REMEDIAL INVESTIGATION WORK PLAN

BCP Site # C704060

EJ Victory Building
59 Lester Avenue
Village of Johnson City, Broome County, New York

Prepared for:

EJ Victory Building, LLC
225 Wilkinson Street
Syracuse, New York 13204

October 2020

REVISION	DATE	SUMMARY OF REVISION

AECC ENVIRONMENTAL CONSULTING

Asbestos & Environmental Consulting Corporation
6308 Fly Road
East Syracuse, New York 13057
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CERTIFICATION

I, H. Nevin Bradford, certify that I am currently a NYS registered professional engineer and that this Remedial Investigation Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

H. Nevin Bradford	**October 30, 2020**	
NYS Professional Engineer (#086008)	Date	Signature / Stamp

It is a violation of Article 130 of New York State Education Law for any person to alter this document in any way without the express written verification of adoption by any New York State licensed engineer in accordance with Section 7209(2), Article 130, New York State Education.

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COMMON ACRONYMS AND ABBREVIATIONS

AST – Aboveground Storage Tank
ASTM – American Society for Testing Materials International
AWQS – Ambient Water Quality Standards
bgs – Below Ground Surface
DEC – Department of Environmental Conservation
EPA – Environmental Protection Agency
ESA – Environmental Site Assessment
GIS – Geographic Information Systems
GWS – Groundwater Standard
LBP – Lead-Based Paint
N/A – Not Applicable
NYSDEC – New York State Department of Environmental Conservation
NYSDOH – New York State Department of Health
PAH – Polycyclic Aromatic Hydrocarbons
PCB – Poly-Chlorinated Biphenyls
PFAS – Per- and Polyfluoroalkyl Substances
ppb – Parts Per Billion
ppm – Parts Per Million
REC – Recognized Environmental Condition
RI – Remedial Investigation
RRSCO – Restricted Residential Soil Cleanup Objective
SCO – Soil Cleanup Objective
SVOC – Semi-Volatile Organic Compound
TAL – Target Analyte List
TCL – Target Compound List
TOGS – Technical & Operational Guidance Series 1.1.1 (NYSDEC)
USDA – United States Department of Agriculture
USEPA – United States Environmental Protection Agency
USGS – United States Geological Survey
VOC – Volatile Organic Compound

1.0 SITE AND PROJECT BACKGROUND

1.1 SITE LOCATION AND DESCRIPTION

The EJ Victory Building property (Site) is located at 59 Lester Avenue in the Village of Johnson City, Broome County, New York (see Figure 1).

1.1.1 Location

The EJ Victory Building property (Site) is located on 4.971 acres in the Central Village Neighborhood and Historic District of the Village of Johnson City. The BCP area comprises the entire property. It is bordered to the north by an active rail corridor owned by a Norfolk-Southern rail line, followed by a vacant commercial property (formerly Whipple Lumber); to the northeast by Lester Avenue, followed by a retail plaza containing a credit union branch (Visions Federal Credit Union) and a Walmart store; to the east by Lester Avenue, followed by a light manufacturing facility owned by Great Eastern Hemp, LLC; to the south by single-family and two-family residential buildings situated along Laurel Street, Avenue A, and Avenue B; to the southwest by a vacant industrial building, and to the west by the Village of Johnson City Justice Building/Police Department.

The Site is situated at an elevation of approximately 860 feet above mean sea level, and is relatively flat. The surrounding area exhibits a gradual gradient toward the northwest, in the direction of Little Choconut Creek, the nearest surface water feature. Little Choconut Creek is located approximately 375 feet to the northwest of the Site, and Creek originates approximately six (6) miles north of the Village, near the Greater Binghamton Airport. The Creek meanders on a general southerly course to the Village, where it assumes a more westerly course, ultimately draining to the Susquehanna River at a point approximately 6,000 feet west of the subject property.

1.1.2 Site Features

The Site is currently developed with a vacant, historic industrial building containing a total of 343,603 square feet of gross floor area. The building contains five (5) complete above-grade floors, and a partial sixth floor containing seven (7) separate penthouse-level spaces. The penthouse-level spaces contain elevator motor equipment, electrical transformers, and/or stair tower access to the roof level. Two (2) single-story masonry block additions are attached to the exterior northern side of the main building. The majority of the area surrounding the building consists of asphalt-paved driveway.

Helen Drive crosses through the site from east to west south of the existing structure. The portion of the site that is located south of Helen Drive is comprised of two asphalt parking lots that are separated by Avenue A. These include a +/- 26,500 square foot lot located south of Helen Drive and bounded by Avenue A to the east and Avenue B to the west, and a +/- 12,500 square foot lot located to the south of Helen Drive and bounded by Avenue A to the west.

The Site and surrounding properties are served by municipal water and sewer services.

1.1.3 Current Zoning and Land Use

The Site is zoned General Commercial. The current and proposed uses are in accordance with existing zoning. The surrounding parcels to the north and east are currently utilized for commercial purposes. Surrounding properties to the southeast are currently used for residential purposes. Surrounding

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properties to the west include a vacant industrial building (southwest) and a municipal office building (Village of Johnson City Justice Building/Police Department).

1.2 OWNERSHIP AND USE

The subject property has been owned by EJ Victory Building, LLC since March 4, 2020. The Site and existing structure are presently vacant awaiting renovation.

Available records indicate that the subject site has historically been owned by the following:

o 59 Lester Empire, LLC	2017 - 2019
o The County of Broome	2014 - 2017
o Danny R. Planavsky	2002 - 2014
o 53 Lester Avenue Realty, Ltd., 40-46 Corlius Avenue Realty, Ltd., 72-76 Court Street Realty, Ltd., 59 Lester Avenue Realty, Ltd.	1998 - 2002
o Dan R. Planavsky	1994 - 1998
o Endicott-Johnson Corporation	1919 - 1994
o Lestershire Lumber and Box Company	Prior to 1919

The Site contains a vacant, historic factory building that was constructed in or about 1921. For the majority of its existence, the building served as a shoe manufacturing facility owned and operated by Endicott-Johnson Corporation. These operations are reported to have utilized various chemicals, including solvents, alcohols, acids, and petroleum-based products. The facility also operated several electrical transformers and historically contained an oil house (exact nature of “oil” is unclear).

Prior to the construction of the Endicott-Johnson facility, the property was occupied by the Lestershire Lumber and Box Company. Such use pre-dates 1898, the date of the earliest available historic record. These operations included box manufacturing, and lumber production and planing. Ancillary activities appear to have included kiln operation, cabinet construction, and coal combustion.

Following the cessation of the Endicott-Johnson operations in or about 1988, the property has reportedly been used as storage warehouse space (boats, automotives, and general storage). The property and existing structure have been vacant and unused since approximately 2013.

1.3 GEOLOGIC SETTING

According to Geologic Map of New York – Finger Lakes Sheet (Lawrence V. Rickard and Donald W. Fisher, March 1970), the bedrock in the area of the Site is mapped as shale and siltstone of the Sonyea Group.

According to the Surficial Geologic Map of New York – Finger Lakes Sheet (Ernest H. Muller and Donald H. Cadwell, 1986), the overburden deposits at and in the vicinity of the site consist of outwash

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sand and gravel, described as "coarse to fine gravel with sand, proglacial fluvial deposition, well-rounded and stratified, thickness variable (2-20 meters)".

The USDA online soil survey database identifies the soil at the Site as 'Cut-and-Fill Land'. The southern approximately one-half of the site is mapped as "Cut-and-fill lands, gravelly materials". This material is described as a well drained soil of Hydrologic Soil Group A, having a typical profile of very gravelly silt loam (0-4 inches) and very gravelly sandy loam (4-70 inches). The soil across the northern remainder of the property is mapped as "Cut-and-fill lands, silty materials". This soil is described as well drained soil of Hydrologic Soil Group A, generally comprised of silt loam.

Soil encountered during a site investigation in 2019 (see Section 1.4.2 below) consisted primarily of loose, brown, fine to medium sand and gravel. Groundwater was generally encountered between 23.5 and 32.4 feet below grade in depth across the site. Water elevations collected from the groundwater monitoring wells installed during the investigation indicated that groundwater flows generally toward the north-northwest beneath the site.

There are no surface waters or wetlands on or immediately adjacent to the Site.

1.4 SITE ENVIRONMENTAL HISTORY

1.4.1 Past Uses of the Site

The Site contains a vacant, historic factory building that was constructed in or about 1921. For the majority of its existence, the building served as a shoe manufacturing facility owned and operated by Endicott-Johnson Corporation. These operations are reported to have utilized various chemicals, including solvents, alcohols, acids, and petroleum-based products. The facility also operated several electrical transformers and historically contained an oil house (exact nature of "oil" is unclear).

Prior to the construction of the Endicott-Johnson facility, the property was occupied by the Lestershire Lumber and Box Company. Such use pre-dates 1898, the date of the earliest available historic record. These operations included box manufacturing, and lumber production and planing. Ancillary activities appear to have included kiln operation, cabinet construction, and coal combustion.

Following the cessation of the Endicott-Johnson operations in or about 1988, the property was used as storage warehouse space (boats, automotives, and general storage) until approximately 2013. The property and existing structure have been vacant and unused since approximately 2013.

A Phase I and Phase II ESA were completed at the Site in 2019 as part of environmental due diligence conducted by EJ Victory Building, LLC. No remedial actions have been completed at the Site.

1.4.2 Prior On-Site Investigations

Note: When reviewing this section, it is recommended that the reader refer to the Summary of Analytical Exceedances drawings attached to this RIWP (Figures 3A, 3B, and 3C).

Phase I Environmental Site Assessment (ESA)

A Phase I ESA Report was prepared by EA Engineering, P.C. (EA) in 2019 for the Site. The EA report indicates that the property was historically used for shoe manufacturing from 1918 into the 1980s, and the site was a non-operational industrial manufacturing building at the time of the ESA. The ESA identified the recognized environmental conditions (RECs) in connection with the Site:

- Several adjacent properties are identified in the New York Spills database. The incidents include storage tank test failure and product spills during filling, abandoned drums containing unidentified petroleum products, and automobile leaks.
- The Ellis Property is located adjacent to the subject site to the north and reported petroleum (unidentified) contamination above groundwater standards in 2001.
- The Endicott Johnson Inc. Former Site is located adjacent to the subject site to the southeast and is identified in the manifest database for a 2005 shipment of 1,100 kilograms of polychlorinated biphenyl (PCB)-containing waste. As Endicott Johnson was the former owner and tenant of the subject property, it was concluded that PCB-containing material may have been used on the Site.
- The site reconnaissance associated with the Phase I ESA identified large quantities of suspect fluid contained in non-operational transformers on the sixth floor of the building. Based on the age of the building it was concluded that the fluid may contain PCB oil.
- An unidentified storage tank on the second floor of the building was critically damaged. EA also considered the cumulative presence of suspect conditions, including chemical containers, a white substance dripping from the ceiling, large containers of liquid, and substantial staining and debris, to be a REC.
- Manufacturing activities were performed at the subject site for much of the 20th century. The adjacent Endicott-Johnson Paracord Brownfield site had known contamination from similar operations by the same company.
- Building demolition has occurred at the site. The fate of the demolition debris is unknown.

Based on the above, EA recommended that a Phase II Environmental Site Assessment (Phase II ESA) be performed to further investigate the potential impact to the environmental condition of the site by the above factors. The Phase II ESA was subsequently performed by EA in October 2019.

Phase II Environmental Site Assessment (ESA)

To investigate these RECs, in October 2019, EA Engineering, P.C. performed field activities associated with the Phase II ESA. The scope of the Phase II ESA included the advancement of 14 borings around the perimeter of the building and within the adjacent parking lot areas, the advancement of 3 soil borings into soil beneath the building foundation, the installation of permanent groundwater monitoring wells within 7 of the exterior borings, and the installation of 5 sub-slab vapor sampling points through the basement floor / building foundation.

Shallow soil samples (ranging from 0-10 feet below grade) and deep soil samples (ranging from 24-36 feet below grade) were collected and analyzed for:

- Target Compound List (TCL) volatile organic compounds (VOCs) via EPA Method 8260C;
- TCL semi-volatile organic compounds (SVOCs) via EPA Method 8270D;
- Target Analyte List (TAL) metals via EPA Methods 6010C and 7471B (mercury);
- Hexavalent chromium via EPA Method 7196A;
- Polychlorinated biphenyls (PCBs) via EPA Method 8082A; and
- Asbestos via polarized light microscopy techniques

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Surface (0-6 inch depth) soil samples were not collected during the investigation. Additionally, soil samples were not analyzed for pesticides, herbicides, 1,4-dioxane, or per- and polyfluoroalkyl substances (PFAS), since these contaminants were not expected to be of primary concern.

Groundwater collected from the 7 monitoring wells was analyzed for:

- TCL VOCs via EPA Method 8260C;
- TCL SVOCs via EPA Method 8270D;
- TAL metals via EPA Methods 6010C and 7471B (mercury);
- Hexavalent chromium via EPA Method 7196A; and
- Polychlorinated biphenyls (PCBs) via EPA Method 8082A.

Groundwater samples from 4 of the wells were also analyzed for PFAS compounds.

Soil vapor samples were collected using Summa canisters and were analyzed for VOC by EPA Method TO-15.

All analyses data were reported using NYSDEC ASP Category B deliverables and the NYSDEC EQuIS format electronic data deliverable. Data Usability Summary Reports (DUSRs) were also prepared for all analytical data sets.

The soil encountered within the borings is described as consisting primarily of loose, brown, fine to medium sand and gravel. Groundwater was generally encountered between 23.5 and 32.4 feet below grade in depth across the site. Water elevations collected from the groundwater monitoring wells installed during the investigation indicated that groundwater flows generally toward the north-northwest beneath the site.

Based on EA's Phase II ESA report, the primary contaminants of concern identified to date are:

- Soils: Various Polycyclic Aromatic Hydrocarbons (PAHs), including benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-c,d)pyrene; acetone; and metals, including arsenic, chromium, and zinc.

- Groundwater: Various metals, including aluminum, arsenic, chromium, copper, iron, lead, magnesium, manganese, nickel, and sodium.

- Soil Vapor: Non-chlorinated VOCs (benzene, 1,2,4-trimethylbenzene, and naphthalene).

Within soils:

- Various Polycyclic Aromatic Hydrocarbons (PAHs), including benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene were detected above Restricted Residential Soil Cleanup Objectives (RRSCOs) across the majority of the site. In general, concentrations on the northwestern portion of the property were approximately 10 to 50 times the RRSCOs; concentrations south of the building were approximately 4 to 6 times the RRSCOs; and concentrations on the northeastern portion of the site were above, but in the same order-of-magnitude as, the RRSCOs.

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- Acetone was detected above Unrestricted SCOs across the northern portion of the Site.
- Arsenic, chromium, and zinc were detected above Unrestricted SCOs in the area south of the building.

Within groundwater:

- Numerous metals, including arsenic, chromium, copper, iron, lead, magnesium, manganese, nickel, and sodium, were detected at concentrations above the corresponding Ambient Water Quality Standards (AWQSs) for Class GA groundwater established by the NYSDEC in *Technical and Operation Guidance Series 1.1.1 – Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations (T.O.G.S. 1.1.1)* across the majority of the site. Arsenic, chromium, copper, lead, magnesium, and nickel were present a concentrations approximately two (2) to seven (7) times the AWQS values. Manganese and sodium were present at concentrations of approximately ten (10) times the AWQS values. Iron was present at concentrations up to 330 times the AWQS.
- Aluminum was also detected at significantly elevated concentrations (3,500 to 47,200 μg/L). While there is no established AWQS for Class GA groundwater established in T.O.G.S. 1.1.1, the AWQS for Class A surface drinking water sources is 100 μg/L.

Within soil vapor:

1. Benzene, 1,2,4-trimethylbenzene, and naphthalene were detected above applicable USEPA sub-slab soil vapor regional screening levels for residential use (NYSDOH does not currently have established standards or action levels for the detected compounds).

2.0 WORK PLAN

The objective of this Work Plan is to describe the steps associated with the Remedial Investigation (RI) activities to further characterize soils and groundwater in specific areas on the Site. The previous assessments and investigations conducted by EA will serve as the basis for conducting the RI activities as described in the following section of this Work Plan. The purposes of the RI activities are to (1) further delineate the limits of impacted soil and groundwater that were identified during previous environmental investigations, (2) collect data on media (i.e., surface soil) and potential contaminants not previously analyzed for in the 2019 Phase II ESA, and (3) further assess the potential for off-site migration of constituents from the Site.

See the Section 3.0 - Sampling and Analysis Plan for additional details.

2.1 GENERAL PROTOCOLS

2.1.1 Site Preparation

All sample location points are easily accessed by a standard truck- or track-mounted drilling rig.

Once the sample locations are accepted by the NYSDEC, the coordinates of the locations will be logged in the field.

In order to collect near-surface soil samples (i.e. – soil immediately beneath the existing asphalt/concrete), an excavator will be used to break up the asphalt/concrete at the sample location.

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2.1.2 Soil Screening Methods

Visual and instrument-based soil screening will be performed by an environmental professional when advancing borings, test pits, etc. into known or potentially contaminated material.

When applicable, soils will be segregated based on previous environmental data and screening results into material that requires off-site disposal, material that requires testing, and material that can be returned to the subsurface.

2.1.3 Investigation-Derived Waste Management

Investigation-Derived Waste (IDW) is expected to be placed in sealed drums or containers. However, in case material needs to be stockpiled, the following protocols will be followed:

- Soil stockpiles will be continuously encircled with a berm and/or silt fence. Hay bales will be used as needed near catch basins, surface waters and other discharge points.

- Stockpiles will be kept covered at all times with appropriately anchored tarps. Stockpiles will be routinely inspected and damaged tarp covers will be promptly replaced.

- Stockpiles will be inspected at a minimum once each week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the site and available for inspection by NYSDEC.

2.1.4 Materials Excavation and Load Out

An environmental professional or person under their supervision will oversee intrusive work and the excavation and load-out of containerized / stockpiled material.

The owner of the Site and the contractors performing the work are solely responsible for safe execution of all intrusive and other work performed under this Plan.

Egress points for truck and equipment transport will be inspected daily to verify they are clean of dirt and other materials derived from the site during intrusive excavation activities. As the Site is currently covered with asphalt/concrete, a truck wash will be not be necessary. However, if conditions change and the asphalt/concrete cover is removed to a significant degree, an environmental professional will be responsible for ensuring that outbound equipment / trucks are washed at a truck wash before leaving the site, until the activities performed under this section are complete. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to site-derived materials.

Trucks will be prohibited from stopping and idling in the neighborhood outside the project site.

2.1.5 Materials Transport Off-Site

Loaded vehicles leaving the site will be appropriately lined, tarped, securely covered, manifested, and placarded in accordance with appropriate Federal, State, local, and NYSDOT requirements (and all other applicable transportation requirements).

Transport of materials will be performed by licensed haulers in accordance with appropriate local, State, and Federal regulations, including 6 NYCRR Part 364. Haulers will be appropriately licensed and trucks properly placarded.

Material transported by trucks exiting the site will be secured with tight-fitting covers. Loose-fitting canvas-type truck covers will be prohibited. If loads contain wet material capable of producing free liquid, truck liners will be used.

Queuing of trucks will be performed on-site in order to minimize off-site disturbance. Off-site queuing will be prohibited.

2.1.6 Materials Disposal Off-Site

Soil/fill/solid waste excavated and removed from the site will be treated as contaminated and regulated material, and will be transported and disposed in accordance with all local, State (including 6NYCRR Part 360) and Federal regulations. If disposal of soil/fill from this site is proposed for unregulated off-site disposal (i.e. clean soil removed for development purposes), a formal request with an associated plan will be made to the NYSDEC. Unregulated off-site management of materials from this site will not occur without formal NYSDEC approval.

Off-site disposal locations for excavated soils will provided to NYSDEC. This will include estimated quantities and a breakdown by class of disposal facility if appropriate, i.e. hazardous waste disposal facility, solid waste landfill, petroleum treatment facility, C&D recycling facility, etc. Actual disposal quantities and associated documentation will be reported to the NYSDEC. This documentation will include: waste profiles, test results, facility acceptance letters, manifests, bills of lading and facility receipts.

Non-hazardous historic fill and contaminated soils taken off-site will be handled, at minimum, as a Municipal Solid Waste per 6NYCRR Part 360-1.2, unless otherwise authorized by the NYSDEC. Material that does not meet Track 1 unrestricted SCOs is prohibited from being taken to a New York State recycling facility (6NYCRR Part 360-16 Registration Facility).

2.1.7 Materials Re-Use On-Site

No re-use of IDW is anticipated during the Remedial Investigation.

2.1.8 Fluids Management

All liquids to be removed from the site, including excavation dewatering and groundwater monitoring well purge and development waters, will be handled, transported and disposed in accordance with applicable local, State, and Federal regulations. Dewatering, purge and development fluids will not be recharged back to the land surface or subsurface of the site, but will be managed off-site.

2.1.9 Backfill From Off-Site Sources

Backfill is not expected to be necessary during the Remedial Investigation. However, in case backfill needs to be imported, the following protocols will be followed:

- All materials proposed for import onto the site will be approved by the NYSDEC and qualified environmental professional and will be in compliance with NYSDEC provisions prior to receipt at the site.
- Material from industrial sites, spill sites, or other environmental remediation sites or potentially contaminated sites will not be imported to the site.

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- Sampling and analysis of any proposed fill material will be performed in accordance with the requirements of DER-10. The number and type (i.e., grab vs. composite) of samples will be as outlined in Table 5.4(e)10 of DER-10, as follows:

<table>
<tr><th>Contaminant</th><th>VOCs</th><th colspan="2">SVOCs, Inorganics & PCBs/Pesticides</th></tr>
<tr><th>Soil Quantity (CY)</th><th>Discrete Samples</th><th>Composite Samples</th><th>Discrete Samples/Composite</th></tr>
<tr><td>0 - 50</td><td>1</td><td>1</td><td rowspan="8">3-5 discrete samples from different locations in the fill being provided will comprise a composite sample for analysis.</td></tr>
<tr><td>50 - 100</td><td>2</td><td>1</td></tr>
<tr><td>100 - 200</td><td>3</td><td>1</td></tr>
<tr><td>200 - 300</td><td>4</td><td>1</td></tr>
<tr><td>300 - 400</td><td>4</td><td>2</td></tr>
<tr><td>400 - 500</td><td>5</td><td>2</td></tr>
<tr><td>500 - 800</td><td>6</td><td>2</td></tr>
<tr><td>800 - 1000</td><td>7</td><td>2</td></tr>
<tr><td>>1000</td><td colspan="3">Add an additional 2 VOC and 1 composite for each additional 1000 cubic yards</td></tr>
</table>

The characterization samples will be analyzed for the specific metals, semi-volatile organic compounds, volatile organic compounds, PCBs, and pesticides listed in Appendix 5 of DER-10. The samples shall also be analyzed for emerging contaminants (Per- and Polyfluoroalkyl Substances and 1,4-Dioxane), in accordance with the NYSDEC's *Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs* (NYSDEC PFAS Guidelines), dated October 2020.

The analysis results shall indicate that all analyte concentrations are below the Allowable Constituent Levels for Imported Fill or Soil for Residential Use established in Appendix 5 of DER-10, and below the soil criteria for emerging contaminants established in the NYSDEC PFAS Guidelines.

- Trucks entering the site with imported soils will be securely covered with tight fitting covers. Imported soils will be stockpiled separately from excavated materials and covered to prevent dust releases.

2.1.10 Stormwater Pollution Prevention

Since the area being disturbed during the Remedial Investigation will not exceed 1 acre in size, a Storm Water Pollution Prevention Plan (SWPPP) that conforms to the requirements of NYSDEC Division of Water guidelines and NYS regulations is not necessary. However, the following "Best Management Practices" will be followed if sediment is observed leaving the Site:

- Barriers, silt fencing, or hay bales will be installed and inspected once a week and after every storm event. All necessary repairs shall be made immediately.
- Accumulated sediments will be removed as required to keep the barrier and hay bale check functional.
- All undercutting or erosion of the silt fence toe anchor shall be repaired immediately with appropriate backfill materials.
- Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

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- Erosion and sediment control measures shall be observed to ensure that they are operating correctly. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters.

2.1.11 Contingency Plans

If underground tanks or other previously unidentified contaminant sources are found during the investigation, excavation activities will be suspended until sufficient equipment is mobilized to address the condition.

Sampling will be performed on product, sediment, and surrounding soils, etc. as necessary to determine the nature of the material and proper disposal method. Chemical analysis will be performed for a comprehensive list of analytes (TAL metals; TCL volatiles and semi-volatiles, TCL pesticides and herbicides, TCL PCBs, 1,4-dioxane, and PFAS), unless the site history and previous sampling results provide a sufficient justification to limit the list of analytes. In this case, a reduced list of analytes will be proposed to the NYSDEC for approval prior to sampling.

Identification of unknown or unexpected contaminated media identified by screening during invasive site work will be promptly communicated by phone to NYSDEC's Project Manager. Reportable quantities of petroleum product will also be reported to the NYSDEC spills hotline. These findings will be also included in the Remedial Investigation report.

2.1.12 Odor Control Plan

This odor control plan is capable of controlling emissions of nuisance odors off-site. Specific odor control methods to be used on a routine basis will include covering odorous soils with polyethylene sheeting or similar tarp/cover. If nuisance odors are identified at the site boundary, or if odor complaints are received, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and NYSDOH will be notified of all odor events and of any other complaints about the project. Implementation of all odor controls, including the halt of work, is the responsibility of the qualified environmental professional, and any measures that are implemented will be discussed in the Remedial Investigation report.

All necessary means will be employed to prevent on- and off-site nuisances. At a minimum, these measures will include: (a) limiting the area of open excavations and size of soil stockpiles; (b) shrouding open excavations with tarps and other covers; and (c) using foams to cover exposed odorous soils. If odors develop and cannot be otherwise controlled, additional means to eliminate odor nuisances will include: (d) direct load-out of soils to trucks for off-site disposal; (e) use of chemical odorants in spray or misting systems; and, (f) use of staff to monitor odors in surrounding neighborhoods.

If nuisance odors develop during intrusive work that cannot be corrected, or where the control of nuisance odors cannot otherwise be achieved due to on-site conditions or close proximity to sensitive receptors, odor control will be achieved by sheltering the excavation and handling areas in a temporary containment structure equipped with appropriate air venting/filtering systems.

2.1.13 Dust Control Plan

Based on the nature of the proposed work, it is not expected that the Remedial Investigation activities will result in dust generation that would require suppression. However, should conditions be observed during the work that suggest that off-site migration of dust is occurring or may potentially occur, the following dust mitigation provisions will be implemented:

- Dust suppression will be achieved through the use of a dedicated on-site water truck. The truck will be equipped with a water cannon capable of spraying water directly onto off-road areas including excavations and stockpiles.
- Clearing and grubbing of larger sites will be done in stages to limit the area of exposed, unvegetated soils vulnerable to dust production.
- Gravel will be used on highly trafficked areas to provide a clean and dust-free road surface.
- On-site roads will be limited in total area to minimize the area required for water truck sprinkling.

2.1.14 Noise

The contractor shall ensure compliance with local noise control ordinances.

2.2 REMEDIAL INVESTIGATION (RI) ACTIVITIES

Note that as part of the 2019 Phase II ESA, the laboratory provided a Category B deliverable, the data was validated, and a Data Usability Summary Report was prepared. Therefore, the data generated during the 2019 Phase II ESA can be relied upon for the RI.

2.2.1 Soil and Groundwater Investigation

The following data was collected and validated during the 2019 Phase II ESA:

- Shallow and deep soil was sampled within 14 exterior and 3 interior soil borings for TCL VOC, TCL SVOC, TAL metals, PCBs, Hexavalent Chromium, and asbestos;
- Groundwater from 7 groundwater monitoring wells was sampled for TCL VOC, TCL SVOC, TAL metals, PCBs, and Hexavalent Chromium;
- Groundwater from 4 groundwater monitoring wells was sampled for PFAS compounds; and
- Soil vapor was sampled at 5 locations beneath the building slab for TO-15 list VOC.

The purpose of the proposed soil and groundwater investigation is to supplement the validated data collected during the 2019 Phase II ESA at the Site, to confirm the lateral and vertical extent of all target contaminants in all media at the site (surface soil, shallow soil, deep soil, groundwater, and soil vapor). To supplement the previous data, the proposed work will include the following:

- Collection of surface / near surface soil samples from 7 representative locations across the Site (identified as SS-1 through SS-7 on attached Figure 2A), as the previous Phase II ESA did not include sampling of soil from the surface (0-6 inch depth);
- Collection of surface soil samples at 6 locations along the building façade (identified as SS-8 through SS-13 on attached Figure 2A) for laboratory analysis to document concentrations of lead and PCBs;

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- The advancement of three (3) new soil borings (identified as SB-15 through SB-17 on attached Figure 2A) to collect samples of all depth intervals (surface soil, shallow soil, and deep soil) for analysis for PFAS compounds, 1,4-dioxane, TCL pesticides, and TCL herbicides; and
- The collection of groundwater samples from the 7 existing monitoring wells (locations depticted on attached Figure 2B) and analysis of the samples for dissolved TAL metals (field filtered).

Surface / Near-Surface Sampling Locations

Surface / near surface soil samples will be collected from 7 representative locations across the Site, as the previous Phase II ESA did not include sampling of soil from the surface (0-6 inch depth). The proposed sample locations are identified as SS-1 through SS-7 on attached Figure 2A.

Additional surface soil samples will also be collected from 6 locations along the building façade for laboratory analysis to document concentrations of lead and PCBs. The proposed sample locations are identified as SS-8 through SS-13 on attached Figure 2A. This sampling is proposed to determine whether surface soil immediately adjacent to the building has been impacted by leaching of lead or PCBs from exterior building materials (i.e., paint, caulks/sealants).

