.120(e)(4).

AED/CPR/First aid/Bloodborne Pathogens – provided to personnel based on project activities identified in the Scope of Work (i.e. life threatening) and EMS response time (i.e. less than 15 minutes). See Section 6.9 and Attachment 4.
Respiratory protection – as per 29 CFR 1910.134. Medical qualification by a physician is required to wear a respirator. Annual fit testing and training is also required.
Power-operated hand tools.

Confined space entry – Supervisor must be trained to meet 29 CFR 1926.651(j).

Lockout/tagout – as per 29 CFR 1910.147.

Asbestos abatement – as per 29 CFR 1926.1101.

Scaffold use – as per 29 CFR 1926.451.

Excavation/trenching – as per 29 CFR 1926.651.

The Work Assignment Project Manager determines the necessary training in accordance with Section 24 of the SHARP Management manual and coordinates the training with the Project Safety Representative.

7.6 OSHA Outreach Programs

When applicable, the project may use qualified instructors and online courses to conduct OSHA 10-hour construction safety training. If applicable, supervisory staff must complete the 30-hour course. Depending on the scope of work, similar requirements may be included in all subcontracts. Participants successfully completing the course receive a certificate of completion from OSHA.

For this Program, OSHA 10-hour construction safety training may be required on individual work assignments. Supervisory staff will not be required to complete the 30-hour course

7.7 Specialized Training and Orientations

Project personnel may be required to receive specialized training or complete a facility orientation on client rules and requirements as well as the unique tools, equipment, and procedures used to perform the work.

SECTION 8 – RECORDKEEPING AND POSTING

Parsons/O'Brien & Gere and its subcontractors must comply with the recordkeeping requirements of OSHA, Owner, Parsons/O'Brien & Gere, and this safety program, including:

- OSHA 300 logs
- Medical treatment and follow-up
- Cranes
- Heavy equipment inspection logs
- Fall protection training
- Inspections
- Audits
- Others as required

The Program Manager is the official record keeper for files relating to Parsons/O'Brien & Gere employees. Each subcontractor maintains its files.

For this project, safety bulletin boards used for displaying OSHA posters in conspicuous places as required by OSHA will be located at each participating office and in field trailers when applicable.

The OSHA Form 300A for the GBU shall also be posted from February 1 – April 30 of each calendar year.

SECTION 9 – SAFETY AND HEALTH REQUIREMENTS

9.1 COMPETENT PERSON AND ACTIVITY HAZARDS ANALYSIS

Table 9-1 in the Appendix represents OSHA, client, and Parsons corporate regulations for Competent Person and Activity Hazards Analysis requirements. Parsons/O'Brien & Gere and its subcontractors are individually responsible for training their respective employees and for complying with all project requirements.

9.2 ENVIRONMENTAL HAZARDS

9.2.1 Heat Related Illness

Project activities may take place during time periods where exposure to temperature extremes could occur. In order to minimize exposure to temperature extremes, project personnel shall be familiar with the health effects of exposure to temperature extremes and the control measures that can minimize exposure. Personnel wearing impermeable protective clothing when ambient temperatures exceed 70F will be subject to a heat stress monitoring program (see Appendix).

For this project, personnel may be required to wear impermeable protective clothing or respirators when ambient temperatures exceed 70F dependent on specific wrok assignment requirments.

Training shall be provided to all employees to recognize heat illness hazards before starting to work outdoors.

Any employee experiencing or witnessing signs and/or symptoms of a heat related illness shall report the findings to their supervisor immediately.

Supervisors shall understand the procedures to follow when an employee exhibits symptoms consistent with heat illness, including emergency response.

Definitions

Acclimatization - a temporary adaption of the body to work in the heat that occurs gradually when a person is exposed to it. Acclimatization peaks in most people within 4-14 days of regular work for at least 2 hours per day in the heat.

Environmental Risk Factors - working conditions that create the possibility that heat illness could occur, including air temperature, relative humidity, radiant heat from the sun and other sources, conductive heat sources such as the ground, air movement, workload severity and duration, protective clothing and personal protective equipment worn by employees.

Heat Illness - a serious medical condition resulting from the body's inability to cope with a particular heat load, and includes heat cramps, heat exhaustion, heat syncope and heat stroke.

Heat Wave - a sudden and temporary rise of temperature above the seasonal average for a particular region, which lasts for a prolonged period of time. A heat wave can greatly increase the risk of heat related illnesses.

Personal Risk Factors - an individual's age, degree of acclimatization, health, water consumption, alcohol consumption, caffeine consumption, and use of prescription medications that affect the body's water retention or other physiological responses to heat.

Preventive Recovery Period - a period of time to recover from the heat in order to prevent heat illness.

Shade - blockage of direct sunlight. Canopies, umbrellas and other temporary structures or devices may be used to provide shade. One indicator that blockage is sufficient is when objects do not cast a shadow in the area of blocked sunlight. Shade is not adequate when heat in the area of shade defeats the purpose of shade, which is to allow the body to cool. For example, a car sitting in the sun does not provide acceptable shade to a person inside it, unless the car is running with air conditioning.

Signs and Symptoms of Heat Illnesses

Heat Rash – or prickly heat, occurs in hot and humid environments where sweat is not removed from the skin. Usually disappears when worker returns to cool environment.

Heat Cramps – muscle contractions from the loss of fluids /electrolytes due to sweating. Occurs when workers perform hard physical labor in a hot environment. Most common in the arms and legs. Cramping can occur after work has stopped.

Heat Exhaustion – inadequate blood circulation from stress due to constant heat. The whole body, especially the circulatory system, is extremely stressed. Possible symptoms include: pale, flushed face and neck; clammy skin; heavy sweating; fatigue; shortness of breath; headache; dizziness or fainting; nausea and vomiting; and rapid heartbeat and breathing.

Heat Stroke – body's failure to regulate its' temperature. The most serious stage of heat illness. Symptoms include: dizziness and confusion, red, hot, dry skin; nausea and vomiting; very little sweating; rapid pulse; high body temperature, 105° F or higher; convulsions, and fainting.

Heat Illness Prevention

Prevention of heat related illness in extreme temperature project personnel shall consider implement a Physiological monitoring program, include monitoring with a WBGT and implementing work rest regiments. The field team shall be encouraged to drink plenty of liquids to replenish electrolytes. The field team shall also, construct a shaded rest area for workers to take breaks.

Prevention of heat related illness may call for establishing work teams to rotate to minimize heat related illnesses.

Heat Illness Treatment

Heat Cramps - take water every 15 to 20 minutes. Drinking an electrolyte replacement (like Gatorade) may help.

Heat exhaustion - Get medical help. Don't leave the person alone. While waiting, remove worker to cool place to rest; remove as much clothing as possible; give water and electrolytes; and don't allow person to get chilled.

Heat Stroke – Call 911 immediately. While awaiting medical help, get victim into cool area, fan vigorously, apply cool water to clothing or skin, and apply ice packs under arms and to the groin area.

Heat Waves

Heat illness prevention during heat waves means taking extra measures.

More vigilance - supervisors/employees watch others very closely and provide more frequent feedback during work activities. Site workers shall avoid working alone and utilize the "Buddy System", watch each other and closely monitor/report an employees' condition. Personnel shall be accounted for their whereabouts throughout the work shift and at the end of the day.

More water - employees should drink small quantities of water more frequently before, during and after work. There should be extra supplies of water for replenishment, encourage employees to consult with their doctor on salt/mineral replacement.

More cooling - use other cooling measures in addition to shade, spraying body with water/wiping with wet towels and taking additional/longer breaks in the shade.

Change schedule - work activities may be started earlier on later in the evening, split-up work shifts and avoid working during the hotter parts of the day. Work shifts can be cut short or stop work.

Change meals - encourage employees to eat smaller/or more frequent meals (less body heat during digestion than with big meals), choose foods with higher water content (for example, fruits, vegetables and salads).

Acclimatization warning - personnel should allow the body time to adjust to sudden, abnormally high temperatures or other extreme conditions. Even employees previously fully acclimatized are at risk for heat illness.

Environmental and Physiological Factors

- Average ambient air temperature 96ºF (75-116ºF)
- Average humidity 29% (12% - 55%)
- Average wind speed 7 mph
- Average core body temperature 104ºF (98 -108ºF)

Provision of Water

Sufficient amounts of cool water shall be available and replenished at all times w/at least one quart per employee per hour for the entire shift.

Easy access to clean and cool water shall be available to encourage frequent drinking.

Access to Shade

A Preventative Recovery Period (PRP) is necessary if an employee is suffering from heat illness or believes that a rest break is needed to recover from the heat.

Access to shade shall be permitted at all times. Employees shall have access to an area with shade that is either open to the air or provided with ventilation or cooling for a period of no less than 5 minutes.

Measurement

Portable heat stress meters or monitors are used to measure heat conditions. These instruments can calculate both the indoor and outdoor WBGT Index according to established ACGIH Threshold Limit Value equations. With this information and information on the type of work being performed, heat stress meters can determine how long a person can safely work or remain in a particular hot environment.

Additional Guidance

Cal/OSHA - http://www.dir.ca.gov/DOSH/HeatIllnessInfo.html

NIOSH - http://www.cdc.gov/niosh/topics/heatstress

SECTION 10 – APPENDIX

10.1 FORMS

10.2 STOP WORK AUTHORITY

PARSONS

4721 Hedgemore Drive ● Charlotte, North Carolina 28209 ● (704) 529-6946 ● Fax (704) 529-6974

April 15, 2011

TO: ALL PARCOMM EMPLOYEES AND SUBCONTRACTORS

Re: **Stop Work Authority and Responsibility**

Dear Team Members:

We want you to share our belief that all accidents are preventable and that no job is worth doing unless we do it with a 100% commitment to safety. The SHARP Management program is based on our nine ZERO Incident Techniques. One of those key techniques is worker involvement and participation. We ask that you take the time to execute every task safely and correctly.

Our expectation of worker involvement and participation is directly related to the concept of Stop Work Authority and Responsibility. Keep your eyes open at all times, and notice your surroundings and what everyone around you is doing. If you see anything that raises a safety concern, know that you are authorized to STOP WORK IMMEDIATELY until that activity can be further evaluated and completed safely.

We ask you to remember that we ALWAYS:

- Understand and remain within the planned scope of work
- Operate in accordance with our Project Safety Plans and Activity Hazard Analysis
- Follow safe work practices and procedures, including proper use of safety devices and personal protective equipment
- Meet or exceed our customers' safety expectations
- Involve the right people in decisions that affect procedures and equipment so that change can be effectively and safely managed

This is our commitment to you: that you have both the authority and the responsibility to stop work at any time to protect your safety and health, the safety and health of everyone around you, and the environment. You must take this action, and we want you to know that you can take it without fear of repercussions. Please take a moment to sign the enclosed team poster to confirm your commitment to the Stop Work principle.

Best regards,

Michael Walsh
President

Sharon Barreras
Operations, SVP

10.3 SUBCONTRACTOR SAFETY PLANS (SSPS)

A list of approved Work Assignment specific Subcontractor Safety Plans (SSPs) or copies of the SSPs prepared in accordance with Section 1.3 should be included in this section.

Parsons/O'Brien & Gere

SAFETY TRAINING, HAZWOPER TRAINING AND MEDICAL INFORMATION

INDIVIDUAL INFORMATION					SITE SPECIFIC	HAZWOPER TRAINING				MISCELLANEOUS SAFETY TRAINING										MEDICAL INFORMATION					
NAME (Last, First)	COMPANY NAME	JOB TITLE	TYPE OF ACTIVITY	TYPE OF ACCESS	Annual PSP/HASP Orientation Date	40-hr. Trainin	24-hr. Trainin	8-hr. Supervisor Trainin	Annual 8-hr. Refresher Expires	AED Expires	CPR Expire	First Aid Expire	Bloodborne Pathogens Expires	DOT Training Expires	Excavation Competent Persor	Scaffold Competent Person	Confined Space Entry Training	Forklift Operation Expires	LPS Trainin	Medical Examination Expires	Respirator Clearance Expires	Respirator Fit Test Expires	Respirator Manufacturer - Type/Size	Drug Test	Alcohol Test
Doe, John	Parsons	Inspector	Non-engaged	Escort Only	5/1/05	n/a	1/2/90	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Doe, Jane	XYZ Contractor	Laborer	Engaged	Unrestricted	2/1/04	1/2/91	n/a	n/a	1/1/05	2/1/06	2/1/06	2/1/06	2/1/07	6/1/05	5/1/97	5/1/97	8/1/99	n/a	n/a	5/1/06	5/1/06	5/1/06	MSA - FF/MED	4/12/05	4/12/05

PARSONS/O'Brien & Gere
Pre-Field Work Safety Meeting

Date:		Project/Location:	
Subcontractor Representative:		Parsons/O'Brien & Gere Project Manager:	
Phone:		Phone:	
Subcontractor Safety Rep:		Parsons/O'Brien & Gere Safety Manager:	
Phone:		Phone:	

The following items were identified and reviewed with the subcontractor.

Health & Safety		Medical	
Site-Specific Safety Plans/Model Program		Substance Abuse Screening	
Competent/Qualified Person Documentation		Emergency Procedures	
Safety Audits/Inspections		Site Security	
Subcontractor Responsibilities		Smoking Policy	
Site Orientation Requirements		Medical Services Requirements	
Mobilization/Kickoff Safety Meeting/Date		Treatment Locations/Addresses/Phone List	
Crane Inspection Certification		Other	
Personal Protective Equipment (PPE)			
Environmental Hazards			
Other			

Additional Notes/Comments:

PARSONS/O'Brien & Gere

Employee/Subcontractor Training Acknowledgement

Name of Trainer: _____

Training Subject: _____

Training materials used: _____

Name of employee: _____

Date of hire/assignment: _____

I, _____, hereby certify that I have received training as described above in the following areas:

- Names of personnel responsible for site safety and health.
- Safety, health or other hazards at the site.
- The proper use of personal protective equipment.
- The potential occupational hazards in general in the work area and associated with my job assignment.
- Work practices by which a worker can minimize risks from hazards.
- Safe use of engineering controls and equipment on the site.
- Acute effects of compounds on the site.
- Decontamination procedures.
- General safety requirements indicate the safe work conditions, safe work practices and personal protective equipment required for my work.
- The hazards of any chemicals to which I may be exposed and my right to information contained on material safety data sheets for those chemicals, and how to understand this information.
- My right to ask questions, or provide any information to the employer on safety either directly or anonymously without any fear of reprisal.
- Disciplinary procedures the employer will use to enforce compliance with general safety requirements.

I understand this training and agree to comply with general safety requirements for my work area.

_____ _____

Employee Signature Date

PARSONS/O'Brien & Gere
Risk Mitigation Two-Week Look-Ahead Form

Safety plan for week ending:	_____	Subcontractor:	_____
Project/ Location:	_____	Meeting date:	_____
Plan Prepared by:	_____	Dated:	_____

Next Two Weeks Scope of Work:

Identified Risks/Exposures/Hazards:

Control Measures:

Additional Activity Hazards Analysis Required:

Subcontractors Mobilizing/Demobilizing:

Audit/Inspections Scheduled:

Competent Person Changes:

Planned Orientation/Training :

Recommendations/Comments/Concerns:

Note: This information should be incorporated into the meeting minutes.

Safety Meeting Sign-In Sheet

Safety Meeting Presenter: _____ Date: _____

Current Weather Conditions:

Temperature (^{o}F) = _____ Wind Direction = _____ Wind Speed = _____

Clear - Sunny – Cloudy – Rain - Snow Forecast = _____

Current Site Conditions (circle as appropriate):

Dry - Wet - Muddy - Frozen - Snow Covered - Other (describe) _____

1. Incidents or Injuries to report from Previous Day Activities: No □ Yes □ - explain below:

_____

2. Safe and/or At-Risk Observations from Previous Day Activities:_____

_____

_____

3. Activities Taking Place Today: _____

_____

_____

3. Anticipated Hazards: _____

_____

_____

4. Engineering Controls-Work Practices-PPE to Protect Against Hazards: _____

_____

_____

5. Additional Safety Topic or Comments: _____

_____

PRINTED NAME	SIGNATURE	COMPANY	LAST 4 DIGITS OF SS #

PARSONS/O'Brien & Gere
Notice of Noncompliance with Safety and Health Regulations

Under conditions of this enforcement procedure check all items that apply:

_____ 1. You are being notified of this violation and should take corrective action to prevent a reoccurrence. The corrective action shall be documented to the Parsons/O'Brien & Gere Construction Management representative immediately.

_____ 2. You must submit a plan for compliance to your Parsons/O'Brien & Gere Construction Management representative and the Construction Safety Manager within two days of receipt of this letter. The compliance plan must include the means or methods of compliance and the date that the requirements for compliance will be completed. Once compliance has been achieved, a follow up letter must be sent to the Parsons/O'Brien & Gere Construction Management representative and Construction Safety Manager. Failure to comply will result in disciplinary action against your Company.

_____ 3. You are required to review the stated procedures with your Parsons/O'Brien & Gere Construction Management representative. Work may not commence on the site until the review is complete and the Subcontractor responds formally that the procedure is understood and will comply.

_____ 4. You are required to review the stated procedures with your Parsons/O'Brien & Gere Construction Management representative. Work may not commence on the site until the review is complete and you must confirm formally the disciplinary action to be taken against the supervisor and employees.