These samples will be collected in accordance with the procedures outlined in AECC Standard Operating Procedure (SOP) #101, a copy of which is included in Appendix A, as follows:

- Where bare soil and/or vegetative cover exists, the samples for all target compounds except VOC will be collected from the upper 2 inches (0-2 inches) immediately beneath any vegetative cover, and samples for VOC analysis will be collected from a depth of 2-6 inches immediately below any vegetative cover.
- Where soil is covered by an asphalt surface layer, the samples for all target compounds except VOC will be collected from the upper 2 inches (0-2 inches) immediately beneath the asphalt layer, and samples for VOC analysis will be collected from a depth of 2-6 inches immediately below the asphalt layer.

New Boring Locations

Three (3) new soil borings will be advanced across the property, to collect samples of all depth intervals (surface soil, shallow soil, and deep soil) for analysis for PFAS compounds, 1,4-dioxane, TCL pesticides, and TCL herbicides. This sampling is planned as no soil samples were analyzed for these potential contaminants during the 2019 Phase II ESA.

The soil borings will be advanced using direct-push techniques, as described in AECC SOP #105, a copy of which is included in Appendix A.

Initially, samples of surface soil will be collected at each boring location, as follows:

- Where bare soil and/or vegetative cover exists, the samples will be collected from the upper 2 inches (0-2 inches) immediately beneath any vegetative cover.
- Where soil is covered by an asphalt surface layer, the samples for will be collected from the upper 2 inches (0-2 inches) immediately beneath the asphalt layer.

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Next, the borings will be advanced, with continuous soil sampling to depths sufficient to encounter the water table. Based on the 2019 Phase II ESA, the borings would be expected to continue to depths of 30 to 36 feet below grade.

The soil samples recovered from the borings will be: (1) classified with respect to predominant soil types, texture, and relative moisture content, (2) examined for staining or obvious odors suggestive of impact by petroleum products, and, (3) field screened with a portable photo-ionization detector (PID), to document whether volatile organic compounds (VOCs) are released from the soils. The PID screening will be performed by headspace analysis methods, by placing a representative portion of the soil sample into a re-sealable plastic bag, and monitoring the airspace surrounding the soil within the bag as the soil is agitated to promote the release of VOCs. The PID will be calibrated with a 100 part-per-million (ppm) isobutylene / air calibration gas mixture.

Shallow soil samples (typically 2 to 15 feet below grade) and deep soil samples (immediately above water table, typically ranging from 26 to 36 feet below grade) will be collected from each boring for analysis for PFAS, 1,4-Dioxane, TCL pesticides, and TCL herbicides. The sampling for PFAS compounds will be performed in accordance with the October 2020 NYSDEC PFAS Guidelines.

<u>Supplemental Groundwater Sampling</u>

Groundwater samples will be collected from the 7 existing monitoring wells, field filtered, and analyzed for dissolved TAL metals. This is proposed due to the high concentrations of various metal compounds that were detected in the raw (i.e., unfiltered) groundwater samples collected during the 2019 Phase II ESA. A comparison of total (unfiltered) metals concentrations to dissolved (filtered) metals concentrations will aid in determining whether the metals concentrations previous observed in groundwater are related to suspended particulates, or present in a dissolved phase (and therefore more likely to migrate).

Prior to sampling, each well will be re-developed using the Monitoring Well Development procedures described in AECC SOP #107, a copy of which is included in Appendix A. Following development, the wells will be allowed to recharge and stabilize for a period of 7 calendar days prior to sampling. The wells will then be purged and sampled for the target analytes, in accordance with the procedures outlined in AECC SOP #106, a copy of which is included in Appendix A.

See Section 3.0 – Sampling and Analysis Plan for details regarding the tasks associated with the above scope items.

2.2.2 Off-Site Investigation Activities

No off-site investigation activities are planned as part of the RI.

2.2.3 Soil-Vapor Intrusion Evaluation

Since previous sub-slab vapor sampling was performed during the 2019 Phase II ESA, and a sub-slab depressurization system will be installed in the existing building as a Remedial Action, no soil vapor samples will be collected as part of the RI.

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2.2.4 Supplemental Investigation Work Plan (if necessary)

If sampling and analysis of soils and/or groundwater reveals concentrations of contaminants above applicable standards (Part 375 Restricted Residential Use standards for soils and TOGS 1.1.1 standards/guidelines for groundwater) and the NYSDEC Project Coordinator deems it necessary, EJ Victory Building, LLC and the NYSDEC will negotiate a supplemental sampling plan to include the sampling of additional boring and/or well locations. If contaminants commonly associated with dense non-aqueous phase liquid (DNAPL) plumes (ex - chlorinated solvents) are determined to be a concern that required further investigation, the supplemental sampling plan may include the installation and sampling of deep wells. Deep groundwater depths would be measured (and flow direction determined) if deep groundwater wells are installed.

2.3 QUALITATIVE HEALTH RISK ASSESSMENT

In an effort to assess potential site impacts on human health and the environment, a qualitative human health risk assessment will be completed. This risk assessment will include a contaminant exposure and toxicity assessment.

The results of this focused qualitative risk assessment will be used to develop an overall characterization of risk to humans and the environment. The focused risk assessment will assess the following aspects, based on current and historic site specific analytical data:

- Identification of potential receptors
- Contaminant identification and selection of indicator compounds and chemicals of concern
- Exposure assessment to identify actual or potential exposure pathways and the extent or amount of exposure
- Toxicity assessment and dose response information
- Risk characterization of the potential risks or adverse health or environment effects for each of the exposure scenarios

2.4 DATA USABILITY

A data usability review effort will be completed for the analytical data generated as part of the investigation, consistent with NYSDEC-DUSR Guidance for this type of project. As part of this effort, a general evaluation of field records and analytical data will be performed to assess whether the data are accurate and defensible.

2.5 REPORT PREPARATION

Upon completion of the RI activities and following receipt of laboratory analysis of the soil and groundwater samples collected from at the Site, AECC will prepare a report in accordance with DER-10 that summarizes the RI activities and the results of the laboratory analyses. The RI sections of the report will identify or otherwise address the amount, concentration, persistence, mobility, state, and other relevant characteristics of the contaminants identified at the site.

Electronic data deliverables (EDDs) for each report will also be submitted in EQuIS format.

2.6 PROJECT SCHEDULE

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The following project schedule is proposed. Note that due to the required coordination between State agencies, additional time to obtain approvals and complete each task may be necessary. In such a case, the project schedule will be revised.

Submit Remedial Investigation Work Plan	**October 2020**
End 30 Day RI Comment Period	November 2020
DEC Approval of Remedial Investigation Work Plan	November 2020
Begin Investigation Field Work	December 2020
Complete Investigation Field Work	December 2020
Submit Draft Remedial Investigation Report	**February 2021**
Significant Threat Determination / Fact Sheet	February 2021
DEC Approval of Remedial Investigation Report	March 2021
Submit Remedial Action Work Plan with Alternatives Analysis	**April 2021**
End 45 Day Comment Period	June 2021
DEC Approval of Remedial Action Work Plan	June 2021
Submit Fact Sheet Announcing Start of Construction	June 2021
Begin Construction / Remediation	**June 2021**
Submit Draft Site Management Plan	**July 2021**
Submit Executed Environmental Easement Package	August 2021
DEC Approval of Site Management Plan	September 2021
Submit Draft Final Engineering Report	**December 2021**
Environmental Easement Recorded	Spring 2022
DEC Approval of Draft Final Engineering Report	Spring 2022
Submit Fact Sheet Announcing Final Engineering Report	Spring 2022
Certificate of Completion	**Fall/Winter 2022**
Fact Sheet Describing Institutional/Engineering Controls	Fall/Winter 2022
Complete Construction	**Fall/Winter 2022**

3.0 SAMPLING AND ANALYSIS PLAN

This Sampling and Analysis Plan discusses the sampling procedures and methods to be used on the project for the collection of soil and groundwater samples, the procedures and methods to be followed by the laboratory, and Quality Assurance / Quality Control procedures that will assure the accuracy and precision of the data collection during the project.

3.1 FIELD SAMPLING PLAN

As described in Section 2.2, the RI activities will include the advancement of soil borings, collection of surface (or near-surface), shallow, and deep soil samples, and the sampling of groundwater monitoring wells.

Soil and groundwater samples collected for laboratory analysis will be delivered to the laboratory at the completion of each sample delivery group. The soil and groundwater sampling procedures are described in more detail below.

3.1.1 Sampling Objective

Field sampling will be designed to obtain representative samples of environmental media in an effort to assess the impact that the site may have upon human health and the environment. The field sampling plan will include media sampling for groundwater, surface soils (or near-surface soils), and shallow and deep subsurface soils. The goal of this investigation is to establish the nature and extent of contamination at the site.

3.1.2 Soil Sampling Procedures

Soil sampling at the site will be conducted in accordance with various AECC SOPs as identified in the individual sections and provided in Appendix A. In general, the following steps will be followed for the collection of soil samples.

<u>Surface and Near-Surface Soil Sampling – AECC SOP #101</u>

Spoons, scoops, and trowels are of similarly designed construction and will therefore be used in accordance with the following procedures, unless an alternate method is described. Deviations from the standard operating procedures described herein and the rationale/justification for those deviations are to be recorded in the field logbook.

1. Don PPE as per the project HASP.
2. Select location and be sure that all surface preparation and soil sampling tools are decontaminated.
3. Prepare surface for sampling. Loosen soils by use of a long-handled shovel or pitchfork outside of the perimeter of the sample location.
4. Remove the bulk of the vegetated layer (plants and roots).
5. Use a disposable trowel to collect a representative sample of soil immediately beneath the vegetative layer.
6. The soils shall be screened with a PID to identify the presence or absence of volatile organic vapors. Soils shall be visually characterized with respect to color, grain size, consistency and moisture status. Each distinct layer shall be described using the Modified Burmister classification system.
7. If sampling for VOCs is required, collect this sample portion first.
8. If a specific depth interval has been targeted, collect soils from that depth into a collection pan.
9. If more soil is needed to meet sample volume requirements, additional soil may be collected from an immediately-adjacent location.
10. Homogenize the soil in the collection pan (excluding soil for VOC analysis) by mixing the soil in the collection pan with the sampling tool until a uniform mixture is achieved.
11. Transfer soil from the collection pan into the appropriate sample jars/containers using the sampling tool or a clean stainless steel teaspoon or spatula. Use of fingers should be avoided.
12. Once filled, the rim and threads of the sample container should be cleaned of gross soil by wiping with a paper towel, then capped and labeled. Do not submerge the sample containers in water to clean them.

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13. Label the samples and place the containers into a cooler with wet ice that has been contained within sealed plastic bag(s) as soon as possible (immediately) after collection.
14. Log the samples in field notebook, chain of custody and other required documentation.
15. Handle samples for shipment to the laboratory.
16. Decontaminate sampling tools prior to reuse.
17. Investigation-derived waste (IDW) should be properly contained before leaving the area.
18. In order to eliminate surface hazard and/or the creation of a preferred path for contaminant migration, backfill the sampling location and restore the surface to as close to pre-sampling conditions as possible.

Subsurface Soils Sampling via Direct-Push / Geoprobe – AECC SOP #105

At increased depths, the effectiveness of spoons, scoops, and trowels decreases. Hand augers and similar equipment can be a suitable method for collecting soil samples at shallow depths, but have been deemed unfeasible for this project. Therefore, a mechanical method such as direct-push sampling may be warranted. Deviations from the standard operating procedures described herein and the rationale/justification for those deviations are to be recorded in the field logbook.

1. Don PPE as per the project HASP.
2. Decontaminate sampling tools and components that may come in contact with soil during sampling activities.
3. Assemble the sampling tube including the liner, discrete sample tooling (if appropriate), sand-basket (if appropriate), and cutting shoe.
4. Prepare the surface for direct-push sampling. Direct push tooling can generally penetrate several inches of asphalt and/or crushed stone surface materials.
5. The direct-push rig operator will thread on a push/drive cap on the top of the device and push the sample tube into the ground.
6. The direct-push rig operator removes the push/drive cap, replaces it with a pull-cap and pulls sampler from the ground with the machine hydraulics.
7. The sample tube is then opened, to allow the soil-filled liner to be removed so that it can be cut open by the project geologist/scientist/engineer to allow for soil classification/description, field-screening, sampling for laboratory analysis, etc.
8. The sampling tube and components that contact soil during the sampling process are decontaminated, re-assembled, with a new, disposable liner and the process is repeated. The advancement of the sampling tube to depth is achieved through the addition of drive-rods, each of which is typically the same length as the sampling tube (commonly 3, 4, or 5 feet in length).
9. Upon completion of the borehole, the hole is backfilled with soil cuttings or hydrated granular bentonite, or is completed as a piezometer or monitoring well.

Upon extraction of the liner from the direct-push sampling tube, the liner must be opened so as to expose the soils for visual classification/description, field screening and/or sampling for laboratory analysis. This is accomplished through the use of a liner cutting system, typically comprising a liner holder, and a liner cutter. The liner holder is a trough-like device that holds the liner securely in place so that it can be cut open.

The liner cutter is a tool affixed with two parallel hook-shaped blades that is drawn along the liner to cut a lengthwise opening in the liner for easy access and viewing of the sampled material. Liner cutters come in one-handle and two-handle varieties.

a) Place the soil-filled liner into the soil holder. Be sure that the liner holder is placed on a solid surface such as a sturdy work table, tailgate, etc.

b) Install the liner in the liner holder. Adjust the stop on the liner holder to secure the liner tightly in the holder.

c) Wearing leather work gloves, grasp the cutter by the handle(s) (avoid accidental contact with the blades) and place the cutter on the liner. The liner holder will usually have a bent bar that secures the liner in place, which provides resistance against the draw of the liner cutter. Begin the cut at the end of the liner opposite this bar. Be sure that blades are positioned just beyond the end of the liner to initiate the cut.

d) With slight downward pressure on the cutter, draw the cutter slowly and smoothly along the liner. If excessive force is required to open the liner, the cutter blades may be dull and should be replaced immediately.

e) When the cutter has been drawn the entire length of the liner, the cut section of the liner may be removed to access the sampled material.

f) The soils shall be screened with a PID to identify the presence or absence of volatile organic vapors. Soils shall be visually characterized with respect to color, grain size, consistency and moisture status. Each distinct layer shall be described using the Modified Burmister classification system.

g) If sampling for VOCs is required, collect this sample portion first.

h) Except for VOC sample fractions, the remainder of the soil sample from the interval of interest should be collected into the collection pan.

i) If more soil is needed to meet sample volume requirements, additional soil may be collected from an immediately-adjacent location.

j) Homogenize the soil in the collection pan (excluding soil for VOC analysis) by mixing the soil in the collection pan with the sampling tool until a uniform mixture is achieved.

k) Transfer soil from the collection pan into the appropriate sample jars/containers using the sampling tool or a clean stainless steel teaspoon or spatula. Use of fingers should be avoided.

l) Once filled, the rim and threads of the sample container should be cleaned of gross soil by wiping with a paper towel, then capped and labeled. Do not submerge the sample containers in water to clean them.

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m) Label the samples and place the containers into a cooler with wet ice that has been contained within sealed plastic bag(s) as soon as possible (immediately) after collection.

n) Log the samples in field notebook, chain of custody and other required documentation.

o) Handle samples for shipment to the laboratory.

When using direct-push methods for collecting soil samples for VOC analysis, the drilling subcontractor shall not retrieve more than one subsequent sampler from the subsurface while the project geologist/scientist collects samples from a previous interval.

3.1.3 Monitoring Well Development and Sampling Procedures

Monitoring Well Development – AECC SOP #107

The existing 7 monitoring wells will be developed in accordance with AECC SOP #107. In general, the following steps will be followed for the installation of monitoring wells.

1. Each well shall be developed using a surge and pump technique to remove sediment from the well bore and sand pack. Development shall continue until turbidity has reached 50 NTU's.

2. Sampling of the developed wells shall not occur until a minimum of 7-days has passed.

3.1.4 Groundwater Sampling Procedures

Groundwater Sampling – AECC SOP #106

Low-flow groundwater sampling at the site will be conducted in accordance with AECC SOP #106. In general, the following steps will be followed for the collection of groundwater samples.

1. The sampling technician will remove the well cap and, using a PID, test for VOC vapors immediately above well riser pipe. The PID reading will be recorded in the field logbook. This procedure will then be performed at each well to be sampled.

2. Using a peristaltic pump, each monitoring well will be purged utilizing low-flow techniques. A metering device will be used to monitor field parameters as listed below. Only after the meter readings indicate that the following acceptance criteria (USEPA EQASOP- GW 001, Rev. 3, updated January 19, 2010) have been achieved will the sample be collected:
   - *groundwater turbidity (10% for values >5 NTU)*
   - *temperature (3%)*
   - *pH (+ 0.1 unit)*
   - *specific conductance (3%)*
   - *dissolved oxygen (10% for values >5mg/L)*
   - *Oxygen/Reduction Potential (+ 10 millivolts)*

3. Purged groundwater will be placed into a 55-gallon drum which will be labeled, tightly covered, and temporarily stored on-site.

4. A sufficient volume of groundwater will be collected from each well to fill dedicated vials/jars.

5. The label on each sample jar will identify the sample location, date and time, and parameters to be analyzed.

3.1.5 Sample Handling and Chain-of-Custody Procedures

Sample Handling, Packaging, & Shipping / Sample Labeling & COC – AECC SOPs #102 and #108

Upon completion of the soil and groundwater sampling for a particular day or period of time, the following procedures will be followed:

1. The sealed, labeled samples of soil and groundwater will be carefully packed into a cooler refrigerated with ice or ice packs for delivery to the laboratory for analysis.

2. Packing material may be placed around the sample jars inside the cooler to minimize the potential for sample container breakage that could occur during sample handling and delivery to the laboratory.

3. A chain-of-custody form will be properly completed, signed, and dated by all persons responsible for the collection and delivery of the soil and groundwater samples.

4. The chain-of-custody form will be placed into a sealable plastic bag, sealed, and placed inside the cooler to accompany the soil and groundwater samples from the time of collection until delivery to the laboratory within 24-hours from the time of collection.

3.1.6 Sample Identification

Samples of soil and groundwater will be identified and labeled to include the site name, the sample location, grid location (if applicable), and the sampling time and date. The following alphanumeric system will be used to identify each sample and will correspond with the sample location to be identified on a field-generated sampling diagram:

Sample Type +	Location No. +	Depth =	Example Sample I.D
Soil – Test Pit	TP-01, 02…	(# - #", # - #')	TP-02 (48-60")
Soil – Boring	SB-01, 02…	(# - #", # - #')	SB-02 (2-6")
Groundwater	MW-01	N/A	MW-01
Blind Duplicate	SB, MW,	N/A	SB-D2, MW-D1

3.2 QUALITY ASSURANCE / QUALITY CONTROL PROCEDURES

A Quality Assurance Project Plan (QAPP) describes the manner in which quality assurance / quality control (QA/QC) procedures will be implemented during the RI activities to assure the accuracy and precision of the data collection. Guidance for the selection of QAPP objectives was obtained from NYSDEC's *DER-10 Technical Guidance for Site Investigation and Remediation* (May 2010).

Quality Assurance (QA) refers to the conduct of all planned and systematic actions necessary to perform satisfactorily all task-specific activities and to provide information and data confidence as a result of such activities. The QA for task-specific activities includes the development of procedures, auditing, monitoring, and surveillance of the performance.

Quality Control (QC) refers to the activity performed to determine if the work activities conform to the requirements. This includes activities such as inspections of the work activities in the field. QA is an overview monitoring of the performance of QC activities through audits rather than first time inspections.

The project-specific QAPP is presented as Appendix B.

4.0 DECONTAMINATION PROCEDURES

The following procedures will be performed to decontaminate exploration equipment, sampling equipment, and personnel after each drilling/sampling event and equipment demobilization. See AECC Standard Operating Procedure #103 for additional details.

4.1 PERSONNEL DECONTAMINATION

Personnel will be required to follow procedures outlined in the Health and Safety Plan (see Appendix C).

4.2 EQUIPMENT DECONTAMINATION

Equipment will be decontaminated between uses, and at the end of each project phase (contractor demobilization).

4.2.1 Prior to Use On-Site

The drill rig, backhoe, and/or excavator will be steam-cleaned prior to their entrance to the site. Greases and oils will not be used on any down-hole equipment during drilling or exploration activities.

Hand-operated equipment, direct-push sampling tubes, split-spoons, etc. that have been used on other sites will be decontaminated according to the protocols detailed in Section 4.2.2 prior to their use on-site.

4.2.2 Reusable Equipment

The following steps will be employed to decontaminate reusable equipment:

1. Don PPE items appropriate to the characteristics of the contaminated material that was encountered (safety glasses, latex or nitrile gloves, and disposable Tyvek garment for example).

2. Remove gross contamination, dirt, etc from the equipment by brushing and rinsing with tap water. This step should be completed in a 5-gallon bucket or appropriately sized container.

3. Wash the equipment with a phosphate-free detergent and tap water solution. This step should be completed in a separate wash bucket using brush, or pressure sprayer.

4. Rinse the equipment with potable water until all detergent has been removed. This step can be performed over an empty bucket using a squeeze bottle or pressure sprayer.

5. Triple-rinse the equipment with distilled or de-ionized water. Rinsate should be collected in the bucket used in step 3.

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6. Allow the equipment to air dry on clean plastic sheeting. If faster drying is required, use paper towels to blot the equipment dry before reuse.

7. Wrap the dried decontaminated equipment with aluminum foil, shiny side out, for storage until the equipment is to be used again. Alternately, small equipment can be placed into clean plastic bags and sealed for longer term storage.

8. Properly containerize and/or manage wash water and decontamination rinsate.

<u>Submersible Pumps</u>

When decontaminating submersible pumps used for groundwater sampling (or monitoring well development), the above-listed steps 2 and 3 may be conducted in a tube or cylinder that is sealed at the bottom end (commonly a 3-foot length of PVC pipe affixed with a water-tight end cap). The pump is inserted into the cylinder which is filled with the wash water, detergent solution, or rinse water and is turned on at a low setting for approximately five (5) minutes, so as to cycle the wash solutions through the pump's impellers and internal components. After the pump is removed from the potable water rinse cycle, the triple-rinse is performed with copious amounts of distilled/deionized water, being sure to flush through the impellers.

<u>Large Equipment Decontamination</u>

On some projects, large equipment (excavators, backhoes, truck-mounted drilling equipment, etc.) is used for sampling or site characterization activities, and may become contaminated during site activities (or may require decontamination prior to use on site). Due to the asphalt/concrete cover at the Site, large equipment is not anticipated to become contaminated. However, if such a condition arises, the contractor will construct a temporary decontamination pad (typically consisting of a bermed, plastic-sheet lined area) where equipment and tooling can be brought for decontamination with a high-temperature high-pressure washer and/or manual scrubbing.

4.2.3 Disposable Equipment

In lieu of decontamination, disposable equipment will be placed in a dedicated 55-gallon drum or equivalent container for subsequent disposal.

4.2.4 Sample Containers

Upon filing and capping sample bottles, the outside of the bottle will be wiped off with a clean paper towel. These towels will be handled / managed as disposable equipment.

5.0 GENERAL SITE-SPECIFIC HEALTH AND SAFETY PLAN

A Health and Safety Plan (HASP) sets forth requirements for maintaining the health and safety of persons at the Site. The HASP addresses general health and safety issues related to the presence of specific chemical and physical hazards that may be encountered during performance of the work activities at the Site. The HASP includes an Emergency Response Plan, which presents the procedures to be followed in the event of an emergency situation.

The site-specific Health and Safety Plan is presented as Appendix C.

6.0 COMMUNITY AIR MONITORING PLAN

The intent of the CAMP is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air. The action levels specified within the Plan require increased monitoring, corrective actions to abate emissions, and / or work shutdown.

Continuous monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) will be required for all ground intrusive activities, including but not limited to, soil excavation and handling, trenching, and the installation of monitoring wells. CAMP monitoring is not required for this project when using hand tools for shallow soil sampling, provided that sampling does not occur during extremely dry or windy conditions to minimize any off-site migration of contaminated soil particles.

The site-specific CAMP, prepared in accordance with Appendix 1A of DER-10, is presented as Appendix D.

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7.0 CITIZEN PARTICIPATION PLAN

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

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

A site-specific CPP has been approved by the NYSDEC and is available for review at the document repository. The CPP activities that will be conducted during the RI include:

- Maintaining and updating the Site Contact List
- Distributing a fact sheet to the individuals / entities listed on the Site Contact List regarding the proposed RI activities and announcing a 30-day public comment period for the RIWP
- Conducting the 30-day public comment period
- Delivering the RI report to the document repository upon completion.
- Distributing a fact sheet to the Site Contact List that describes the results of the RI

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TABLES

Table 1 – Sampling and Analysis Summary

Table 1: Sample and Analysis Summary

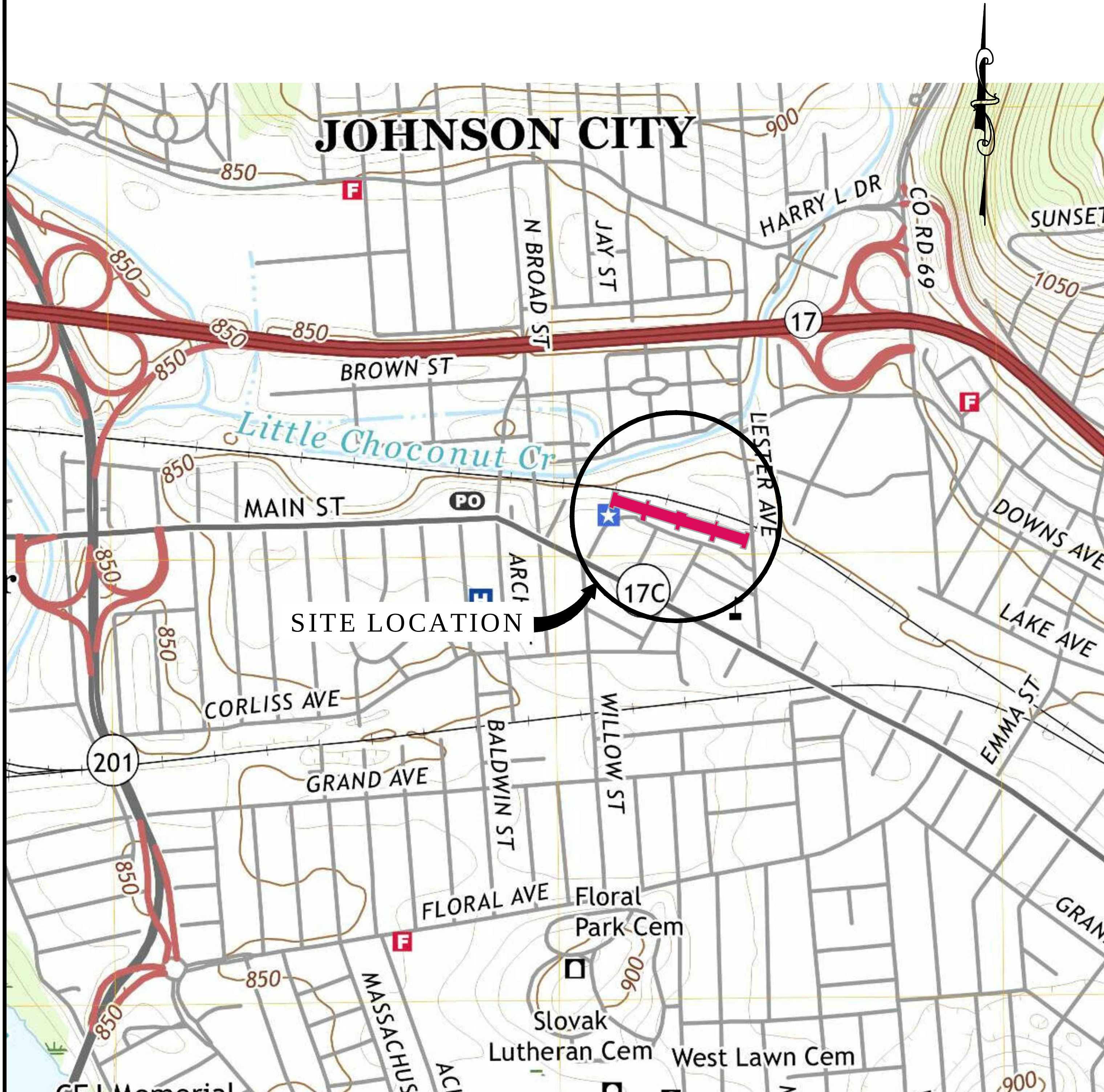
Boring/ Well Location	Media/ Type of Sample	Analysis										
		TCL VOCs	TCL SVOCs	TAL Metals	Hex Cr	TCL PCBs	TCL Pesticides	TCL Herbicides	1,4-Dioxane	PFAS	VOCs (TO-15)	Lead
Previous Validated Investigation Data												
SB/MW-1	Shallow Soil	●	●	●	●	●						
	Deep Soil	●	●	●	●	●						
	Groundwater	●	●	●	●	●				●		
SB/MW-2	Shallow Soil	●	●	●	●	●						
	Deep Soil	●	●	●	●	●						
	Groundwater	●	●	●	●	●				●		
SB/MW-3	Shallow Soil	●	●	●	●	●						
	Deep Soil	●	●	●	●	●						
	Groundwater	●	●	●	●	●				●		
SB/MW-4	Shallow Soil	●	●	●	●	●						
	Deep Soil	●	●	●	●	●						
	Groundwater	●	●	●	●	●				●		
SB/MW-5	Shallow Soil	●	●	●	●	●						
	Deep Soil	●	●	●	●	●						
	Groundwater	●	●	●	●	●						
SB/MW-6	Shallow Soil	●	●	●	●	●						
	Deep Soil	●	●	●	●	●						
	Groundwater	●	●	●	●	●						
SB/MW-7	Shallow Soil	●	●	●	●	●						
	Deep Soil	●	●	●	●	●						
	Groundwater	●	●	●	●	●						
SB-8	Shallow Soil	●	●	●	●	●						
	Deep Soil	●	●	●	●	●						
SB-9	Shallow Soil	●	●	●	●	●						
	Deep Soil	●	●	●	●	●						
SB-10	Shallow Soil	●	●	●	●	●						
	Deep Soil	●	●	●	●	●						
SB-11	Shallow Soil	●	●	●	●	●						
	Deep Soil	●	●	●	●	●						
SB-12	Shallow Soil	●	●	●	●	●						
	Deep Soil	●	●	●	●	●						
SB-13	Shallow Soil	●	●	●	●	●						
	Deep Soil	●	●	●	●	●						
SB-14	Shallow Soil	●	●	●	●	●						
	Deep Soil	●	●	●	●	●						

Boring/ Well Location	Media/ Type of Sample	Analysis										
		TCL VOCs	TCL SVOCs	TAL Metals	Hex Cr	TCL PCBs	TCL Pesticides	TCL Herbicides	1,4-Dioxane	PFAS	VOCs (TO-15)	Lead
IB-01	Shallow Soil	●	●	●	●	●						
	Deep Soil	●	●	●	●	●						
IB-02	Shallow Soil	●	●	●	●	●						
	Deep Soil	●	●	●	●	●						
IB-03	Shallow Soil	●	●	●	●	●						
	Deep Soil	●	●	●	●	●						
SSG-01	Soil Vapor										●	
SSG-02	Soil Vapor										●	
SSG-03	Soil Vapor										●	
SSG-04	Soil Vapor										●	
SSG-05	Soil Vapor										●	
Proposed Remedial Investigation												
SB-15	Surface Soil						●	●	●	●		
	Shallow Soil						●	●	●	●		
	Deep Soil						●	●	●	●		
SB-16	Surface Soil						●	●	●	●		
	Shallow Soil						●	●	●	●		
	Deep Soil						●	●	●	●		
SB-17	Surface Soil						●	●	●	●		
	Shallow Soil						●	●	●	●		
	Deep Soil						●	●	●	●		
SS-1	Surface Soil	●	●	●	●	●	●	●	●	●		
SS-2	Surface Soil	●	●	●	●	●	●	●	●	●		
SS-3	Surface Soil	●	●	●	●	●	●	●	●	●		
SS-4	Surface Soil	●	●	●	●	●	●	●	●	●		
SS-5	Surface Soil	●	●	●	●	●	●	●	●	●		
SS-6	Surface Soil	●	●	●	●	●	●	●	●	●		
SS-7	Surface Soil	●	●	●	●	●	●	●	●	●		
SS-8	Surface Soil					●						●
SS-9	Surface Soil					●						●
SS-10	Surface Soil					●						●
SS-11	Surface Soil					●						●
SS-12	Surface Soil					●						●
SS-13	Surface Soil					●						●

A blind duplicate, matrix spike, and matrix spike duplicate will be submitted for soil samples at a rate of 1 for every 20 samples collected.