_____ 5. All work on the site will stop until the Parsons/O'Brien & Gere Construction Management representative reviews all the facts with the Subcontractor and determines if the contract between the parties will be terminated.

Sincerely,

_____
Parsons/O'Brien & Gere Representative

cc: Issuing Construction Manager Representative
Job File
GBU Safety Manager
Project Manager

PARSONS/O'Brien & Gere

Notice of Subcontractor Violation of Safety and Health Regulations

Date: _____

Contractor Name: _____
Address: _____

_____

_____

Attention: _____

This letter officially notifies you that you have been found to be in violation of the following Safety Regulations:

_____

on (date) _____, by_____.

Confined Space Entry	___	Lockout/Tagout	___	Hot Work	___	Personal Protective Equipment	___
Knowledge of the environment	___	Awareness of warning alarms	___	Evacuation routes	___	Back-up Alarms	___
Assembly locations	___	Fall Protection	___	Scaffolding	___	Environmental/Hazardous Material Storage	___
Trenching	___	Safe Work Practices	___	Security Practices	___		

Other: _____

_____

_____

This/These violations occurred at the following locations: _____

_____

at the following times_____ and dates _____

The name of the employees was/were _____

under the supervision of_____.

Safety and Health Inspection Checklist

Project: _____ Date: _____

Name: _____ Time: _____

Any items that have been found deficient must be corrected before work or use.

This checklist includes, but is not limited to, the following:

	Yes	No
Safe Access and Workspace		
Are safe access and adequate space for movement available for:		
Emergencies		
Work area		
Walkways and passageways		
Are ladders, stairways, and elevators properly located and functioning?		
Is protection provided for floor and roof openings?		
Is overhead protection provided for all areas of exposure?		
Is lighting adequate?		
Planning Work for Safety		
Are employees provided with all required protective equipment?		
Have other contractors and trades been coordinated with to prevent congestion and avoid hazards?		
Is all temporary flooring, safety nets, and scaffolding provided where required?		
Utilities and Services Identification		
High voltage lines		
Have all been identified by signs?		
Have high voltage lines been moved or de-energized, or barriers erected to prevent employee contact?		
Sanitary Facilities		
Drinking water		

	Yes	No
Are toilet facilities adequate?		
Work Procedures – Materials Handling		
Is material handling space adequate?		
Is material handling equipment adequate and proper?		
Is material handling equipment in good condition?		
Other (e.g., tunnels, excavations, shafts)		

Comments:

PARSONS/O'Brien & Gere

Activity Hazards Analysis Training Record

JOB NUMBER_____

AHA NUMBER_____

JOB LOCATION_____

DATE:_____

NAME OF TRAINER:_____

SUBJECTS COVERED:_____

_____

_____

_____

TRAINING AIDS USED:_____

_____

_____

ATTENDEES (PLEASE SIGN NAME LEGIBLY):

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

(Use additional sheets if necessary)

PARSONS/O'Brien & Gere
Mobilization/Kickoff Safety Meeting

Date: _____ Project/Location: _____

Parsons/O'Brien & Gere Representative: _____Subcontractor Representative: _____

The following project site safety, health and security requirements, procedures, and hazards have been identified and reviewed with the Subcontractor.

PSP/SSP/Emergency Planning/Response Plan			Demolition	
Competent/Qualified Person			Personal Protective Equipment	
Hazardous Materials/Waste			Cranes/Hoists/Annual Inspection Certificate	
Vehicle/Heavy Equipment			Overhead Power Lines	
Lockout/Tagout			Confined Spaces (Permit/Non-Permit)	
Electrical			Excavations/Trenching	
Fire Protection			Site Security/Visitor Control/Public Exposure	
Hot Work/Welding/Cutting			Hazard Communication - MSDSs	
Fall Protection/Guardrails/ Scaffolding/Ladders			Permits (Excavation/Scaffolding/Demolition/Traffic/ Confined Space/etc.)	

Additional Project Concerns:

_____

_____

_____

_____

_____

Other Attendees:

Name	Title	Company

PARSONS/O'Brien & Gere
Subcontractor Competent Person Form

Definition

A competent person is a person having the ability to recognize existing and predictable hazards and having the authority to correct them.

Responsibility

The designated subcontractor competent person is responsible for recognizing and correcting safety risks/hazards. This person has the authority to stop work in a potential safety concern on the jobsite. This Subcontractor Manager and competent person are considered the contacts for Parsons/O'Brien & Gere projects.

This form must be completed by each subcontractor's manager and the subcontractor's designated competent persons. ***Where a subcontractor is responsible for multiple crafts, it will be necessary to maintain additional designated competent persons and forms.*** Each subcontractor on a Parsons/O'Brien & Gere project must submit this completed form to the Parsons/O'Brien & Gere Construction Manager before beginning work on the project and must update it any time the designated representative(s) changes.

Acknowledgment

I,_____ representing, _____
Subcontractor Manager **Subcontractor Company Name**
have assigned _____ to be the competent person in the areas indicated and I
_____ Subcontractor Competent Person acknowledge that this individual has been thoroughly trained and is experienced in hazard recognition and has the authority to stop work and correct hazards in the event of a potential hazardous or imminent danger situation.

_____ _____
Subcontractor Manager (Signature) **Date**

I, _____ acknowledge that I have been thoroughly trained and have the experience
Competent Person (Signature)
to perform the duties as the _____ competent person in the areas marked below and
Subcontractor Company Name
I understand that I have the responsibility and authority to correct hazards and to stop work in the event of a potential hazardous or imminent danger situation.

Asbestos	Hearing Protection	Welding/Cutting
Respiratory Protection	Scaffolding	Rigging
Cranes/Derricks	Electrical	Lead
Fall Protection	Ladders	Excavations/Trenches
Demolition	Tunnels/Shafts	First Aid/CPR
Underground Const.	Material/Personnel Hoists	Concrete/Forms/Shoring
Marine Work/Diving	Bolting/Riveting/Fitting	Mechanical Demolition

PARSONS/O'Brien & Gere

Safety Performance Evaluation

1. New Employee Orientation/Training .....10 pts

   Each employee must receive training on site-specific hazards and procedures on the first day of work. For current employees, training should be conducted the first day after this program is established. Training must also include procedures for reporting all incidents and hazards. (*Employees must sign forms stating that they have been trained. 2 points are deducted for every form that is not submitted to the Safety Manager within two days of hire.*)

2. Daily Safety Huddle .....10 pts

   Every shift begins with a huddle of all workers under your supervision. Review the work to be performed during the shift. Identify the hazards involved and ask everyone to stay focused, use their protective equipment and perform all work safely. (*Spot checks are conducted to ensure that the talks occur. 2 points are deducted for each day that huddles are not conducted.*)

3. Weekly Toolbox Talks.....10 pts

   A toolbox talk must be completed once each week. Each employee must sign a sign-in sheet which describes the topic discussed. Topics and sign-in sheets can be provided by the Safety Manager. (S*ign-in sheets must be submitted to the Safety Manager each week. 5 points are deducted for weeks in which no sign-in sheet is received.*)

4. Weekly Safety Inspections.....10 pts

   A weekly inspection is performed using the checklist provided by the Safety Manager. (Signed, completed *checklists are submitted to the Safety Manager weekly. 5 points are deducted for weeks in which no checklist is received.*)

5. Personal Protective Equipment.....10 pts

   Each worker under your supervision must wear the personal protective equipment (PPE) required at all times. (*Spot* checks *are performed to ensure compliance. 1 point is deducted for every violation.*)

6. Housekeeping.....10 pts

   Work areas must be kept tidy and clear of all obstructions, tripping hazards, scrap, etc. (*Spot checks are performed to* ensure *compliance. 1 point is deducted for every violation.*)

7. Safety Enforcement .....10 pts

   Each employee is subject to following Parsons/O'Brien & Gere' safety program requirements. A violation notice must be issued to the employee for any violations. (*Spot checks are performed to ensure compliance. 1 point is deducted for every violation.*)

8. Report All Incidents .....10 pts

   All accidents must be reported to the Safety Manager within one hour. (*2 points are deducted for each late report.* Reports *over two days late receive a 5-point deduction.*)

9. Meet Safety Goals .....20 pts

   The work is conducted without injury. (*5 points are deducted for a recordable incident. 20 points are deducted for an* incident *with days away from work.*)

Evaluation Results

Scores are tabulated each month.

- 90-100 pts – Meets expectations
- 80-89 pts – Minor improvements required
- 70-79 pts – Warning/written reprimand
- Below 70 – Unsatisfactory/loss of supervisory duties

PARSONS/O'Brien & Gere

Project Manager Safety Expectations

1. Start-up Planning
   - Prepare project hazard/risk analysis
   - Budget for qualified safety oversight
   - Budget for safety training, incentives, etc.
   - Establish challenging safety goals
2. Lead by Example
   - Personally set the standard for attitude and behavior
   - Act safely at all times
   - Praise safe behavior and apply discipline fairly
3. New Employee Orientation/Training
   - Lead supervisory responsibility and authority
   - START and Zero Injury Techniques
   - Job/site specific hazards/procedures
   - Hazard and incident reporting procedures
4. Activity Hazard Analysis
   - Prepared for all significant tasks
   - Always reviewed prior to task execution
5. Safety Audits
   - Monthly in office, weekly in field
   - System to track corrective actions
6. Personal Protective Equipment
   - Identify equipment and training requirements
   - Develop inspection and maintenance plan
7. Housekeeping
   - Work areas kept tidy
   - Clearly defined standards
8. Ongoing Safety Training/Awareness
   - Maintain safety billboards at project sites
   - Hold regular safety meetings
   - Implement job specific training as needed
9. Subcontractor/Craft Labor Management
   - Include meaningful safety specs in RFPs
   - Establish qualification program
   - Require craft to be trained before arrival
   - Require/review subcontractor safety program
   - Audit subcontractor safety practices
10. Report and Investigate All Incidents
    - Report all incidents including near misses
    - Secure site and photograph immediately
    - Coordinate investigation with Company Safety Manager
    - Review, approve and understand monthly statistics
11. Incentive Programs to Recognize Safe Behavior
    - Encourage immediate recognition of safe behavior
    - Include safety component in any incentive programs
12. Alcohol/Substance Abuse Program
    - 100% Pre-employment screening of employees and subcontractors
    - Post-incident screening required for all incidents
13. Establish and Meet Safety Goals
    - Accident rates
    - Insurance losses
    - Zero regulatory violations or fine

Your Right... Your Responsibility

Every single employee has the responsibility and the authority to **STOP WORK** at any time necessary to protect the safety or health of themselves, others, and the environment. Anyone can execute this responsibility without repercussions. We believe that the **GOAL OF ZERO** is possible with everyone's support and commitment. The Parsons Safety, Health, and Risk Program (SHARP Management) formalizes our corporate ZERO INCIDENT management approach.

TOGETHER WE CAN PREVENT ALL INJURIES!

Michael Walsh
PARCOMM
President

Sharon Barreras
PARCOMM
Operations, SVP

PARSONS
SHARP Management Zero Incident Techniques:

- Demonstrated management commitment
- Staffing for safety
- Safety planning: pre-project and pre-task
- Safety training and education
- Worker involvement and participation
- Rewards and recognition
- Subcontractor management
- Accident/incident reporting & investigation
- Drug and alcohol testing

I am committed to the Goal of Zero, and I believe that all injuries can be prevented. I will do my part by executing Stop Work Authority so that the Goal of Zero can be achieved.

Competent Person and Activity Hazards Analysis Requirements

Safety and Health Requirement	OSHA Regulation	EM 385-1-1 Regulation	Competent Qualified Person-Supv	Training Required	AHA Required
1. General Safety & Health	1926.20	01.A	*Yes*	*Yes*	*Yes*
2. Safety Training	1926.21	01.B.01	*Yes*	*Yes*	*Yes*
3. Confined Spaces	1910.146; 1926.21	06.01	*Yes; Supv*	*Yes*	*Yes*
4. Confined Space Permit System	1910.146	06.01	*Yes*	*Yes*	*Yes*
5. First Aid and Medical	1926.23, 50	03.A	*Yes*	*Yes*	*Yes*
6. Fire Protection and Prevention	1926.24, 150-155, 352	09.A	*Yes*	*Yes*	*Yes*
7. Housekeeping	1926.25	14.C	*N/A*	*N/A*	*N/A*
8. Illumination	1926.26, 56	07.A	*Recommended*	*N/A*	*N/A*
9. Sanitation	1926.27, 51	02.A	*N/A*	*N/A*	*N/A*
10. Personal Protective Equipment	1926.28, 95-98, 100-107	05.A	*Yes*	*Yes*	*Yes*
11. Acceptable Certifications	1926.29		*Yes*	*Yes*	*Yes*
12. Incorporation by Reference	1926.31	Preamble	*N/A*	*N/A*	*N/A*
13. Emergency Employee Action Plans	1926.35	01.E	*Recommended*	*Yes*	*Yes*
14. Noise Exposure	1910.95; 1926.52	05.C	*Yes*	*Yes*	*Yes*
15. Radiation Protection	1926.53, 54		*Yes*	*Yes*	*Yes*
16. Gases, Vapors, Dusts and Mists	1926.55		*Yes*	*Yes*	*Yes*
17. Ventilation	1926.57, 353		*Recommended*	*Yes*	*Yes*
18. Hazard Communication	1926.59	1.B.06	*Yes*	*Yes*	*Yes*
19. Process Safety Management	1910.119; 1926.64		*Yes*	*Yes*	*Yes*
20. Hazardous Waste Operations and Emergency Response	1910.120; 1926.65	28.A	*Yes* *Supv – 8 hr*	*Yes*	*Yes*
21. Accident prevention signs and tags	1926.200	08.A	*N/A*	*N/A*	*N/A*
22. Signaling	1926.201	08.B	*Recommended*	*N/A*	*Yes*
23. Barricades	1926.202		*N/A*	*N/A*	*N/A*
24. Material Storage	1926.250	14.B	*N/A*	*Yes*	*Yes*
25. Rigging	1926.251	15.A	*Yes*	*Yes*	*Yes*
26. Waste Disposal	1926.252	14.D	*Yes*	*Yes*	*Yes*
27. Tools	1926.300-307	13.A	*N/A*	*N/A*	*Yes*
28. Gas Welding and Cutting	1926.350	10.A	*Recommended*	*Yes*	*Yes*
29. Arc Welding	1926.351	10.E	*Recommended*	*Yes*	*Yes*
30. Electrical	1926.400-415	11.E	*Yes*	*Yes*	*Yes*
31. General Electrical	1926.416	11.A	*Yes*	*Yes*	*Yes*
32. Lockout Tagout	1910.147; 1926.417	12.A	*Yes*	*Yes*	*Yes*
33. Lockout Tagout Permit System	1910.147	12.A	*Yes*	*Yes*	*Yes*
34. Maintenance of Electrical Equipment	1926.431	11A	*Yes*	*Yes*	*Yes*

Competent Person and Activity Hazards Analysis Requirements (Cont'd)

Safety and Health Requirement	OSHA Regulation	EM 385-1-1 Regulation	Competent Qualified Person	Training Required	AHA Required
35. Environmental Deterioration of Electrical Equipment	1926.432		*Yes*	*Yes*	*Yes*
36. Batteries/Battery Charging Equipment	1926.441	11.E	*N/A*	*Yes*	*Yes*
37. Scaffolding	1926.450-454	22.A	*Yes*	*Yes*	*Yes*
38. Aerial Lifts	1926.453	22.J and K	*Yes*	*Yes*	*Yes*
39. Fall Protection	1926.500-503	21.A	*Yes*	*Yes*	*Yes*
40. Cranes, Derricks, Hoists, Elevators and Conveyors	1926.550	16.A	*Yes*	*Yes*	*Yes*
41. Motor Vehicles, Mechanized Equipment	1926.600-603	18.A	*Yes*	*Yes*	*Yes*
42. Powered Industrial Trucks (forklifts)	1910.178		*Yes*	*Yes*	*Yes*
43. Site Clearing	1926.604	31.A	*N/A*	*Yes*	*Yes*
44. Marine Operations and Equipment	1926.606	16.F	*Yes*	*Yes*	*Yes*
45. Excavations	1926.650-652	25.A	*Yes*	*Yes*	*Yes*
46. Excavation Permit	N/A	N/A	*Yes*	*Yes*	*Yes*
47. Concrete and Masonry Construction	1926.700-706	27.A	*Yes*	*Yes*	*Yes*
48. Steel Erection	1926.750-761 and SENRAC		*Yes*	*Yes*	*Yes*
49. Underground Construction	1926.800	26.A	*Yes*	*Yes*	*Yes*
50. Caissons	1926.801	26.H	*Yes*	*Yes*	*Yes*
51. Cofferdams	1926.802		*Yes*	*Yes*	*Yes*
52. Compressed Air	1926.803	26.I	*Yes*	*Yes*	*Yes*
53. Demolition	1926.850-860 inclusive	23.A	*Yes*	*Yes*	*Yes*
54. Power Transmission and Distribution	1926.950-960 inclusive	11.H	*Yes*	*Yes*	*Yes*
55. Rollover Protective Structures; Overhead Protection	1926.1000-1003 inclusive		*N/A*	*N/A*	*Yes*
56. Stairways and Ladders Scope	1926.1050	21.A	*N/A*	*Yes*	*Yes*
57. S/L General Requirements	1926.1051		*Yes*	*Yes*	*Yes*
58. Stairways	1926.1052	21.E	*Recommended*	*Yes*	*N/A*
59. Ladders	1926.1053	21.D	*Yes*	*Yes*	*Yes*
60. Ladder/Stair Training	1926.1060		*Yes*	*Yes*	*Yes*
61. Diving Scope	1926.1071-1072	30.A	*Yes*	*Yes*	*Yes*
62. Dive Team Quals	1926.1076	30.A.08	*Yes*	*Yes*	*Yes*
63. Dive Safe Practices Manual	1926.1080	30.A.16	*Yes*	*Yes*	*Yes*
64. Pre-dive Procedures	1926.1081		*Yes*	*Yes*	*Yes*
65. Procedures During Dive	1926.1082	30.A.15	*Yes*	*Yes*	*Yes*