A trip blank (VOCs), blind duplicate, matrix spike, and matrix spike duplicate will be submitted for aqueous samples at a rate of 1 for every 20 samples collected. In addition, one field duplicate and one equipment blank will be submitted for PFAS samples.

FIGURES



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SOURCE: USGS BINGHAMTON WEST QUADRANGLE, 7.5 SERIES. BINGHAMTON WEST, NY 2019

0 1,000' 2,000'

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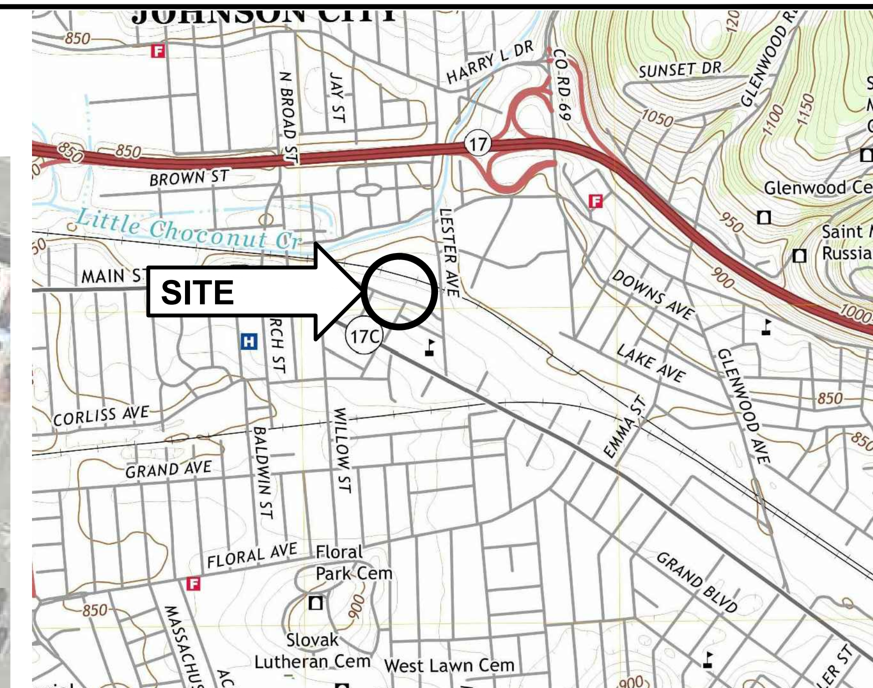
East Syracuse, NY 13057

PROJECT NO. 20-056	SITE LOCATION PLAN	FIGURE 1
DRAWN: MAR 2020		
DRAWN BY: NP	E.J. Victory Building 59 Lester Avenue Johnson City, New York 13790	
CHECKED BY: HNB		



SITE LOCATION

LEGEND:

- APPROXIMATE PROPERTY LINE
- SURFACE/SAMPLE LOCATION AT BUILDING FOUNDATION (LEAD AND PCB ANALYSIS)
- SURFACE/NEAR SURFACE SAMPLE LOCATION (FULL ANALYSIS LIST)
- SOIL BORING LOCATION (PFAS, 1, 4-DIOXANE,PESTICIDE AND HERBICIDE ANALYSIS)

NOTES:

1. AERIAL PHOTOGRAPH FROM GOOGLE EARTH WEBSITE (PHOTO TAKEN APRIL, 2017).
2. APPROXIMATE PROPERTY LINE BASED ON ONONDAGA COUNTY GIS MAPS.
3. ALL LOCATIONS ARE APPROXIMATE.

0 115' 230'

GRAPHIC SCALE

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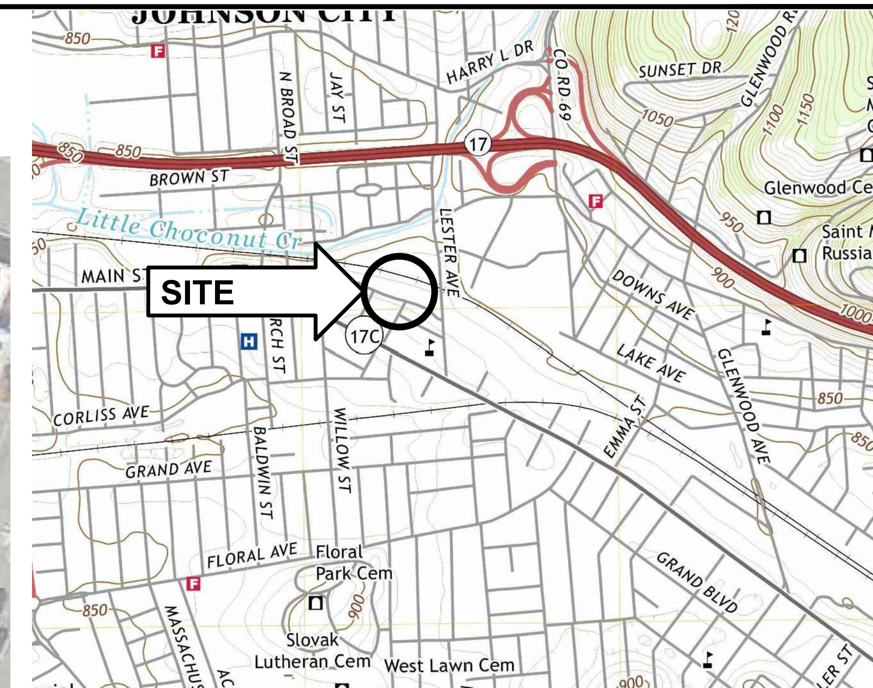
PROJECT NO. 20-056	Remedial Investigation **Proposed Soil Sample Location Plan**	FIGURE 2A
DRAWN: OCT. 2020		
DRAWN BY: NP	EJ Victory Building 59 Lester Avenue Johnson City, New York 13790	
CHECKED BY: HNB		



SITE LOCATION

LEGEND:

APPROXIMATE PROPERTY LINE

MW-# MONITORING WELL LOCATION AND ID

NOTES:

1. AERIAL PHOTOGRAPH FROM GOOGLE EARTH WEBSITE (PHOTO TAKEN APRIL, 2017).
2. APPROXIMATE PROPERTY LINE BASED ON ONONDAGA COUNTY GIS MAPS.
3. ALL LOCATIONS ARE APPROXIMATE.

0 115' 230'

GRAPHIC SCALE

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PROJECT NO. 20-056	Remedial Investigation **Proposed Groundwater Sample Location Plan**	FIGURE 2B
DRAWN: OCT. 2020		
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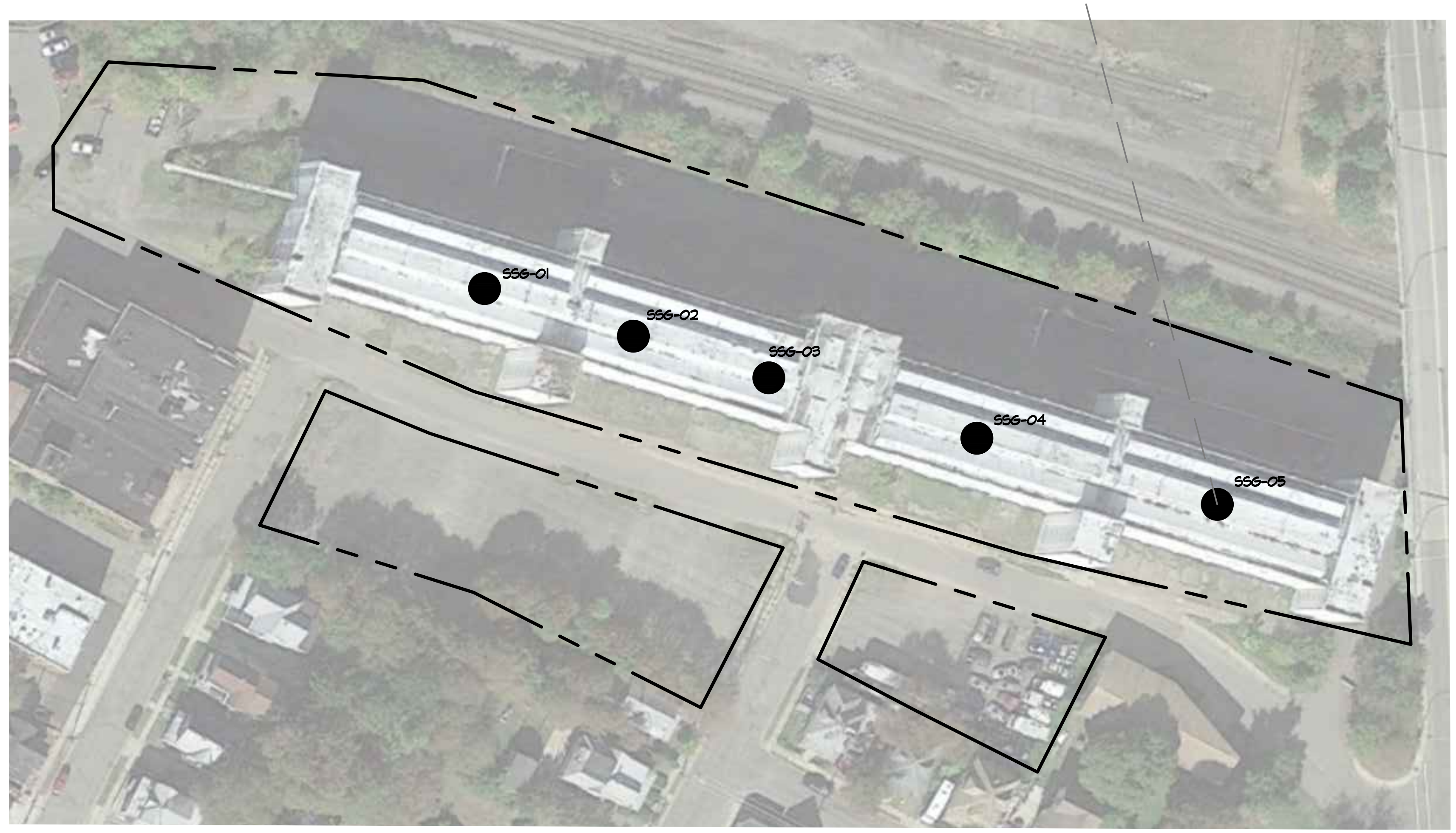
Sample ID / Location			SSG-05
Sampling Date			10/16/2019
VOC	EPAR	EPAI	CONC
Benzene	12.0	53	**16**
1,2,4-Trimethylbenzene	7.0	867	**42**
Naphthalene	0.083	0.36	**4,100**



LEGEND:

— — — APPROXIMATE PROPERTY LINE

● SSG-# SUB-SLAB SOIL GAS SAMPLE LOCATION AND ID

TABLE NOTES:

ALL SOIL GAS / VAPOR VALUES ARE REPORTED IN MICROGRAMS PER CUBIC METER (ug/m^3)

DOH - NOTE THAT SUB-SLAB SOIL GAS CONCENTRATION AT WHICH MITIGATION MAY BE REQUIRED IS DEPENDENT ON MEASURED CONCENTRATION OF INDOOR VAPORS.

BOLD - CONCENTRATION EXCEEDS EPA RESIDENTIAL SUB-SLAB SOIL GAS RSL

EPAR - EPA RESIDENTIAL SUB-SLAB SOIL GAS RSL

EPAI - EPA INDUSTRIAL SUB-SLAB SOIL GAS RSL

NOTES / DISCLAIMERS:

1. APPROXIMATE PROPERTY LINE BASED ON TBD
2. ALL LOCATIONS ARE APPROXIMATE.
3. THE NYSDOH ONLY MAINTAINS STANDARDS FOR A LIMITED NUMBER OF COMPOUNDS

0 37'-6" 75'
GRAPHIC SCALE

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PROJECT NO. 20-056
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DRAWN BY: NP/DB
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Summary of Analytical Exceedances
In Soil Vapor

EJ Victory Building
59 Lester Avenue
Johnson City, New York 13790

FIGURE
3A

Sample ID / Location			SB-10
Sampling Date			10/23/2019
Sample Depth (feet bgs)			0-8
SVOC	SCO	RRSCO	CONC
Benzo(a)anthracene	1	1	**15**
Benzo(a)pyrene	1	1	**12**
Benzo(b)fluoranthene	1	1	**19**
Chrysene	1	3.9	**14**
Dibenz(a,h)anthracene	0.33	0.33	**2.4 J**
Indeno(1,2,3-cd)pyrene	0.5	0.5	**6.9**

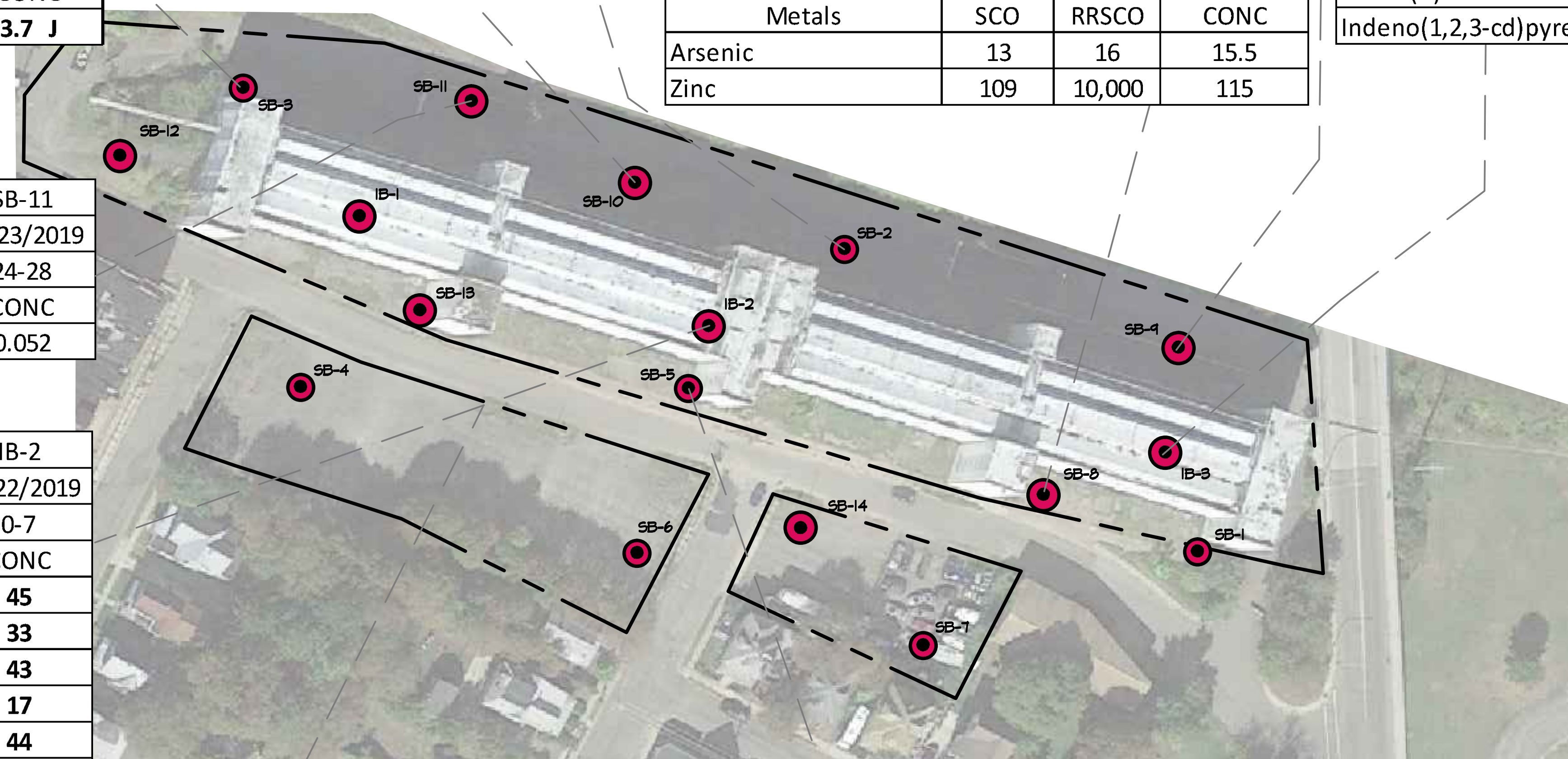
Sample ID / Location			SB-2
Sampling Date			10/18/2019
Sample Depth (feet bgs)			0-4
VOC	SCO	RRSCO	CONC
Acetone	0.05	100	0.055

Sample ID / Location			SB-9
Sampling Date			10/23/2019
Sample Depth (feet bgs)			0-4
SVOC	SCO	RRSCO	CONC
Benzo(a)anthracene	1	1	**1.5 J**
Benzo(a)pyrene	1	1	**1.3 J**
Benzo(b)fluoranthene	1	1	**1.9 J**
Indeno(1,2,3-cd)pyrene	0.5	0.5	**1.2 J**

Sample ID / Location			SB-8
Sampling Date			10/24/2019
Sample Depth (feet bgs)			0-4
SVOC	SCO	RRSCO	CONC
Benzo(a)anthracene	1	1	**5.9 J**
Benzo(a)pyrene	1	1	**4.7 J**
Benzo(b)fluoranthene	1	1	**5.7 J**
Chrysene	1	3.9	**6.1 J**
Indeno(1,2,3-cd)pyrene	0.5	0.5	**3.1 J**
Metals	SCO	RRSCO	CONC
Arsenic	13	16	15.5
Zinc	109	10,000	115

Sample ID / Location			SB-3
Sampling Date			10/21/2019
Sample Depth (feet bgs)			0-6
SVOC	SCO	RRSCO	CONC
Benzo(a)anthracene	1	1	**3.7 J**

Sample ID / Location			IB-3
Sampling Date			10/22/2019
Sample Depth (feet bgs)			0-9
SVOC	SCO	RRSCO	CONC
Benzo(b)fluoranthene	1	1	**1.1**
Indeno(1,2,3-cd)pyrene	0.5	0.5	**0.56**



Sample ID / Location			SB-11
Sampling Date			10/23/2019
Sample Depth (feet bgs)			24-28
VOC	SCO	RRSCO	CONC
Acetone	0.05	100	0.052

LEGEND:

APPROXIMATE PROPERTY LINE

SB-# SOIL BORING LOCATION AND ID

Sample ID / Location			IB-2
Sampling Date			10/22/2019
Sample Depth (feet bgs)			0-7
SVOC	SCO	RRSCO	CONC
Benzo(a)anthracene	1	1	**45**
Benzo(a)pyrene	1	1	**33**
Benzo(b)fluoranthene	1	1	**43**
Benzo(k)fluroanthene	0.8	3.9	**17**
Chrysene	1	3.9	**44**
Indeno(1,2,3-cd)pyrene	0.5	0.5	**23**

TABLE NOTES:

ALL SOIL VALUES ARE REPORTED IN mg/kg (APPROXIMATE PARTS PER MILLION - ppm)

SCO - NYSDEC UNRESTRICTED USE SOIL CLEANUP OBJECTIVE

RRSCO - NYSDEC RESTRICTED RESIDENTIAL USE SOIL CLEANUP OBJECTIVE

J - ESTIMATED VALUE (THE CONCENTRATION IS GREATER THAN THE METHOD DETECTION LIMIT, BUT BELOW THE QUANTITATION LIMIT)

BOLD - CONCENTRATION EXCEEDS APPLICABLE RRSCO VALUE

			IB-2
Sampling Date			10/22/2019
Sample Depth (feet bgs)			9-14
SVOC	SCO	RRSCO	CONC
Benzo(a)anthracene	1	1	**53**
Benzo(a)pyrene	1	1	**36**
Benzo(b)fluoranthene	1	1	**42**
Benzo(k)fluroanthene	0.8	3.9	**21**
Chrysene	1	3.9	**48**
Indeno(1,2,3-cd)pyrene	0.5	0.5	**21**

Sample ID / Location			SB-5
Sampling Date			10/17/2019
Sample Depth (feet bgs)			28-32
Metals	SCO	RRSCO	CONC
Chromium	30	180	31.8

NOTES / DISCLAIMERS:

1. APPROXIMATE PROPERTY LINE BASED ON TBD
2. ALL LOCATIONS ARE APPROXIMATE.

0 37'-6" 75'

GRAPHIC SCALE

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East Syracuse, NY 13057

PROJECT NO. 20-056
DRAWN: MAR 2020
DRAWN BY: NP/DB
CHECKED BY: HNB

Summary of Analytical Exceedances
In Soil

EJ Victory Building
59 Lester Avenue
Johnson City, New York 13790

FIGURE
3B

Sample ID / Location		MW-3
Sampling Date		10/24/2019
Metals	AWQS	CONC
Aluminum	NE	3,500
Iron	300	**5,400**
Manganese	300	**350**
Sodium	20,000	**84,300**

Sample ID / Location		MW-5
Sampling Date		10/23/2019
Metals	AWQS	CONC
Aluminum	NE	40,600
Arsenic	25	**35**
Chromium	50	**180**
Iron	300	**84,800**
Lead	25	**76**
Magnesium	35,000	**68,200**
Manganese	300	**2,500**
Nickel	100	**110**
Sodium	20,000	**216,000**

Sample ID / Location		MW-2
Sampling Date		10/23/2019
Metals	AWQS	CONC
Aluminum	NE	26,500
Chromium	50	**340**
Iron	300	**52,200**
Lead	25	**48**
Magnesium	35,000	**87,000**
Manganese	300	**1,800**
Nickel	100	**210**
Sodium	20,000	**66,000**

Sample ID / Location		MW-1
Sampling Date		10/23/2019
Metals	AWQS	CONC
Aluminum	NE	17,600
Chromium	50	**120**
Iron	300	**29,900**
Lead	25	**45**
Magnesium	35,000	**38,800**
Manganese	300	**1,500**
Sodium	20,000	**144,000**

LEGEND:

APPROXIMATE PROPERTY LINE

MONITORING WELL LOCATION AND ID (MW-#)

TABLE NOTES:

ALL GROUNDWATER VALUES ARE REPORTED IN ug/L (APPROXIMATE PARTS PER BILLION - ppb)

AWQS - NYSDEC AMBIENT WATER QUALITY STANDARD OR GUIDANCE VALUE FOR CLASS GA GROUNDWATER

J - ESTIMATED VALUE (THE CONCENTRATION IS GREATER THAN THE METHOD DETECTION LIMIT, BUT BELOW THE QUANTITATION LIMIT)

NE - NO AWQS ESTABLISHED FOR THIS COMPOUND

BOLD - CONCENTRATION EXCEEDS THE RESPECTIVE AWQS FOR THIS COMPOUND

Sample ID / Location		MW-4
Sampling Date		10/24/2019
Metals	AWQS	CONC
Aluminum	NE	7,700
Iron	300	**14,000**
Manganese	300	**500**
Sodium	20,000	**145,000**

Sample ID / Location		MW-6
Sampling Date		10/24/2019
Metals	AWQS	CONC
Aluminum	NE	47,200
Arsenic	25	**54**
Chromium	50	**83**
Copper	200	**270**
Iron	300	**99,400**
Lead	25	**110**
Magnesium	35,000	**95,000**
Manganese	300	**3,400**
Nickel	100	**120**
Sodium	20,000	**324,000**

Sample ID / Location		MW-7
Sampling Date		10/23/2019
Metals	AWQS	CONC
Aluminum	NE	27,500
Arsenic	25	**30**
Chromium	50	**110**
Iron	300	**60,000**
Lead	25	**81**
Magnesium	35,000	**61,800**
Manganese	300	**1,800**
Sodium	20,000	**194,000**

NOTES / DISCLAIMERS:

1. APPROXIMATE PROPERTY LINE BASED ON TBD
2. ALL LOCATIONS ARE APPROXIMATE.

0 — 37'–6" — 75'
GRAPHIC SCALE

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Asbestos & Environmental Consulting Corporation
6308 Fly Road
East Syracuse, NY 13057

PROJECT NO. 20-056
DRAWN: MAR. 2020
DRAWN BY: NP/DB
CHECKED BY: HNB

Summary of Analytical Exceedances
in Groundwater

EJ Victory Building
59 Lester Avenue
Johnson City, New York 13790

FIGURE 3C

APPENDIX A

Standard Operating Procedures

Scope and Application

The purpose of this SOP is to establish uniform procedures for the collection of surface and shallow soil samples using hand-operated sampling tools/equipment. Adherence to this SOP will promote consistency in sampling methods and if followed properly will provide a basis for sample representativeness.

It is noted that other state or federal agency standard operating procedures may exist that require deviation from this SOP. These required deviations must be identified before the sampling program begins (ideally during the work plan/sampling plan development), and must be explained in the project-specific work plan/sampling plan.

Equipment/Apparatus/Supplies

Materials needed for this SOP may include:

Spoons/Scoops/Trowels – Sampling spoon/scoops/trowels may be reusable or disposable. Reusable spoons/scoops shall be constructed of stainless steel to facilitate easy decontamination. Disposable scoops may be constructed of other materials (example: high density polypropylene (HDPE), which are preferable to stainless steel when acquiring samples for trace element analysis.) however the use of softer and more brittle materials may be less effective in higher density soils.

Shovel – Shovels may be used for the preparation of the sample collection area (i.e., to remove surface materials to allow sampling with a spoon or scoop) or for samples requiring large sample volume (i.e, bench-scale treatability samples).

Soil Auger/Bucket (Hand) Auger - A soil auger/bucket (hand) auger usually comprises a T-handle attached to a spiral-bladed metal auger (soil auger) or a hollow tube with cutting teeth at the bottom (bucket or hand auger). Turning the handle in a clockwise direction, either brings soil toward the surface (hand auger) or into the hollow tube (bucket). Only moderate down-pressure should be used as forcing the auger through hard zones or in cobble-rich soils can damage equipment and injure the individual using the equipment.

Soil Augers are typically good for sampling depths up to 3 feet. Representative samples can be collected directly from the auger flight as it is withdrawn from the ground, or from the tube-sampler attachment which can be advanced into the soil after augering to the top of the desired depth interval. It should be noted that soil augers cause considerable disturbance of the soil that can cause the loss of volatile organic compounds (VOCs) from the soil, therefore, some consideration should be given to using a tube-sampler attachment, or another less invasive method for sampling soils for (VOCs).

Bucket/hand augers are generally used to collect soil samples from depths ranging from the ground surface to approximately five (5) feet below the ground surface. In some instances, soil samples may be collected from greater depths, but often with considerable more difficulty. Bucket/hand augers allow for discrete depth interval sampling as the soil is retained within the hollow tube of the auger when it is extracted from the ground. It should be noted that if depth-discrete sampling is the objective, more than one auger may be necessary, with one larger bucket auger used to provide access to the required sampling depth and another (clean) smaller auger used for sample collection.

Upon retrieval from the ground, the soil on the flights of the auger or within the bucket can be poured directly into collection pan or sample container (if loosely consolidated) or be removed with a clean decontaminated spoon or scoop and transferred into the appropriate container.

Collection Pan – A soil collection pan is often used as an intermediate between removal of soil from the ground and filling the sample containers/soil jars. Stainless steel is required material of construction..