Competent Person and Activity Hazards Analysis Requirements (Cont'd)

Safety and Health Requirement	OSHA Regulation	EM 385-1-1 Regulation	Competent Qualified Person	Training Required	AHA Required
66. Post Dive Procedures	1926.1083	30.A.22	*Yes*	*Yes*	*Yes*
67. SCUBA Diving	1926.1084	30.B	*Yes*	*Yes*	*Yes*
68. Surface-Supplied Air Diving	1926.1085	30.A.04	*Yes*	*Yes*	*Yes*
69. Mixed-gas Diving	1926.1086	30.D	*Yes*	*Yes*	*Yes*
70. Live boating	1926.1087	30.A.05	*Yes*	*Yes*	*Yes*
71. Diving Equipment	1926.1090	30.E	*Yes*	*Yes*	*Yes*
72. Diving Recordkeeping Requirements	1926.1092	30.A.06	*Yes*	*Yes*	*Yes*
73. Internal Traffic Control	N/A	8.D	*N/A*	*Yes*	*Yes*
74. Traffic Movement Restriction Times	N/A	8.C	*N/A*	*Yes*	*Yes*
75. Line Breaking	1910.119, 1926.54		*Yes*	*Yes*	*Yes*
76. Major Material Movements	N/A	N/A	*N/A*	*Yes*	*Yes*
77. Right-of-way Restrictions	N/A	N/A	*N/A*	*Yes*	*Yes*
78. Bicycles/Golf Carts	N/A	18.D	*N/A*	*Yes*	*N/A*
79. IIPP/SSPP	Cal 3203	Cal 3203	*Yes*	*Yes*	*Yes*

HEAT STRESS AND HEAT STRESS MONITORING

Physiological and behavioral monitoring of personnel wearing clothing that differs from the ACGIH standard ensemble of permeable clothing (i.e. cotton or synthetic work clothes) in insulation value and/or wind and vapor permeability should commence when the temperature in the work area is above 70°F (21°C). Table 2.2 presents the suggested frequency for such monitoring. Monitoring frequency should increase as ambient temperature increases or as slow recovery rates are observed. Heat stress monitoring should be performed by a qualified individual, who shall be able to recognize symptoms related to heat stress.
To monitor the workers, be familiar with the following heat-related disorders and their symptoms:

- **Prickly Heat** (Heat rash)
  - Painful, itchy red rash. Occurs during sweating, on skin covered by clothing.
- **Heat Cramps**
  - Painful spasm of arm, leg or abdominal muscles, during or after work.
- **Heat Exhaustion**
  - Headache, nausea, dizziness. Cool, clammy, moist skin. Heavy sweating. Weak, fast pulse. Shallow respiration, normal temperature.
- **Heat Fatigue**
  - Weariness, irritability, loss of skill for fine or precision work. Decreased ability to concentrate. No loss of temperature control.
- **Heat Syncope** (Heat Collapse)
  - Fainting while standing in a hot environment.
- **Heat Stroke**
  - Headache, nausea, weakness, hot dry skin, fever, rapid strong pulse, rapid deep respirations, loss of consciousness, convulsions, coma. **This is a life threatening condition.**

Do <u>not</u> permit a worker to wear a respirator, a semi-permeable or impermeable garment when they are showing signs or symptoms of a heat-related illness. An individual may be at greater risk if profuse sweating is sustained over hours. Thus, discontinue exposure to heat stress.

If a worker appears to be disoriented or confused, or suffers inexplicable irritability, malaise, or flu-like symptoms, the worker should be removed for rest in a cool location with rapidly circulating air and kept under skilled observation. If sweating stops and the skin becomes hot and dry, immediate care with hospitalization is essential.

To monitor the worker, measure their heart rate and oral temperature:

- **Heart rate**. Count the radial pulse during a 30-second period as early as possible in the rest period and multiply by 2.
  - If the heart rate exceeds 110 beats per minute (bpm) at the beginning of the rest period, then shorten the next work cycle by one-third and keep the rest period the same.
  - If the heart rate still exceeds 110 beats per minute (bpm) at the beginning of the next rest period, then shorten the following work cycle by another one-third.

  NOTE: A worker cannot return to work after a rest period if their heart rate is greater than 180 beats per minute minus age in years (for individuals with normal cardiac performance); if recovery heart rate at 1 minute after a peak work effort is greater than 110 bpm; or if they have symptoms of sudden and severe fatigue, nausea, dizziness or lightheadedness.

- **Oral temperature**. Use a digital oral thermometer to measure the temperature at the end of the work period (but before drinking).
  - If the oral temperature exceeds 99.6°F (37.6°C), then shorten the next work cycle by one-third without changing the rest period.
  - If the oral temperature still exceeds 99.6°F (37.6°C) at the beginning of the next rest period, then shorten the following cycle by another one-third.

  NOTE: A worker cannot return to work after a rest period if their body core temperature (i.e. ear thermometer) exceeds 101.3°F (38.5°C) for acclimatized personnel or 100.4°F (38.0°C) for unacclimatized personnel. Do not permit a worker to wear a semi-permeable or impermeable garment when their oral temperature exceeds 100.6°F (38.1°C).

Prevention of Heat Stress - Proper training and preventative measures will aid in averting loss of worker productivity and serious illness. Heat stress prevention is particularly important because once a person suffers from heat stroke or heat exhaustion, that person may be predisposed to additional heat related illness. To avoid heat stress the following steps should be taken:

- Adjust work schedules.
  - Mandate work slowdowns as needed.
  - Perform work during cooler hours of the day if possible or at night if adequate lighting can be provided.
- Provide shelter (air-conditioned, if possible) or shaded areas to protect personnel during rest periods.
- Maintain worker's body fluids at normal levels. This is necessary to ensure that the cardiovascular system functions adequately. Daily fluid intake must approximately equal the amount of water lost in sweat, id., eight fluid ounces (0.23 liters) of water

must be ingested for approximately every eight ounces (0.23 kg) of weight lost. The normal thirst mechanism is not sensitive enough to ensure that enough water will be drunk to replace lost sweat. When heavy sweating occurs, encourage the worker to drink more. The following strategies may be useful:

- Maintain water temperature 50° to 60°F (10° to 16.6°C).
- Provide small disposal cups that hold about four ounces (0.1 liter).
- Have workers drink 16 ounces (0.5 liters) of fluid (preferably water or dilute drinks) before beginning work.
- Urge workers to drink a cup or two every 15 to 20 minutes, or at each monitoring break. A total of 1 to 1.6 gallons (4 to 6 liters) of fluid per day are recommended, but more may be necessary to maintain body weight.

Table 2.2
Suggested Frequency of Physiological Monitoring
For Fit and Acclimated Workers(A)

Adjusted Temperature(B)	*Normal Work Ensemble(C)*	*Impermeable Ensemble*
90°F or above (32.2°C) or above	After each 45 min. of work	After each 15 min. of work
87.5°F (30.8°-32.2°C)	After each 60 min. of work	After each 30 min. of work
82.5°-87.5°F (28.1°-30.8°C)	After each 90 min. of work	After each 60 min. of work
77.5°-82.5°F (25.3°-28.1°C)	After each 120 min. of work	After each 90 min. of work
72.5°-77.5°F (22.5°-25.3°C)	After each 150 min. of work	After each 120 min. of work

A. For work levels of 250 kilocalories/hour.

B. Calculate the adjusted air temperature (ta adj) by using this equation: ta adj °F = ta °F + (13 x % sunshine). Measure air temperature (ta) with a standard mercury-in-glass thermometer, with the bulb 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.)

C. A normal work ensemble consists of cotton coveralls or other cotton clothing with long sleeves and pants. Impermeable ensemble includes wearing polycoated Tyvek suits, cloth (woven material) overalls, and half or full facepiece respirators.

Attachment 1

WORK ASSIGNMENT SCOPING DOCUMENT

ATTACHMENT 2
RESPONSIBILITY/IDENTIFICATION OF KEY LINE PERSONNEL

Performing Office: (Insert Office Location)

Address: (Insert Project Address/City/State/Zip Code)

Company Executive responsible for project	Contact No.
_____	_____
Parsons/O'Brien & Gere Project Manager	Contact No.
_____	_____
Parsons/O'Brien & Gere Project Safety Representative	Contact No.
_____	_____
Parsons/O'Brien & Gere Field Team Leader	Contact No.
_____	_____
Client - Project Manager/Representative	Contact No.
_____	_____

ATTACHMENT 3
MEDICAL SERVICES AND PANEL OF PHYSICIANS

The Project Manager in conjunction with the Parsons Workers Compensation Analyst establishes a panel of medical providers/facilities for the project and selects two (2) facilities to treat non-emergency work-related injuries and illnesses. The primary facility must be an occupational clinic, and the secondary facility must be able to provide treatment for all types of injuries and during all hours of operations (i.e. hospital). The facilities are listed below:

- *Site 1 – Facility Name and Location TBD by Workers Compensation Analyst (Donna Miller). Contact the facility to determine hours of operation.*
- *Site 2 – Facility Name and Location of nearest hospital – determined by MapQuest or similar. Contact the facility to determine hours of operation.*

NOTE: Transportation of an injured worker to a medical facility for non-emergency treatment must be done by at least two (2) individuals (i.e. driver and observer).

(Insert MapQuest or similar identifying the route of travel for each Site. Note: Route shall be verified to be accurate by actually traveling the route to avoid one-way streets and determine proper entrances, etc.

ATTACHMENT 4
EMERGENCY RESPONSE PROCEDURES/EMERGENCY ACTION PLAN

The project shall display posters/signs in visible locations throughout the project area (including subcontractor facilities if the same phone numbers are used) with a description of emergency response procedures, including but not limited to evacuation routes, assembly points, alarm notification system and communication procedures. Examples of visible locations include common areas such as a copier/fax/printer, microwave, coffee maker, vehicle dashboard, etc.

Insert the telephone number (i.e. 911) to be called in the event of an emergency (medical, fire, police). Include name/provider for each type of emergency. Hospitals must be contacted to confirm they are capable of handling the expected type of injuries (i.e. compound fracture, contaminated worker, etc.). Fire Departments need to be verified as paid or volunteer for response time.

- *Evacuation Route* - _____
- *Assembly Point* - _____
- *Alarm Notification System* - _____
- *Medical – call ____. Facility Name: _____. Phone number:*
- *Fire – call ____. Fire Department: _____ (paid or volunteer)*
- *Police – call _____. Police Department: _____.*

If EMS cannot respond to the project in less than 15 minutes (or 4 minutes for activities that can be expected to result in an accident involving suffocation, severe bleeding, or other life threatening or permanently disabling injury or illness), then the project will require at least one individual on site at all times that work is being performed to have a valid certificate in CPR and first aid. The response time for Emergency Medical Services (EMS) when dialing (insert appropriate "extension" or "number") has been determined to be (insert "number") minutes. Based on the activities provided in the Scope of Work (Section 2.1) and the list of Activity Hazard Analysis (AHA) included in Section 6.3, the project (insert "does" or "does not") expect to have an accident involving suffocation, severe bleeding, or other life threatening or permanently disabling injury or illness. (If CPR and first aid certification is required, include the following statement. Otherwise, delete) - The employee(s) listed in the PSP Training-Medical Records spreadsheet (Appendix) are assigned to the project on a full time basis and will have a valid certificate in AED, CPR, first aid and bloodborne pathogens.

ATTACHMENT 5
MEDICAL SURVEILLANCE AND/OR MONITORING PROGRAMS

All personnel engaged in activities that results in the exposure to chemicals at or above the OSHA Permissible Exposure Limit (PEL) or wear a respirator for more than 30 days in a year, must comply with 29 CFR 1910.120(f) – Medical Surveillance. All personnel who wear a respirator must be medically qualified by a physician, trained and fit-tested on an annual basis, even if they are not required to participate in a medical surveillance program under 29 CFR 1910.120(f).

Based on the activities listed in Attachment 1, the following hazards or activities are associated with this project, which may result in an exposure that requires an individual to participate in a medical surveillance program. (Insert the work activities in the Table below that may result in an exposure to a hazard, how the exposure will occur and the type of medical surveillance that is required based on the anticipated exposure level)

Work Activity	Hazard	Medical Surveillance/Training
List the specific activities that will result in noise levels above 85 decibels)	Noise	If noise exposures exceed 85 decibels over an 8-hour time weighted average, an employee must participate in a Hearing Conservation Program.
List the specific activities that will result in chemical exposure above a Permissible Exposure Limit (PEL) in the breathing zone	Chemical exposures – (list the specific chemicals that will be monitored to determine whether exposures exceed a PEL)	For respirator use, medical qualification, training and fit-testing must be received on an annual basis. If an individual is exposed at or above the PEL or wears a respirator more than 30 days per year, then participation in a Medical Surveillance Program is required.
Insert job title or work activity (if applicable)	Other project specific chemicals (i.e. mercury, lead, asbestos, etc).	Identify the type and frequency of monitoring required.

The Division Safety Manager administers the medical surveillance program.

ATTACHMENT 6
SITE RISK ANALYSIS

Before work begins, Work Assignment Project Managers lead a team that performs a risk analysis at each work site to identify hazards that require specific control measures in accordance with Section 23 of the SHARP Management manual. Potential hazards are listed below. ***(Modify list as needed by adding or deleting red text. For each hazard identified, explain how and where the hazard will exist. An Activity Hazard Analysis (AHA) must be provided in Section 6.3 for each hazard, in order to identify the required controls and/or PPE.***

- *Asbestos – reference CSHM-35*
- *Biological – viruses, medical waste, or toxins (hepatitis, Lyme disease, anthrax, West Nile Virus, malaria, typhus, dengue fever)*
- Chemical exposures – if soil and/or water analysis data, or historical air monitoring data indicates the need for Level C respiratory protection, then action levels (based on OSHA PELs) and corrective action(s) must be provided. Use the Action Level Table in Attachment 9 for entering Action Levels and PPE/Action Taken in Table A6-1. NOTE: A respirator cartridge change-out schedule must be developed and included in Section 6.2 (5) - use the Wood Math Model Table based on the anticipated levels of chemical exposure.
- *Confined spaces – limited or restricted means for entry or exit, and is not designed for continuous occupancy (vaults, tanks, manholes, pipelines, excavations > 4 ft deep)*
- *Crane movement - rigging*
- Environmental – cold/heat related illnesses, animals, insects, poisonous plants/vegetation. See Section 9.2 for information related to Environmental hazards.
- *Excavations and trenches – deeper than 4 feet with personnel working within excavation*
- *Falls – working at heights greater than six feet*
- *Fires – reference CSHM-12*
- *Hazardous material handling – reference CSHM-17*
- *Heavy equipment operation*
- Lightning - personnel shall follow the 30/30 rule - stop field activities and seek shelter when the time between seeing the lightning and hearing the thunder is less than 30 seconds. When the lightning has subsided for 30 minutes, work activities can resume.
- *Marine safety/work around water*
- *Noise – reference CSHM-7*
- *Overhead utility lines or obstructions*
- Underground utilities or obstructions - if subsurface soil disturbance more than 6” below grade surface will occur, then the Parsons Subsurface Soil Disturbance Protocol must be followed (included in the Appendix).
- *Traffic*

TABLE A6.1
SAMPLE HEALTH HAZARD QUALITIES OF HAZARDOUS SUBSTANCES OF CONCERN

Compound	PEL [a/] (ppm)	TLV [b/] (ppm)	IDLH [c/] (ppm)	Odor Threshold[d/] (ppm)	Ionization Potential[e/] (eV)	Physical Description/Health Effects/Symptoms
Benzene	1 STEL= 5 (29 CFR 1910.1028) dd/	0.5 STEL= 2.5 (skin)	500	4.68	9.24	Description/Health Colorless to light-yellow liquid (solid<42oF) with aromatic (gasoline-like) odor. Eye, nose, skin, and respiratory system irritant. Causes dizziness, headache, headaches, nausea, staggered gait, fatigue, anorexia, exhaustion, dermatitis, bone marrow depression, and leukemia. Mutagen, experimental teratogen, and carcinogen. SOURCE: www.sciencelab.com/xMSDS-Benzene-9927339
Calcium Carbonate	TWA 15 mg/m^3 (total)	TWA 5 mg/m3 (resp)	N.D.	NA	NA	Noncombustible Solid. Exposure routes : inhalation, skin and/or eye contact Symptoms: irritation eyes, skin, mucous membrane; cough, sneezing, rhinorrhea (discharge of thin nasal mucus);lacrimation (discharge of tears) Target Organs: Eyes, skin, respiratory system SOURCE: http://www.cdc.gov/niosh
Calcium Silicate	TWA 15 mg/m^3 (total)	TWA 5 mg/m3 (resp)	N.D.	NA	NA	Noncombustible Solid. Exposure routes : inhalation, skin and/or eye contact Symptoms: irritation eyes, skin, upper respiratory system Target Organs: Eyes, skin, respiratory system SOURCE: http://www.cdc.gov/niosh
Lead	0.05 mg/m3 (29 CFR 1910.1025) dd/	0.05 mg/m3	100 mg/m3	NA	NA	Heavy, ductile, bluish-white/silvery/gray metal. Slightly hazardous in case of skin and eye contact, ingestion and inhalation. Causes metallic taste, fever, nausea, chills, chest pain, muscle pains and aches, weakness, headache, dizziness, insomnia, gingival lead line, lead cholic, constipation, memory loss, convulsions/seizures, coma, and death. Inhalation of fumes may cause fume metal fever with flu-like symptoms. Mutagen, experimental teratogen, and suspected carcinogen. SOURCE: http://www.sciencelab.com/xMSDS-Lead-9927204
Magnesium Hydroxide (magnesium oxide fume)	TWA 15 mg/m^3	TWA 15 mg/m	750 mg/m^3	NA	NA	Finely divided white particulate dispersed in air. [Note: Exposure may occur when magnesium is burned, thermally cut, or welded upon.] Symptoms: irritation eyes, nose; metal fume fever: cough, chest pain, flu-like fever Target Organs: Eyes, respiratory system SOURCE: http://www.cdc.gov/niosh
Mercury (alkyl, organo)	0.01 mg/m3 (skin)	0.01 mg/m3 STEL=0.03mg/m3 (skin)	2 mg/m3	NA	NA	Appearance and odor vary depending on the specific (organo) alkyl compound. Causes skin tingling, incoordination, joint dysfunction, visual and hearing disturbances, spasticity, jerking limbs, dizziness, salivation, tearing, nausea, vomiting, diarrhea, constipation, skin burns, emotional disturbances, kidney injury and possible teratogenic effects.
Mercury (aryl, inorganic and vapors) elemental, inorg	0.1 mg/m3 (ceiling) (skin)	0.1 mg/m3 (skin) 0.025 mg/m3 (skin)	10 mg/m3	NA	NA	Silver-white, heavy, odorless, liquid or tin-white ductile, malleable, soft, solid metal. Irritates skin, eyes, mucous membranes and harmful if ingested or inhaled. Causes dermatitis, violent pain, profuse vomiting, coughing, chest pain, shortness of breath, bronchitis, lung inflammation, ringing in the ears, tremors, insomnia, irritability, indecision, headaches, fatigue, weakness, fever, salivation, inflammatory disease of the mouth, gastrointestinal disturbances, anorexia, weight loss and protein in the urine. Mutagen, experimental teratogen, and questionable carcinogen. SOURCE: http://www.espi-metals.com/msds's/mercury.pdf
Phenol	5 (skin)	5 (skin)	250	0.048 ppm (air)	8.50	Colorless to light-pink, crystalline solid with a burning taste and a sweet acrid odor. Irritates skin, eyes, gastrointestinal and respiratory tract. May result in corneal damage, itchy, red and watery eyes, blindness, skin inflammation, blistering, dermatitis, sneezing, coughing, choking, unconsciousness or death. Toxic to kidneys, liver and central nervous system (CNS). Mutagen, experimental teratogen, and questionable carcinogen. SOURCE: http://www.sciencelab.com/xMSDS-Phenol-9926463

in the NIOSH Pocket Guide to Chemical Hazards, June 1997.
f/ mg/m3 = milligrams per cubic meter.
g/ Based on coal tar pitch volatiles.
h/ NA = Not available.
i/ Recommended values.
j/ (skin) = Refers to the potential contribution to the overall exposure by the cutaneous route.
k/ Olfactory fatigue has been reported for the compound and odor may not serve as an adequate warning property.
l/ mR/hr = mrem/hr = Milliroentgen equivalent in man per hour.
m/ (STEL) = Short Term Exposure Limit, a 15 minute time-weighted average that should not be exceeded at any time during the work day.
n/ f/cc = fibers per cubic centimeter.
o/ Respirable fraction.
p/ Total dust.
q/ As chlorine.
r/ (ceiling) = Ceiling concentration which should not be exceeded at any time.
s/ Based on exposure limits for petroleum distillates (petroleum naphtha).
t/ LD50 = Median lethal dose; mg/kg = milligrams per kilogram.
u/ Irritation threshold.
v/ Based on fume.
w/ Airborne exposure limit (AEL) developed by United States Department of the Army.
x/ Dulls senses.
y/ Strabismus is a visual disorder due to the turning of one or both eyes from the normal position.
z/ NIOSH recommends reducing exposure to the lowest feasible concentration, and limiting the number of workers exposed.
aa/ Based on selenium oxide.
bb/ Indicates that the IDLH value was based on 10% of the lower explosive limit for safety considerations, even though relevant toxicological data indicated that irreversible health effects or impairment of escape existed only at higher concentrations (NIOSH Pocket Guide to Chemical Hazards, 1997).
cc/ Based on dust.
dd/ Refer to expanded rules for this compound.
ee/ Soluble salts of aluminum.
ff/ Trona is also used to refer to sodium sulfate and boron tribromide.
gg/ Based on Aroclor-1254.
hh/ Total dust containing no asbestos and less than 1% crystalline silica.
ii/ Soluble salts.
jj/ Based on analogy to phenol.
kk/ Depends upon variety.
ll/ Based on 1,2,4-Trimethylbenzene.
mm/ Methemoglobinemia is the presence of a soluble brown crystalline blood pigment that differs from hemoglobin in containing ferric iron, and in being unable to combine reversibly with molecular oxygen (Webster's New Collegiate Dictionary, 1981).
nn/ Vapor.

ATTACHMENT 7
FIVE HAZARD CONTROL MEASURES – ORDER OF PRECEDENCE

Site hazards and hazards resulting from investigation and remediation activities are controlled using one or more of the control measures listed below. The order of precedence is as follows:

1. **Engineer/design to eliminate or minimize hazards.** A major component of the design phase is to select appropriate safety features to eliminate a hazard and render it fail-safe or provide redundancy using backup components.
2. **Guard the hazard.** Hazards that cannot be eliminated by design must be reduced to an acceptable risk level by safety guards or isolation devices that render them inactive.
3. **Provide warnings.** Hazards that cannot be totally eliminated by design or guarding are controlled through using a warning or alarm device.

Exclusion Zone

The exclusion zone at this site will be limited to the area immediately surrounding the work activity, the building, or designated by the Project Supervisor or SSO. Caution tape or other visible marker may be used to delineate this zone. Unprotected onlookers should be located 50 ft. upwind of decommissioning, or demolition activities. In the event that action levels are exceeded in the breathing zone, then all personnel in the exclusion zone must stop work, evacuate, and evaluate the situation. If the actions levels continue to exceed recommended limits, then an upgrade to the level of personal protective equipment is required on properly trained and certified crew members to continue work.

Decontamination Zone

A decontamination area will be set up for equipment decontamination. Equipment decontamination will consist of dry removal of material followed by water washing of the equipment. Personnel decontamination must take place prior to leaving the decontamination area and prior to entering any support zone, personnel hygiene facilities, or before eating, drinking, or smoking. Any decontamination water will be staged on-site for appropriate disposal. The site decontamination area(s) is yet to be delineated and presently undecided if the area will be a fixed station or 'mobile'.

Support Zone

The support zone will be located upwind to both the exclusion zone and the decontamination zone. Break areas, operational direction and support facilities (to include supplies, equipment storage, and maintenance areas) will be located in this area. No equipment or personnel will be permitted to enter the support zone from the exclusion zone without passing through the personnel or equipment decontamination zone first. The work zones (Exclusion & CRZ) will be setup and delineated prior to the needed work task(s) commencing; the support zone will be outlined & discussed at that appropriate time.

4. **Provide special procedures or training.** When design, guarding, or warnings cannot eliminate hazards, subcontractors must develop procedures, training, and audits to ensure safe completion of work. Training cannot be a substitute for hazard elimination when life-threatening hazards are present.

[Include a list of the chemicals that will be used on site and include a copy of the Material Safety Data Sheet (MSDS) in the Appendix

Decontamination Procedure

Level D or Modified Level D protection will be worn for initial entry on-site and initially for all activities. If air concentrations exceed action levels, workers will employ engineering controls first before upgrading the level of protection. Personal decontamination may be necessary for activities involving the use of Level C or Level B PPE. Exhibit A-7 includes the proper decontamination procedures that may be implemented if chemical contamination is present and PPE protection greater than Level D is used. The SSO will determine the proper procedures for decontamination based on the work activities and amount of contamination. All site personnel engaging in intrusive activities will have their breathing zones monitored in accordance with Attachment 9.

Provide personal protective equipment. To protect workers from injury, the last method in the order of precedence is the use of personal protective equipment, such as hard hats, gloves, eye protection, life jackets, and other protective equipment with the understanding that bulky, cumbersome, and heavy personal protective equipment is often discarded or not used, rendering this method ineffective without proper controls.

[This is where you would insert language on a respirator cartridge changeout schedule based on the Wood Math model. Including a general description of biological, physical and other hazards that may be present on a site is permissible, but each hazard mentioned must also be identified in an Activity Hazard Analysis (AHA)].

Exhibit A-7
Decontamination Procedure

* Decontamination procedures can be modified by the PSM or SSO based on work activities and potential contamination.

STATION	NAME	DESCRIPTION
Station 1	Segregated Equipment Drop	Deposit equipment used on the site (tools, sampling devices and containers, monitoring instruments, clipboards, etc.) on plastic drop cloths or in different containers with plastic liners. Each will be contaminated to a different degree. Segregation at the drop reduces the probability of cross-contamination.
Station 2	Suit, Safety Boots, and Outer Glove Wash	Thoroughly wash chemically resistant suit, safety boots and outer-gloves. Scrub with long-handle, soft-bristle scrub brush and copious amounts of Alconox/water solution. Necessary equipment includes: • Wash tub (30 gallon or large enough for person to stand in) • Alconox/water solution • Long-handle soft-bristle scrub brushes
Station 3	Suit, Safety Boots, and Outer Glove Rinse	Rinse off Alconox/water solution using copious amounts of water. Repeat as many times as necessary. Necessary equipment includes: • Wash tub (30 gallon or large enough for person to stand in) • Spray unit • Water • Long-handle, soft-bristle scrub brushes
Station 4	Outer Gloves Removal	Remove the outer gloves and deposit in individually marked plastic bags. Necessary equipment includes: • Plastic bag
Station 5	Canister, Air Tank, or Mask Change	If a worker leaves the exclusion zone to change a canister, mask or air tank, this is the last step in the decontamination procedures. The worker's canisters or tank are exchanged, new outer glove donned, and joints taped. Worker returns to duty. Otherwise the worker proceeds to Station 6. Necessary equipment includes: • Canisters, air tanks, or mask • Tape • Gloves
Station 6	Removal of Chemically Resistant Suit	With assistance of helper, remove suit. Deposit in container with plastic liner. Necessary equipment includes: • Container with plastic liner
Station 7	Inner-Glove Wash	Wash inner gloves with Alconox/water solution that will not harm skin. Repeat as many times as necessary. Necessary equipment includes: • Alconox/water solution • Wash tub • Long-handle, soft-bristle brushes
Station 8	Inner-Glove Rinse	Rinse inner-gloves with water. Repeat as many times as necessary. Necessary equipment includes: • Water • Wash tub
Station 9	Respirator Removal	Remove face-piece. Avoid touching face. Wash respirator in clean, sanitized solution, allow to dry and deposit face-piece in plastic bag. Store in clean area. Necessary equipment includes: • Plastic bags • Sanitizing solution • Cotton
Station 10	Inner-Glove Removal	Remove inner gloves and deposit in container with plastic liner. Necessary equipment includes: • Container with plastic liner

Exhibit A-7 (Continued)
Decontamination Procedure

STATION	NAME	DESCRIPTION
Station 11	Field Wash	Wash hands and face. Necessary equipment includes: • Water • Soap • Tables • Wash basins or buckets • Clean towels
Station 12	Redress	If re-entering Exclusion Zone put on clean field clothes (e.g., Tyvek, gloves, etc.). Necessary equipment includes: • Table • Clothing The SSO will monitor the decontamination system for effectiveness.

ATTACHMENT 8
ACTIVITY HAZARD ANALYSES

PARSONS/O'Brien & Gere

Activity Hazards Analysis

Site Visit or Site Walk

Project Name & Number:	**AHA No.** 021	**Date:** April 27, 2005	**New:** Yes
Location:	**Contractor:** Parsons		**Revised:**
Required Personal Protective Equipment:	Level D- Long pants, safety glasses, hard hat (in presence of heavy equipment), steel-toed boots. The following safety equipment is project dependent: gloves, goggles.	**Analysis by:** R. Absolom	**Date:** April 27, 2005
	Superintendent/Competent Person	**Reviewed by:** M. Raybuck	**Date:** July 5, 2005
Work Operation: Site Visit or Site Walk		**Approved by:**	**Date:**

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Site visit/walk	Slips, Trips, Falls	▪ Workers will be aware of potentially slippery surfaces and tripping hazards. ▪ Work slowly during transit. Jumping, running, and horseplay are prohibited. ▪ Workers will keep all areas clean and free of debris to deter any unnecessary trips and falls. ▪ Clean up all spills immediately. ▪ Personnel will notify the SSO of any unsafe conditions ▪ Follow Marine Safety Standard Operating Procedures	▪ Inspect job site and staging area and identify any concerns. ▪ Inspect job site daily.
	Rain	▪ Have proper PPE (i.e. rain gear, footwear, etc) available. Be aware of slip hazards, puddles, etc.	
	Sunshine	▪ Have sunscreen available for ultraviolet protection. Have water for dehydration.	
	Snow	▪ Have warm clothes available for cold temperatures.	
	Lightning	▪ Do not begin or continue work until lightning subsides for 20 minutes.	
	High winds, dust storm	▪ Wear goggles if dust/debris is visible.	

	Cold and Heat Stress	▪ Visitors will dress accordingly to prevent injuries from extreme heat, or cold. ▪ SSO will monitor for cold/heat stress symptoms.	
	Biological Hazards (ticks, bees, mosquitoes, snakes, etc.)	▪ Personnel will be aware of potential exposure to biological hazards. ▪ Wear appropriate clothing (hat, long-sleeve shirt, long pants, gloves, boots etc.) and insect repellant.	
	Site Hazards Material Exposure	▪ Training and safety awareness of potential exposure to contaminates at the site. ▪ Training of all personnel decontamination procedures (if appropriate to visit). ▪ Appropriate PPE will be worn dependent on site conditions and actions levels. (if appropriate to visit) ▪ Must sign off on health and safety plan. ▪ Visitor will be escorted around site by a 40 hour trained individual unless cleared with the SSO.	

Training Requirements:

Visitors will report to the Site Safety Officer who will give a short health and safety orientation and require sign off on the PSP. The SSO will determine if the visitor can access the site based on verification of 40 training or 8 hour Supervisor training or if the visitor(s) will need to be escorted by a 40-hour trained individual onsite.

All personnel engaged in hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards shall receive appropriate training as required by 29 CFR 1910.120(e), including, but not limited to initial 40-hour, 8 hour Supervisor and annual 8-hour refresher training.

Medical qualification, training and fit testing must be received on an annual basis for individuals that wear a respirator. If an individual wears a respirator more than 30 days per year, or they are exposed at or above the Permissible Exposure Limit (PEL) of chemical for more than 30 days in a year, then they must participate in a Medical Surveillance Program as required by 29 CFR 1910.120 (f).

All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity and review it with their Supervisor during their Daily Safety Huddle.

PARSONS/O'Brien & Gere

Activity Hazards Analysis

Sampling- Water

Project Name & Number: NYSDEC Standby Contract # D007623	**AHA No.** 020	**Date:** March 17, 2005	**New:** Yes
Location:	**Contractor:** Parsons		**Revised:**
Required Personal Protective Equipment:	Modified Level D- Long pants, safety glasses/ splash goggles, hard hat, steel-toed boots, nitrile outer gloves and latex inter gloves, tyvek coveralls.	**Analysis by:** R. Absolom	**Date:** March 17, 2005
Work Operation: Water Sampling	**Superintendent/Competent Person:** TBD	**Reviewed by:** M. Raybuck	**Date:** July 5, 2005
		Approved by:	**Date:**

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Water Sampling	▪ Inhalation of contaminated dust Inhalation of volatile contaminants ▪ Ingestion of contaminants ▪ Skin/eye contact with contaminated materials	▪ If exposure to contaminated materials occurs, promptly wash contaminated skin using soap or mild detergent and water. ▪ Wash eyes with large amounts of water. ▪ If a person breathes in a large amount of organic vapor, move the exposed person to fresh air, rinse mouth. Perform artificial respiration if breathing stops. ▪ Keep the affected person warm and at rest. Obtain medical treatment for all of these situations as required. ▪ Wear appropriate safety equipment (i.e., goggles, gloves, boots) as appropriate for reducing risk of contamination.	
	Noise exposure	▪ Hearing protection will be worn in hazardous noise areas or working around heavy machinery or equipment. ▪ Wear earplugs when noise level from equipment exceeds 90 decibels (dBA) averaged over an eight-hour day.	
	Pinch Points	▪ Maintain awareness of procedures underway and be attentive of sampling operations.	
	Cold/Heat Stress	▪ Implement the cold/heat stress control program.	