Other commonly used materials –

- Stainless steel teaspoon or spatula
- Ziploc-type bags
- Aluminum Foil
- Sampling kit (i.e., bottles, labels, custody records, cooler, etc.)
- Six foot folding tape for depth measurement
- Personal protective equipment (as required in HASP)
- Field project notebook/pen

Procedures

General

Site-specific soil characteristics and project-specific requirements such as sampling depth will dictate the preferred type of sampling equipment to be used. In addition, the analytical program requirements will define the volume of sample needed, which will also influence the selection of the appropriate sampling equipment (i.e., sampling for semi-volatile organic compounds requires a larger soil volume and thus a larger sized bucket auger, than that necessary for total lead sampling). The project work plan/sampling plan should define specific requirements and equipment required for the given site. Sampling personnel should be equipped with a variety of sampling equipment to address deviations from anticipated sampling situations.

Equipment Decontamination

Sampling equipment must be decontaminated prior to its initial use and following the collection of each soil sample. Site specific decontamination should be outlined in the sampling plan/work plan. If site-specific decontamination procedures are not stipulated in the work/sampling plan, the procedures described in AECC SOP # 103 – Equipment Decontamination, shall be used.

Samples for Volatile Organic Compound Analysis

Because volatile organic compounds (VOCs) can volatilize and be lost during the sampling process, precautions are necessary to minimize this effect during soil sampling. A sample collected for VOC analysis should be collected first (before collecting samples to be analyzed for other parameters) and should collected as quickly and as directly as possible, from a discrete, relatively undisturbed portion of soil. In general, it is best to transfer soils directly from the sampling device into the sampling container, without the use of an intermediate collection pan.

Sampling Procedures

Preparing the Ground Surface at the Sampling Location

At most locations the surface must be prepared prior to surface soil sampling. This may include removal of surface debris or vegetation to expose the actual soil surface, or the loosening of dense compacted soils such as those in heavy traffic areas or frozen soils.

Shovel Sampling

Detailed operating procedures for shovels, trowels, spoons and scoops is unnecessary, other than to state that this equipment shall be decontaminated before use.

Upon completion of sampling activities, backfill the sampling location and restore the surface to as close to pre-sampling conditions as possible to eliminate surface hazard or preferred path for contaminant migration. The sampling plan/work plan may specify the requirements for backfilling and surface restoration.

Trowel, Spoon and Scoop Sampling

Spoons, scoops, and trowels are of similarly designed construction and will therefore be operated in accordance with the following procedure, unless an alternate method is described in the site-specific work plan or sampling plan. Deviations from the standard operating procedures described herein and the rationale/justification for those deviations are to be recorded in the field logbook.

1. Select location and be sure that all surface preparation and soil sampling tools are decontaminated.
2. Prepare surface for sampling – Remove surficial material with shovel if necessary to achieve the required depth.
3. Turn the sampling tool into the ground and rotate so that a representative column of soil is removed.

4. If sampling for VOCs is required, collect this sample portion first.
5. If a specific depth interval has been targeted, collect soils from that depth into a collection pan.
6. If more soil is needed to meet sample volume requirements, additional soil cores may be collected from an immediately adjacent location.
7. Homogenize the soil in the collection pan (excluding soil for VOC analysis) by mixing the soil in the collection pan with the sampling tool until a uniform mixture is achieved.
8. Transfer soil from the collection pan into the appropriate sample jars/containers using the sampling tool or a clean stainless steel teaspoon or spatula. Use of fingers should be avoided.
9. Once filled, the rim and threads of the sample container should be cleaned of gross soil by wiping with a paper towel, then capped and labeled. Do not submerge the sample containers in water to clean them.
10. Label the samples and place the containers into a cooler with wet ice that has been contained within sealed plastic bag(s) as soon as possible (immediately) after collection.
11. Log the samples in field notebook, chain of custody and other required documentation.

12. Handle samples for shipment to the laboratory in accordance with AECC SOP # 102 – Environmental Sample Handling, Packaging, and Shipping.
13. Decontaminate sampling tools prior to reuse.
14. Investigation-derived waste (IDW) should be properly contained before leaving the area.
15. Backfill the sampling location and restore the surface to as close to pre-sampling conditions as possible, to eliminate surface hazard and/or the creation of a preferred path for contaminant migration. The sampling plan/work plan may specify the requirements for backfilling and surface restoration.

Soil Auger Sampling

When using a soil auger for the collection of surface or shallow soil samples, the following procedure will be employed unless an alternate method is described in the site-specific work plan or sampling plan. Deviations from the standard operating procedures described herein and the rationale/justification for those deviations are to be recorded in the field logbook.

1. Select Location and be sure that all surface preparation and soil sampling tools are decontaminated.
2. Prepare surface for sampling – remove vegetation or surface debris as necessary.
3. Turn the soil auger gently in a clockwise direction until the top of the desired depth is achieved.
4. Remove the auger, thus clearing the disturbed soil from the augered hole.
5. If using the auger flights to collect the sample, return the auger to the hole and continue turning the auger so that it penetrates the interval of interest. Retrieve the auger and transfer soil into a collection pan.

6. If using a tube–sampler attachment, insert the tube sampler into the augered hole to the top of the desired interval and push/turn the tube sampler through the interval of interest.
7. Multiple trips and/or multiple adjacent auger holes may be necessary to sample the interval of interest at a given location.
8. Samples to be analyzed for VOCs should be collected first, directly from the auger flights or tube-sampler attachment.
9. With the exception of the VOC fraction (if required), the remaining soils should be placed into the soil collection pan.
10. Homogenize the soil in the collection pan (excluding soil for VOC analysis) by mixing the soil in the collection pan with the sampling tool until a uniform mixture is achieved.
11. Transfer soil from the collection pan into the appropriate sample jars/containers using the sampling tool or a clean stainless steel teaspoon or spatula. Use of fingers should be avoided.
12. Once filled, the rim and threads of the sample container should be cleaned of gross soil by wiping with a paper towel, then capped and labeled.
13. Label the samples and place the containers into a cooler with wet ice that has been contained within sealed plastic bag(s) as soon as possible (immediately) after collection.
14. Log the samples in field notebook, chain of custody and other required documentation.
15. Handle samples for shipment to the laboratory in accordance with AECC SOP # 102 – Environmental Sample Handling, Packaging, and Shipping.
16. Decontaminate sampling tools prior to reuse.
17. Investigation-derived waste (IDW) should be contained before leaving the area.
18. Backfill the sampling location and restore the surface to as close to pre-sampling conditions as possible, to eliminate surface hazard and/or the creation of a preferred path for contaminant migration. The sampling plan/work plan may specify the requirements for backfilling and surface restoration.

Bucket/Hand Auger Sampling

When using a bucket/hand auger for the collection of surface or shallow soil samples, the following procedure will be employed unless an alternate method is described in the site-specific work plan or sampling plan. Deviations from the standard operating procedures described herein and the rationale/justification for those deviations are to be recorded in the field logbook.

1. Select location and be sure that all surface preparation and soil sampling tools are decontaminated.
2. Prepare surface for sampling – remove vegetation or surface debris as necessary.
3. Push downward and turn the bucket/hand auger in a clockwise direction until bucket becomes filled with soil. Usually a 6 to 12-inch core of soil is obtained each time the auger is inserted.
4. Empty and repeat until the top of the interval of interest is encountered. Soil from above the interval that requires sampling and analysis can be emptied onto plastic sheeting for description/classification.

5. Using a clean/decontaminated bucket auger, insert the auger into the bottom of the hole so that it is positioned above the interval of interest. A smaller diameter bucket may be necessary to prevent the auger from being contaminated by passing through the overburden soils.
6. Turn the bucket/hand auger so that bucket fills with soil from the interval of interest.
7. Once filled, the auger should be removed from the ground and emptied into the soil collection pan. If a VOC sample is required, the sample should be taken directly from the auger bucket using a clean/decontaminated teaspoon or spatula and/or directly filling the sample container from the auger.
8. Repeat the process until the desired sample interval has been thoroughly penetrated with extracted soils placed into the collection pan.
9. Except for VOC sample fractions, the remainder of the soil sample should be collected into the collection pan.
10. Homogenize the soil in the collection pan by mixing the soil in the collection pan with the sampling tool until a uniform mixture is achieved.
11. Transfer soil from the collection pan into the appropriate sample jars/containers using the sampling tool or a clean stainless steel teaspoon or spatula. Use of fingers should be avoided.
12. Once filled, the rim and threads of the sample container should be cleaned of gross soil by wiping with a paper towel, then capped and labeled.
13. Label the samples and place the containers into a cooler with wet ice that has been contained within sealed plastic bag(s) as soon as possible (immediately) after collection.
14. Log the samples in field notebook, chain of custody and other required documentation
15. Handle samples for shipment to the laboratory in accordance with AECC SOP # 102 – Environmental Sample Handling, Packaging, and Shipping.
16. Decontaminate sampling tools prior to reuse.
17. Investigation-derived waste (IDW) should be contained before leaving the area.
18. Backfill the sampling location and restore the surface to as close to pre-sampling conditions as possible to eliminate surface hazard and/or the creation of a preferred path for contaminant migration. The sampling plan/work plan may specify the requirements for backfilling and surface restoration.

Quality Assurance/Quality Control

Quality control requirements for sample collection are dependent on project-specific sampling objectives which may be outlined in the site-specific Quality Assurance Project Plan (QAPP) if applicable, or may be included in the site-specific work plan/sampling plan. This information will include requirements for sample preservation and holding times, container types, sample packaging and shipment, as well as requirements for the collection of various quality assurance samples such as trip blanks, matrix spike/matrix spike duplicates, field blanks/equipment blanks, and field duplicates. The Project Manager is responsible for assuring that the Quality Assurance/Quality Control objectives are specified and communicated to individuals responsible for collecting the samples.

Documentation

Documentation of sample collection, handling and shipping is required, and takes a variety of forms including:

- Field log book
- Sample collection records
- Chain-of-Custody forms
- Shipping Labels

The field book will be maintained as an overall log of all samples collected during a project. Sample collection records are generated for each sample collected during a project and must include:

- Project Number and Location
- Sampling point location location/ID
- Date and time that sample was collected
- Description/designation of the sample location
- Name of collector
- Equipment used to collect the sample
- Number of sample containers, sizes, preservatives
- Specific Sample ID
- Depth
- Soil type
- Analysis Requested
- Laboratory Designation
- Shipping ID Number/Tracking ID Number

Depending on project-specific requirements, this information may be required to be collected on a separate sample collection record form. If such a form is not required, the information will be collected in the project field log book.

Chain-of-custody forms are transmitted with the samples to the laboratory for sample tracking purposes. These may be AECC-specific or be provided by the laboratory providing analytical services for the project. Shipping labels are required if sample coolers are to be transported to the laboratory by a third-party (courier service). Original and/or copies of these documents will be retained in the appropriate project files.

Training & Qualifications

Surface soil sampling is a relatively simple procedure requiring minimal training and generally a small amount of equipment. Individuals conducting surface soil sampling for the first time will be supervised/trained by experienced personnel. Sampling personnel collecting samples that might contain petroleum compounds, heavy metals, or other potentially hazardous materials will be trained and certified in accordance with the requirements of 29 CFR 191O.120(e)(3}(i), OSHA's HAZWOPER standard.

Scope and Application

The purpose of this procedure is to establish a uniform set of procedures for handling, packaging and shipping environmental samples. Adherence to this SOP will ensure that samples are received by the laboratory in good condition. This procedure will also prevent cross-contamination of samples during shipment and minimize sample container breakage.

This SOP is to be used **ONLY** for environmental samples. Hazardous material shipments shall adhere to USDOT requirements which are not presented in this document.

Equipment/Apparatus/Supplies

Required materials include the following:

Duct tape
Strapping tape (1-inch minimum width)
Clear packing tape
Re-sealable plastic bags (Ziploc® or equivalent) sized for the sample containers used
Bubble wrap
"Fragile" labels
"This Side Up" labels
Adhesive address labels

Procedures

Sample bottle shipping preparation

Each bottle shall be properly labeled using the provided labels as detailed in SOP # 108. Once the label is affixed to the bottle the label shall be covered with clear packing tape which is wrapped completely around the bottle.

Each bottle shall be sealed by placing clear packing tape completely around the neck of the bottle and the bottle cap. If a QAPP for a particular project states that a custody seal on the bottle cap is required it shall be placed across the bottle cap prior to placing the clear packing tape on the bottle.

Sample bottle packaging

Each bottle or VOA vial pair (aqueous samples) shall be placed in an appropriately sized sealable plastic bag. Care shall be taken to ensure that air is removed from each bag. The purpose of bagging the samples is to protect against sample material release and cross-contamination should the sample container leak or break during shipment.

Bubble wrap shall then be used to completely wrap the bagged sample bottle or VOA vial pair. The bubble wrap shall be secured in place using packing tape.

Cooler Inspection, Preparation and Packing

Each cooler to be used for shipment of samples shall be inspected for integrity. The hinges shall be inspected and the walls, bottom and top of the cooler shall be inspected for cracks. Coolers with broken hinges and/or cracks shall not be used for sample shipment.

Each cooler shall be clean and free of any solid or liquid residue. If the cooler is equipped with a drain then duct tape shall be placed on the inside and outside portions of the drain to ensure that liquids or solids cannot pass through it.

Prior to placement of ice and or samples in the cooler, the cooler shall be lined with bubble wrap. A layer of bagged ice (see below) shall then be placed on the bottom of the cooler.

Prepared sample containers shall then be placed upright in the cooler such that they are tightly arranged. If there are insufficient sample bottles to achieve a tight packing arrangement then the samples shall be equally spaced throughout the cooler and the interstices shall be filled with additional bubble wrap.

A second layer of bagged ice shall then be placed on top of the samples and bubble wrap shall be laid over the top of them.

If the cooler is to be shipped via an overnight carrier (i.e.FedEx®, UPS or similar) the signed chain of custody shall be placed in a sealable plastic bag and taped to the underside of the cooler lid.

Ice Bagging

Ice, consisting of commercially available cubed ice, shall be placed in sealable plastic bags sized for the cooler to be used. A second bag shall be place over the first to provide a secondary containment layer. Care shall be taken not to overfill the bags such that the bag is difficult to seal. A typical cooler will require four 1 or 2-gallon bags with two bags beneath the samples and two on top of the samples.

Cooler Sealing and Labeling

The cooler shall be closed and the lid shall be securely sealed using duct tape. Duct tape shall be placed along the entire perimeter of the lid where it meets the cooler body including hinges. Care shall be taken to ensure a tight seal by the tape on the cooler surface.

"Fragile" and "This Side Up" labels shall be placed on each side of the cooler. A "Fragile" label shall be placed on the top of the cooler. "This Side Up" labels shall have an arrow pointing upward. Clear packing tape shall be placed over labels. Examples of the labels are shown below:

An adhesive label shall be attached to the top of the cooler which has the destination information clearly shown on it. Clear packing tape shall be placed over the entire surface of the label.

Clear packing tape shall be wrapped completely around the cooler at a minimum of two points. Strapping tape (1-inch width minimum) shall then be placed on top of the packing tape and shall completely encircle the cooler.

If shipping will be by FedEx® or similar, the airbill shall be affixed to the top of the cooler.

Quality Assurance/Quality Control

Prior to shipment, the cooler shall be inspected to ensure that it is properly sealed and labeled.

Documentation

If samples are being shipped via courier or via direct delivery then a copy of the signed chain of custody shall be retained. If shipping via other carrier, the copy of the airbill shall be retained for the project records.

Scope and Application

The purpose of this procedure is to establish a uniform set of procedures for conducting decontamination of field sampling equipment. Decontamination is performed as a quality assurance measure and a safety precaution. The use of equipment that has not been properly decontaminated for collecting samples for chemical analysis can lead to erroneous data due to cross contamination. In addition, decontamination protects field personnel and others from potential exposure to hazardous materials and prevents contamination from being transported away from a site.

This SOP focuses on decontamination of non-disposable equipment used for sampling environmental media for chemical analysis. Decontamination of other materials (well-construction materials and drill stem for example)are sometimes required and are discussed in other SOPs or dealt with in project-specific work plans.

It is noted that other state or federal agency standard operating procedures may exist that require deviation from this SOP. These required deviations must be identified before the sampling program begins (ideally during the work plan/sampling plan development), and must be explained in the project-specific work plan/sampling plan.

Equipment/Apparatus/Supplies

Required materials may include:

- Tap/potable water
- Phosphate-free detergent (Liqui-nox, Alconox, or similar)
- Distilled and/or deionized water
- Solvents as defined by the Work Plan, QAPP, etc. (may include nitric acid, dilute hydrochloric acid, methanol, hexane, isopropanol, etc.)
- PPE
- Paper towels
- Wash buckets/basins/containers
- Waste containers pails/buckets with lids, drums or plastic bags.
- Cleaning brushes
- Pressure sprayers and/or squeeze bottles
- Plastic sheeting
- Aluminum foil/plastic bags
- Project notebook/pen

Procedures

AECC's standard decontamination procedure is presented in the steps listed below. The standard may be modified on a project-specific basis, as described in project specific QAPP, sampling programs or other documents, and may include additional steps, solvents, materials, etc., depending on the quality assurance objectives for the project.

1. Don PPE items appropriate to the characteristics of the contaminated material that was encountered (safety glasses, latex or nitrile gloves, and disposable Tyvek garment for example).
2. Remove gross contamination, dirt, etc from the equipment by brushing and rinsing with tap water. This step should be completed in a 5-gallon bucket or appropriately sized container.
3. Wash the equipment with a phosphate-free detergent and tap water solution. This step should be completed in a separate wash bucket using brush, or pressure sprayer.
4. Rinse the equipment with potable water until all detergent has been removed. This step can be performed over an empty bucket using a squeeze bottle or pressure sprayer.
5. Triple-rinse the equipment with distilled or de-ionized water. Rinseate should be collected in the bucket used in step 3.
6. Allow the equipment to air dry on clean plastic sheeting. If faster drying is required, use paper towels to blot the equipment dry before reuse.
7. Wrap the dried decontaminated equipment with aluminum foil, shiny side out, for storage until the equipment is to be used again. Alternately, small equipment can be placed into clean plastic bags and sealed for longer term storage.
8. Containerize and/or manage wash water and decontamination rinseate in accordance with project-specific requirements.

When decontaminating submersible pumps used for groundwater sampling (or monitoring well development), the above-listed steps 2 and 3 may be conducted in a tube or cylinder that is sealed at the bottom end (commonly a 3-foot length of PVC pipe affixed with a water-tight end cap). The pump is inserted into the cylinder which is filled with the wash water, detergent solution, or rinse water and is turned on at a low setting for approximately five (5) minutes, so as to cycle the wash solutions through the pump's impellers and internal components. After the pump is removed from the potable water rinse cycle, the triple-rinse is performed with copious amounts of distilled/deionized water, being sure to flush through the impellers.

As stated previously, project-specific decontamination procedures may be required and will be specified in the project's QAPP, sampling plan or project-specific work plan. Some project-specific modifications may include the following:

- For glass and plastic sampling equipment used for sampling environmental media for metals analyses, decontamination may include a rinse with a 10% solution of nitric acid.
- For metallic sampling equipment used for sampling environmental media for metals analyses, decontamination may include a rinse with a 10% hydrochloric acid solution.

- For sampling equipment used for sampling environmental media for organic parameters (volatile organic compounds, semivolatile organic compounds, pesticides, polychlorinated biphenyls, etc.), decontamination may include an intermediate rinse with methanol, hexane, or isopropanol.

The above-listed solvents are hazardous materials due to their toxicity and/or corrosivity, and are specifically excluded from AECC's standard decontamination procedure because of these properties. When the use of these (or other similar) solvents is required by a project-specific QAPP or Sampling Plan, the plans must also describe additional protocols and procedures regarding their safe use and handling and to assure that associated investigation-derived waste (wash water and spent rinseate) is handled, characterized, and disposed of in accordance with federal, state and local requirements.

Large Equipment Decontamination

On some projects, large equipment (excavators, backhoes, truck-mounted drilling equipment, etc) is used for sampling or site characterization activities, and may become contaminated during site activities (or may require decontamination prior to use on site). For these situations, the drilling subcontractor will construct a temporary decontamination pad that typically consists of a bermed, plastic-sheet lined area where equipment and tooling can be brought for decontamination with a high-temperature high pressure washer (steam jenny) and/or manual scrubbing. If heavy equipment decontamination is required for a specific project, the specifications for the decontamination pad, and procedures for decontamination will be stipulated in the project QAPP and/or Sampling Plan.

Quality Assurance/Quality Control

General guidelines for quality control check of field equipment decontamination usually require the collection of one equipment blank from the decontaminated equipment per day, however the collection of equipment blanks and similar QA/QC samples is to be based on specific project requirements. For projects with a QAPP, the document will specify the type and frequency of collection of each type of quality assurance sample. For projects without a QAPP, the need for and/or frequency of equipment blanks and other QA/QC samples will be specified in the scope of work, or the project work plan.

Equipment blanks are generally collected by pouring laboratory-supplied deionized water into, over, or through the freshly decontaminated sampling equipment and then transferring this water into a sample container. Field blanks should then be labeled as a sample and submitted to the laboratory to be analyzed for the same parameters as the associated sample. Field blank sample numbers, as well as collection method, time and location should be recorded in the field notebook.

Documentation

Specific information regarding decontamination procedures should be documented in the project-specific field notebook. Documentation in the notebook should thoroughly describe the construction of each decontamination facility and the decontamination steps implemented in order to show compliance with the project work plan. Decontamination events should be logged when they occur with the following information documented:

- Date, time and location of each decontamination event
- What equipment was decontaminated
- Method used for decontamination
- Solvents used
- Notable circumstances
- Date, time and location of equipment blanks collected and the methods/procedures used for collection.
- Storage of decontamination wastes (spent wash and rinse water).

Repetitive decontamination of small items of equipment does not need to be logged each time the item is cleaned, however a note should be made that such equipment was decontaminated as required and in accordance with this SOP, or project specific QAPP, Work Plan, etc.

Scope and Application

The purpose of this SOP is to lay out the specific standardized procedure to be used for collecting soil samples using direct-push methods. Subsurface soil sampling, conducted in accordance with this SOP will promote consistency in sampling and provide a basis for sample representativeness.

Direct push sampling involves the hydraulic pushing and/or percussive hammering of a sampling tube into the subsurface. The inside of the sampling tube is generally lined with a sleeve or liner made of acetate or (it may also be made of stainless steel, brass, plastic, Teflon, etc.), that catches the soil during the samplers advancement. The sampler includes a cutting shoe, and may also include an internal locking piston (or similar device) that seals the sampling tube until it is unlocked at the top of a specific depth to facilitate the collection of soils from a discrete interval. The sampling tube is threaded onto direct-push rods. The rods and tooling are driven into, and subsequently pulled from the subsurface with the hydraulic/percussive direct-push equipment. The direct-push “rig” may be mounted on wheels so that it can be manually moved about. More typically, however, the direct-push rig is mounted in the back of a pick up truck, on a skid-steer or the unit is track mounted so that it can be driven from location to location in areas of a site that are not accessible to truck-mounted units.

Direct-push sampling methods are generally applicable to unconsolidated soil/fill materials to a maximum recommended depth of approximately 30 feet below ground surface (bgs). Soils may be obtained using this method for visual classification, field screening for contamination, as well as for physical and/or chemical analysis. Sampling shall be continuous throughout the length of the boring.

Direct-push sampling is an intrusive subsurface exploration method. By law, the clearance of underground utilities must be performed prior to the initiation of any intrusive activities. The drilling subcontractor performing the direct-push activities is responsible for notifying Dig Safely New York or another Underground Facilities Protective Organization (UFPO).

The ability to drive the sample tooling to a desired depth (as well as the ability to retrieve the sampling device from the subsurface) depends on the density and composition of the soil and the power of the hydraulic equipment. Additionally, sample recovery is somewhat dependent on grain size. Coarse gravel, cobbles, and boulders may plug a small diameter sample tube, preventing material from entering, or may cause refusal of the tooling altogether.

Likely soil types that might be encountered and preliminary site information (accessibility, surface conditions, etc) should be used to determine whether direct-push methods are appropriate for a site, and to determine the specific tooling best suited for subsurface characterization. Subcontractors/direct-push service providers should then be selected on the basis of whether or not they have equipment and tooling necessary for those specific site/soil conditions.

Responsibilities

Project Geologist/Scientist

The project geologist/scientist is responsible for conducting subsurface soil sampling in a manner consistent with this SOP. The project geologist/scientist will observe all sampling activities to ensure that the SOP is followed, and will record all pertinent data and information on appropriate forms, logs and/or in the project field notebook.

It is also the project geologist/sampling engineer's responsibility to indicate the specific targeted sampling depth or sampling interval to the drilling subcontractor.

The project geologist/sampling engineer is also responsible for the collection of representative environmental characterization samples once the sampling device has been retrieved from the subsurface, disarticulated and liner removed.

Additional sample collection responsibilities include labeling, handling, and storage of samples until further chain-of-custody procedures are implemented.

Drilling Subcontractor

The drilling subcontractor is responsible for providing the necessary equipment for obtaining subsurface soil samples. This generally includes the truck or ATV-mounted percussion/probing machine and one or more sampling tubes (multiple diameters) in good operating condition, appropriate liners, and other necessary equipment for borehole preparation and sampling. It is the drilling subcontractor's responsibility to provide and maintain their own boring logs if desired. Equipment decontamination materials should also be provided by the subcontractor and should meet project specifications.

Equipment/Apparatus/Supplies

In addition to the equipment and materials provided by the drilling subcontractor, required materials may include the following:

- Project-specific documents (Scope of work, HASP, QAPP, Sampling Plan)
- Boring Logs
- Stainless steel spoons, spatulas, soil mixing pans etc.
- Sampling supplies (bottles, labels, custody records and tape, cooler)
- Folding rule or tape measure

- Portable chair and/or folding table
- Decontamination supplies (per the QAPP)
- Health and safety equipment/PPE (per the HASP)
- Field project notebook/pen
- Steel tape measure
- Stainless steel spoons, spatulas
- Plastic sheeting

Procedures

Typical Direct-Push Sampling Procedure

1. Don PPE as per the project HASP.
2. Decontaminate sample tooling and components that may come in contact with soil during sampling activities. Note: the level of decontamination will depend on whether soils are being sampled for laboratory analysis, field screening, or simply for visual classification.
3. Assemble the sampling tube including the liner, discrete sample tooling (if appropriate), sand-basket (if appropriate), and cutting shoe.
4. Prepare the surface for direct-push sampling. Direct push tooling can generally penetrate several inches of asphalt and/or crushed stone surface materials. If several inches of concrete are present at the location, coring or another method will be necessary to penetrate the surface pavement.
5. The direct-push rig operator will thread on a push/drive cap on the top of the device and push the sample tube into the ground.
6. The direct-push rig operator removes the push/drive cap, replaces it with a pull-cap and pulls sampler from the ground with the machine hydraulics.
7. The sample tube is then opened, to allow the soil-filled liner to be removed so that it can be cut open by the project geologist/scientist/ engineer to allow for soil classification/description, field-screening, sampling for laboratory analysis, etc.
8. The sampling tube and components that contact soil during the sampling process are decontaminated, re-assembled, with a new, disposable liner and the process is repeated. The advancement of the sampling tube to depth is achieved through the addition of drive-rods, each of which is typically the same length as the sampling tube (commonly 3, 4, or 5 feet in length).
9. Upon completion of the corehole, the hole is backfilled with soil cuttings or hydrated granular bentonite, or is completed as a piezometer or monitoring well.

Exposing Soils for Classification/Characterization and/or Sampling for Laboratory Analysis

Upon extraction of the liner from the direct-push sampling tube, the liner must be opened so as to expose the soils for visual classification/description, field screening and/or sampling for laboratory analysis. This is accomplished through the use of a liner cutting system, typically comprising a liner holder, and a liner cutter. The liner holder is a trough-like device that holds the liner securely in place so that it can be cut open.

The liner cutter is a tool affixed with two parallel hook-shaped blades that is drawn along the liner to cut a lengthwise opening in the liner for easy access and viewing of the sampled material. Liner cutters come in one-handle and two-handle varieties.

1. Place the soil-filled liner into the soil holder. Be sure that the liner holder is placed on a solid surface such as a sturdy work table, tailgate, etc.
2. Install the liner in the liner holder. Adjust the stop on the liner holder to secure the liner tightly in the holder.
3. Wearing leather work gloves, grasp the cutter by the handle(s) (avoid accidental contact with the blades) and place the cutter on the liner. The liner holder will usually have a bent bar that secures the liner in place, which provides resistance against the draw of the liner cutter. Begin the cut at the end of the liner opposite this bar. Be sure that blades are positioned just beyond the end of the liner to initiate the cut.
4. With slight downward pressure on the cutter, draw the cutter slowly and smoothly along the liner. If excessive force is required to open the liner, the cutter blades may be dull and should be replaced immediately.
5. When the cutter has been drawn the entire length of the liner, the cut section of the liner may be removed to access the sampled material.

The equipment described above is standard practice for most drilling subcontractors and is required by this SOP. This requirement should be communicated and confirmed with the drilling subcontractor before going into the field. Alternate methods of cutting sample liners open (i.e., holding a liner with one hand and using a hook-blade utility knife with the other to open the liner) can result in severe cuts and nasty infections, and **are not to be used**.

Sampling Soils for Environmental Laboratory Analysis

Sampling of soils for environmental laboratory analysis shall be conducted as described in AECC SOP # 101 - Surface and Shallow Soil Sampling. The intervals to be sampled shall be specified in the Project Work Plan. If the sampling program includes laboratory analysis for volatile organic compounds (VOCs), the VOC sampling shall be performed before any other activity.

Once the liner has been opened, the soils contained within can be sampled for laboratory analysis and classified. Materials from the liner can be removed using clean decontaminated/disposable spoons or spatulas. Except for soils to be sampled for volatile organic compound analysis, the soils should be placed into a sample collection pan and homogenized, or placed directly into the appropriate sample container(s).