	Muscle strain/injuries from improper lifting	▪ Personnel will utilize proper lifting techniques or ask for assistance with moving/lifting objects.	
	Rain	▪ Have proper PPE (i.e. rain gear, footwear, etc) available. Be aware of slip hazards, puddles, etc.	
	Sunshine	▪ Have sunscreen available for ultraviolet protection. Have water for dehydration.	
	Snow	▪ Have warm clothes available for cold temperatures.	
	Lightning	▪ Do not begin or continue work until lightning subsides for 20 minutes.	

Training Requirements:

All personnel engaged in hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards shall receive appropriate training as required by 29 CFR 1910.120(e), including, but not limited to initial 40-hour, 8 hour Supervisor and annual 8-hour refresher training.

Medical qualification, training and fit testing must be received on an annual basis for individuals that wear a respirator. If an individual wears a respirator more than 30 days per year, or they are exposed at or above the Permissible Exposure Limit (PEL) of chemical for more than 30 days in a year, then them must participate in a Medical Surveillance Program as required by 29 CFR 1910.120 (f).

All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity and review it with their Supervisor during their Daily Safety Huddle.

PARSONS/O'Brien & Gere

Activity Hazards Analysis

Sampling- Sediment

Project Name & Number: NYSDEC Standby Contract # D007623	**AHA No.** 019	**Date:** April 28, 2005	**New:** Yes
Location:	**Contractor:** Parsons		**Revised:**
Required Personal Protective Equipment:	Modified Level D- Long pants, safety glasses/ splash goggles, hard hat, steel-toed boots, nitrile outer gloves and latex inter gloves, tyvek coveralls,	**Analysis by:** R. Absolom	**Date:** April 28, 2005
Work Operation: Sediment Sampling- (e.g., split spoon drilling, etc.)	**Superintendent/Competent Person:** TBD	**Reviewed by:** M. Raybuck	**Date:** July 5, 2005
		Approved by:	**Date:**

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Sediment Sampling	▪ Inhalation of contaminated dust ▪ Inhalation of volatile contaminants ▪ Ingestion of contaminants ▪ Skin/eye contact with contaminated materials	▪ If exposure to contaminated materials occurs, promptly wash contaminated skin using soap or mild detergent and water. ▪ Wash eyes with large amounts of water. ▪ If a person breathes in a large amount of organic vapor, move the exposed person to fresh air. Perform artificial respiration if breathing stops. ▪ Keep the affected person warm and at rest. Obtain medical treatment for all of these situations as required. ▪ Wear appropriate safety equipment (i.e., goggles, gloves, boots) as appropriate for reducing risk of contamination.	
	Pinch Points/Overhead equipment	▪ Maintain awareness of procedures underway. ▪ Wear hard hats when around machinery and equipment. ▪ Keep observers back from active operations. Get operators attention before approaching.	

	Noise Exposure	▪ Hearing protection will be worn in hazardous noise areas or working around heavy machinery or equipment. ▪ Wear earplugs when noise level from equipment exceeds 90 decibels (dBA) averaged over an eight-hour day.	
	Cold/Heat Stress	▪ Implement the Cold/Heat stress control program.	
	Muscle strain/injuries from improper lifting	▪ Personnel will utilize proper lifting techniques or ask for assistance with any moving or lifting objects.	
	Rain	▪ Have proper PPE (i.e. rain gear, footwear, etc.) available. Be aware of increase slip, trip and fall hazards.	
	Sunshine	▪ Have sunscreen available for ultraviolet protection. Have water available to prevent dehydration.	
	Snow	▪ Have warm clothes available for cold temperatures.	
	Lightning	▪ Do not begin or continue work until lightning or thunder subsides for 20 minutes.	

Training Requirements:

All personnel engaged in hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards shall receive appropriate training as required by 29 CFR 1910.120(e), including, but not limited to initial 40-hour, 8 hour Supervisor and annual 8-hour refresher training.

Medical qualification, training and fit testing must be received on an annual basis for individuals that wear a respirator. If an individual wears a respirator more than 30 days per year, or they are exposed at or above the Permissible Exposure Limit (PEL) of chemical for more than 30 days in a year, then them must participate in a Medical Surveillance Program as required by 29 CFR 1910.120 (f).

All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity and review it with their Supervisor during their Daily Safety Huddle.

PARSONS/O'Brien & Gere

Activity Hazards Analysis

Sampling- Processing

Project Name & Location: NYSDEC Standby Contract # D007623	**AHA No.** 018	**Date:** 3-17-05	**New:**
Location:	**Contractor:** Parsons		**Revised:**
Required Personal Protective Equipment:	Level D- Long pants, safety glasses, hard hat (around heavy equipment or drill rig) nitrile gloves, steel-toed boots,	**Analysis by:** R. Absolom	**Date:** March 17, 2005
Work Operation: Sample Processing (outdoors and within processing trailer)	**Superintendent/Competent Person:** TBD	**Reviewed by:** M. Raybuck	**Date:** July 5, 2005
		Approved by:	**Date:**

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Packing sample for off-site shipment to lab	Accidental breakage of glass bottles	▪ Wear cut-resistant gloves during packaging of glass bottles. ▪ Immediate clean-up of spills.	
	Back Injury, muscle strain/stress	▪ Personnel will utilize proper lifting techniques or ask for help with moving/lifting objects.	
	Hazardous Material Exposure	▪ Training and safety awareness of potential exposure to contaminates at the site and decontamination procedure. ▪ Appropriate PPE will be worn (e.g., safety glasses, gloves, etc.). ▪ Personnel will follow decontamination procedure. ▪ Screen for COCs with PID and mercury meter analyzer over samples and in workers breathing zone. ▪ Ventilate work area with fans or vents	

	Slips, Trips, Falls	▪ Workers will be aware of potentially slippery surfaces and tripping hazards. ▪ Workers will keep all areas clean and free of debris to deter any unnecessary trips and falls. ▪ Personnel will clean up all spills immediately. ▪ Personnel will notify the SSO of any unsafe conditions	
	Heat and Cold Stress	▪ The SSO will implement the cold/heat stress control program as appropriate to conditions. ▪ SSO will monitor workers for heat/cold stress symptoms.	
	Eye Injury	▪ PPE (safety glasses, etc.) will be worn.	

Training Requirements:

All personnel shipping hazardous materials will have appropriate DOT training.

All personnel engaged in hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards shall receive appropriate training as required by 29 CFR 1910.120(e), including, but not limited to initial 40-hour, 8 hour Supervisor and annual 8-hour refresher training.

Medical qualification, training and fit testing must be received on an annual basis for individuals that wear a respirator. If an individual wears a respirator more than 30 days per year, or they are exposed at or above the Permissible Exposure Limit (PEL) of chemical for more than 30 days in a year, then them must participate in a Medical Surveillance Program as required by 29 CFR 1910.120 (f).

All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity and review it with their Supervisor during their Daily Safety Huddle.

PARSONS/O'Brien & Gere

Activity Hazards Analysis

Operation of General Hand Tools

Project Name & Number: NYSDEC Standby Contract # D007623	**AHA No.** 017	**Date:** 7-19-07	**New:** Yes
Location:	**Contractor:** Parsons		**Revised:**
Required Personal Protective Equipment:	Level D-Long pants, safety glasses with side shields / safety goggles, hard hat, safety toe boats, work gloves (leather palm style).	**Analysis by:** P. Roth	**Date:** 7-19-07
	Superintendent/Competent Person TBD	**Reviewed by:** J. Nassimos	**Date:** 7-19-07
Work Operation: Operation of hand tools		**Approved by:** J. Clark	**Date:** 7-20-07

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Operation of general hand tools	General	▪ When operating any tool one must be aware of what's around them including objects and other people. ▪ Clear other persons away from the "line of fire." ▪ Group instruction will given on the proper use of each tool.	▪ Each tool used will be visually inspected prior to use and periodically each day to ensure operational safety.
	Pinch Points	▪ Everyone will be aware of where possible pinch points are.	
	Eye injury	▪ Safety glasses with side shields or safety goggles will be wore at all times.	
	Noise	▪ If the noise created 85 dBA, hearing protection will be required.	
	Back Injuries	▪ Proper lifting techniques when moving and operating any tool will be observed.	.
	Cuts/ Abrasions	▪ During operation of hand tools, work gloves will be worn.	

Training Requirements:

Everyone using any hand tool will have read this AHA and be aware of the possible hazards associated with using each tool.

PARSONS/O'Brien & Gere

Activity Hazards Analysis

Operation- Motor Vehicle

Project Name & Number: NYSDEC Standby Contract # D007623	**AHA No.** 016	**Date:** April 27, 2005	**New:** Yes
Location:	**Contractor:** Parsons		**Revised:**
Required Personal Protective Equipment:	Wear seat belt at all times; make sure that clothing will not interfere with driving.	**Analysis by:** R. Absolom	**Date:** April 27, 2005
	Superintendent/Competent Person	**Reviewed by:** M. Raybuck	**Date:** July 5, 2005
Work Operation: Operation of Motor Vehicle		**Approved by:**	**Date:**

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Driving to and from the job site	Vehicle Accident	▪ All employees shall complete the ParsonsU safety module on Defensive Driving. ▪ Plan your travel route and check maps for directions or discuss with colleagues. ▪ Complete a Vehicle Inspection Report before driving and check for proper equipment/supplies. ▪ Clean windows and mirrors as needed throughout the trip. ▪ Have sun glasses available to reduce sun glare and wear as needed. ▪ Follow vehicle maintenance schedule to reduce possibilities of breakdown while driving.	▪ Inspect all fluid level, air pressure in tires, adjust mirrors and seat positions appropriately, watch fuel level and fill up when level is low.
	Distraction while driving	▪ Stop driving a vehicle, regardless of the speed (i.e. even 5 mph) or location (i.e. private road), when the potential of being distracted by conversation exists. ▪ Drivers are prohibited from using communication devices (e.g., cell phones) while operating any motor vehicle.	
	Fatigue/Falling asleep	▪ Get adequate rest prior to driving. ▪ Pull over and rest if experiencing drowsiness ▪ Change seat position, stretch, open the window, adjust radio if experiencing drowsiness.	

	Weather /Road conditions	▪ Check road and weather conditions prior to driving. ▪ Be prepared to adjust driving if conditions change. ▪ Travel in daylight hours if possible. ▪ Give yourself plenty of time to allow for slow downs due to construction, accidents, or other unforeseen circumstances. ▪ Use lights at night and lights/wipers during inclement weather.	
	Theft/Crime of parked vehicle	▪ Lock the vehicle when leaving the area ▪ Use ant-theft deterrents (e.g., the club, visible alarm indicators, etc.) ▪ Park in well lit areas. ▪ Hide valuables	

Training Requirements:

All drivers are required to have a current valid driver's license and all vehicles must have the required State vehicle registration and/or inspection documentation. It is company policy that all wireless device use, whether "hand-held" or "hands free", ***is prohibited*** while driving any vehicle at any time as follows: for business use *at any time*; or for *personal use* during business hours; and as defined by law.

All employees operating a Company vehicle are required to familiarize themselves with the contents of the AHA before starting a work activity.

PARSONS/O'Brien & Gere

Activity Hazards Analysis

Operation- Heavy Equipment or Machinery

Project Name & Number: NYSDEC Standby Contract # D007623	**AHA No.** 015	**Date:** 10/15/2010	**New:** Yes
Location:	**Contractor:** Ballard Const. Inc.		**Revised:**
Required Personal Protective Equipment:	Hard Hat, Safety vest, Gloves, Steel Toe Boots, Safety Glasses, Ear Plugs	**Analysis by:** R.Ranieri	**Date:** **10/15/2010**
Work Operation: Operation of Heavy Equipment or Machinery	**Superintendent/Competent Person:** TBD	**Reviewed by:** W. Ballard	**Date:** 10/15/2010
		Approved by:	**Date:**

Work Activity	**Potential Hazards**	**Preventive or Corrective Measures**	**Inspection Requirements**
Motorized Equipment Operation	Equipment Maintenance	▪ The equipment must be maintained in a proper functioning condition. ▪ All motors must be shut off. Electrical, mechanical and hydraulic components locked when making repairs. ▪ Safety shut off system must be tested daily and not disabled. ▪ Bleed off pressure on hydraulic lines before undoing fittings. ▪ Do not leave tools or parts loose on the equipment after maintenance has been performed.	▪ Follow the maintenance manual recommended procedures for each piece of equipment.
	General Use	▪ All equipment must be inspected daily prior to use. ▪ Equipment must be operated and maintained in accordance to manufacturer's guidelines. ▪ Any equipment that is unattended must be immobilized and secured against accidental movement. ▪ All heavy equipment will have a back up alarm	
	Fire Hazard	▪ All motors must be shut off during refueling. • Smoking in the vicinity of the drilling rig is not permitted.	

		• An A-B-C fire extinguisher must be maintained on associated motorized equipment. • Fuel containers will not be stored within 10' of the equipment. • Fuel will be stored in UL approved safety containers with contents clearly label.	
	Operation of Motorized Equipment	▪ Operators of motorized equipment will be trained in the proper operation of that apparatus.	
	Tip Over Struck By Pinch Points Loading and Unloading Equipment from Trailer	▪ Equipment will be shut off and stabilized accordingly. ▪ All personnel will be aware of moving machinery and parts and wear appropriate PPE when near machinery (e.g., hard hat, safety glasses, gloves etc.). ▪ Load and unload on flat, stable ground. ▪ Shut off equipment while in transport. ▪ Safely tie off equipment before moving.	
	Noise Exposure	▪ Hearing protection will be worn in hazardous noise areas or working around heavy machinery or equipment. ▪ Wear earplugs when noise level from equipment exceeds 90 decibels (dBA) averaged over an eight-hour day.	

Training Requirements:

All personnel engaged in the operation of heavy equipment and machinery will have knowledge and experience in working with and operating the equipment. All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity and review it with their Supervisor during their Daily Safety Huddle. Operator of D-3 dozer will be either Dan Stagnitta or Chet Rupracht (operators employed by Ballard Const. Inc.). Both are experienced in safe operation and maintenance of this piece of equipment.

PARSONS/O'Brien & Gere

Activity Hazards Analysis

Land Clearing

Project Name & Number: NYSDEC Standby Contract # D007623	**AHA No.** 014	**Date:** June 12, 2007	**New:** Yes
Location:	**Contractor:** Parsons		**Revised:**
Required Personal Protective Equipment:	Level D- Long pants, safety glasses, hard hat, steel-toed boots, work gloves, hearing protection.	**Analysis by:** R. Absolom	**Date:** June 12, 2007
Work Operation: Cutting vegetation	**Superintendent/Competent Person:** TBD	**Reviewed by:**	**Date:**
		Approved by: Jerry Clark	**Date: June 13, 2007**

Work Activity	**Potential Hazards**	**Preventive or Corrective Measures**	**Inspection Requirements**
Site Area Grading	Vehicle and heavy equipment traffic in work area	▪ Operation of heavy equipment in accordance with the PSP. ▪ Be alert when working around heavy equipment. ▪ Ground guides for the backing of all vehicles. ▪ No heavy equipment will be operated without a ground guide. ▪ Barriers, warning signs, designated walkways or other safeguards must be provided where pedestrians are exposed to the risk of collision.	▪ Follow operations manual maintenance and inspection procedures for each piece of equipment used on site.
Remove undesirable vegetation with selected equipment (brushhog, machetes, sweeps, etc.)	Site hazardous material exposure	▪ Training and safety awareness of potential exposure to contaminates at the site and decontamination procedure. ▪ Operators will be instructed to not significantly disturb soil, i.e., no intrusive activity.	▪
	Accidental contact with brushhog, machetes, and sweeps.	▪ Training and safety awareness of equipment operation ▪ Ensure equipment safety features are functional. ▪ Appropriate PPE will be worn.	Follow operations manual maintenance and inspection procedures for each piece of equipment used on site.

	Slips, trips, falls	▪ Workers will be aware of potentially slippery surfaces and tripping hazards. ▪ Workers will keep all areas clean and free of debris to deter any unnecessary trips and falls. ▪ Clean up all spills immediately. ▪ Personnel will notify the SSO of any unsafe conditions.	
	Heat and Cold Stress	▪ The SSO will implement the cold/heat stress control program as appropriate to conditions.	
	Eye Injury	▪ PPE (safety glasses, Lumberjack hardhat system [faceguard, hearing protection, and hardhat]) will be worn.	

Training Requirements:

All personnel engaged in hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards shall receive appropriate training as required by 29 CFR 1910.120(e), including, but not limited to, initial 40-hour, and annual 8-hour refresher.

Medical qualification, training and fit-testing must be received on an annual basis for individuals that wear a respirator. If an individual wears a respirator more than 30 days per year, or they are exposed at or above the Permissible Exposure Limit (PEL) of a chemical for more than 30 days in a year, then they must participate in a Medical Surveillance Program as required by 29 CFR 1910.120(f)

All assigned employees working at potentially contaminated sites are required to familiarize themselves with this AHA before starting a work activity and review it with their Supervisor during their Daily Safety Huddle.