Once filled, the sample container should be properly capped, cleaned and labeled, and placed into a cooler with ice in preparation for shipping to the laboratory, in accordance with standard operating procedures pertaining to sample handling, packaging and shipping.

Volatile Organic Samples

In order to minimize the loss of volatiles during the sampling process, samples should be collected into lab-supplied glassware as soon as possible after retrieving the sampler from the subsurface. Other tasks (classification, sampling for other parameters, field-screening, equipment decontamination, etc.) should either be performed by others, or be completed after collecting samples for VOC analysis.

Upon filling the sample container, clean and label the container and place it into a cooler immediately. Residual sample may then be used to fill other sample or logging requirements

When using direct-push methods for collecting soil samples for VOC analysis, the drilling subcontractor shall not retrieve more than one subsequent sampler from the subsurface while the project geologist/scientist collects samples from a previous interval.

Soil Classification

Soils will be visually classified in using the Modified Burmeister Soil Classification System or alternate methods required by project specifications.

Equipment Decontamination

Sampling equipment must be decontaminated prior to its initial use and following the collection of each soil sample. Site specific decontamination should be outlined in the sampling plan/work plan. If site-specific decontamination procedures are not stipulated in the work/sampling plan, the procedures described in AECC SOP # 103 – Equipment Decontamination, will be used.

Quality Assurance/Quality Control

Quality control requirements are dependent on project-specific sampling objectives. The QAPP will provide requirements for equipment decontamination (frequency and materials), sample preservation and holding times, sample container types, sample packaging and shipment, as well as requirements for the collection of various quality assurance samples such as trip blanks, field blanks, equipment blanks, and field duplicate samples.

In the absence of a QAPP, QA/QC will be attained through adherence to SOPs and requirements stipulated in project-specific specifications.

Documentation

Various forms are required to ensure that adequate documentation is made of sample collection activities. These forms will vary from project to project and may include:

- Field Log Books
- Soil Boring Logs
- Sample Collection Records
- Sample Container Labels
- Chain of Custody Forms
- Shipping Labels

Boring logs (see Example in AECC SOP # 104 – Split Spoon Soil Sampling) will provide visual and descriptive information for each sample collected and are often the most critical form of documentation generated during a soil sampling program. The field log book is kept as a general log of activities and should not be used in place of the boring log. Occasionally, sample collection records are used to supplement boring logs, especially for environmental samples which have been collected for laboratory analysis. Sample container labels are affixed to individual sample containers and then completed. Chain-of-custody forms are transmitted with the samples to the laboratory for sample custody tracking purposes. Shipping labels are required if sample coolers are to be transported to the laboratory by a third party (courier service). Original copies of these records should be maintained in the appropriate project files.

Scope and Application

The purpose of this SOP is to establish uniform procedures for the collection of groundwater samples. Adherence to this SOP will promote consistency in sampling methods and if followed properly will provide a basis for sample representativeness.

This SOP focuses on the collection of groundwater samples from properly developed monitoring wells, and may be applicable from other wells, springs etc that can be accessed for sampling. Groundwater samples might also need to be collected from residential potable water wells, industrial supply wells, open soil borings/core holes, and other sources which are not readily accessible, or that might require additional instruction and protocols for sampling. The collection of groundwater samples from these sources will vary according to the project and protocols, and procedures for collecting groundwater samples from these features will be discussed in the project-specific QAPP, or sampling plan.

State or federal agency mandated operating procedures may exist that require deviation from this SOP. These required deviations must be identified before the sampling program begins (ideally during the work plan/sampling plan development), and must be explained in the project-specific work plan/sampling plan.

Responsibilities

Project Manager

The project manager is responsible for assuring that project specific requirements are communicated to the project team and for providing the materials, resources, and guidance necessary to perform the work in accordance with this SOP and associated project-specific work plan.

Sampling Technician

The sampling technician is responsible for conducting groundwater sampling in a manner consistent with this SOP and/or in accordance with the QAPP, sampling plan or other project documents. The sampling technician will observe all sampling activities to ensure that the SOP is followed, and will record all pertinent data and information on appropriate forms, logs and/or in the project field notebook.

The sampling technician is responsible for ensuring that he/she has the appropriate laboratory supplied sampling supplies, the sampling equipment and supplies, and the supplies and materials for equipment decontamination.

Generally, the sampling technician is also responsible for handling the collected samples, maintaining custody documentation and preparing the samples for shipping/delivery to the analytical laboratory. On larger projects, a separate team may be assigned this task.

Equipment/Apparatus/Supplies

Required materials will vary depending on the method of groundwater sampling being conducted. In general, the equipment necessary may include:

- Project-specific plans (QAPP, sampling plan, scope of work, HASP).
- Appropriate PPE and safety equipment.
- Plastic sheeting
- Bailers (disposable or re-usable) and bailer-line/string.
- Development pumps (submersible, peristaltic, bladder, Waterra, centrifugal, air-lift, etc.)
- Sampling pumps (typically submersible, peristaltic or bladder)
- Monitors/meters (water quality meter) with calibration standards.
- Water Level Indicator (WLI) or Oil/Water Interface Probe
- Decontamination equipment and supplies (see AECC SOP-103)
- Sample bottles, labels, preservatives, chains of custody, coolers, etc. (sampling kits)
- Sample handling and shipping supplies (see AECC SOP–102),
- Field notebook, and records/forms for documentation/pen(s).
- Buckets and/or drums for carrying/containing purge water.
- Sampling cup/clear container for checking field parameters during purging
- Cooler and ice for samples
- Filters if required for metals analysis.
- Paper Towels

It is important that the sampling technician understand how to use all equipment and supplies that are provided for, and expected to be used, for collection of groundwater samples. If you have never used a particular piece of equipment, be sure to talk to the project manager for direction/instructions prior to deploying to the jobsite.

All equipment/supplies/apparatus that will be inserted into a well to facilitate well purging or groundwater sample collection, or that will come into contact with potentially contaminated groundwater during the sampling process must be decontaminated before and after each use.

Field monitoring equipment/meters should be calibrated and operated in accordance with manufacturer's instructions.

Procedures

General

During a groundwater sampling event, the first activity upon arrival at the site is typically the measurement/collection of depth-to-water data at each well location. Each of the wells to be gauged should be opened so that they are each able to equilibrate with the atmosphere, and should be gauged with a water level indicator, for depth to water and total well depth. If free phase product is anticipated at a given location, this should be field verified with a clean new disposable bailer and/or an oil/water interface probe.

Data on depth to water, depth to the base of the welland the diameter of each well should be recorded on the groundwater sample collection record and/or in the field notebook, as should any other pertinent information such as length and vertical position of well screen (if present), depth and thicknesses of immiscible layers, odors, lack of water, etc. The water level indicator/oil water separator must be decontaminated between use at each well. Flushing the probe and tape of the WLI with distilled water is generally sufficient for wells with no free product, however decontamination with detergents or solvents may be necessary if wells contain non-aqueous phase liquids (NAPLs).

NOTE: Historical water-level and groundwater quality data if available, should be used be used by the sampling technician. These data will aid in identifying changes in water levels over time, changes in well conditions (e.g., gradual silting up of a well screen), and which wells may be the most contaminated.

The length of the water column and the well diameter are used to calculate the volume of water in the well (calculated well volume) and is recorded on the groundwater sample collection record and/or the field notebook. Well volume is calculated as presented below.

$V = 0.041D^2(d2-d1)$, where
V = Calculated well volume in gallons
D = inside diameter of well casing in inches
d2 = total well depth in feet
d1 = depth to water surface in feet

Groundwater Sampling

Groundwater sampling is conducted in two general stages, well purging and sample collection.
During purging, groundwater is removed from the well so as to remove the water that might have been affected by exposure to the atmosphere. This is commonly done by pumping or bailing a minimum of three (3) calculated well volumes from a well, prior sample collection. Field parameters such as temperature, specific conductivity, turbidity, and pH may be collected during the purging process. When such field parameters are collected, purging continues until

the parameters have stabilized to within 10-percent of their preceding measurement, or until a maximum of five (5) calculated well volumes have been removed from the well.

Sample collection involves the filling of sample containers and the measurement of field-measured parameters. A summary of the most common groundwater sampling methods, and procedures to be followed for each method, are presented below.

<u>Sampling with a Bailer</u>

Bailing is a common and convenient method for purging and sampling groundwater, especially for situations where the depth of groundwater and the total depth of groundwater and well depth are both relatively shallow.

A bailer is a tube shaped device with a check valve at its lower end. Bailers come in a variety of sizes and volumes and are commonly disposable, although reusable bailers are available. Clean braided nylon or cotton cord is tied to the top of the bailer and the bailer is lowered into groundwater. When filled, the bailer is lifted from the well and the check-valve prevents water from draining out.

Procedures

Purging

1. Don PPE as per the project HASP section regarding groundwater sampling.
2. Obtain a clean bailer and a spool of clean polypropylene or nylon bailer cord.
3. Uncover the top end of the bailer and tie the cord to the bailer loop. Test the knot to ensure that it is secure, and remove the wrapping from the bailer.
4. Gently lower the bailer to bottom of the well.
5. Cut the cord at a proper length and tie a hand loop at the end of the cord, and attach it to your arm, or other fixed feature to prevent losing it down the well.
6. Gently raise the bailer, using the cord. The bailer cord should never touch the ground surface during purging or sampling.
7. Grab the bailer with one hand as it emerges from the well. Pour the bailed groundwater from the bailer into a graduated purge container.
8. Repeat this procedure until one calculated well volume of water is removed from the well.
9. After purging one calculated well volume, place a small volume of purged water into a sample cup and measure any required field parameters and record results on the Groundwater Sample Collection Record or in the field logbook or groundwater sampling form. If using a flow through apparatus for monitoring field parameters, record the readings from the display at this time and record in the filed logbook or groundwater sampling form.
10. Continue purging, by repeated bailing until the required purge volume has been removed from the well or until field parameters have stabilized.

Sample Collection

1. After completing purging, allow the well to recover to 90% of its static level before collecting the sample.
2. Insert the bailer into the well and gently lower the bailer to the bottom of the well.
3. Gently raise and retrieve the filled bailer from the well.
4. Grab the bailer with one hand as it emerges from the well. Insert a sample discharge tube into the bottom of the bailer to open the check valve and collect the discharging water into sample containers. In general, samples to be analyzed for VOCs are to be collected first, followed by samples to be analyzed for other organic compounds and inorganic constituents.
5. The samples to be analyzed for volatile organic compounds (VOCs) should be collected as gently as possible; so as to minimize the disturbance and aeration of the water as it enters the sample vials. Care should be taken to fill the vials such that no air bubbles are visible within the vial.
6. Repeat the sampling process until all sample containers are filled, adding required preservatives as necessary before capping.
7. After all sample containers are filled, fill the sampling cup with water and collect any required field-measured data (may include: temperature, pH, specific conductance, dissolved oxygen, total dissolved solids, oxidation-reduction potential, turbidity, salinity, etc) on the Groundwater Sample Collection Record, or in the field notebook.
8. Label and log the samples and place the containers into a cooler with ice as soon as possible (immediately) after collection.
9. Handle samples for shipment to the laboratory in accordance with AECC SOP # 102 – Environmental Sample Handling, Packaging, and Shipping.

Sampling with a Peristaltic Pump

Peristaltic pumps are commonly used for groundwater samples when the volume of water required to be purged is low, and when the depth to the groundwater surface is less than approximately 20 feet. Peristaltic pumps provide a low flow rate, typically in the range of 0.02-0.2 gallons/minute (75-750 ml/min), and are therefore best suited to low-flow sampling techniques, or for collecting samples from wells with low purge volumes.

A peristaltic pump is a type of positive displacement pump. During operation, a series of rollers rotate inside the pump casing, over a section of flexible silicone tubing. The silicone tubing is compressed and continued rotation forces water to be pumped through the system. A suction tube typically made of polyethylene or Teflon-lined polyethylene is attached to the intake end of the silicone tubing, and a discharge tube of similar material is attached to the outflow end of the silicone tubing. The suction tube is lowered into the water surface far enough so that it will remain submerged if drawdown occurs. Upon turning the pump on, the water is drawn up the suction tube, through the pump tube, and pushed out the discharge tube. Because each of the sections of hose comes in contact with groundwater, clean, new tubing must be used for each sampling location, and it is common practice to dedicate tubing to a specific well for use during future groundwater sampling events.

Procedure

Purging

1. Don PPE as per the project HASP section regarding groundwater sampling.
2. Attach new (or dedicated) sections of suction, silicone and discharge tubing, and install the silicone tubing into the peristaltic pump.
3. Insert the suction tubing into the well so that the open end is below the water surface (commonly set midway along the well screen, or so the intake is situated halfway between the lower screen slot and the uppermost submerged screen slot).
4. Start the pump and direct the discharging purge water into a graduated purge bucket, and adjust the pump speed to produce a smoothly flowing discharge.
5. Calculate the purge rate by recording the time required to purge a given volume and adjust to a flow rate of between 250 and 500 ml/min (if possible).
6. Measurements of temperature, pH and specific conductance (and/or other assigned parameters) should be made after each well purge volume and documented on the Groundwater Sample Collection Record or in the field logbook.
7. Samples may be collected after the required purge volume has been removed or the field-parameters have stabilized.

Sample Collection

1. After completing purging, allow the well to recover to 90% of its static level before collecting the sample.
2. During sample collection from a given well, samples to be analyzed for VOCs are collected first, and samples to be analyzed for other organic compounds and inorganic constituents are collected last.
3. When sampling for VOCs, reduce the flow rate so that the flow approximates 50 ml/min and use the discharge to fill the sample vials. This should be done as gently as possible, minimizing the disturbance and aeration of the water as it enters the vials. Care should be taken to fill the vial completely such that no air bubbles are visible in the vial.
4. For subsequent, non VOC samples, return the flow rate to approximately 250 ml/min and fill sample containers, being sure to add the required preservatives as necessary before capping.
5. After all sample containers are filled, fill the sampling cup with water and collect any required field-measured data (may include: temperature, pH, specific conductance, dissolved oxygen, total dissolved solids, oxidation-reduction potential, turbidity, salinity, etc) on the Groundwater Sample Collection Record or in the field notebook.
6. Label and log the samples and place the containers into a cooler with ice as soon as possible (immediately) after collection.
7. Handle samples for shipment to the laboratory in accordance with AECC SOP # 102 – Environmental Sample Handling, Packaging, and Shipping.

<u>Sampling with a Submersible Pump</u>

Submersible pumps are commonly used for groundwater sampling activities when groundwater is deep, or when a large volume of water must be purged prior to sampling. Because this type of pump is inserted into the groundwater being sampled, thorough decontamination between sampling locations is necessary to prevent cross-contamination. As an additional measure to prevent potential cross-contamination, historic groundwater quality data should be used (if available) to establish the order in which sampling occurs. Groundwater sampling with submersible pumps should proceed from the least contaminated wells to the most contaminated wells.

Discharge tubing, typically made of polyethylene or Teflon lined polyethylene is attached to the outflow of the pump. The pump, discharge tubing, and power cord/ air hose is lowered into the groundwater far enough so that the pump intake will remain submerged if drawdown occurs. A support cable/line is used to support the weight of the pump while it is suspended in the well, and the power cable/air hose is attached to a controller at the ground surface. Upon turning the pump on, the water is pushed up the discharge tube. Because the tubing comes in contact with groundwater, clean, new tubing must be used for each sampling location, and it is common practice to dedicate tubing to a specific well for use during subsequent groundwater sampling events.

Purging

1. Attach new or dedicated discharge tubing to the submersible pump.
2. Insert the pump, discharge hose, power cable/air hose, and support cable into the well so that the pump's intake is below the water surface (commonly set midway along the well screen, or so the intake is situated halfway between the lower screen slot and the uppermost submerged screen slot).
3. Start the pump and direct discharge into graduated purge bucket, and adjust the pump speed to produce a smoothly flowing discharge.
4. Calculate the purge rate by recording the time required to purge a given volume.
5. Measurements of temperature, pH and specific conductance (and/or other assigned parameters) should be made after each well purge volume and documented on the Groundwater Sample Collection Record or in the field logbook.
6. Samples may be collected after the required purge volume has been removed or until field parameters have stabilized.

Sample Collection

1. After completing purging, allow the well to recover to 90% of its static level before collecting the sample.
2. In general, samples to be analyzed for VOCs are to be collected first, followed by samples to be analyzed for other organic compounds and inorganic constituents.
3. If sampling for VOCs, reduce the flow rate so that the flow approximates 50 ml/min and use the discharge tube to fill the sample vials. This should be done as gently as possible, minimizing the disturbance and aeration of the water as it enters the vials. Care should be taken to completely fill the vial such that no air bubbles are visible in the vial.

4. For other parameters, adjust the flow rate to approximately 250 ml/min, and fill other sample containers, being sure to add the required preservatives as necessary before capping.
5. After all sample containers have been filled, fill the sampling cup with water and collect any required field-measured data (may include: temperature, pH, specific conductance, dissolved oxygen, total dissolved solids, oxidation-reduction potential, turbidity, salinity, etc) on the groundwater sample collection record or in the field notebook.
6. Label and log the samples and place the containers into a cooler with ice as soon as possible (immediately) after collection.
7. Handle samples for shipment to the laboratory in accordance with AECC SOP # 102 – Environmental Sample Handling, Packaging, and Shipping.

Quality Assurance/Quality Control

Quality assurance sampling is a common component of groundwater sampling programs. QA/QC sampling involves the collection and analysis of additional samples for the purposes of verifying that sampling equipment is suitably clean (equipment blanks), to check the laboratory's accuracy and/or precision (field duplicate), whether the sample matrix may be affecting the analytical results (Matrix Spike/Matrix Spike Duplicate), and whether samples might have been affected by conditions during shipment of the sample containers or samples (trip blank). The specific types of samples to be collected, the procedures to be used for collection, and the frequency QA/QC sample collection will be defined in the QAPP, work plan or project-specific work plan.

Documentation

Groundwater sampling activities should be documented in the field notebook, as well as on forms including the chain of custody record and sample collection records. Purge data collected during well purging prior to sample collection may be collected in the field notes, or on Groundwater Sample Collection Records (See Figure 1 Groundwater Sample Collection Record and Figure 2 for Low Flow Groundwater Sample Collection Record). Labels for sample jars must replicate the information provided on the chain-of-custody and at a minimum must include site ID/project number, sample ID, sampling date, sampling time, preservative, and sampler's initials. Other documentation such as meter calibration records, certifications for pre-cleaned sample containers, and shipping paperwork should be maintained as part of the project file.

FIGURE 1 Groundwater Sample Collection Record

AECC ENVIRONMENTAL CONSULTING

Well/Piezo ID:

Groundwater Sample Collection Record

Client: ______________________ Date: ____________
Project No: ______________________ Time: Start _______ am/pm
Site Location: ______________________ Finish _______ am/pm
Weather Conds: ____________ Collector(s) ______________________

WATER LEVEL DATA: (measured from Top of Casing) Well ☐ Piezometer ☐

a. Total Well Length ________ c. Casing Material ______ e. Length of Water Column ________ 0
b. Water Table Depth ________ d. Casing Diameter ______ f. Calculated Well Vol.see back) _______

WELL PURGING DATA
a. Purge Method ____

b. Acceptance Criteria defined (from workplan)
- Minimum Required Purge Volume (@ ______ well volumes) ________________________
- Maximum Allowable Turbidity ________ NTUs
- Stabilization of parameters ________ %

c. Field Testing Equipment Used: Make Model Serial Number

____

____

d. Field Testing Equipment Calibration Documentation Found in Field Notebook # ______ Page #______

Time	Volume Removed (gal)	T° (C/F)	pH	Spec. Cond (umhos)	Turbidity (NTUs)	DO	Color	Odor	Other

e. Acceptance criteria pass/fail

	Yes	No	N/A
Has required volume been removed	☐	☐	☐
Has required turbidity been reached	☐	☐	☐
Have parameters stabilized	☐	☐	☐

If no or N/A - Explain below.

____

____

SAMPLE COLLECTION: Method: ______________________________

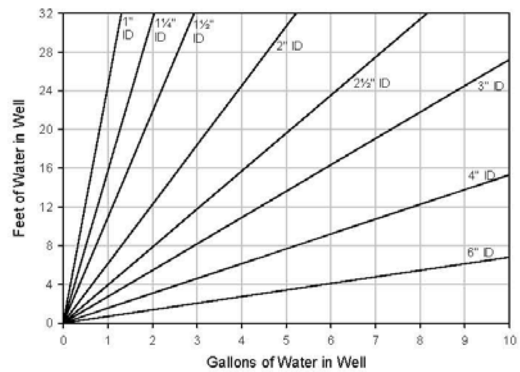
Sample ID	Container Type	No. of Containers	Preservation	Analysis	Time

Comments ____

Signature ____________________________ Date ____________________________

FIGURE 1 (Cont'd) Groundwater Sample Collection Record

Purge Volume Calculation



Volume / Linear Ft. of Pipe

ID (in)	Gallon	Liter
0.25	0.0025	0.0097
0.375	0.0057	0.0217
0.5	0.0102	0.0386
0.75	0.0229	0.0869
1	0.0408	0.1544
1.25	0.0637	0.2413
1.5	0.0918	0.3475
2	0.1632	0.6178
2.5	0.2550	0.9653
3	0.3672	1.3900
4	0.6528	2.4711
6	1.4688	5.5600

(continued from front)

Time	Depth to GW	Temp	pH	Spec. Cond.	Turbidity	Flow Rate	Volume Removed	Draw-down	Other
(24 hr)	(feet)	(°C/F)	(SU)	(µS/cm)	(NTU)	(liters/min)	(liters)	(feet)	(Color, odor, sheen, etc.)

FIGURE 2 Low Flow Groundwater Sample Collection Record

Well ID:

Low Flow Groundwater Sample Collection Record

Client:__________ Date:__________ Time: Start ______ am/pm
Project No:__________ Finish ______ am/pm
Site Location:__________
Weather Conds:__________ Collector(s):__________

1. WATER LEVEL DATA: (measured from Top of Casing)

a. Total Well Length______ c. Length of Water Column __0__ (a-b) Casing Diameter/Material

b. Water Table Depth ______ d. Calculated System Volume (see back) ______ __________

2. WELL PURGE DATA

a. Purge Method:__________

b. Acceptance Criteria defined (see workplan)

- Temperature	3%	-D.O.	10%
- pH	± 1.0 unit	- ORP	± 10mV
- Sp. Cond.	3%	- Drawdown	< 0.3'

c. Field Testing Equipment used: Make Model Serial Number

Time (24hr)	Volume Removed (Liters)	Temp. (°C/F)	pH (SU)	Spec. Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (ml/min)	Drawdown (feet)	Color/Odor

d. Acceptance criteria pass/fail	Yes	No	N/A
Has required volume been removed	☐	☐	☐
Has required turbidity been reached	☐	☐	☐
Have parameters stabilized	☐	☐	☐

(continued on back)

If no or N/A - Explain below.

____

3. SAMPLE COLLECTION: Method:__________

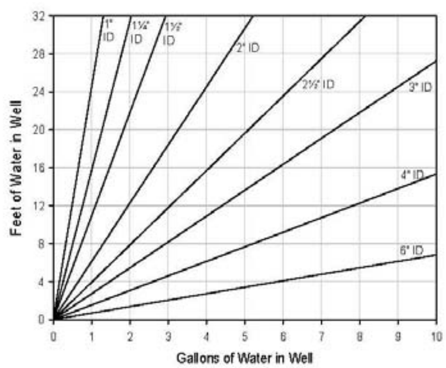
Sample ID	Container Type	No. of Containers	Preservation	Analysis Req.	Time

Comments __________

Signature__________ Date __________

FIGURE 2 (Cont'd) Low Flow Groundwater Sample Collection Record

Purge Volume Calculation



Volume / Linear Ft. of Pipe		
ID (in)	Gallon	Liter
0.25	0.0025	0.0097
0.375	0.0057	0.0217
0.5	0.0102	0.0386
0.75	0.0229	0.0869
1	0.0408	0.1544
1.25	0.0637	0.2413
1.5	0.0918	0.3475
2	0.1632	0.6178
2.5	0.2550	0.9653
3	0.3672	1.3900
4	0.6528	2.4711
6	1.4688	5.5600

(continued from front)

Time (24 hr)	Volume Removed (Liters)	Temp (°C/F)	pH	Spec. Cond. (µS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (ml/min)	Drawdown (ft)	Color/Odor

EPA 537 (PFAS) Field Sampling Guidelines

PLEASE READ INSTRUCTIONS ENTIRELY PRIOR TO SAMPLING EVENT

Sampling for PFAS via EPA 537 can be challenging due to the prevalence of these compounds in consumer products. The following guidelines are strongly recommended when conducting sampling.

Reference-NHDES https://www.des.nh.gov/organization/divisions/waste/hwrb/documents/pfc-stakeholder-notification-20161122.pdf

FIELD CLOTHING and PPE

- No clothing or boots containing Gore-Tex®
- All safety boots made from polyurethane and PVC
- No materials containing Tyvek®
- Do not use fabric softener on clothing to be worn in field
- Do not used cosmetics, moisturizers, hand cream, or other related products the morning of sampling
- Do not use unauthorized sunscreen or insect repellant (see reference above for acceptable products)

SAMPLE CONTAINERS

- All sample containers made of HDPE or polypropylene
- Caps are unlined and made of HDPE or polypropylene (no Teflon® -lined caps)

WET WEATHER (AS APPLICABLE)

Wet weather gear made of polyurethane and PVC only

EQUIPMENT DECONTAMINATION

- "PFAS-free" water on-site for decontamination of sample equipment. No other water sources to be used
- Only Alconox and Liquinox can be used as decontamination materials

FOOD CONSIDERATIONS

No food or drink on-site with exception of bottled water and/or hydration drinks (i.e., Gatorade and Powerade) that is available for consumption only in the staging area

OTHER RECOMMENDATIONS

Sample for PFAS first! Other containers for other methods may have PFAS present on their sampling containers

FIELD EQUIPMENT

- Must not contain Teflon® (aka PTFE) or LDPE materials
- All sampling materials must be made from stainless steel, HDPE, acetate, silicon, or polypropylene
- No waterproof field books can be used
- No plastic clipboards, binders, or spiral hard cover notebooks can be used
- No adhesives (i.e. Post-It® Notes) can be used
- Sharpies and permanent markers not allowed; regular ball point pens are acceptable
- Aluminum foil must not be used
- Keep PFC samples in separate cooler, away from sampling containers that may contain PFAS
- Coolers filled with regular ice only - Do not use chemical (blue) ice packs

EPA 537 (PFAS) Field Sampling Guidelines

PLEASE READ INSTRUCTIONS ENTIRELY PRIOR TO SAMPLING EVENT

Sampler must wash hands before wearing nitrile gloves in order to limit contamination during sampling. Each sample set requires a set of containers to comply with the method as indicated below. **Sample set is composed of samples collected from the same sample site and at the same time.*

Container Count	Container Type	Preservative
3 Sampling Containers - Empty	250 mL container	Pre preserved with 1.25 g Trizma
1 Reagent Water for Field Blank use	250 mL container	Pre preserved with 1.25 g Trizma
P1 Field Blank (FRB) - Empty	250 mL container	Unpreserved

Sampling container <u>must be filled to the neck.</u> For instructional purposes a black line has been drawn to illustrate the required fill level for each of the 3 Sample containers

Field blanks are recommended and the containers have been provided, please follow the instructions below.

Field Blank Instructions:

1. Locate the Reagent Water container from the bottle order. The Reagent Water container will be pre-filled with PFAS-free water and is preserved with Trizma.
2. Locate the empty container labeled "Field Blank".
3. Open both containers and proceed to transfer contents of the "Reagent Water" container into the "Field Blank" container.
4. If field blanks are to be analyzed, they need to be noted on COC, and will be billed accordingly as a sample.

Both the <u>empty</u> Reagent Water container and the <u>filled</u> Field Blank container must be returned to the lab along with the samples taken.

Sampling Instructions:

1. Each sampling event requires 3 containers to be filled to the neck of the provided containers for each sampling location.
2. Before sampling, remove faucet aerator, run water for 5 min, slow water to flow of pencil to avoid splashing and fill sample containers to neck of container (as previously illustrated) and invert 5 times.
3. Do not overfill or rinse the container.
4. Close containers securely. Place containers in sealed ZipLoc® bags, and in a separate cooler (no other container types).
5. Ensure Chain-of-Custody and all labels on containers contain required information. Place sample, Field Blank and empty Reagent Blank containers in ice filled cooler (do not use blue ice) and return to the laboratory. Samples should be kept at 4°C ±2. Samples must not exceed 10°C during first 48 hours after collection. Hold time is 14 days.

Please contact your Alpha Analytical project manager with additional questions or concerns.

Scope and Application

The purpose of this SOP is to provide guidance on the installation of overburden and bedrock monitoring wells and the subsequent development of monitoring wells after they are installed. Monitoring wells are installed to monitor the depth to groundwater, aquifer properties, and to obtain samples of groundwater for chemical analysis.

If monitoring wells are not properly installed, they may act as a route of contaminant migration between separate aquifers or may allow contamination at the ground surface to migrate to the subsurface. This condition represents a huge liability to the Company, and in many states, to the individual Professional Geologist responsible for installing the well. It is vitally important that monitoring wells be constructed and maintained so as to ensure that such migration of contamination does not occur.

Some states and EPA Regions have implemented strict requirements for monitoring well construction. These requirements must be reviewed in advance of the field program and specified in the project work plan.

Monitoring wells are generally constructed in a soil boring or core hole that has been advanced using conventional drilling equipment, using commercially-available well construction and filter/sealing materials. After installation, and prior to groundwater sample collection, the wells must be properly developed to enhance/maximize the interconnectivity between the well and the formation, and to remove fine grained material from the filterpack. Procedures for monitoring well development are outlined at the end of this SOP, and procedures for groundwater sample collection are provided in AECC SOP# 106 – Groundwater Sampling.