PARSONS/O'Brien & Gere

Activity Hazards Analysis

Knife and Blade Use

Project Name & Number: NYSDEC Standby Contract # D007623	**AHA No.** 013	**Date:** October 11, 2007	**New:** Yes
Location:	**Contractor:** Parsons		**Revised:**
Required Personal Protective Equipment:	Level D-Long pants, safety glasses, hard hat (in presence of heavy equipment), steel-toed boots, cut-proof gloves (kevlar work gloves or equivalent).	**Analysis by:** M. Vetter	**Date:** October 11, 2007
	Superintendent/Competent Person	**Reviewed by:**	**Date:**
Work Operation: Knife and blade use.		**Approved by:**	**Date:**

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Utility knife use	Cuts from knife	▪ Use only self-retracting utility knives to cut materials. ▪ Always use a sharp blade when cutting. Dispose used blades in a provided "sharps container." ▪ Always wear cut resistant gloves when using a knife.	▪ Inspect utility knife prior to use. Replace blades and holders as necessary.
Cutting with saw or drill	Cuts and Abrasions	▪ Use tool in proper body positioning, keep hand, legs feet and body away. ▪ Unplug tool when servicing. ▪ Keep cord away from cutting plane. ▪ Wear safety glasses and cut resistant work gloves.	▪ Inspect tool before and during each use. ▪ Inspect areas before and during use
	Injury from Hand Tool Operation	▪ Personnel awareness of potential hazards from hand tool operation. ▪ SSO will ensure that all tools used onsite are in proper working order and are in good condition. ▪ Personnel to inform SSO or Project Manger if tools require repair or replacement.	▪ Follow operations and maintenance
	Injury from Power Tool Operation	▪ All tools will be in good working order. ▪ No damaged equipment will be issued until repaired or	▪ Follow operations and maintenance procedures for each

		replaced. ▪ When power operated tools are designed to accommodate guards, the guard must be in place on the tool. ▪ Fuel powered tools may be refueled, serviced, or maintained only while the tools are stopped and not operating.	piece of equipment used on site.

Training Requirements:

All personnel engaged in hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards shall receive appropriate training as required by 29 CFR 1910.120(e), including, but not limited to initial 40-hour, 8 hour Supervisor and annual 8-hour refresher training.

All assigned employees are required to familiarize themselves with the contents of this JSA before starting a work activity and review it with their Supervisor during their Daily Safety Huddle.

PARSONS/O'Brien & Gere

Activity Hazards Analysis

Operation of General Hand Tools

Project Name & Number: NYSDEC Standby Contract # D007623	**AHA No.** 012	**Date:** 8-13-10	**New:** No
Location:	**Contractor:** Parsons		**Revised:**
Required Personal Protective Equipment:	Level D-Long pants, safety glasses with side shields / safety goggles, safety toe boats, work gloves (leather palm style).	**Analysis by:** P. Roth	**Date:** 7-19-07
	Superintendent/Competent Person TBD	**Reviewed by:** M.Hennessey	**Date:** 8-12-10
Work Operation: Operation of hand tools		**Approved by:** Andrew Falder	**Date:** 8-13-10

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Operation of general hand tools	General	▪ When operating any tool one must be aware of what's around them including objects and other people. ▪ Clear other persons away from the "line of fire." ▪ Group instruction will given on the proper use of each tool.	▪ Each tool used will be visually inspected prior to use and periodically each day to ensure operational safety.
	Pinch Points	▪ Everyone will be aware of where possible pinch points are.	
	Eye injury	▪ Safety glasses with side shields or safety goggles will be wore at all times. Must wear a face shield	
	Noise	▪ If the noise created 85 dBA, hearing protection will be required.	
	Back Injuries	▪ Proper lifting techniques when moving and operating any tool will be observed.	
	Cuts/ Abrasions	▪ During operation of hand tools, work gloves will be worn. ▪ While operating the saw, all body parts will be kept clear of rotating blade.	

Training Requirements:

Everyone using any hand tool will have read this AHA and be aware of the possible hazards associated with using each tool.

PARSONS/O'Brien & Gere

Activity Hazards Analysis

Operation of Hand Auger

Project Name & Number: NYSDEC Standby Contract # D007623	**AHA No.** 011	**Date:** 01/28/11	**New:** Yes
Location:	**Contractor:** Parsons		**Revised:**
Required Personal Protective Equipment: Hard hat, Safety Glasses, Safety Toe Boots, Leather Palm Work Gloves		Analysis by: Matt Vetter	Date: 1/28/11
	Superintendent/Competent Person	Reviewed by:	Date:
Work Operation: Hand Auger		Approved by:	Date:

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Operation of hand auger	General	▪ When operating tool one must be aware of what's around them including objects and other people. ▪ Clear other persons away from the "line of fire." ▪ Group instruction will be given on the proper use of hand auger.	▪ Visually inspected hand auger prior to use and periodically each day to ensure operational safety.
	Pinch Points	▪ Everyone will be aware of where possible pinch points are.	
	Eye injury	▪ Safety glasses with side shields or safety goggles will be wore at all times.	

	Back Injuries	▪ Proper lifting techniques when lifting the auger will be observed. ▪ If necessary, pulling the tube from the ground will be done by two people. ▪ Proper lifting techniques will be reviewed as a group with entire field team.	
	Cuts/ Abrasions	▪ During operation of hand auger, work gloves will be worn.	

Training Requirements:

All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity and review it with their Supervisor during their Daily Safety Huddle.

PARSONS/O'Brien & Gere

Activity Hazards Analysis

Fueling-Motor Vehicle

Project Name & Number: NYSDEC Standby Contract # D007623	**AHA No.** 010	**Date:** June 27, 2005.	**New:** Yes
Location:	**Contractor:** Parsons		**Revised:**
Required Personal Protective Equipment:	Level D- Long pants, safety glasses, hard hat (when working around heavy equipment.	**Analysis by:** R. Absolom	**Date:** June 27, 2005
	Superintendent/Competent Person	**Reviewed by:** M. Raybuck	**Date:** July 5, 2005
Work Operation: Fueling of motor vehicle		**Approved by:**	**Date:**

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Fueling the vehicle	Overflow/Spills of fuel on to pavement.	▪ Ensure that fuel pumps have a UL listed automatic closing valve. ▪ Use approved safety containers. ▪ Workers will be aware capacity of fuel tank/container. ▪ Do not "squeeze in" extra gasoline to fill up tank. ▪ Inform gas station attendant of fuel spill.	▪ Follow operations manual maintenance and inspection procedures for each piece of equipment used on site.
	Explosion	▪ Ensure that all fuel is in approved safety containers. ▪ No smoking or open flame with in 50 feet. ▪ Equipment/Motors that use flammable fuel shall be shut down during fueling, servicing, or maintenance. ▪ Turn cell phones off during fueling of vehicle.	
	Spill on clothing	▪ Workers should be aware of capacity of fuel tank. ▪ Wear gloves while fueling. ▪ Change clothing if saturated with fuel.	

Training Requirements:

All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity and review it with their Supervisor during their Daily Safety Huddle.

PARSONS/O'Brien & Gere

Drilling/Boring and Associated Soil Sampling

Project Name & Number: NYSDEC Standby Contract # D007623	**AHA No.** 009	**Date:** 12-27-07	**New:**
Location:	**Contractor:** Parsons		**Revised:**
Required Personal Protective Equipment:	Level D-Long pants, safety glasses with side shields / safety goggles, safety toe boots, work gloves (leather palm style)	**Analysis by:** P. Roth	**Date:** 12-27-07
	Superintendent/Competent Person TBD	**Reviewed by:**	**Date:**
Work Operation: Drilling/Boring and Associated Soil Sampling		**Approved by:**	**Date:**

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
General drilling activities	Slips, Trips and Falls	▪ Keep work area free of excess material and debris. ▪ Remove all trip hazards by keeping materials/objects organized and out of walkways. ▪ Wear appropriate PPE including non-slip steel toe rubber boots when working on wet or slick surfaces.	Conduct a formal weekly site inspection and an informal daily site inspection.
	Heat/Cold Stress	▪ All workers dress accordingly to prevent injuries from extreme heat, or cold. ▪ SSO will monitor for cold/heat stress symptoms.	Start (oral) temperature recording at the job site: ▪ At the Field Team Leader's discretion when suspicion is based on changes in a worker's performance or mental status. ▪ At a worker's request. ▪ As a screening measure, two times per shift, under unusually hazardous conditions (e.g., wind-chill less than 20°F, or wind-chill less than 30°F with precipitation). As a screening measure whenever any one worker on the site develops hypothermia.

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
	Biological Hazards: Insects, Snakes, , Vegetation	▪ Inspect all work areas when arriving at site to identify hazards. ▪ Wear insect repellant if warranted. ▪ Wear appropriate PPE including: leather work gloves, long sleeves, pants, and snake boots if warranted.	
	Fire/Explosion	▪ No smoking within the work area. ▪ A Type ABC, 20-lb, fully charged fire extinguisher will be on site.	
Ambient Air Monitoring	Vapors	▪ Approach area where vapors are suspected from upwind direction and stay upwind/crosswind of potential sources of vapors. (Use flagging to indicate wind direction.)	Monitor workers breathing zone at a minimum of once every 30 minutes.
	Ineffective Air Monitoring	▪ Ensure that personnel using Air monitoring equipment have been properly trained. ▪ The instrument will be calibrated prior to use.	
Drill Rig Set-up	Rig Roll Over	▪ Do not move rig when mast is raised. ▪ Cross all hills and obstructions head on. ▪ Set riggers prior to raising mast. ▪ Prior to setting drill rig, ensure that the ground is stable enough to support the rig.	
	Overhead obstacles	▪ Use a spotter when raising mast to confirm clearance of overhead lines and other obstructions.	Note and flag obstructions during the pre-construction site inspection. Conduct a formal weekly site walk and an informal daily site inspection.
	Rig Movement	▪ Stay clear of operating equipment when the rig is moving. ▪ Establish communication system between workers involved in moving and attaching sections. ▪ Use a spotter as necessary to move the rig.	

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
	Sharp or Elevated Equipment	▪ Wear appropriate PPE including steel-toed safety boots, leather gloves and hard hat	
Ground Disturbance: Auger/Boring Advancement	Faulty or Inappropriate Equipment	▪ Qualified driller must inspect drill rig prior to use, if faulty or inappropriate, do not proceed with work until repaired or replaced. ▪ Inspect all hand tools prior to use, if faulty or inappropriate do not proceed with work until repaired or replaced.	
	Moving Equipment	▪ Clear area of obstructions and communicate with all workers involved when drilling begins. ▪ Do not exceed manufactures recommended speed, torque, or other specifications. Penetrate the ground slowly with hands on the controls for at least the first foot of soil to minimize the chance of auger kick-out. ▪ Stay clear of rotating auger. ▪ Use long handled shovel to clear away cuttings when the auger has stopped. ▪ Do not wear loose clothing. ▪ Wear appropriate PPE, including leather gloves and steel-toed boots. ▪ Approach after you have visual attention of operator and the drilling operations have been shutdown.	
	Suspended Loads	▪ Do not walk under suspended loads. ▪ When possible, remove overhead hazards promptly. ▪ Wear appropriate PPE, including hard hat and steel-toed boots.	
	High Noise Levels	▪ Hearing protection will be worn in hazardous noise areas or when working around drill rigs. ▪ Wear earplugs when noise level from equipment exceeds 85 decibels (dBA) averaged over an eight-hour day.	As a rule of thumb: if you are standing next to a person and have to raise your voice to be heard, hearing protection is required.

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
	Vapors and Airborne Particulates	▪ Monitor air concentrations using direct-reading, real-time instruments. ▪ Stop work if hazardous conditions (explosive atmosphere, oxygen deficient atmosphere) are identified, and remain stopped until precautions are taken. ▪ Wear appropriate PPE as warranted by the conditions. ▪ Stay upwind of drilling operation.	
Ground Intrusion: Split Spoon	Faulty Equipment	▪ Inspect rope/cable/rod for wear, fraying, oils and moisture prior to use, do not use if faulty until repaired or replaced. ▪ Inspect cathead for rust and rope grooves prior to use, do not use if faulty until repaired or replaced.	
	Moving Equipment	▪ Do not wrap rope around any part of the body or hand. ▪ Maintain distance of 18 inches from in-running points on running/reciprocating equipment. ▪ Eliminate excess rope. ▪ Do not wear loose clothing. ▪ Wear appropriate PPE including leather gloves.	
Soil Sampling	Contaminated Materials	▪ Wear appropriate PPE, including Nitrile gloves.	
	Sharp Sampling Tools	▪ Use a retractable blade when opening sleeves. ▪ When opening sleeves, cut away from the body. ▪ Place soil core on sturdy surface prior to cutting.	
	Vapors	▪ Wear appropriate PPE, including respirator if warranted.	Review PPE requirements in PSP for action levels. Monitor **worker's** breathing zone at a minimum of once every 30 minutes.
	Sample Cross Contamination	▪ Decontaminate or dispose of sampling equipment including drill rig equipment that comes in contact with samples between each sampling location.	

Training Requirements:

All personnel engaged in hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards shall receive appropriate training as required by 29 CFR 1910.120(e), including, but not limited to initial 40-hour, 8 hour Supervisor and annual 8-hour refresher training.

Medical qualification, training and fit testing must be received on an annual basis for individuals that wear a respirator. If an individual wears a respirator more than 30 days per year, or they are exposed at or above the Permissible Exposure Limit (PEL) of chemical for more than 30 days in a year, then they must participate in a Medical Surveillance Program as required by 29 CFR 1910.120 (f).

All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity and review it with their Supervisor during their Daily Safety Huddle.

PARSONS/O'Brien & Gere

Activity Hazards Analysis

Decontamination- Portable Tools

Project Name & Number: NYSDEC Standby Contract # D007623	**AHA No.** 008	**Date:** March 17, 2005	**New:** Yes
Location:	**Contractor:** Parsons		**Revised:**
Required Personal Protective Equipment:	Modified Level D- Long pants, safety glasses/splash goggles, hard hat, steel-toed boots, nitrile outer gloves and latex inter gloves, tyvek coveralls	**Analysis by:** R. Absolom	**Date:** March 17, 2005
Work Operation: Tool Decontamination	**Superintendent/Competent Person:** TBD	**Reviewed by:** M. Raybuck	**Date:** July 5, 2005
		Approved by:	**Date:**

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
General	Site Hazardous Material Exposure	▪ Training and safety awareness of potential exposure to contaminates at the site and decontamination procedures. ▪ Appropriate PPE will be worn (e.g., gloves, splash goggles, Tyvek, etc.). ▪ Personnel will follow decontamination procedures.	
	Eye Injury	▪ PPE (safety glass, etc.) will be worn.	
	Slips, Trips, Falls	▪ Workers will be aware of potentially slippery surfaces and tripping hazards. ▪ Workers will keep all areas clean and free of debris to deter any unnecessary trips and falls. ▪ Personnel will clean up all spills immediately. ▪ Personnel will notify the SSO of any unsafe conditions.	
Remove gross contamination with brush.	Damaging equipment or tools	▪ To clean instrumentation: follow manufacturer's instructions.	
Place in decontamination bucket or rinse with decontamination solution	Spill/leakage	▪ Workers will have berms or spill absorbent pads nearby to prevent the spread of contaminated water. ▪ Decontamination area will be designed to minimize exposure	

		and maintain spill containment.	
Clean with wash solution	Chemical reaction with wash solution	▪ A fire extinguisher will be located in an accessible location on site. ▪ Review the chemicals of concern and use appropriate wash solution.	
Rinse with water	Contamination remains	▪ Personnel will repeat proper decontamination procedure.	

Training Requirements:

All personnel engaged in hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards shall receive appropriate training as required by 29 CFR 1910.120(e), including, but not limited to initial 40-hour, 8-hour Supervisor and annual 8-hour refresher training.

Medical qualification, training and fit testing must be received on an annual basis for individuals that wear a respirator. If an individual wears a respirator more than 30 days per year, or they are exposed at or above the Permissible Exposure Limit (PEL) of chemical for more than 30 days in a year, then them must participate in a Medical Surveillance Program as required by 29 CFR 1910.120 (f).

All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity and review it with their Supervisor during their Daily Safety Huddle.

PARSONS/O'Brien & Gere

Activity Hazards Analysis

Decontamination- Personnel

Project Name & Number: NYSDEC Standby Contract # D007623	**AHA No.** 007	**Date:** March 17, 2005	**New:** Yes
Location:	**Contractor:** Parsons		**Revised:**
Required Personal Protective Equipment:	Modified Level D- Long pants, safety glasses/ splash goggles, hard hat, steel-toed boots, nitrile outer gloves and latex inter gloves, tyvek coveralls,	**Analysis by:** R. Absolom	**Date:** March 17, 2005
Work Operation: Personnel Decontamination	**Superintendent/Competent Person:** TBD	**Reviewed by:** M. Raybuck	**Date:** July 5, 2005
		Approved by:	**Date:**

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Decontaminate personnel exiting from the Exclusion zone	General	▪ Personnel should dress in suitable safety equipment to reduce exposure. ▪ Collect rinse water and dispose of per appropriate standard operating procedures. ▪ Follow decontamination procedures.	
	Site Hazardous Material Exposure	▪ Training and safety awareness of potential exposure to chemicals of concern at the site and decontamination procedure. Review chemicals of concern. ▪ Appropriate PPE will be worn (e.g. tyvek, nitrile gloves, safety glass, etc.).	
	Slips, Trips, Falls	▪ Workers will be aware of potentially slippery surfaces and tripping hazards. ▪ Workers will keep all areas clean and free of debris to deter any unnecessary trips and falls. ▪ Clean up all spills immediately. ▪ Personnel will notify the SSO of any unsafe conditions.	
	Heat and Cold Stress	▪ The SSO will implement the cold/heat stress control program as appropriate to conditions.	