Responsibilities

Project Manager

The project manager is responsible to make sure that projects involving the installation of monitoring wells are properly planned and executed, and to assure that project-specific well construction specifications are effectively communicated to the Project Geologist/Scientist and to the Drilling Subcontractor that will be responsible for monitoring well construction.

Project Geologist/Scientist

The project geologist/scientist is responsible for directly overseeing the construction and installation of monitoring wells by the drilling subcontractor. He/she is also responsible for making sure that well installation procedures are consistent with this SOP and that the specifications defined in the project work plan are adhered to. The project geologist/scientist is responsible for recording all pertinent data on the appropriate forms and/or in the field notebook.

Subcontractors

The drilling subcontractor is responsible for providing the necessary equipment for well construction and installation consistent with the project requirements. In addition to the drilling equipment, this will typically include:

- Threaded flush-joint riser pipe of an approved material that typically consist of polyvinyl chloride (PVC) or stainless steel. Other specialty riser pipe materials may be required (e.g., Teflon). Note that glue or PVC cements for joining lengths of riser pipe are not permitted.
- Threaded flush-joint slotted screen of appropriate slot size and approved material (PVC, stainless steel). The use of glues or PVC cements is not permitted.
- Properly sized and washed filter pack material (quartz sand).
- Bentonite (granular, and chips or pellets)
- Steel surface casing (if required)
- Tremie pump and pipe

Commonly a surveying subcontractor is retained to survey aspects of a subsurface site characterization project. Depending on the project work plan, the surveyor may be responsible for providing a monitoring well's horizontal coordinates, ground surface elevation, gauging point (i.e., top of casing) elevation and/or the top of the protective casing elevation.

Equipment/Apparatus/Supplies

In addition to the equipment and materials provided by the drilling subcontractor, required materials may include the following:

- Project-specific documents (Scope of work, HASP, QAPP, Sampling Plan)
- Monitoring Well As-Build Diagrams (Figure 1)
- Weighted tape measure for verifying well and hole depths and well material dimensions. Stainless steel spoons, spatulas, soil mixing pans etc.
- Health and safety equipment/PPE (per the HASP)
- Field project notebook/pen

Procedures

Monitoring well installation begins with the completion of a soil boring or corehole to the required depth, and often begins while hollow-stem augers (or other temporary casing material) are still in the ground to prevent the open hole from collapsing. The soil boring/core hole should be at least 2-inches larger in diameter than the screen/riser so that filter pack, seals, and grouting materials can be installed effectively and without causing bridging. The well construction materials are carefully emplaced into the soil boring/corehole while the hollow stem augers/temporary casing is progressively withdrawn from the ground.

Before starting the well construction process, the field geologist/scientist should verify that the well construction materials are new/clean or whether decontamination of the materials is required. The geologist/scientist should also measure and record the dimensions of the various components that will collectively become the well. Upon completion, a person should be able to use these measurements to precisely locate the depth of any well feature (i.e., flush-joint, bottom of end cap, top screen slot, etc.) as measured from the top of the well casing.

Procedures

The following general procedure will be used during the installation of monitoring wells:

1. Advance the hollow stem augers/temporary casing to the required termination depth and remove center rods.
2. Check the total depth of the soil boring/corehole with a decontaminated, weighted tape.
3. Emplace lowermost portion of the filter-pack sand into the boring through the hollow-stem augers/temporary casing, withdrawing the augers/temporary casing as necessary, so that 6-inches of filter pack sand lies in the bottom of the boring.
4. Verify depth with weighted tape.
5. Thread the bottom cap onto screened section(s), and tighten so that joints are flush.
6. Insert screen into the boring, and add lengths of riser pipe, adding centralizers as necessary (especially in deeper installations), until the well string rests on the bottom of and is centered in the soil boring/corehole.
7. Cut the top riser off at the appropriate height for stick-up or flush mount type well installation and insert locking expansion plug. Be sure to measure the length of riser removed and subtract from the total riser length measured previously.
8. Continue adding filter pack sand into the annular space between the well casing and the augers/temporary casing, progressively withdrawing the augers/temporary casing as necessary, until the filter pack sand is 2 to 3 feet above the uppermost screen slot.
9. Verify depth to top of filter pack with weighted tape.
10. Tremie, or for shallow wells (<35 feet in depth) gravity feed a 2-foot thick (minimum) layer of bentonite chips, pellets or slurry above the filter pack, being sure that the bentonite does not bridge or accumulate within the hollow stem auger/temporary casing.
11. Verify depth to the top of the filter pack seal with weighted tape.
12. Prepare bentonite-cement grout approximating the ratio:

    2 # bentonite powder: 94 # Portland cement: 7 gal. potable water

13. Tremie the grout into the annulus using a tremie pipe and pump (gravity feed bentonite pellets if emplacing them at a shallow depth range). Grout the well to within 2 to 3 feet of the surface but not higher than the average frost line.

14. Install protective cover (stick-up or flush-mount) and prepare concrete pad and finish so that it slopes away from the wellhead in all directions. Pads will have a minimum thickness of 4 inches. Drill vent hole in casing or expansion plug/well cap (stick up installations only) and lock the protective cover (or the expansion plug for flush mount installations).
15. If the well design specifies guard posts/bollards, dig the holes and set the guard posts in concrete separate from the concrete well pad. Bollards must extend to a depth of 2 feet.
16. Record the appropriate construction/completion information in the field logbook and on the monitoring well as-built detail (Figure 1).
17. If a form was used for the concrete pad, return to the well site after the concrete has cured for at least 24 hours and remove the form. Backfill around the pad with native soil and restore surface as appropriate.
18. The well identification should be marked on the protective casing and PVC cap. Paint the well cover and posts, if required.

Monitoring Well Development:

Monitoring wells are developed to enhance the interconnection between the well and the aquifer. Drilling methods inherently cause disturbance of the saturated portion of a monitoring well, and if mud rotary techniques are used when drilling in bedrock, the drilling mud may cake up on and seal off, or partially obstruct the water-bearing zone in a well. Development is the process of removing the caked material from the bore/corehole wall, and/or removing fine-grained materials from the filter pack. Development using vigorous methods should occur a minimum of 48 hours after the well is completed to allow the filter pack seal grout to sufficiently cure. Development may occur before the 48 hour minimum if the development occurs before the emplacement of the filter-pack and grout, or if development is to be completed by hand bailing or other relatively low stress method that will not draw the seal/grout materials into the filter-pack or well.

Equipment needed:

- Pump, pump tubing, or bailer and bailer cord, surge block (or other method-specific equipment as appropriate)
- Water-level indicator.
- Temperature, conductivity and pH meters.
- Personnel protective equipment as specified in the site-specific HASP.
- Decontamination supplies.

- Disposal drums, if required.

The most common well development methods utilized by AECC are: surging with a surge block, over-pumping, and bailing. Surging involves raising and lowering a surge block or surge plunger inside the well. The resulting surging motion forces water into the formation and loosens sediment, pulled from the formation into the well. Occasionally, sediments must be removed from the well with a bailer or pump.

Over-pumping involves pumping at a rate high enough to draw the water level in the well down as low as possible, and then allowing the well to recharge to near the original level. This process is repeated until sediment-free water is produced.

Bailing includes the use of a simple manually operated check-valve bailer to remove water from the well. The bailing method, like other methods, should be repeated until sediment free water is produced. Bailing may be the method of choice in a shallow well or in slowly-recharging wells.

These are standard (i.e., typically applicable) operating procedures which may be varied or changed and/or combined as required, dependent on site conditions, equipment limitations or limitations imposed by the procedure. Other less-common methods may also be applicable, depending on project/site specific situations. In all instances, the procedures employed are to be documented in the field notebook and development data log.

The following steps will be followed when developing monitoring wells:

1. Obtain information on each well to be developed and list on the Development Data Logs (i.e., drilling method, well diameter, well depth, screened interval, anticipated contaminants).
2. Obtain a water level meter, air monitoring instruments, materials for decontamination, and water quality instrumentation (if stipulated in the QAPP/Work Plan or other project specific documents).
3. Assemble drums or containers for temporary storage of water produced during well development.
4. Assemble necessary equipment on a plastic sheet surrounding the wellhead.
5. Record pertinent information in the field logbook and or development data log (personnel, time, location ID, etc.) and don appropriate PPE as specified in the site specific HASP or Job Safety Analysis (JSA).
6. Open the monitoring well, take air monitor reading with a PID at the top of casing and in the breathing zone as appropriate.
7. Measure depth to water and the total depth of the monitor well. Calculate the water column volume of the well (refer to the groundwater sampling logs in AECC SOP# 106 - Groundwater Sampling) to approximate well volume based on well diameter.

8. Begin development and measure the initial pH, temperature, turbidity, and specific conductivity of the water and record in the site logbook. Note the initial color, clarity, and any other observable conditions.
9. Continue to develop the well and periodically measure the water quality parameters indicated in step 8 (above). Depending on project objectives and available time, development should proceed until these water quality parameters stabilize, or until the water has a turbidity of less than 50 nephelometric turbidity units (NTUs).
10. Record the final water quality parameters in the field notebook and purge data sheets.
11. Remove the pump assembly or bailers from the well, decontaminate, and cleanup the site.
12. Lock the well cover before leaving. Dispose of produced water as required by the project work plan

<u>Terms/Definitions:</u>

Annulus: The space between the borehole wall and the outside of the well screen or riser pipe.

Bentonite Seal: A granular, chip, or pellet bentonite material that is often used to provide an annular seal above the well screen filter pack. This seal is typically installed dry followed by in-place hydration with or without the addition of water. Hydrated bentonite is sometimes used as a grout seal.

Bottom Cap/Plug: Threaded or slip-on cap placed at the bottom of the well prior to installation. Often serves as a sump for accumulation of silt which settles within the well. The measured length from the lowermost well screen slot to the bottom of the bottom cap is known as the sump or tail pipe portion of the well.

Centralizers: Stainless steel expansion clamps which, when fitted to well screens or riser pipe, expand to contact the borehole walls positioning the well centrally (and plumb) within the open borehole so as to allow for even placement and distribution of filter pack, seals and grout.

Expansion Plug/Well Cap: Cap used to cover the opening at the top of the well riser pipe. Expansion plugs are equipped with a rubber gasket and threaded wing nut which, when turned, provides a watertight seal. Expansion caps may also be locked, and generally are recommended for use with flush-constructed wells where road box protective casings are also used. Other well caps may include slip-on or threaded caps made of the same material as the well casing.

Filter Pack: A well-graded, clean sand or gravel placed around the well screen to act as a filter in preventing the entry of very fine soil particles into the well.

Grout Seal: A cement/bentonite mixture used to seal a borehole that has been drilled to a depth greater than the final well installation depth or to seal the remaining borehole annulus once the filter pack seal has been installed above the filter pack. Occasionally, pure bentonite is used as a grout seal.

Measuring Point: A selected point at the top of the well casing (riser pipe) used for obtaining periodic water-level measurements. The measuring point should consist of either a notch or indelibly marked point on the upper surface of the casing. Typically, the highest point on the casing (if not level) is used as the measuring point. The measuring point is also the point that is surveyed when well elevation data is obtained.

Protective Casing: A locking metal casing, placed around that portion of the well riser pipe that extends above the ground surface. The protective casing is generally cemented in place when the concrete pad is constructed around the well.

Riser Pipe: The non-perforated portion of well casing material used above the well screen, that extends to the ground surface. Riser pipe is typically available pre-cleaned and pre-threaded for immediate use.

Road Box/Flush Mount Protective Cover: A protective casing that is flush-mounted with the ground surface, and are used in areas where the monitoring well cannot extend above the ground surface for traffic or security reasons.

Tremie Pipe: A small diameter pipe which fits in the open borehole annulus and is used to inject filter sands or hydrated seal materials or grouts under pressure.

Well Screen: That portion of the well casing material that is perforated in some manner so as to provide a hydraulic connection to the aquifer. Typically a well screen is purchased pre-slotted, pre-cleaned, and pre-threaded for immediate use.

Vent Hole: Small diameter hole drilled in the upper portion of the well riser pipe (or in the expansion plug/well cap which provides atmospheric venting of the well. The vent holes allow for constant equilibration of the water level with changing atmospheric conditions. In flood-prone areas, or with flush-mount wells, vent holes should not be used.

Quality Assurance/Quality Control

Quality control requirements are project-specific and can vary greatly from project to project. QA/QC protocols regarding the decontamination of well construction materials or the collection and analysis of equipment blanks and/or well material blanks, if required, will be specified in the QAPP. In the absence of a QAPP, QA/QC will be attained through adherence to SOPs and requirements stipulated in other project-specific specifications (i.e., work plan, sampling plan, etc.).

Documentation

All well construction data will be recorded on the Monitoring Well As-Built Detail form (Figure 1). Well locations are to be identified on field maps, and additional information collected during installations will be recorded in the field notebook.

Well development will be documented on the Monitoring Well Development Record (Figure 2).

Deviations from this SOP, and the rationale for those deviations should be documented in the field project notebook.

Figure 1 – Monitoring Well Construction Detail

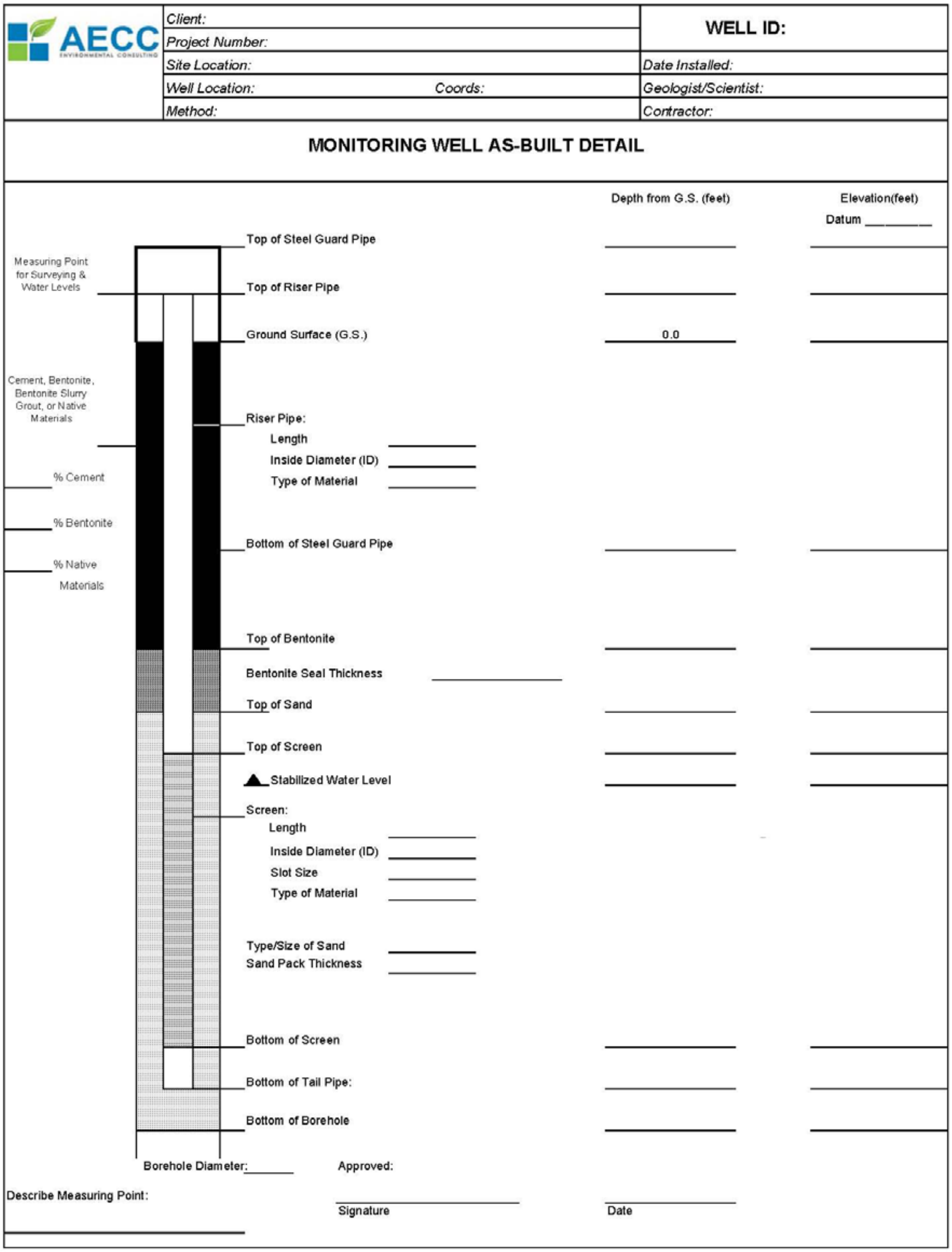


Figure 2
Monitoring Well Development Record

Well/Piez. ID:

Monitoring Well Development Record

Client: ____________ Site Location: ____________

Project #: ____________ Date: ____________ Developer: ____________

WELL DATA

Well ☐ Piezometer ☐ Diameter ________ Material ________

Measuring Point Description ____________ Geology at Screen Interval (if known) ____________

Depth to Top of Screen (ft.) ____________

Depth to Bottom of Screen (ft.) ____________ Time of Water Level Measurement ________

Total Well Depth (ft.) ____________ Calculate Purge Volume (gal.) ________

Depth to Static Water Level (ft.) ____________ Disposal Method ____________

Wellhead PID/FID ____________

Original Well Development ☐ Redevelopment ☐ Date of Original Development ________

DEVELOPMENT METHOD ____________ **PURGE METHOD** ____________

Field Testing Equipment Used: Make Model Serial Number

____

____

Field Testing Calibration Documentation Found in Field Notebook # ____________ Page # ____________

Time	Volume Removed (gal)	T° (C/F)	pH	Spec. Cond (umhos)	Turbidity (NTUs)	DO	Color	Odor	Other

ACCEPTANCE CRITERIA (from workplan)

Min. Purge Volume (____ well volumes) _____gallons

Maximum Turbidity Allowed _____ NTUs

Stabilization of parameters _____%

	Yes	No	N/A
Has required volume been removed	☐	☐	☐
Has required turbidity been reached	☐	☐	☐
Have parameters stabilized	☐	☐	☐

If no or N/A explain below:

____

____

____

Signature ____________ Date: ____________

8/13/2012 Well-Piez. developing

Figure 2 Monitoring Well Development Record (Cont'd)

Continued from front

Well ID: ________

Time	Volume Removed (gal)	T° (C/F)	pH	Spec. Cond (umhos)	rbidity (NTU	DO	Color	Odor	Other

Scope and Application

The purpose of this procedure is to establish a uniform set of procedures for labeling environmental sample containers and properly completing a Chain of Custody (COC) form. Adherence to this SOP will ensure that sample containers are properly labeled, the sample collection and descriptive information is documented and that the required analytical parameters are specified on the COC form.

Sample labels provide the information necessary during handling to complete the COC forms and they reduce the possibility of confusing sample containers. The COC form is intended as a legal record of possession of a sample.

This SOP is to be used **ONLY** for the labeling and COC documentation of environmental samples. The labeling of hazardous material sample containers and the completion of COC forms shall adhere to USDOT regulations.

Equipment/Apparatus/Supplies

Required materials include the following:

Adhesive Sample Labels (laboratory-provided)
COC form(s)
Clear packing tape

Procedures

Sample bottle labeling

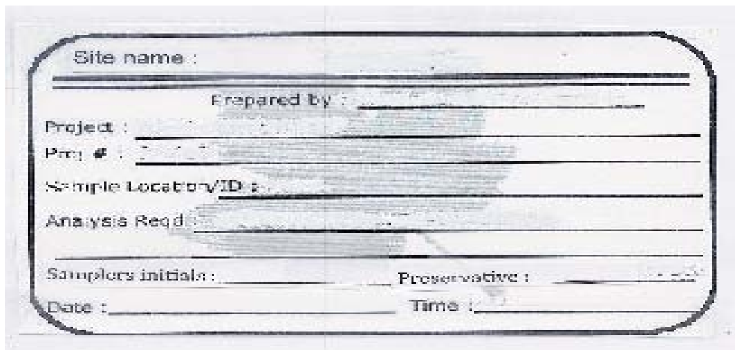
Sample containers shall be pre-labeled with blank adhesive label before samples are collected. The container shall be labeled using the adhesive labels provided by the analytical laboratory

Once a sample has been placed into a container and the container is properly sealed, the sampler shall record the following information on the label:

- Site name
- Label prepared by (lab name)
- Project name
- Project number
- Sample Location / ID
- Analysis required
- Samplers' initials
- Preservative (if present)
- Date and time that the sample was acquired

The label shall then be covered with clear packing tape which is wrapped completely around the bottle.

An example of a sample container label is shown below.



Chain of Custody Completion

The COC form is typically provided by the analytical laboratory and must be partially completed by the sampler prior to releasing custody of the sample. The essential information that must be provided on the COC form by the sampler is as follows:

- Project Name/Site Name
- Details of who the lab report should be routed to
- Details of who should be invoiced for the analytical services
- Project number
- Turnaround time requested
- Date and time that each sample was collected
- Type of sample collection method (composite or grab)
- Matrix sampled (liquid, soil, sludge)
- Number of containers filled per sample number
- Requested analyses
- Remarks

Most importantly, each COC form has a section where the sampler signs, dates and records the time that he/she releases the samples to a shipping agent or the sample receiver at the laboratory. Once the samples are released a copy of the COC form shall be retained by the sampler and routed to the project file. If the cooler is to be shipped via an overnight carrier (i.e. FedEx®, UPS or similar) the signed chain of custody shall be placed in a sealable plastic bag and taped to the underside of the cooler lid. The COC form should be initiated at the lab at sample container receipt and it remains with the sample at all times.

Quality Assurance/Quality Control

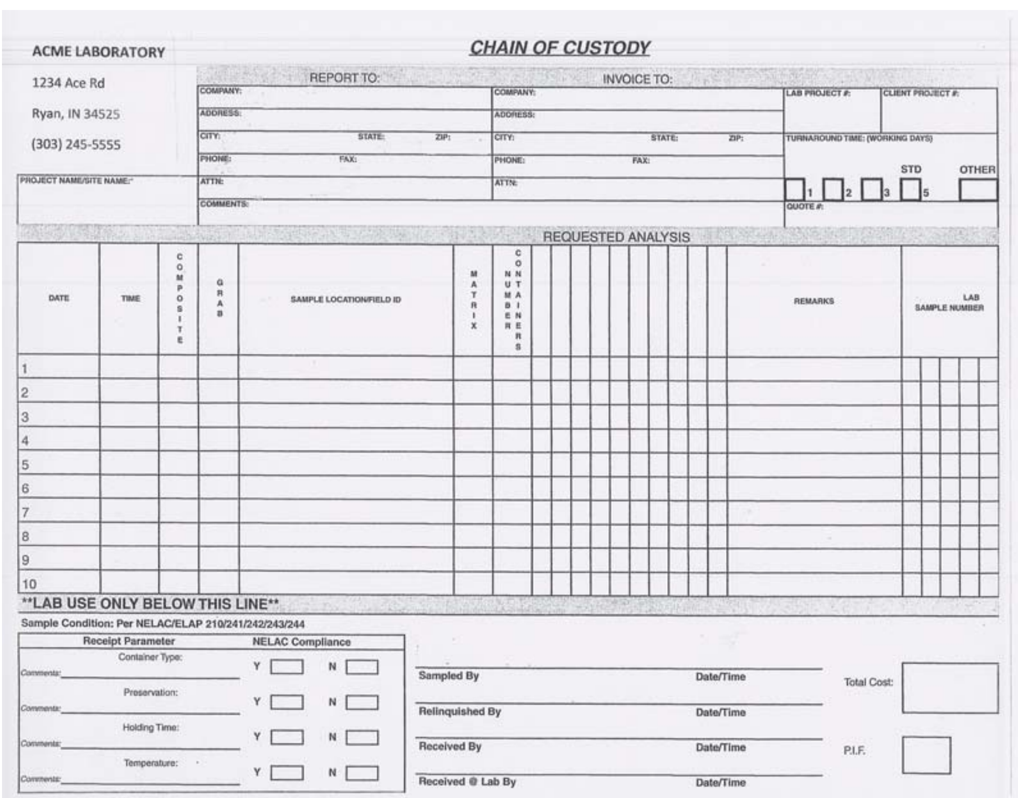
Prior to affixing a container label to a sample container, and then completing the label, the sampler shall review the project sampling plan/scope of work to ensure that the required label information has been recorded on the label.

Prior to sealing the COC for shipment the sampler shall review the project sampling plan/scope of work to ensure that the form has been fully and accurately completed (e.g., all sample Location / ID information, the appropriate laboratory analyses, and the required turn-around-time for analytical results are requested).

Documentation

If samples are being shipped via courier or via direct delivery then a copy of the signed chain of custody shall be retained. If shipping via other carrier, the copy of the airbill shall be retained for the project records.

An example of a chain of custody form is presented below.



ACME LABORATORY
1234 Ace Rd
Ryan, IN 34525
(303) 245-5555

CHAIN OF CUSTODY

REPORT TO: COMPANY: ADDRESS: CITY: STATE: ZIP: PHONE: FAX: ATTN: COMMENTS:

INVOICE TO: COMPANY: ADDRESS: CITY: STATE: ZIP: PHONE: FAX: ATTN:

LAB PROJECT #: CLIENT PROJECT #:

TURNAROUND TIME: (WORKING DAYS) 1 2 3 STD 5 OTHER

QUOTE #:

PROJECT NAME/SITE NAME:

REQUESTED ANALYSIS

	DATE	TIME	COMPOSITE	GRAB	SAMPLE LOCATION/FIELD ID	MATRIX	NUMBER OF CONTAINERS	REMARKS	LAB SAMPLE NUMBER
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									

LAB USE ONLY BELOW THIS LINE

Sample Condition: Per NELAC/ELAP 210/241/242/243/244

Receipt Parameter	NELAC Compliance	
Container Type: Comments:	Y	N
Preservation: Comments:	Y	N
Holding Time: Comments:	Y	N
Temperature: Comments:	Y	N

Sampled By — Date/Time
Relinquished By — Date/Time
Received By — Date/Time
Received @ Lab By — Date/Time

Total Cost:
P.I.F.

Scope and Application

The purpose of this procedure is to establish a uniform general set of procedures for the calibration of field monitoring equipment. Calibration is performed as a quality assurance measure and a safety precaution. The use of equipment that has not been properly calibrated can lead to erroneous data. In addition, proper calibration of monitoring equipment helps to protect field personnel and others from potential exposure to hazardous materials.

This SOP focuses on calibration of equipment used for monitoring field activities and sampling environmental parameters.

It is noted that other state or federal agency standard operating procedures may exist that require deviation from this SOP. These required deviations must be identified before the sampling program begins (ideally during the work plan/sampling plan development), and must be explained in the project-specific work plan/sampling plan.

Equipment/Apparatus/Supplies

Examples of commonly used equipment items that require calibration include:

- Organic vapor monitors – a Photoionization detector (PID) for sampling volatile organic compounds (VOCs) in air for example.
- Combustible gas monitors – an explosimeter for detecting concentrations of explosive gases in air for example.
- Water quality meters for measuring parameters such as temperature, pH, and turbidity

Required materials may include:

- Distilled and/or deionized water
- Paper towels
- Cylinder containing standard reference gas (span gas)
- Cylinder containing clean dry air
- Calibration standards/reagents
- Tedlar® bags
- Project notebook/pen

Procedures

Given that there exist a wide variety of monitoring equipment items, and that such items are supplied by many different manufacturers, AECC does not have a standard equipment calibration procedure. However, at a minimum, each item of field monitoring equipment shall be calibrated on a daily basis. Note that specific calibration instructions are not addressed in this SOP, and personnel shall consult the equipment manufacturer supplied documents (e.g., User's

Guidebook) for detailed instructions. Equipment must be calibrated as per the manufacturer's requirements. In the case where equipment is procured on a rental basis the calibration records specific to each piece of equipment shall be provided by the vendor and remain with the equipment item. Manufacturer's specification for calibration frequency may be superseded if required by a project-specific QAPP, sampling program or other documents, depending on the quality assurance objectives for the project.

Chemical reagents used for calibration purposes sometimes can be hazardous. When the use of these (or other similar) reagents solvents is required by a project-specific QAPP or Sampling Plan, the plans must also describe additional protocols and procedures regarding their safe use and handling. If associated investigation-derived waste is generated through the use of chemical reagents the plans should detail how it is to be handled, characterized, and disposed of in accordance with federal, state and local requirements.

Quality Assurance/Quality Control

General guidelines for quality control check of field equipment calibration usually require the equipment to be calibrated on a daily basis. As stated above, AECC's procedure is that each item of field monitoring equipment shall be calibrated on a daily basis. Additional calibration shall be performed whenever an exceptionally high reading ("spike") is detected. For projects with a QAPP, the document will specify the frequency of equipment calibration. For projects without a QAPP, the need for and/or frequency of equipment calibration will be specified in the scope of work, or the project work plan.

Documentation

Specific information regarding equipment calibration procedures should be documented in the project-specific field notebook. Documentation in the notebook should thoroughly describe the calibration steps implemented in order to show compliance with the project work plan. Calibration events should be logged when they occur with the following information documented:

- Date, time and location of each calibration event
- What equipment was calibrated
- Method used for calibration
- Notable circumstances.

APPENDIX B

Quality Assurance Project Plan (QAPP)

QUALITY ASSURANCE PROJECT PLAN

Remedial Investigation

NYSDEC BCP #C704060

EJ Victory Building

Village of Johnson City, Broome County, New York

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ATTACHMENTS

1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) is an appendix to the Remedial Investigation Work Plan (RIWP), which is required as an element of the remedial program at the EJ Victory Building site (hereinafter referred to as the "Site") under the New York State (NYS) Brownfield Cleanup Program (BCP), administered by New York State Department of Environmental Conservation (NYSDEC). The Site is being remediated in accordance with Brownfield Cleanup Agreement (BCA) Index # C704060-09-20, which was executed on September 17, 2020.

1.1 Scope of the QAPP

This QAPP was prepared to provide quality assurance (QA) guidelines to be implemented during the Remedial Investigation (RI). The QAPP will assure the accuracy and precision of data collection during the RI. The QAPP identifies procedures for sample collection to mitigate the potential for cross-contamination, as well as analytical requirements necessary to allow for independent data validation. The QAPP has been prepared in accordance with USEPA's Requirements for Quality Assurance Project Plans for Environmental Data Operations; the EPA Region II CERCLA Quality Assurance Manual, and NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation (May 2010). This document may be modified for subsequent phases of investigative and remedial work, as necessary. The QAPP provides:

- A means to communicate to the persons executing the various activities exactly what is to be done, by whom, and when
- A culmination to the planning process that ensures that the program includes provisions for obtaining quality data (e.g., suitable methods of field operations)
- A document that can be used by the Project Managers and QA Officer to assess if the activities planned are being implemented and their importance for accomplishing the goal of quality data
- A plan to document and track project data and results
- Detailed descriptions of the data documentation materials and procedures, project files, and tabular and graphical reports

The QAPP is primarily concerned with the quality assurance and quality control aspects of the procedures involved in the collection, preservation, packaging, and transportation of samples; field testing; record keeping; data management; chain-of-custody procedures; laboratory analyses; and other necessary matters to assure that the investigation activities, once completed, will yield data whose integrity can be defended.

QA refers to the conduct of all planned and systematic actions necessary to perform satisfactorily all task-specific activities and to provide information and data confidence as a result of such activities. The QA for task-specific activities includes the development of procedures, auditing, monitoring and surveillance of the performance.

QC refers to the activity performed to determine if the work activities conform to the requirements. This includes activities such as inspections of the work activities in the field (verification that the items and materials installed conform to applicable codes and design specifications). QA is an overview monitoring of the performance of QC activities through audits rather than first time inspections.

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2.0 PROJECT ORGANIZATION AND RESPONSIBILITY

The following section provides a generic organization for sampling activities, including roles, responsibilities, and required qualifications of these organizations.

2.1 Project Team

2.1.1 NYSDEC and NYSDOH

It is the responsibility of the NYSDEC, in conjunction with the New York State Department of Health (NYSDOH), to review the project documents for completeness and conformance with the site-specific cleanup objectives and to make a decision to accept or reject these documents based on this review. The NYSDEC also has the responsibility and authority to review and approve QA documentation collected during investigative and remedial activities and to confirm that the QA Plan was followed.

2.1.2 Property Owner

For this BCP project, the property owner (Owner) is also the BCP Volunteer. The Owner will be responsible for complying with the QA requirements as specified herein and for monitoring and controlling the quality of the Brownfield cleanup activities either directly or through their designated environmental consultant and/or legal counsel. The Owner will also have the authority to select Contractor(s) to assist them in fulfilling these responsibilities. The Owner is responsible for implementing the project, and has the authority to commit the resources necessary to meet project objectives and requirements.

2.1.3 Environmental Consultant

On behalf of the Owner, AECC will be responsible for the coordination and performance of the RI activities, interpretation of the analytical data, and evaluation of the need for and performance of Interim Remedial Measures (IRMs).

<u>Project Manager</u>

The Project Manager has the responsibility for ensuring that the project meets the overall project objectives, reports directly to the Owner, coordinates with the NYSDEC/NYSDOH Project Coordinators, and is responsible for technical and project oversight. The PM will:

- Define project objectives and develop a detailed work plan schedule
- Establish project policy and procedures to address the specific needs of the project as a whole, as well as the objectives of each task
- Acquire and apply technical and corporate resources as needed to assure performance within budget and schedule constraints
- Develop and meet ongoing project and/or task staffing requirements, including mechanisms to review and evaluate each task product
- Review the work performed on each task to assure its quality, responsiveness, and timeliness
- Review and analyze overall task performance with respect to planned requirements and authorizations
- Review and approve all deliverables before their submission to NYSDEC
- Develop and meet ongoing project and/or task staffing requirements, including

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mechanisms to review and evaluate each task product
- Ultimately be responsible for the preparation and quality of interim and final reports
- Represent the project team at meetings

Field Team Leader

The Field Team Leader has responsibility for implementation of specific project tasks identified at the Site, including supervision of project field personnel, subconsultants, and subcontractors. The Field Team Leader reports directly to the Project Manager and will:

- Define daily develop work activities
- Orient field staff concerning the project's special considerations
- Monitor and direct subcontractor personnel
- Review the work performed on each task to ensure its quality, responsiveness, and timeliness
- Assure that field activities, including sample collection and handling, are carried out in accordance with this QAPP

Quality Assurance Officer

The QA Officer will have direct access to corporate executive staff as necessary, to resolve any QA dispute, and is responsible for auditing the implementation of the QA program in conformance with the demands of specific investigations and policies, and NYSDEC requirements. Specific function and duties include:

- Performing QA audits on various phases of the field operations
- Reviewing and approving QA plans and procedures
- Providing QA technical assistance to project staff
- Reporting on the adequacy, status, and effectiveness of the QA program on a regular basis to the Project Manager for technical operations
- Responsible for assuring third party data review of all sample results from the analytical laboratory

2.1.4 Subcontractors

During the remedial investigation, subcontractors and subconsultants will be utilized to perform various project tasks, likely including:

- Environmental Drilling Contractor - to install soil borings and groundwater monitoring wells and other sampling points to monitor environmental media (as needed)
- Environmental Laboratory - to analyze soil and groundwater samples
- Data Validator - to prepare Data Usability Summary Reports
- Licensed Land Surveyor - to determine location and/or elevation data associated with excavations, monitoring wells, sample locations, etc.

2.1.5 Key Personnel

Key personnel anticipated for this project are as follows:

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Team Member	Organization	Telephone	Role/Title
Matthew Paulus	EJ Victory Building, LLC	315.481.1552	Owner Contact
Harry Warner	NYSDEC	315.426.7400	Regional HW Engineer
Anthony J. Bollasina	NYSDEC	518.402.2754	DEC Project Coordinator
Shaun Surani	NYSDOH	518.402.7860	DOH Project Coordinator
Richard McKenna	AECC	315.432.9400	Project Manager
H. Nevin Bradford	AECC	315.432.9400	Project Engineer
Drew Brantner	AECC	315.432.9400	Field Team Leader
Bryan Airel	AECC	315.432.9400	Health & Safety Officer
Drew Brantner	AECC	315.432.9400	QAPP Officer

2.2 Laboratory Responsibilities

Environmental laboratories utilized for sample analysis for this project must be an independent, NYSDOH Environmental Laboratory Approval Program (ELAP)-certified facility approved to perform the analyses prescribed herein.

Laboratory Director

The Laboratory Director is a technical advisor and is responsible for summarizing and reporting overall unit performance. Responsibilities of the Laboratory Director include:

- Provide technical, operational, and administrative leadership
- Allocation and management of personnel and equipment resources
- Quality performance of the facility
- Certification and accreditation activities
- Blind and reference sample analysis

Quality Assurance Manager (QA Manager)

The QA Manager has the overall responsibility for data after it leaves the laboratory. The QA Manager will be independent of the laboratory but will communicate data issues through the Laboratory Director. In addition, the QA Manager will:

- Oversee laboratory QA
- Oversee QA/QC documentation
- Conduct detailed data review
- Determine whether to implement laboratory corrective actions, if required
- Define appropriate laboratory QA procedures
- Prepare laboratory SOPs

3.0 QA/QC OBJECTIVES

The overall objectives and criteria for assuring quality for this effort are discussed below. This QAPP addresses how the acquisition and handling of samples and the review and reporting of data will be documented. The objectives of this QAPP are to address the following:

- The procedures to be used to collect, preserve, package, and transport soil, groundwater and air samples

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- Field data collection
- Record keeping
- Data management
- Chain-of-custody procedures
- Precision, accuracy, completeness, representativeness, for sample analysis and data management under EPA analytical methods

3.1 Data Quality Objectives

Data Quality Objectives (DQOs) are statements that describe the desired quality of data necessary to meet the objectives of the sampling program. The DQOs for the project were prepared in anticipation of the various media that would require sampling for laboratory analysis. DQO Forms have been completed for each type of sampling media and are located in Attachment A.

The DQO forms include information on the type of media sampled, the intended use of the data being collected, the type of analyses that will be requested, the level of analytical methodology and documentation required, sampling procedures, and the type of QAPP field samples that will be collected in support of the project. The sections of the DQO forms are described below.

<u>Sampled Media</u>: This section describes the material that is being sampled (groundwater, soil, surface water, waste material, etc.).

<u>Data Use</u>: This section is used to indicate the intended purpose of the sampling and analytical data. (i.e., for site characterization, evaluation or remedial alternatives, risk assessment, monitoring of existing sampling points, or waste characterization, etc.).

<u>Data Type</u>: This section identifies the compounds/analytes that samples collected during the program will be analyzed for. Also indicates whether field parameters such as pH, specific conductivity, temperature and turbidity will be monitored during sample collection.

<u>Level of Analysis</u>: This section identifies the level of analytical support required of the samples collected for a specific purpose as described below:

- Level I - Field Screening: This level is characterized by the use of portable type instruments that provide real-time data.

- Level II - Field Analysis: This level is characterized by the use of portable analytical instruments in an on-site lab or transported to the site. This section identifies the field analysis to be used.

- Level III - Standard Analytical Protocols: This level may include standard analytical protocols in accordance with NYSDOH Environmental Laboratory Approval Program (ELAP) certification requirements, without the NYSDEC Analytical Services Protocol (ASP) Category B QAPP and deliverables / reportables documentation.

- Level IV - NYSDEC ASP Reportables / Deliverables: This level is characterized by rigorous QAPP NYSDEC ASP protocols and Category B reportable / deliverable documentation that is suitable for data validation.

<u>Sampling Procedures</u>: This section provides information on sampling procedures to be used in

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sample collection, or provides directions to where to find this information in the project plans.

Data Quality Factors: This section describes factors that influence the quality or quantity of data to be collected. Primary contaminants and associated levels of concern are identified concerning ARARs or potential risks. The required detection limits are also given or referenced.

QAPP Samples: This section indicates additional samples to be collected to support QA/QC procedures. Additional samples to be collected include:

- Split Samples –Split samples (or duplicates) are two samples taken from the same source; digested, distilled or otherwise processed; and then analyzed. Duplicate sample analysis is used to determine reproducibility or consistency in the analysis. For this RI, spilt samples will noted in AECC's log book, but will not be identified on the sample label (known as a blind duplicate), preventing the laboratory from knowing which samples are duplicates. Duplicate / split samples shall be collected at a rate of 1 per 20 samples (5%).

- Matrix Spike / Matrix Spike Duplicates – Matrix spike duplicate samples are collected as a duplicate sample, to which the analytical laboratory will add known amounts of analyte. These QA/QC samples are intended to assess the extraction procedure used by the laboratory. These samples shall be collected at a rate of 1 per 20 samples (5%) or sample delivery group whichever is smaller and for each sample matrix.

- Trip Blanks – Trip blanks are samples that are prepared prior to the sampling event in the same type of sample container and are kept with the collected samples throughout the sampling event. Trip blank vials are not opened in the field and are analyzed for volatile organics only, and trip blanks are only collected when the sampling program includes samples that are being analyzed for VOCs. Trip Blanks shall accompany any shipment of aqueous samples for VOCs.

- Equipment Blanks – Equipment blanks are samples that are obtained by running analyte-free water through or over the sample collection equipment in a way that is identical to the sample collection procedures. Field blanks may be used during QA/QC procedures to evaluate if sampling equipment has contributed contaminants to the samples. These samples shall be collected daily whenever re-usable sampling equipment is used.

3.2 Sampling Procedures

Objectives and procedures for soil, groundwater, and soil vapor sampling have been designed to allow for the acquisition of accurate and precise data, and are detailed in the Field Sampling Plan and Standard Operating Procedures attached to this RIWP.

3.3 Laboratory Coordination

Laboratory coordination will be conducted under the direction of the Project Manager and QA Officer.

All chemical analyses for matrices will be completed by a laboratory capable of performing project-specific analyses as indicated in this QAPP and approved by the NYSDOH/NYSDEC as having the appropriate standard operating procedures, QA/QC programs, resumes, and organizational structure to complete analytical work as specified in this Work Plan. The laboratory will have current certification for standard methodologies and QA/QC, and will be required to remain certified as such throughout the project.

The laboratory utilized for laboratory analysis required under this project will be certified under the NYSDOH Environmental Laboratory Approval Program (ELAP) and will be required to maintain this certification for the duration of the program.

The laboratory will be capable of producing ASP Category B deliverables, as needed for subsequent data validation / data usability evaluation purposes.

3.4 Analytical Methodologies

All analyses will be performed by SW-846 methodologies with QAPP guidelines of 2005 ASP Category B. The following criteria will describe the appropriate methodologies for extraction, digestion, and analysis of the previously listed matrices. The specific analytes to be identified by each method, along with the Contract Required Quantitation Limits, are listed in Appendix C of the NYSDEC ASP (http://www.dec.ny.gov/data/der/asp2005cd/asp2005cd.zip).

Parameter Group	Analytical Method
TCL VOCs	USEPA Method 8260B + TICS
TCL SVOCs	USEPA Method 8270C +TICS
TAL Metals	USEPA Method 6010, 7470/7471 (Hg), 9014 (CN)
PCB Aroclors	USEPA Method 8082
Herbicides	USEPA Method 8151
Organochlorine Pesticides	USEPA Method 8081
1,4-Dioxane*	USEPA Methods 8270SIM (soil) and 522 (groundwater)
PFAS**	NYSDOH Method 537 (Modified) – Groundwater Only

*The detection limit for 1,4-Dioxane in aqueous samples is to be no greater than 0.35 ug/L
**Polyfluoroalkyl substances, 2ng/L reporting limit for PFOA and PFOS

Soil / Groundwater Analysis – Soil and groundwater samples will be analyzed for certain parameters listed above, based on location (see Section 3.0 - Sampling and Analysis Plan of the RIWP). In addition, groundwater samples will also be field-analyzed for a limited group of field parameter analyses to include pH, specific conductance, dissolved oxygen (DO), redox potential (ORP), temperature, and turbidity.

Soil Vapor Sampling – Soil vapor sampling will not be performed as part of the RI since sampling was performed previously in 2019 and Remedial Actions will include a soil vapor mitigation system for the Site building.

Waste Characterization Samples – Samples collected for waste characterization/disposal purposes will be analyzed in accordance with the appropriate SW-846 methodologies, for the parameters required by the disposal facility.

3.5 Analytical Quality Control

As stated previously, analytical quality for samples collected for site characterization or monitoring purposes will be in accordance with NYSDEC-ASP Category B. Analysis in accordance with NYSDOH-ELAP certification requirements may be used for samples collected for waste characterization or disposal purposes. The following holding times will be required from the contracted analytical laboratory, regardless of sample matrix:

Parameter	Task	Aqueous Holding Time	Solids Holding Time
VOCs	Analysis*	14 days	14 days
SVOCs	Extraction	7 days	14 days
	Analysis**	40 days	40 days
PCBs	Extraction	7 days	14 days
	Analysis**	40 days	40 days
Pesticides	Extraction	7 days	14 days
	Analysis**	40 days	40 days
Herbicides	Extraction	7 days	14 days
	Analysis**	40 days	40 days
Metals	Analysis	180 days	180 days
Mercury	Analysis	28 days	28 days
Cyanide	Analysis	14 days	14 days
1,4-Dioxane	Extraction	7 days	7 days
	Analysis**	40 days	40 days
PFAS	Analysis	14 days	Not Applicable

* The extraction time for Encore samplers is 48 hours.
** Days after extraction.

3.6 Laboratory Deliverables

The analytical data will be presented in 2005 ASP Category B reportable/deliverables format. Category B deliverables will not be requested for waste characterization samples.

4.0 SAMPLE CUSTODY PROCEDURES

Sample custody is controlled and maintained through the chain-of-custody procedures. Chain of custody is the means by which the possession and handling of samples will be tracked from the source (field) to their final disposition, the laboratory. A sample is considered to be in a person’s custody if it is in the person’s possession or it is in the person's view after being in his or her possession or it was in that person's possession and that person has locked it in a vehicle or room. Sample containers will be cleaned and preserved at the laboratory before shipment to the Site.

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4.1 Sample Storage

Samples are stored in secure limited-access areas. Walk-in coolers or refrigerators are maintained at 4°C, ± 2°C, or as required by the applicable regulatory program. The temperatures of all refrigerated storage areas are monitored and recorded a minimum of once per day. Deviations of temperature from the applicable range require corrective action, including moving samples to another storage location if necessary.

4.2 Sample Custody

Sample custody is defined by this document as when any of the following occur:

- It is in someone's actual possession
- It is in someone's view after being in his or her physical possession
- It was in someone's possession and then locked, sealed, or secured in a manner that prevents unsuspected tampering
- It is placed in a designated and secured area

Samples are removed from storage areas by the sample custodian or analysts and transported to secure laboratory areas for analysis. Access to the laboratory and sample storage areas is restricted to laboratory personnel and escorted visitors only; all areas of the laboratory are therefore considered secure. If required by the applicable regulatory program, internal chain-of-custody is documented in a log by the person moving the samples between laboratory and storage areas.

Laboratory documentation used to establish COC and sample identification may include the following:

- Field COC forms or other paperwork that arrives with the sample
- The laboratory COC
- Sample labels or tags are attached to each sample container
- Sample custody seals
- Sample preparation logs (i.e., extraction and digestion information) recorded in hardbound laboratory books that are filled out in legible handwriting, and signed and dated by the chemist
- Sample analysis logs (e.g., metals, GC/MS, etc.) information recorded in hardbound laboratory books that are filled out in legible handwriting, and signed and dated by the chemist
- Sample storage log (same as the laboratory COC)
- Sample disposition log, which documents sample disposal by a contracted waste disposal company

4.3 Sample Tracking

All samples are maintained in the appropriate coolers prior to and after analysis. The analysts remove and return their samples as needed. Samples that require internal COC are relinquished to the analysts by the sample custodians. The analyst and sample custodian must sign the original COC relinquishing custody of the samples from the sample custodian to the analyst. When the samples are returned, the analyst will sign the original COC returning sample custody to the sample custodian. Sample extracts are relinquished to the instrumentation analysts by the preparatory analysts. Each preparation department tracks internal COC through their logbooks/spreadsheets.

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Any change in the sample during the time of custody will be noted on the COC (e.g., sample breakage or depletion).

5.0 CALIBRATION PROCEDURES AND FREQUENCY

This section describes the calibration procedures and the frequency at which these procedures will be performed for both field and laboratory instruments.

5.1 Field Instruments

Field equipment that will likely be used for the project includes:

- Photoionization detector (PID)
- Peristaltic pump
- Multi-parameter water quality meter (includes pH, turbidity, temperature, Eh, and specific conductance)
- Electric water level indicator
- Hand-held Global Positioning System (GPS) device

5.2 Preventative Maintenance

Each piece of field equipment is checked according to its routine maintenance schedule and before field activities begin. Field personnel will report all equipment maintenance and/or replacement needs to the Project QA Officer and will record the information on the daily field record.

5.3 Field Instrument Calibration

All instruments and equipment used during sampling and analysis will be operated, calibrated, and maintained according to the manufacturer's guidelines and recommendations as well as criteria set forth in the applicable analytical methodology references. Operation, calibration, and maintenance will be performed by personnel properly-trained in these procedures. Brief descriptions of calibration procedures for field and laboratory instruments follow.

- Photoionization detector (PID) – Standard operating procedures for the PID require that routine maintenance and calibration be performed every six months. Field calibration will be performed on a daily basis. The packages used for calibration are non-toxic analyzed gas mixtures available in pressurized containers. All calibration procedures will follow the manufacturer recommendations.

- Peristaltic pump – No calibration required.

- Multi-parameter water quality meter - This instrument is factory-calibrated, and is also re-calibrated on a regular interval by the equipment rental company. The certification of calibration is provided by the equipment rental company.

- Electric water level indicator – No calibration required.

- Hand-held GPS device – This instrument is self-calibrating.

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Further calibration procedures can be reviewed in AECC Standard Operating Procedure #110 – Field Monitoring Equipment Calibration, which attached to the RIWP.

6.0 DATA VALIDATION AND REPORTING

All data generated through field activities, or by the laboratory operation shall be reduced and validated (as required in the RIWP) before reported.

6.1 Data Usability Evaluation

Data evaluation will be performed by a third-party data validator using the most current methods and quality control criteria from the USEPA's Contract Laboratory Program (CLP) *National Functional Guidelines for Organic Data Review*, and Contract Laboratory Program*, National Functional Guidelines for Inorganic Data Review*.

6.1.1 Procedures Used to Evaluate Field Data Usability

The performance of field activities, calibration checks on field instruments at the beginning of each day of use, manual checks of field calculations, checking for transcription errors and review of field log books is the shared responsibility of the Field Team Manager and Head Field Technician.

6.1.2 Procedures Used to Evaluate Laboratory Data Usability

The data review guidance will be used only to the extent that it is applicable to the SW-846 methods. SW-846 methodologies will be followed primarily and given preference over CLP when differences occur. Also, results of blanks, surrogate spikes, MS/MSDs, and laboratory control samples will be reviewed / evaluated by the data validator. Sample analytical data for each sample matrix will be evaluated. The third-party data validation expert will also evaluate the overall completeness of the data package. Completeness checks will be administered on all data to determine whether deliverables specified in this QAPP are present. The reviewer will determine whether all required items are present and request copies of missing deliverables.

6.2 Data Reporting

6.2.1 Field Data Reporting

All field documents will be accounted for when they are completed. Accountable documents include items such as field notebooks, sample logs, field data records, photographs, data packages, computer disks, and reports.

6.2.2 Laboratory Data Reporting

Analytical data will be summarized in tabular format with such information as sample identification, sample matrix description, parameters analyzed and their corresponding detected concentrations, and the detection limit. Analytical results will be incorporated into reports as data tables, maps showing sampling locations and analytical results, and supporting text.

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7.0 CORRECTIVE ACTION

Corrective action is the process of identifying, recommending, approving, and implementing measures to counter unacceptable procedures or out of quality control performance that can affect data quality. Corrective action can occur during field activities, laboratory analyses, data validation, and data assessment. Corrective actions proposed and implemented should be documented in the regular quality assurance reports to management. Corrective action should be implemented only after approval by the Project Manager, or his/her designee. If immediate corrective action is required, approvals secured by telephone from the Project Manager should be documented in an additional memorandum.

7.1 Field Corrective Action

If errors in field procedures are discovered during the observation or review of field activities by the Project QA Officer or his/her designee, corrective action will be initiated. Nonconformance to the QA/QC requirements of the field operating procedures will be identified by field audits or immediately by project staff who know or suspect that a procedure is not being performed in accordance with the requirements. The Project QA Officer or his/her designee will be informed immediately upon discovery of all deficiencies. Timely action will be taken if corrective action is necessary.

Corrective action in the field may be needed when the sample network is changed (i.e., more/less samples, sampling locations other than those specified in the Work Plan, etc.) or when sampling procedures and/or field analytical procedures require modification due to unexpected conditions. In general, the Project Manager and QA Officer may identify the need for corrective action. The Project Manager will approve the corrective measure that will be implemented by the field team. It will be the responsibility of the Project Manager to ensure that corrective action has been implemented.

If the corrective action will supplement the existing sampling using approved procedures in the QAPP, the corrective action approved by the Project Manager will be documented. If the corrective actions result in less samples (or analytical fractions), alternate locations, etc., which may result in non-achievement of project QA objectives, it will be necessary that all levels of project management, including the NYSDEC Project Coordinator, concur with the proposed action.

Corrective actions will be implemented and documented in the project field record book. No staff member will initiate corrective action without prior communication of findings through the proper channels. If corrective actions are insufficient, work may be stopped by the NYSDEC Project Coordinator.

If at any time a corrective action issue is identified which directly impacts project data quality objectives, the NYSDEC Project Coordinator will be notified immediately.

7.2 Laboratory Corrective Action

Corrective actions may be initiated if the quality assurance goals are not achieved. The initial step in a corrective action is to instruct the analytical laboratory to examine its procedures to assess whether analytical or computational errors caused the anomalous result. If no error in laboratory procedures or sample collection and handling procedures can be identified, then the Project Manager will assess whether reanalysis or resampling is required or whether any protocol should be modified for future sampling events.

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7.3 Data Validation & Assessment Corrective Action

The need for corrective action may be identified during the data validation or assessment processes. Potential types of corrective action may include resampling by the field team, or reinjection / reanalysis of samples by the laboratory.

These actions are dependent upon the ability to mobilize the field team, whether the data to be collected is necessary to meet the QA objectives (the holding time for samples is not exceeded, etc.). If the data validator identifies a corrective action situation, the Project Manager will be responsible for approving the corrective action implementation. All required corrective actions will be documented by the laboratory Quality Assurance Coordinator.

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DATA QUALITY OBJECTIVES FORM:
SURFACE / NEAR-SURFACE SOIL SAMPLES

Site Name/Location: EJ Victory Building (BCP Site # C704060)
59 Lester Avenue, Village of Johnson City, Broome County, New York

Sample Objectives: To collect data that will assist with characterization of surface / near-surface Site soils.

Sampling Procedures: Sampling Procedures are described within the Field Sampling Plan.

Data Quality Factors: Analytical Detection Limits will be consistent with ASP-Contract Required Quantization Limits (CRQLs).

Sampled Media:

☑ Soils ☐ Sediment ☐ Groundwater ☐ Surface Water ☐ Soil Vapor

☐ Waste Material ☐ Building Materials ☐ Dust/Surfaces ☐ Air

Data Use:

☑ Site Characterization ☐ Monitoring ☐ Health & Safety ☑ Risk Assessment ☐ Disposal

☑ Remedial Design ☐ Confirmation ☑ Evaluate Remedial Alternatives

Field Parameters:

☑ VOCs (ppmv) ☐ Temperature ☐ Turbidity ☐ Dissolved Oxygen ☐ pH

☐ RedOx Potential ☐ Specific Conductivity ☐ Other:

Data Types:

☑ SW-846 ☐ TCLP ☐ SCLP ☐ Other:

Analyses:

☑ TCL VOCs ☑ TCL SVOCs ☐ STARS VOCs ☐ STARS SVOCs ☐ TICs

☐ TO-15 VOCs ☑ TAL Metals ☑ PCBs ☑ Herbicides ☑ Pesticides

☐ PFAS ☑ 1,4-Dioxane ☐ Asbestos ☐ Lead ☐ Mold

☐ Other:

QA/QC Samples:

☑ Duplicate (Split) ☑ Equipment Blank ☑ Field Blank ☐ Trip Blank (VOCs, Aqueous) ☑ MS/MSD

☐ Other:

Level of Analysis:

☑ Level I: Field Screening (portable instruments providing real-time data):

☑ Photoionization Device (PID) ☐ Groundwater Multi-Meter ☐ Dust Monitor

☐ Level II: Field Analysis (portable analytical instruments in an on-site laboratory)

☐ Level III: ASP Analytical Methods (samples to be analyzed in accordance with NYSDEC-ASP 1995)

☑ Level IV: ASP Reportables/Deliverables (NYSDEC-ASP 1995 Category B Reportables/Deliverables)

DATA QUALITY OBJECTIVES FORM:
SURFACE / NEAR-SURFACE SOIL SAMPLES (BUILDING PERIMETER)

Site Name/Location: EJ Victory Building (BCP Site # C704060)
59 Lester Avenue, Village of Johnson City, Broome County, New York

Sample Objectives: To collect data that will assist with characterization of surface / near-surface Site soils adjacent to building perimeter.

Sampling Procedures: Sampling Procedures are described within the Field Sampling Plan.

Data Quality Factors: Analytical Detection Limits will be consistent with ASP-Contract Required Quantization Limits (CRQLs).

Sampled Media:

☑ Soils ☐ Sediment ☐ Groundwater ☐ Surface Water ☐ Soil Vapor

☐ Waste Material ☐ Building Materials ☐ Dust/Surfaces ☐ Air

Data Use:

☑ Site Characterization ☐ Monitoring ☐ Health & Safety ☑ Risk Assessment ☐ Disposal

☑ Remedial Design ☐ Confirmation ☑ Evaluate Remedial Alternatives

Field Parameters:

☑ VOCs (ppmv) ☐ Temperature ☐ Turbidity ☐ Dissolved Oxygen ☐ pH

☐ RedOx Potential ☐ Specific Conductivity ☐ Other:

Data Types:

☑ SW-846 ☐ TCLP ☐ SCLP ☐ Other:

Analyses:

☐ TCL VOCs ☐ TCL SVOCs ☐ STARS VOCs ☐ STARS SVOCs ☐ TICs

☐ TO-15 VOCs ☐ TAL Metals ☑ PCBs ☐ Herbicides ☐ Pesticides

☐ PFAS ☐ 1,4-Dioxane ☐ Asbestos ☑ Lead ☐ Mold

☐ Other:

QA/QC Samples:

☑ Duplicate (Split) ☑ Equipment Blank ☑ Field Blank ☐ Trip Blank (VOCs, Aqueous) ☑ MS/MSD

☐ Other:

Level of Analysis:

☑ Level I: Field Screening (portable instruments providing real-time data):

☑ Photoionization Device (PID) ☐ Groundwater Multi-Meter ☐ Dust Monitor

☐ Level II: Field Analysis (portable analytical instruments in an on-site laboratory)

☐ Level III: ASP Analytical Methods (samples to be analyzed in accordance with NYSDEC-ASP 1995)

☑ Level IV: ASP Reportables/Deliverables (NYSDEC-ASP 1995 Category B Reportables/Deliverables)

DATA QUALITY OBJECTIVES FORM:
SOIL SAMPLES (SHALLOW AND DEEP SAMPLES)

Site Name/Location: EJ Victory Building (BCP Site # C704060)
59 Lester Avenue, Village of Johnson City, Broome County, New York

Sample Objectives: To collect data that will supplement previous characterization of shallow and deep Site soils.