	Eye Injury	▪ PPE (safety glasses, splash goggles) will be worn.	

Training Requirements:

All personnel engaged in hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards shall receive appropriate training as required by 29 CFR 1910.120(e), including, but not limited to, initial 40-hour, 8-hour Supervisor and annual 8-hour refresher.

Medical qualification, training and fit-testing must be received on an annual basis for individuals that wear a respirator. If an individual wears a respirator more than 30 days per year, or they are exposed at or above the Permissible Exposure Limit (PEL) of a chemical for more than 30 days in a year, then they must participate in a Medical Surveillance Program as required by 29 CFR 1910.120(f)

All assigned employees working at potentially contaminated sites are required to familiarize themselves with this AHA before starting a work activity and review it with their Supervisor during their Daily Safety Huddle.

PARSONS/O'Brien & Gere

Activity Hazards Analysis

Decontamination- Large Equipment

Project Name & Number: NYSDEC Standby Contract # D007623	**AHA No.** 006	**Date:** March 17, 2005	**New:** Yes
Location:	**Contractor:** Parsons		**Revised:**
Required Personal Protective Equipment:	Modified Level D- Long pants, safety glasses/ splash goggles, hard hat, steel-toed boots, nitrile outer gloves and latex inter gloves, tyvek coveralls	**Analysis by:** R. Absolom	**Date:** March 17, 2005
Work Operation: Equipment Decontamination	**Superintendent/Competent Person:** TBD	**Reviewed by:** M. Raybuck	**Date:** July 5, 2005
		Approved by:	**Date:**

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Process items through decontamination in accordance with the PSP	Site Hazardous Material Exposure	▪ Training and safety awareness of potential exposure to contaminates at the site and decontamination procedure. ▪ Appropriate PPE will be worn. ▪ Personnel will follow decontamination procedure	
	Slips, Trips, Falls	▪ Workers will be aware of potentially slippery surfaces and tripping hazards. ▪ Workers will keep all areas clean and free of debris to deter any unnecessary trips and falls. ▪ Personnel will clean up all spills immediately. ▪ Personnel will notify the SSO of any unsafe conditions.	
	Heat and Cold Stress	▪ Implement the cold/heat stress control program. ▪ SSO will monitor workers for Heat/Cold stress symptoms.	
	Eye Injury	▪ PPE (safety glasses, etc.) will be worn.	
Hot Water High Pressure Spray/Steam Clean	Hot Water Burns	▪ Prior to decontamination of large equipment, personnel will ensure that all other workers are outside of the decontamination areas.	

		▪ Personnel will wear appropriate PPE (e.g. gloves, tyvek, splash goggles, etc.).	
	Spill/Leak of contaminated Water	▪ Decontamination area will be designed to collect all contaminated wash/rinse water and to prevent the spread of run off. ▪ Berms and absorbent pads will be available for use in controlling spills.	

Training Requirements:

All personnel engaged in hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards shall receive appropriate training as required by 29 CFR 1910.120(e), including, but not limited to initial 40-hour, 8 hour Supervisor and annual 8-hour refresher training.

Medical qualification, training and fit testing must be received on an annual basis for individuals that wear a respirator. If an individual wears a respirator more than 30 days per year, or they are exposed at or above the Permissible Exposure Limit (PEL) of chemical for more than 30 days in a year, then them must participate in a Medical Surveillance Program as required by 29 CFR 1910.120 (f).

All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity and review it with their Supervisor during their Daily Safety Huddle.

PARSONS/O'Brien & Gere

Activity Hazards Analysis

Decontamination- Area Setup

Project Name & Number: NYSDEC Standby Contract # D007623	**AHA No.** 005	**Date:** April 27, 2005	**New:** Yes
Location:	**Contractor:** Parsons		**Revised:**
Required Personal Protective Equipment:	Level D-Long pants, safety glasses, hard hat (in presence of heavy equipment), steel-toed boots, gloves (leather work gloves for construction efforts and clearing).	**Analysis by:** R. Absolom	**Date:** April 27, 2005
	Superintendent/Competent Person	**Reviewed by:** M. Raybuck	**Date:** July 5, 2005
Work Operation: Decontamination Area Setup		**Approved by:**	**Date:**

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Decontamination area set up	Vehicle and heavy equipment traffic in work area	▪ Operation of heavy equipment in accordance with the PSP. ▪ Be alert when working around heavy equipment. ▪ Ground guides for the backing of all vehicles. ▪ No heavy equipment will be operated without a ground guide. ▪ Barriers, warning signs, designated walkways or other safeguards must be provided where pedestrians are exposed to the risk of collision.	▪ Follow operations manual maintenance and inspection procedures for each piece of equipment used on site.
	Muscle strain/injuries from improper lifting	▪ Personnel will utilize proper lifting techniques or ask for assistance with moving/lifting objects.	
	Rain	▪ Have proper PPE (i.e. rain gear, footwear, etc) available. Be aware of slip hazards, puddles, etc.	
	Sunshine	▪ Have sunscreen available for ultraviolet protection. Have water for dehydration.	
	Snow	▪ Have warm clothes available for cold temperatures.	
	Lightning	▪ Do not begin or continue work until lightning subsides for 20 minutes.	

	Cold and Heat Stress	▪ Implement the cold/heat stress program as appropriate to conditions. ▪ SSO will monitor workers for cold/heat stress symptoms.	
	Slips, Trips, Falls	▪ Workers will be aware of potentially slippery surfaces and tripping hazards. ▪ Work slowly during transit. Jumping, running, and horseplay are prohibited. ▪ Workers will keep all areas clean and free of debris to deter any unnecessary trips and falls. ▪ Clean up all spills immediately. ▪ Personnel will notify the SSO of any unsafe conditions.	
	Injury from Hand Tool Operation	▪ Personnel awareness of potential hazards from hand tool operation. ▪ SSO will ensure that all tools used onsite are in proper working order and are in good condition. ▪ Personnel to inform SSO or Project Manger if tools require repair or replacement.	
	Biological Hazards (ticks, bees, mosquitoes, snakes, etc.)	▪ Personnel will be aware of potential exposure to biological hazards. ▪ Wear appropriate clothing (hat, long-sleeve shirt, long pants, gloves, boots etc.) and insect repellant. ▪ Personnel will wear thick gloves when clearing plants or debris from work area.	
	Injury from Power Tool Operation	▪ All tools will be in good working order. ▪ No damaged equipment will be issued until repaired or replaced. ▪ When power operated tools are designed to accommodate guards, the guard must be in place on the tool. ▪ Fuel powered tools may be refueled, serviced, or maintained only while the tools are stopped and not operating.	▪ Follow operations and maintenance procedures for each piece of equipment used on site.

Training Requirements:

All personnel engaged in hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards shall receive appropriate training as required by 29 CFR 1910.120(e), including, but not limited to initial 40-hour, 8 hour Supervisor and annual 8-hour refresher training.

Medical qualification, training and fit testing must be received on an annual basis for individuals that wear a respirator. If an individual wears a respirator more than 30 days per year, or they are exposed at or above the Permissible Exposure Limit (PEL) of chemical for more than 30 days in a year, then them must participate in a Medical Surveillance Program as required by 29 CFR 1910.120 (f).

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PARSONS/O'Brien & Gere

Activity Hazards Analysis

Site Clearing with Chainsaw, String or Blade Trimmer

Project Name & Number: NYSDEC Standby Contract # D007623	**AHA No.** 004	**Date:** 2/8/2010	**New:** Yes
Location:	**Contractor:**		**Revised:**
Required Personal Protective Equipment:	Level D- Long pants, safety glasses, hard hat, steel-toed boots, gloves, face shield, chaps, PPE	**Analysis by:** Dale Dolph	**Date:** 2/8/2010
	Superintendent/Competent Person	**Reviewed by:** Drew Falder	**Date:** 7/22/2010
Work Operation: Site Clearing with Chainsaw ,String or blade Trimmer		**Approved by:**	**Date:**

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Site Access	Slips/trips/falls	• Be aware of potential trip hazards such as underbrush, fallen logs, vines, burrowing animal holes, uneven terrain, etc. • Walk slowly during transit • Keep work zones clean and free of debris to deter any unnecessary trips and falls. • Notify the SSO of any unsafe conditions	• Inspect the area to be cleared prior to clearing activities. • Inspect job site daily.
String/blade Trimmer Operation	Bodily injury/Injury to others	• Be sure there are no other persons within the immediate area • Dress properly. Use safety glasses and face shield. Always wear long pants, long sleeves, gloves, chaps (when using blade trimmer) and the proper footwear. Wearing safety leg guards (chaps) is recommended. • Secure hair above shoulder length. Secure or remove loose clothing or clothing that has loose ties or straps.	• Inspect personnel prior to start of clearing activities for proper PPE and clothing.
	Exposure toxic plants or poisonous vegetation	• Use a dust mask if area of operation is dusty or there is the possibility of poisonous vegetation such as poison ivy, poison oak, poison sumac, etc. • Wear coverall or disposable type tyvek to prevent dermal exposure to debris or pieces of toxic plants thrown by the spinning line. • If an individual is particularly sensitive to any of the	• Inspect areas to be cleared beforehand for the presence of poisonous plants. • If there are no signs of poisonous plants, tyvek is not required.

		above listed poisonous plants, they should refrain from conducting string/blade trimming operations due to the high potential exposure of the toxic plants from debris and vegetation thrown by the spinning apparatus.	
Chainsaw Operation	Bodily injury/Injury to others	• Be sure there are no other persons within the immediate area. • Dress properly. Always use safety glasses and face shield. Always wear long pants, long sleeves, gloves and the proper footwear. Wearing cut resistant safety leg guards (chaps) is required. • Secure hair above shoulder length. Secure or remove loose clothing or clothing that has loose ties or straps that could become entangled in the chainsaw chain. • Never work off a ladder or any unsecure support. Never operate the chainsaw above shoulder height. Never.overreach.	• Ensure that all personnel are trained in the proper operating procedures prior to working with the chainsaw. • Ensure that the chainsaw is operated in accordance with the manufacturers recommended safety precautions and cutting techniques. • Inspect chain saw prior to each use – be sure all guards are in place and the saw is in sound operating condition
	Falling trees and branches	• Be aware of the direction that trees will fall. • Notch trees prior to cutting to ensure direction of fall	• Plan and prepare an escape route to move along when a tree begins to fall
	Chain saw kick back	• Maintain proper chain tension on the bar. Begin cuts with chain saw chain rotating at a sufficient RPM to begin the cut • Be sure anti-kick back device is operating	• Be sure chain is sharp and in good condition
	Noise Exposure	• Hearing protection will be worn in hazardous noise areas or while working with power tools such as a chainsaw or weedeater. • Wear appropriate hearing protection when noise level from equipment exceeds 90 decibels (dBA) averaged over an eight-hour day.	

Training Requirements:

All personnel engaged in hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards shall receive appropriate training as required by 29 CFR 1910.120(e), including, but not limited to initial 40-hour, 8 hour Supervisor and annual 8-hour refresher training.

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PARSONS/O'Brien & Gere

Activity Hazards Analysis

Backhoe Testing

Project Name & Number: NYSDEC Standby Contract # D007623	**AHA No.** 003	**Date:** 10/15/ 2010	**New:** Yes
Location:	**Contractor:** Ballard Const.Inc.		**Revised:**
Required Personal Protective Equipment:	Level D- Long pants, safety glasses, hard hat (only in presence of heavy equipment), steel-toed boots. Tyvek coveralls, Rubber boots, leather gloves, nitrile outer gloves and latex inner gloves.; Level C on hand or nearby – consisting of Respirator with attached cartridges	**Analysis by:** **R. Ranieri**	**Date:** 10/15/2010
	Superintendent/Competent Person	**Reviewed by:** W. Ballard	**Date:** **10/15/2010**
Work Operation: Backhoe Testing		**Approved by:** **R. Ranieri**	**Date:** **April 22, 2010**

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Backhoe Testing	Tip Over Struck by Pinch Points	▪ All personnel will be aware of moving machinery and parts and wear appropriate PPE when near machinery (e.g., hard hat, safety glasses, gloves, etc.	
	Noise Exposure	▪ Hearing protection will be worn in hazardous noise areas or working around heavy machinery or equipment. ▪ Wear earplugs when noise level from equipment exceeds 85 decibels (dBA) averaged over an eight-hour day.	
	Dust Inhalation	▪ If visible dust is observed, Parsons/Honeywell will monitor dust levels with dust monitoring equipment (or equivalent) while excavating backhoe trenches	
	Muscle Strain/injuries from improper lifting	▪ Personnel will utilize proper lifting techniques or ask for assistance with moving/lifting soil	
	Rain	▪ Have proper PPE (i.e. rain gear, footwear, etc) available. Be aware of slip hazards, puddles, etc.	
	Sunshine	▪ Have sunscreen available for ultraviolet protection. Have water for dehydration.	

	Lightning	▪ Do not begin or continue work until lightning subsides for 20 minutes.	
	High winds, dust storm	▪ Wear goggles and dust masks, if dust/debris is visible.	
	Cold and Heat Stress	▪ Personnel will dress accordingly to prevent injuries from extreme heat. ▪ Water will be available in a Cooler. ▪ SSO will monitor for heat stress symptoms.	
	Slips, Trips, Falls	▪ Workers will be aware of potentially slippery surfaces and tripping hazards. ▪ Jumping, running, and horseplay are prohibited. ▪ Workers will keep all areas clean and free of debris to deter any unnecessary trips and falls.	
	Backhoe Excavation and Testing/Profile	▪ Fill removed from the backhoe will be placed at least 1.5 m (ft) away from the trench ▪ Because of the loose fill soils, personnel will not enter into the backhoe trenches more than 1.2 m (4 ft) in depth, unless the backhoe trenches are widened to meet OSHA standards. ▪ Following the completion of all trenching work, backhoe trenches will be filled with the material that was removed from the trench.	▪ **Contact Dig Safely NY to mark out utilities prior to mobilizing for test pits.** ▪ **Conduct GPR survey of test pit area prior to excavation (if applicable).**
	Injury from Hand Tool Operation	▪ Personnel awareness of potential hazards from hand tool operation. ▪ SSO will ensure that all tools used onsite are in proper working order and are in good condition. ▪ Personnel to inform SSO or Project Manager if tools require repair or replacement.	
	Biological Hazards (ticks, bees, mosquitoes, snakes,	▪ Personnel will be aware of potential exposure to biological hazards. ▪ Wear appropriate clothing (hat, long-sleeve shirt, long	

	etc.)	pants, gloves, boots etc.) and insect repellant.	
	Site Hazards Material Exposure	▪ Training and safety awareness of potential exposure to contaminates at the site. ▪ Training of all personnel decontamination procedures. ▪ Appropriate PPE will be worn dependent on site conditions and actions levels. ▪ All backhoe trenches will be monitored by personnel from Parsons/Honeywell for levels of chemicals and vapors to determine if the level of PPE needs to be raised above Level D. ▪ Must sign off on health and safety plan. ▪ Visitor will be escorted around site by a 40 hour trained individual unless cleared with the SSO.	

Training Requirements:

Personnel will report to the Site Safety Officer who will give a short health and safety orientation and require sign off on the PSP. The SSO will determine if the personnel can access the site based on verification of 40 hour training or if the personnel will need to be escorted by a 40-hour trained individual onsite.

All personnel engaged in hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards shall receive appropriate training as required by 29 CFR 1910.120(e), including, but not limited to initial 40-hour and annual 8-hour refresher training.

Medical qualification, training and fit testing must be received on an annual basis for individuals that wear a respirator. If an individual wears a respirator more than 30 days per year, or they are exposed at or above the Permissible Exposure Limit (PEL) of chemical for more than 30 days in a year, then they must participate in a Medical Surveillance Program as required by 29 CFR 1910.120 (f).

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PARSONS/O'Brien & Gere

Activity Hazards Analysis

Activities- Field

Project Name & Number: NYSDEC Standby Contract # D007623	**AHA No.** 002	**Date:** April 27, 2005	**New:** Yes
Location:	**Contractor:** Parsons		**Revised:**
Required Personal Protective Equipment:	Depending on environment at project site: blanket, sunscreen, cold/hot drink, extra clothing.	**Analysis by:** R. Absolom	**Date:** April 27, 2005
	Superintendent/Competent Person	**Reviewed by:** M. Raybuck	**Date:** July 5, 2005
Work Operation: Field Activities		**Approved by:**	**Date:**

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Outdoor, Physical Activity	Heat Stress ▪ Prickly Heat (Heat rash) ▪ Heat Cramps ▪ Heat Exhaustion ▪ Heat Fatigue ▪ Heat Collapse ▪ Heat Stroke	▪ Adjust work schedules. ▪ Mandate work slowdowns as needed. ▪ Perform work during cooler hours of the day if possible or at night if adequate lighting can be provided. ▪ Provide shelter (air-conditioned, if possible) or shaded areas to protect personnel during rest periods. ▪ Maintain worker's body fluids at normal levels. ▪ Train workers to recognize the symptoms of heat related illness	▪ Monitor workers physical conditions ▪ Monitor outside temperature versus worker activity.
Working around water Outdoor activities	Cold Related Injuries Frostbite Hypothermia	▪ Educate workers to recognize the symptoms of frostbite and hypothermia ▪ Identify and limit known risk factors: ▪ Assure the availability of enclosed, heated environment on or adjacent to the site. ▪ Assure the availability of dry changes of clothing. ▪ Assure the availability of warm drinks.	Start (oral) temperature recording at the job site: ▪ At the Field Team Leader's discretion when suspicion is based on changes in a worker's performance or mental status. ▪ At a worker's request. ▪ As a screening measure, two times per shift, under unusually hazardous conditions (e.g., wind-chill less than 20°F, or wind-chill less than 30°F with precipitation). ▪ As a screening measure whenever

			any one worker on the site develops hypothermia.
	Rain	▪ Have proper PPE (i.e. rain gear, footwear, etc) available. Be aware of slip hazards, puddles, etc.	
	Sunshine	▪ Have sunscreen available for ultraviolet protection. Have water for dehydration.	
	Snow	▪ Have warm clothes available for cold temperatures.	
	Lightning	▪ Do not begin or continue work until lightning subsides for 20 minutes.	
	High winds, dust storm	▪ Wear goggles if dust/debris is visible.	
	Pollen	▪ Take medication (i.e. anti-histamine) to minimize allergic reaction to pollen. Wear dust mask, if necessary.	
	Streams	▪ Observe depth of stream and speed of current before proceeding.	
	Walking on uneven or wet terrain (i.e. slopes, leaves, covered objects, holes, etc)	▪ Wear steel toe rubber boots versus over-the-shoe rubber boots. Use walking stick or other object for additional support/balance and to check for animal burrows/holes.	
	Insects, rodents, animals, etc.	▪ Wear Tyvek coveralls. Apply bug repellant spray or lotion to exposed skin.	
	Vegetation	▪ Create a clear path or route with mechanical equipment, whenever possible. Wear appropriate PPE for the vegetation (i.e. leather gloves, Carhartt coveralls and face shield for vegetation that could cause cuts/punctures and/or is higher than waist level.	

Training Requirements:

All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity and review it with their Supervisor during their Daily Safety Huddle.

PARSONS/O'Brien & Gere

Activity Hazards Analysis

Accessing Areas Surrounded by Vegetation

Project Name & Number: NYSDEC Standby Contract # D007623	**AHA No.** 001	**Date:** June 12, 2007	**New:** Yes
Location:	**Contractor:** Parsons		**Revised:**
Required Personal Protective Equipment:	Level D- Long pants, safety glasses/ splash goggles, hard hat, steel-toed boots	**Analysis by:** X. Huang	**Date:** June 12, 2007
Work Operation: Accessing working locations surrounded by dense vegetation	**Superintendent/Competent Person:** TBD	**Reviewed by:** **Jerry Clark**	**Date:** **June 13, 2007**
		Approved by:	**Date:**

Work Activity	**Potential Hazards**	**Preventive or Corrective Measures**	**Inspection Requirements**
Accessing working locations surrounded by dense vegetation	▪ Struck by, struck against, contacted by, or contact with vegetation ▪ Walking on uneven or wet terrain ▪ Expose to insects	▪ Create/clear a path or route whenever possible. Wear steel-toed rubber boots (not over-the-shoe rubber boots), tyvek coveralls, cut-resistant gloves, and face shield if a clear path is not present and vegetation is higher than waist level and cannot be cut down. ▪ Wear steel-toed rubber boots (not over-the-shoe rubber boots). Survey access route for holes, rocks, mud, etc. that could result in a twisted ankle or fall. ▪ Apply bug repellant spray or lotion to exposed skin and wear tyvek coveralls.	Preview area to identify poisonous or dangerous vegetation
Check weather for potential sudden adversity	Rain	▪ Have proper rain gear available. Be aware of slip hazards, puddles, etc.	
	Lighting	▪ Do not begin or resume work until lighting subsides for 20 minutes.	Check weather report daily
	High winds, dust storm, etc.	▪ Wear goggles during high winds if dust/debris is visible.	

Activity Hazards Analysis

Accessing Areas Surrounded by Vegetation

Training Requirements:

All personnel engaged in hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards shall receive appropriate training as required by 29 CFR 1910.120(e), including, but not limited to initial 40-hour and annual 8-hour refresher training.

Medical qualification, training and fit testing must be received on an annual basis for individuals that wear a respirator. If an individual wears a respirator more than 30 days per year, or they are exposed at or above the Permissible Exposure Limit (PEL) of chemical for more than 30 days in a year, then them must participate in a Medical Surveillance Program as required by 29 CFR 1910.120 (f).

All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity and review it with their Supervisor during their Daily Safety Huddle.

PARSONS/O'Brien & Gere

Activity Hazards Analysis

Soil Digging

Project Name & Number: NYSDEC Standby Contract # D007623	**AHA No.** 022	**Date:** June 12, 2007	**New:** Yes
Location:	**Contractor:** Parsons		**Revised:**
Required Personal Protective Equipment:	Modified Level D- Long pants, safety glasses/ splash goggles, hard hat, steel-toed boots, cut-resistant gloves.	**Analysis by:** X. Huang	**Date:** June 12, 2007
Work Operation: Soil Digging- (e.g., shovel, hand auger, etc.)	**Superintendent/Competent Person:** TBD	**Reviewed by:** **Jerry Clark**	**Date:** **June 13, 2007**
		Approved by:	**Date:**

Work Activity	**Potential Hazards**	**Preventive or Corrective Measures**	**Inspection Requirements**
Soil digging	▪ Inhalation of contaminated dust Inhalation of volatile contaminants ▪ Ingestion of contaminants ▪ Skin/eye contact with contaminated materials	▪ If exposure to contaminated materials occurs, promptly wash contaminated skin using soap or mild detergent and water. ▪ Wash eyes with large amounts of water. ▪ If a person breathes in a large amount of organic vapor, move the exposed person to fresh air. Perform artificial respiration if breathing stops. ▪ Keep the affected person warm and at rest. Obtain medical treatment for all of these situations as required. ▪ Wear appropriate safety equipment (i.e., goggles, gloves, boots) as appropriate for reducing risk of contamination. ▪ When transferring equipment and samples to land, follow procedures for demobilization	Be alert for symptoms of exposure. Review relevant MSDSs.
	Pinch points	▪ Maintain awareness of procedures underway and be attentive of equipment operations.	
	Noise Exposure	▪ Hearing protection will be worn in hazardous noise areas or working around heavy machinery or equipment.	

		▪ Wear earplugs when noise level from equipment exceeds 90 decibels (dBA) averaged over an eight-hour day.	

Training Requirements:

All personnel engaged in hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards shall receive appropriate training as required by 29 CFR 1910.120(e), including, but not limited to initial 40-hour and annual 8-hour refresher training.

Medical qualification, training and fit testing must be received on an annual basis for individuals that wear a respirator. If an individual wears a respirator more than 30 days per year, or they are exposed at or above the Permissible Exposure Limit (PEL) of chemical for more than 30 days in a year, then them must participate in a Medical Surveillance Program as required by 29 CFR 1910.120 (f).

All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity and review it with their Supervisor during their Daily Safety Huddle.

Activity Hazards Analysis

Accessing Areas Surrounded by Vegetation

AHA 004

ATTACHMENT 9
SITE-SPECIFIC PROJECT SAFETY PLAN ORIENTATION

Project Name: TBD

Project Location: TBD

Names of personnel responsible for site safety and health:

- Project Manager- TBD
- Construction Manager – TBD
- Project Safety Manager – TBD

Site specific safety plan orientation must be conducted with all new site workers prior to beginning any work. The orientation will be conducted by any of the above mentioned responsible personnel or their designees. Orientation will consist of a review of the *Syracuse Office Safety Plan and the* site-specific PSP.

Emergencies - Call 911 and/or your supervisor for emergencies. In the event of an evacuation, the assembly point is (insert assembly location). The sound indicating an evacuation is three short fog horn blasts.

Incidents – Report all incidents (any unplanned or unexpected event that results in personal injury, property damage, or environmental release) and near-miss incidents to your supervisor and the SSO. Near-miss incidents COULD HAVE been an incident, but didn't because of a slight change in conditions or luck. Near misses have the same causal factors as an incident, so it is just important to investigate them for identifying solutions to prevent recurrence and share lessons learned. Both incidents and near misses will be reported according to both NYSDEC and Parsons/O'Brien & Gere procedural protocol

Communications – The response for anyone from the general public (e.g. media, workers from adjacent properties, etc.) inquiring about the project is: "I'm sorry, but I'm not the right person to answer your question. If you contact (insert appropriate name), the Parsons/O'Brien & Gere project manager at (TBD), he will be able to help you."

Personal Protective Equipment (PPE)

Minimum PPE:

- Safety glasses with side shields (tinted safety glasses are not permitted during overcast weather, after sundown or inside buildings)
- Hard hat
- Steel toe work boots

- Long sleeve shirt
- Long pants
- High-visibility vest

In areas of elevated exposure potential, additional PPE requirements may include:

- Tyvek coveralls and/or inner latex and outer rubber gloves when the potential for contact with contaminated soil and/or groundwater exists
- Face shield –When using pressure washer
- Nomex coveralls –Required in conjunction with hot work permitting
- Hearing protection – When working in an area where decibel level exceeds 85 for an 8 hour period
- Personal flotation device (PFD) – For marine operations, to be implemented in areas of the Project manager's discretion
- High-visibility vest/coat (with reflective stripes if working after dusk) is required when regularly exposed to vehicular traffic. Any high visibility vest/coat other than a traditional traffic vest must be pre-approved by the PSM.

Additional Site-Specific Health and Safety Hazards

Identify all activities on-site as being dangerous and having a possibility for an accident. Review with all workers the activities they are here to perform. Then, identify all possible hazards and safeguards for those activities. Next, have workers review all AHAs associated with those activities.

Site Access Control –Personnel reporting to the site must park in the designated parking areas. Only vehicles approved by the site safety officer may enter the work zone. Site speed limits in the work zone are 5 mph and 10 mph on roadways.

Training –. Copies of the PSP/HASP and material safety data sheets (MSDS) are available to all personnel. Daily safety meetings shall be documented and reviewed by all personnel working at the site, regardless of what time they arrive on-site. Prior to entering the site, general site workers must provide the SSO with valid documentation of the following:

- HAZWOPER certification (40-hr, 24-hr, and/or 8-hr refresher)
- Negative drug test documentation from within the past 2 weeks (if applicable)

Mobile equipment – Use horns to alert others. Mirrors and back-up/travel alarm must be functional on all heavy equipment. Use a spotter when backing vehicles with blind spots and/or around equipment (i.e. pipe lines, etc).

Work Practices – Use the "Buddy System" and maintain two-way radio/mobile phone for communicating and reporting emergencies.

Work permits. - Certain types of work are not to be started until approval is given in the form of a signed permit. A written, properly authorized permit listed below may be required before you

begin any specific high risk activities. Appropriate work permits for the below listed activities can be found in the Parsons Corporate Health and Safety Manual.

Line Breaking Permit (CHSM-27-01) – Required before breaking screwed, flanged, welded, or other type joints on pipelines or vessels containing hazardous materials, or breaking into (disconnecting, drilling, sawing, etc.) non-hazardous materials under pressure

Confined Space or Vessel Entry Permit (CHSM-15-02) – Required before entering tanks, vessels, manholes, or similar confined spaces that have been in service or connected to operating process equipment and may contain potentially hazardous atmospheric conditions

Lockout/Tagout Permit (CHSM-23-03) – Required for the service and maintenance of machines and equipment in which the *unexpected* energizing or start up of the machines or equipment, or release of stored energy could cause injury to workers

Excavation/Drilling Permit (CHSM-33-01) – Required to minimize hazards during excavation/drilling work and ground breaking operations, specifically when a machine or hand tools are used at a depth greater than 1 ft. Before the start of excavation or drilling activities, Parsons/O'Brien & Gere or the subcontractor will contact the utility companies or owners within the established or customary local response times, advise them of the proposed work, and ask them to locate the underground utility installation. In New York State (outside New York City and Long Island) the contact number is 1-800-962-7962 or 811.

Hot Work Permit (CHSM-28-01) –Required before any flame or spark producing activity can begin in any production, operating, or some construction areas of the plant. This includes, but is not limited to:

- Welding/repair of pipe lines under pressure greater than 5 PSI
- Welding/repair of pipe lines containing hazardous or flammable materials
- Welding/repair on any pressure vessel, fired or unfired, under pressure or in the presence of hazardous or flammable materials
- Work on energized circuits
- Cutting/burning of pipe lines, vessels, equipment, etc. that may have contained any hazardous material
- Grinding
- Any hot work on carbon steel pipe lines, vessels, equipment, etc. that may have contained sulfuric acid will not be permitted without extensive review with project and plant personnel due to the possible generation of hydrogen gas

Each plant may have permits that are required for other specific work procedures. Check with your supervisor for these permits.

<u>Contamination</u> - Eating, smoking, and applying cosmetics are not permitted in the work zone. Drinking water may be permitted in the work zone depending on site-specific conditions and the possibility of heat exhaustion.

Decontamination Procedures

- Equipment and PPE (e.g. coveralls, gloves, footwear) used in work zones must be decontaminated or disposed before leaving the exclusion zone.
- Tyvek coveralls and gloves cannot be worn outside the exclusion zone, even if they are clean.
- Personal decontamination may be necessary for activities involving the use of Level C or Level B PPE. Exhibit 6-1 includes the proper decontamination procedures that must be implemented if chemical contamination is present and PPE protection greater than Level D is used.
- Use boot wash stations when appropriate.
- Exclusion zones exist around the perimeter of intrusive activities. Support zones are at the perimeter of the exclusion zone.
- Equipment decontamination will be required for tools and machinery used during intrusive activities. These decontamination activities may include manual washing and/or steam/pressure washing. All liquids generated during personal or equipment decontamination must be collected and containerized for testing and appropriate disposal.
- The SSO will determine the proper procedures for personal and equipment decontamination based on the work activities and amount of contamination.

Proper Hygiene – Wash hands and face before eating, drinking, and smoking.

THE BELOW LISTED ACTION LIMITS ARE PROVIDED AS AN EXAMPLE

Monitoring –All site personnel engaging in intrusive activities will have their breathing zones monitored for the following air quality parameters:

Action Limits:

The following action limits are as per possible site contaminants:

Level D

- PID readings < 5 ppm

and

- Benzene <1 ppm as indicated by benzene 0.5/a Drager Tube

and

- Jerome Mercury Vapor Analyzer, or equivalent, readings ≤ 0.05 mg/m^3 total mercury (limited to visual evidence of mercury in encountered subsurface soils)

and

- MIE personal DataRam® Real-Time Aerosol Monitor, or equivalent, readings ≤ 0.025 mg/m^3 total particulates (lead PEL 0.050 mg/m3)

and

- The absence of sustained visible fugitive dust from site soils

Level C

- PID readings ≥ 5 and ≤ 25 ppm

or

- Benzene between 1 and 25 ppm

and

- Jerome Mercury Vapor Analyzer, or equivalent, readings > .05 mg/m^3 but < .999 mg/m^3 total mercury (this is the upper detection limit of the Jerome Analyzer). Use MSA Mersorb-P100 cartridges or equivalent.

or

- The presence of sustained visible fugitive dust from site soils. (Upgrade is based on judgment of site health and safety officer and MIE personal DataRam Real-Time Aerosol Monitor, or equivalent, readings ≥ 0.025 mg/m^3 total particulates (lead PEL 0.050 mg/m3)

Level B (or retreat)

- PID readings > 25 ppm.

or

- Jerome Mercury Vapor Analyzer, or equivalent, readings ≥ 0.999 mg/m^3 total mercury (meter off scale).

or

- PID readings > 5 ppm and total mercury vapors > 0.05 mg/m^3.

or

- MIE personal DataRam Real-Time Aerosol Monitor, or equivalent, readings ≥ 0.250 mg/m^3 total particulates

Note: All readings that will be used to determine the appropriateness of an upgrade in PPE shall be taken from the worker's breathing zone. Photo ionization detector (PID) readings shall be sustained readings of 30 seconds or more. Jerome readings shall be 12 second sampling periods with the meter held in the worker's breathing zone.

THE BELOW LISTED ACUTE EFFECTS OF HAZARDS ARE PROVIDED AS AN EXAMPLE

Acute Effects of Hazards at this Site

Mercury compounds [except (organo) alkyls] (as Hg)

Exposure Routes - Inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms - Irritation eyes, skin; cough, chest pain, dyspnea (breathing difficulty), bronchitis, pneumonitis; tremor, insomnia, irritability, indecision, headache, lassitude

(weakness, exhaustion); stomatitis, salivation; gastrointestinal disturbance, anorexia, weight loss; proteinuria

Target Organs - Eyes, skin, respiratory system, central nervous system, kidneys

Benzene

Exposure Routes - Inhalation, ingestion, skin and/or eye contact

Symptoms – Irritation eyes, skin, nose, respiratory system; dizziness; headache, nausea, staggered gait; anorexia, lassitude (weakness, exhaustion); dermatitis; bone marrow depression; [potential occupational carcinogen]

Target Organs - Eyes, skin, respiratory system, blood, central nervous system, bone marrow

Lead

Exposure Routes - Inhalation, ingestion, skin and/or eye contact

Symptoms - Lassitude (weakness, exhaustion), insomnia; facial pallor; anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis wrist, ankles; encephalopathy; kidney disease; irritation eyes; hypertension

Target Organs - Eyes, gastrointestinal tract, central nervous system, kidneys, blood, gingival tissue