Sampling Procedures: Sampling Procedures are described within the Field Sampling Plan.

Data Quality Factors: Analytical Detection Limits will be consistent with ASP-Contract Required Quantization Limits (CRQLs).

Sampled Media:

☑ Soils ☐ Sediment ☐ Groundwater ☐ Surface Water ☐ Soil Vapor

☐ Waste Material ☐ Building Materials ☐ Dust/Surfaces ☐ Air

Data Use:

☑ Site Characterization ☐ Monitoring ☐ Health & Safety ☑ Risk Assessment ☐ Disposal

☑ Remedial Design ☐ Confirmation ☑ Evaluate Remedial Alternatives

Field Parameters:

☑ VOCs (ppmv) ☐ Temperature ☐ Turbidity ☐ Dissolved Oxygen ☐ pH

☐ RedOx Potential ☐ Specific Conductivity ☐ Other:

Data Types:

☑ SW-846 ☐ TCLP ☐ SCLP ☐ Other:

Analyses:

☐ TCL VOCs ☐ TCL SVOCs ☐ STARS VOCs ☐ STARS SVOCs ☐ TICs

☐ TO-15 VOCs ☐ TAL Metals ☐ PCBs ☑ Herbicides ☑ Pesticides

☑ PFAS ☑ 1,4-Dioxane ☐ Asbestos ☐ Lead ☐ Mold

☐ Other:

QA/QC Samples:

☑ Duplicate (Split) ☑ Equipment Blank ☑ Field Blank ☐ Trip Blank (VOCs, Aqueous) ☑ MS/MSD

☐ Other:

Level of Analysis:

☑ Level I: Field Screening (portable instruments providing real-time data):

☑ Photoionization Device (PID) ☐ Groundwater Multi-Meter ☐ Dust Monitor

☐ Level II: Field Analysis (portable analytical instruments in an on-site laboratory)

☐ Level III: ASP Analytical Methods (samples to be analyzed in accordance with NYSDEC-ASP 1995)

☑ Level IV: ASP Reportables/Deliverables (NYSDEC-ASP 1995 Category B Reportables/Deliverables)

DATA QUALITY OBJECTIVES FORM:

GROUNDWATER SAMPLES

Site Name/Location: EJ Victory Building (BCP Site # C704060)
59 Lester Avenue, Village of Johnson City, Broome County, New York

Sample Objectives: To collect data that will supplement previous characterization of Site groundwater.

Sampling Procedures: Sampling Procedures are described within the Field Sampling Plan.

Data Quality Factors: Analytical Detection Limits will be consistent with ASP-Contract Required Quantization Limits (CRQLs).

Sampled Media:

☐ Soils ☐ Sediment ☑ Groundwater ☐ Surface Water ☐ Soil Vapor

☐ Waste Material ☐ Building Materials ☐ Dust/Surfaces ☐ Air

Data Use:

☑ Site Characterization ☐ Monitoring ☐ Health & Safety ☑ Risk Assessment ☐ Disposal

☑ Remedial Design ☐ Confirmation ☑ Evaluate Remedial Alternatives

Field Parameters:

☑ VOCs (ppmv) ☑ Temperature ☑ Turbidity ☑ Dissolved Oxygen ☑ pH

☑ RedOx Potential ☑ Specific Conductivity ☐ Other:

Data Types:

☑ SW-846 ☐ TCLP ☐ SCLP ☐ Other:

Analyses:

☐ TCL VOCs ☐ TCL SVOCs ☐ STARS VOCs ☐ STARS SVOCs ☐ TICs

☐ TO-15 VOCs ☐ TAL Metals ☐ PCBs ☐ Herbicides ☐ Pesticides

☐ PFAS ☐ 1,4-Dioxane ☐ Asbestos ☐ Lead ☐ Mold

☑ Other: Dissolved (field-filtered) TAL metals

QA/QC Samples:

☑ Duplicate (Split) ☑ Equipment Blank ☑ Field Blank ☐ Trip Blank (VOCs, Aqueous) ☑ MS/MSD

☐ Other:

Level of Analysis:

☑ Level I: Field Screening (portable instruments providing real-time data):

☑ Photoionization Device (PID) ☐ Groundwater Multi-Meter ☐ Dust Monitor

☐ Level II: Field Analysis (portable analytical instruments in an on-site laboratory)

☐ Level III: ASP Analytical Methods (samples to be analyzed in accordance with NYSDEC-ASP 1995)

☑ Level IV: ASP Reportables/Deliverables (NYSDEC-ASP 1995 Category B Reportables/Deliverables)

APPENDIX C

Health and Safety Plan

HEALTH AND SAFETY PLAN

Remedial Investigation Work Plan
EJ Victory Building
Johnson City, New York

EMERGENCY CONTACT NUMBERS		
Emergency Response Number	911	
Poison Control Center	(800) 222-1222	
Johnson City Police Department	(607) 729-9321	
State Police (Endwell)	(607)754-3854	
Johnson City Fire Department	(607)797-2311	
NEAREST HOSPITAL		
UHS Wilson Medical Cnter 33-57 Harrison Street Johnson City, New York 13790	(607) 763-6000	
OWNER		
EJ Victory Building, LLC (315) 481-1552	Owner Representative	Matthew Paulus: (315) 416-9566 (cell)
ENVIRONMENTAL CONSULTANT		
Bradford Engineering, DPC (315) 529-0482	Project Engineer	H. Nevin Bradford, P.E.
Asbestos & Environmental Consulting Corporation (AECC) (315) 432-9400	Project Manager	Richard McKenna
	Safety Coordinator	Bryan Airel: (315) 416-9290 (cell)
	Field Team Leader	Drew Brantner
DRILLING CONTRACTOR		
TBD	HSO	TBD
	Supervisor	TBD
	Operator	TBD

October 2020

REVISION #	DATE	SUMMARY OF REVISION

1.0 INTRODUCTION

A Brownfield Cleanup Program site investigation is being performed at the Site (See Figure 1) as a result of the detection of petroleum compounds, chlorinated solvents, and metals in Site soils, groundwater, and soil vapor.

This project-specific Health and Safety Plan (HASP) sets forth requirements for maintaining the health and safety of workers at the Site. This HASP addresses general health and safety issues related to the presence of specific chemical and physical hazards that may be encountered during performance of the work activities at the Site. Contractors and Subcontractors are required to prepare and maintain their own project-specific HASP that incorporates the minimum requirements of this HASP.

An Emergency Response Plan is included at the end of this Plan, which presents the procedures to be followed in the event of an emergency situation.

2.0 GENERAL DEFINITIONS

The following definitions shall apply to and are used throughout the HASP:

Contamination Reduction Zone – Area between the Exclusion Zone and Support Zone that provides a transition between contaminated and clean areas. Decontamination stations are located in this zone.

Contractor – Any contractor responsible for performing work that will disturb contaminated Site soils or involve management of other contaminated waste streams such as decontamination residues.

Environmental Consultant – A consultant to the Owner that will specialize in the environmental aspects of the project, namely preparation and implementation of the Remedial Investigation Work Plan, collection of soil samples, collection of groundwater samples, oversight of contractor activities, and decontamination of equipment at the end of the project.

Exclusion Zone – Any portion of the Site where hazardous substances are present, or may reasonably be suspected to be present, in the air, water, or soil.

HSO – The Health & Safety Officer is a qualified professional designated by the Consultant who is responsible for the execution and maintenance of the HASP.

Monitoring – The use of field instrumentation to measure the levels of contaminants. Monitoring will be conducted, if deemed necessary (i.e., excessive airborne dust and particulates), to evaluate potential exposures to chemical and physical hazards.

On-site personnel – All consultant, contractor, and subcontractor personnel working at the Site.

PPE – Personal Protective Equipment; clothing / gear worn by personnel within the work area that is designed to reduce exposure to chemical and / or physical hazards.

Project – All on-site work performed at the Site involving potentially contaminated soil disturbance (i.e., investigations and potential interim remedial measures).

Site – The subject property where the disturbance of potentially contaminated soil may occur.

Subcontractor – All subcontractors to the Contractor hired to work on this project.

Support Zone – The remainder of the Site outside of the Contamination Reduction Zone and Exclusion Zone. Support equipment is located in this zone.

Visitor – All other personnel, excluding the on-site personnel.

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3.0 RESPONSIBILITIES

Implementation of the HASP will be accomplished through an integrated team effort. The following key personnel will be involved with this project:

<table>
<tr><th colspan="3">OWNER</th></tr>
<tr><td>EJ Victory Building, LLC
(315) 481-1552</td><td>Owner Representative</td><td>Matthew Paulus:
(315) 416-9566 (cell)</td></tr>
<tr><th colspan="3">ENVIRONMENTAL CONSULTANTS</th></tr>
<tr><td>Bradford Engineering, DPC
(315) 529-0482</td><td>Field Team Manager</td><td>H. Nevin Bradford, P.E.</td></tr>
<tr><td rowspan="3">Asbestos & Environmental Consulting Corporation (AECC)
(315) 432-9400</td><td>Project Manager</td><td>Richard McKenna</td></tr>
<tr><td>Safety Coordinator</td><td>Bryan Airel:
(315) 416-9290 (cell)</td></tr>
<tr><td>Field Team Leader</td><td>Drew Brantner</td></tr>
<tr><th colspan="3">DRILLING / EXCAVATION CONTRACTOR</th></tr>
<tr><td rowspan="3">TBD</td><td>HSO</td><td>TBD</td></tr>
<tr><td>Supervisor</td><td>TBD</td></tr>
<tr><td>Operator</td><td>TBD</td></tr>
<tr><th colspan="3">GOVERNMENTAL AGENCIES</th></tr>
<tr><td colspan="2">NYS Department of Environmental Conservation (NYSDEC)
(518) 402-2754</td><td>Anthony J. Bollasina, P.G.</td></tr>
<tr><td colspan="2">NYS Department of Health (NYSDOH)
(518) 402-7860</td><td>Shaun Surani</td></tr>
<tr><td colspan="2">Broome County Health Department
(607) 778-3930</td><td>TBD</td></tr>
</table>

This HASP will be periodically reviewed by all parties during the project to verify that it is in accordance with the operations conducted at the Site. Changes in Site conditions or changes in the work tasks at the Site will necessitate a review and modification of the HASP. The Contractor's HSO shall contact the Environmental Consultant if site conditions change that warrant modifications to the HASP, and vise versa. Changes, modifications, and amendments to the HASP will be made in the form of addenda, and will be attached to the HASP.

All parties to the project will perform their duties in a manner consistent with generally accepted practices, and will be responsible for the following (of their own employees) during the project:

- Verification that medical examinations and training requirements for all personnel are current
- Reviewing the HASP with all on-site personnel
- Implementation and maintenance of the HASP
- Providing all on-site personnel with proper PPE
- Compliance with applicable state and federal health and safety standards

The HSO for this project is designated with the following responsibilities:

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- Maintain a daily log book for recording all significant health and safety activities
- Have authority to suspend work due to health or safety-related concerns
- Provide on-site technical assistance and conduct health and safety briefings at the Site
- Verify that first aid kits, eye wash kits, and fire extinguishers are at the Site
- Verify that on-site personnel have received the necessary training and physical examinations
- Verify that on-site personnel have been provided with and are using the required PPE
- Review of the adequacy of the HASP and amend the HASP as necessary during the project
- Prepare addenda to the HASP and maintain required documents for recordkeeping purposes

4.0 SITE HAZARDS EVALUATION

4.1 CHEMICAL HAZARDS

The Site soils and groundwater have been sampled and analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), metals, and asbestos. In addition, soil vapor has been sampled and analyzed for VOCs; and suspect asbestos-containing building materials (ACBMs) and lead-based paints (LBPs) have been sampled and analyzed. No sampling/analysis for PCBs, pesticides, herbicides, or perfluorinated compounds (PFCs) has been conducted to date. The associated laboratory analysis and on-site observations revealed that the following chemicals / materials of concern exist at the Site:

- Petroleum compounds (VOCs and SVOCs)
- Chlorinated solvents
- Metals
- Asbestos (limited areas)
- Lead-Based Paint

Applicable fact sheets and Safety Data Sheets are presented in Appendix A.

Except for possible lead-based paints, concentrations of identified contaminants are not above the threshold for hazardous (TSCA) waste. As the investigation progresses and additional data is collected for the other classes of chemicals, this HASP will be updated to reflect this information.

The contaminants at the Site may enter the human body in a variety of ways. The chemical routes of exposure anticipated from the remedial activities at this Site include:

Absorption - Dermal (skin) contact with impacted soil on-site resulting in absorption of chemicals of concern through the skin and into the blood stream. Proper use of PPE as specified later in this Plan will minimize risks of exposure at the Site.

Ingestion - Chemicals / materials of concern can come in direct contact with the mouth from soil or other contaminated areas (PPE, skin, tools, etc.) and enter the bloodstream through the stomach lining. Proper care in handling PPE and tools, refraining from eating and drinking at the Site, and frequent hand washing with soap and water will minimize risks of exposure.

Inhalation – Volatile vapors and/or contaminants attached to dust and particulates can be entrained by wind and become airborne across the Site and be subsequently inhaled through the nose and / or mouth. This exposure route is the most likely way for worker exposure to occur. The Contractor shall employ methods that minimize the creation of dust and utilize dust suppression techniques to minimize dust and particulates. Respirators with appropriate organic cartridges should be available to on-site workers in case volatile compounds become a nuisance or health hazard. The Contractor is responsible for any personal air monitoring of employees, as deemed necessary.

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4.2 PHYSICAL HAZARDS

Based upon the anticipated field activities, the following potential hazardous conditions may exist:

- The use of typical mechanical equipment such as drill rigs and sampling vehicles can create a potential for crushing and pinching hazards due to movement and positioning of the equipment, movement of lever arms and hydraulics, and entanglement of clothing and appendages in exposed drives and tracks. Mechanical equipment can also create a potential for impact of steel tools, masts, and cables should equipment rigging fail, or other structural failures occur during hydraulic equipment operation. Heavy equipment work must be conducted only by trained, experienced personnel. If possible, personnel must remain outside the turning radius of large, moving equipment. At a minimum, personnel must maintain visual contact with the equipment operator. When not operational, equipment must be set and locked so that it cannot be activated, released, dropped, etc. The mechanical equipment stated above represents typical equipment that is ordinarily used during this scope of work, but is not meant to be an all-inclusive list. Similar precautions should be used around other mechanical equipment deployed to the Site that is not listed above.

- The contractor is responsible for ensuring compliance with OSHA's construction standard for excavations (29 CFR 1926 Subpart P), and for designating the Competent Person responsible for selecting and implementing the appropriate protective system(s), assuring appropriate means of access and egress for excavations greater than four (4) feet in depth, and for ensuring that potential atmospheric and physical hazards associated with any excavation / trenching activities are completed in accordance with Subpart P and other applicable OSHA Standards as applicable.

- Work around large equipment often creates excessive noise. Noise can cause workers to be startled, annoyed, or distracted; cause pain, physical damage to the ear, and temporary and / or permanent hearing loss; and can interfere with communication. If workers are subjected to noise exceeding an 8-hour time-weighted average sound level of 85 dBA, hearing protection will be required with an appropriate noise reduction rating to comply with 29 CFR 1910.95 and to reduce noise levels below levels of concern.

- Personnel may be injured during physical lifting and handling of heavy equipment, construction materials, or containers.

- Personnel may encounter slip, trip, and fall hazards associated with excavations, manways, and construction debris and materials. Precautionary measures should be taken by identifying and removing slip, trip, and fall hazards prior to commencing work. In the event slip, trip, and fall hazards cannot be removed or minimized, site workers will be shown the location of the physical hazard and be asked to avoid it during work activities.

- The potential for fire and / or explosion emergencies is always present on the Site. Field vehicles will be equipped with a fire extinguisher. Employees must be trained in the proper use of fire suppression equipment. However, large fires that cannot be controlled with a fire extinguisher shall be handled by professionals. The proper authorities shall be notified in these instances.

- Persons working outdoors in temperatures at or below freezing may be subject to frostbite. Extreme cold for a short time may cause injury to exposed body surfaces or result in a profound generalized cooling which can cause death. Areas of the body such as fingers, toes, and ears,

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are the most susceptible to cold stress. Ambient air temperature and wind velocity are two factors which influence the development of a cold weather injury. Local injury resulting from exposure to cold temperatures is known as "frostbite." There are several degrees of damage in which frostbite of the extremities can be categorized, as follows:

- Frost nip or incipient frostbite is characterized by sudden bleaching or whitening of the skin.
- Superficial frostbite occurs when the skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient.
- Deep frostbite is characterized by tissues that are cold, pale, and solid; this is an extremely serious injury.

- Heat stress is another potential hazard condition that may arise. Heat stress can result from a number of contributing factors, including environmental conditions, clothing, and workload as well as the physical condition of the individual. Since heat stress is one of the most common injuries / symptoms associated with outdoor work conducted with direct solar load, and, in particular, because wearing PPE can increase the risk of developing heat stress, workers must be capable of recognizing the signs and symptoms of heat-related illnesses. Signs and symptoms of heat-related illnesses which all on-site personnel should be aware, include the following:
  - Heat rash may result from continuous exposure to heat or humid air.
  - Heat cramps are caused by heavy sweating and may include muscle spasms and pain in the hands, feet, and abdomen.
  - Heat exhaustion is indicated by pale, cool, and moist skin; heavy sweating; dizziness; nausea; and fainting.
  - Heat stroke is indicated by red, hot, and unusually dry skin; lack of or reduced perspiration; nausea; dizziness and confusion; rapid pulse; and coma. Immediate action must be taken to cool the body before serious injury or death occurs.

- Overhead and underground utilities exist within the Work Area, which may expose workers to electrocution hazards, explosive hazards, and volatile vapors. A utility location report is provided in Attachment B.

5.0 PERSONAL PROTECTIVE EQUIPMENT

Personnel will be required to wear Level D and Modified Level D PPE ensembles, at a minimum. The following PPE ensembles shall be worn by on-site personnel for the following tasks:

Level D Protection, as listed below, shall be worn by on-site personnel at all times when tasks are performed which DO NOT INVOLVE dermal exposure, or contact with chemical hazards:

- Standard outer garments (i.e. long pants and long-sleeve shirt)
- Durable leather steel-toed work boots
- Rubber boots worn over work boots
- Durable leather gloves
- Eye protection
- Hard hat
- Hearing protection

Modified Level D Protection, as listed below, shall be worn by on-site personnel at all times when tasks are performed which involve dermal exposure or contact with chemical hazards and/or during excavation/handling of soils or groundwater deemed hazardous waste (not currently anticipated for this project):

- Disposable coveralls worn over standard outer garments. Personnel will frequently verify the integrity of their coveralls by checking for holes or tears.
- Durable leather steel-toed work boots
- Disposable nitrile gloves. Personnel will frequently verify the integrity of their gloves by checking for holes or tears.
- Rubber boots worn over work boots
- Eye protection
- Hard hat
- Hearing protection

Respirator use is not anticipated on this project. If respiratory protection becomes necessary, a determination shall be made regarding each person's physical ability to wear a respirator. Consequently, persons required to wear respirators must provide the Contractor's HSO with current documentation (not older than 6 months) regarding their physical condition and ability to wear a respirator, as certified by a qualified physician. Failure to provide current, complete respirator certification documentation will be sufficient grounds to preclude personnel from conducting work activities where respiratory protection is required.

6.0 PERSONNEL TRAINING

Note that this HASP does not cover training requirements for the handling of asbestos or lead-based paint, as training for these hazards are incorporated under separate programs governed by the USEPA, NYSDOH, and NYSDOL.

6.1 REQUIREMENTS AND RESPONSIBILITIES

All on-site personnel and visitors will be trained commensurate with their job responsibilities and in accordance with Occupational Safety and Health Administration (OSHA) training and medical surveillance requirements as specified in 29 CFR 1910.120. The Contractor is responsible for providing such training prior to personnel being allowed to engage in activities that could expose them to health and safety hazards. The HSO has the responsibility to assure that this training is provided for the site-conditions and such training is updated, as needed. The HSO and Contractor's on-site Supervisor will be trained in basic first aid, and at least one of these individuals will be present during each work shift while personnel are at the Site.

6.2 SITE ORIENTATION MEETING

The Contractor will be responsible for notifying all on-site personnel of required attendance at a site orientation meeting, which will be organized by the Contractor's HSO. Any subcontractor personnel will also be required to attend the site orientation meeting as well as any other periodic health and safety meeting specified by the HSO. Personnel attending the site orientation meeting are to sign a Site Orientation Meeting Attendance Acknowledgment Form. The following is a listing of general site orientation training topics:

- Names and responsibilities of key personnel
- Safe work practices
- Personal protective equipment
- Chemical and physical hazards

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- Site equipment Medical surveillance
- Site hazards
- Site control measures
- Decontamination procedures
- Standard operating procedures
- Emergency response plan

6.3 DOCUMENTATION / RECORDKEEPING

OSHA regulations require medical surveillance in the form of annual medical examinations for certain types of work involving exposure to hazardous or toxic substances. All on-site personnel, visitors, and subcontractors are required to have documented proof on file of OSHA training and medical surveillance requirements as specified in 29 CFR 1910.120 to demonstrate compliance with the training requirements specified in this Section. The HSO is responsible to check all personnel to ensure training is kept current during the project.

7.0 MEDICAL CLEARANCE

Medical clearance refers to OSHA requirements for annual physical reports performed by a licensed physician, which document a worker's physical ability to perform specific job duties. Medical clearance is not required for on-site personnel or visitors at the Site, except for OSHA medical surveillance requirements for workers within the Exclusion Zone or Contamination Reduction Zone.

8.0 STANDARD OPERATING PROCEDURES

Potential chemical and physical hazards exist at the Site. This Section presents Standard Operating Procedures (SOPs) that will be followed during the project. Specific precautions to avoid the potential hazards for each task are presented herein.

8.1 GENERAL SOPS

Workers shall adhere to the established SOP for their respective specialties. Work at the Site will be conducted according to established procedures and guidelines for the safety and health of all involved. General SOPs at the Site include the following:

- All questions should be referred to the Contractor's HSO or Project Manager.
- All on-site personnel will be trained and briefed on anticipated hazards, equipment to be worn, safety practices to be followed, emergency procedures, and communications.
- Inspections of the Site will be conducted to ensure compliance with the HASP, and if any change in operation occurs, the HASP will be modified to reflect any change.
- Be observant of not only one's own immediate surrounding but also that of others.
- On-site personnel in the work zone will act as safety backup to each other, and on-site personnel outside the work zone will provide emergency assistance when necessary.
- Use extra precautions when working near heavy equipment.
- Communications using hand signals or other means will be maintained between on-site personnel, the HSO, and the Project Manager at all times.
- Breaks should be planned to prevent heat, cold, stresses, accidents, and fatigue.
- Work areas for various operational activities will be established.
- Strict pedestrian and vehicular traffic control will be maintained on-site.
- Entrance / exit locations and emergency escape routes will be designated and delineated.

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- On-site personnel and equipment in each Work Area will be minimized to maintain effective Site operations.
- Required PPE ensembles must be worn by all on-site personnel entering work areas designated for wearing PPE. At minimum, hard hat, safety glasses, steel-toe boots, durable leather gloves, and hearing protection will be worn on the project Site.
- Work Areas and decontamination procedures will be established based on expected Site conditions.
- Plan work procedures and decontamination areas to minimize contamination exposure.
- Contaminated equipment shall not be placed on unprotected surfaces.
- Procedures for leaving a Work Area will be planned prior to entering the Site.
- All electrical equipment (power tools, extension cords, instruments, etc.) will conform to 29 CFR 1926.400 Subpart K.
- Fire prevention and protection (appropriate signs for flammable liquids, smoking areas, storage areas of combustible or flammable materials, etc.) will be in accordance with OSHA 29 CFR 1926.150 Subpart F.
- Workers shall not enter areas containing asbestos debris, or handle/disturb asbestos-containing materials
- Workers shall not handle/disturb known or potential lead-based paints

Violation of these SOPs may result in immediate dismissal from the Site.

8.2 SITE CONTROL MEASURES

Site control measures will minimize potential contamination of on-site personnel, protect the public from potential on-site hazards, and prevent vandalism of equipment and materials. Site control measures also enhance response in emergency situation. For this project, the primary site control measure will be a temporary fence or other barrier installed along the Site boundary for the duration of the project.

Areas where intrusive work will occur will be routinely divided into three distinct areas: an Exclusion Zone, a Contamination Reduction Zone (CRZ), and a Support Zone.

Exclusion Zone

The Exclusion Zone will be designated as the area where the highest potential for exposure by dermal or inhalation routes exists. The Exclusion Zone coincides with areas being excavated. PPE is required and a daily log will be kept of all personnel entering this zone.

The Exclusion Zone for work areas will be demarcated with barrier tape.

Approval for entry into the Exclusion Zone will require compliance with OSHA training and medical surveillance requirements (29 CFR 1910.120). Subcontractor and vendor equipment will not be permitted to enter the Exclusion Zone without prior authorization and will be subject to Site decontamination procedures. All personnel and equipment shall be decontaminated when leaving the Exclusion Zone. No eating, drinking, or smoking will be permitted in the Exclusion Zone.

Contamination Reduction Zone (CRZ)

The Contractor will establish the CRZ in an area between the Exclusion Zone and Support Zone. Approval for entry into the CRZ will require compliance with OSHA training and medical surveillance requirements (29 CFR 1910.120). Access to the Exclusion Zone will be through the CRZ. The CRZ will be designated as the area immediately adjacent to and surrounding the Exclusion Zone. The

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probability of dermal and inhalation exposure is lower in the CRZ than in the Exclusion Zone. The CRZ includes facilities for personnel and equipment decontamination. PPE worn in the Exclusion Zone may not be worn outside the CRZ, except during emergencies. No eating, drinking, or smoking will be permitted in the CRZ.

Support Zone

The Support Zone includes all areas outside the CRZ and Loading Zone. The exposure potential in the Support Zone is minimal. The Support Zone provides a changing area for personnel entering the CRZ and Exclusion Zone, as well as an area for the storage of clean equipment and materials. Protective clothing worn in the Exclusion Zone will not be allowed to be worn in the Support Zone, except in emergencies. It is the responsibility of the Project Manager to control access to the Site and to assure proper security. Any evidence of unauthorized entry will be noted in the daily log.

Under no circumstances will the general public be permitted to access the work area. All preapproved visitors will be briefed on the HASP, and shall sign the Daily Site Sign-In / Sign-Out Log. Pre-approved visitors will be permitted in the immediate area of active operations only with approval from the Contractor's HSO or Project Manager. All personal vehicles are restricted to the Support Zone.

8.3 COMMUNICATION PROCEDURES

Personnel in the Exclusion Zone will remain within sight of other project personnel. The commonly used international hand and arm signals are listed below, and will be used when necessary:

Signal	Meaning
Right hand thumbs up	OK, I'm All Right
Right hand thumbs down	No, Negative
Rotating both hands at sides	Situation Under Control
Rotating both hands above head	Need Assistance
Hand gripping throat	Out of Air, Cannot Breathe
Both hands placed on hips	Leave Area Immediately
Rotating both hands at knees	Situation Grave, Evacuate Immediately
Both hands placed on top of head	Returning to Support Zone

8.4 DECONTAMINATION PROCEDURES

On-site personnel performing remediation tasks under the Modified Level D PPE ensemble will perform decontamination operations in accordance with the following steps:

- Remove re-usable boot covers, or discard disposable boot covers.
- Remove coveralls first (if applicable), then remove nitrile gloves and place in the disposal container staged in the CRZ. All disposable PPE (gloves, coveralls), rags, cloths, etc. will be containerized separately from general refuse, and disposed of in accordance with the applicable regulations.

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- Remove and discard inner gloves.
- Proceed to the Support Zone bringing decontaminated tools and sampling containers.
- Wash hands, face, and other exposed skin with soap and water. Shower and shampoo as soon as possible at the end of the work day, before any social activities.
- Place non-disposable coveralls in plastic bags prior to leaving the Site and prior to entering any vehicle.
- Launder non-disposable clothing worn in Exclusion Zone prior to reuse, separately from other laundry items. Impermeable items such as vinyl boots do not need to be laundered prior to reuse; however, they should either be kept in the CRZ or placed in a sealed container prior to leaving the CRZ.

8.5 PERIODIC HEALTH AND SAFETY MEETINGS

The HSO will conduct weekly health and safety meetings. These meetings will be a review of existing protocols as well as a means to update personnel on new Site conditions. The meetings will also provide an opportunity for on-site personnel to discuss health and safety concerns. Topics for discussion may include, but are not limited to, the following:

- Review of the type and frequency of environmental and personal monitoring
- Task-specific levels of protection and anticipated potential for upgrading
- Review of existing and new health and safety issues
- Review of emergency procedures

9.0 ACCIDENT AND EMERGENCY RESPONSE PLAN

This Section includes procedures and methods of evaluating and addressing medical, fire, and other emergency situations which may occur at the Site. In any unknown situation, always assume the worst conditions and plan responses accordingly. All emergency situations require concise and timely actions conducted in a manner that minimizes the health and safety risks to on-site personnel and to the public. All on-site personnel shall be familiar with the Emergency Response Plan.

9.1 RESPONSIBILITIES

The Contractor's HSO has the responsibility for directing response activities in the event of an emergency or accident, and will be responsible for the following:

- Assess the situation
- Determine required response measures
- Notify appropriate response teams
- Direct on-site personnel during the emergency

The Contractor's HSO will coordinate the response activities of on-site personnel with those of public agencies. A list of agencies to be contacted and who may, depending on the nature of the situation, assume authority for emergency response is presented in Section 9.6. This table includes names and telephone numbers of local hospitals, ambulance service, fire and police departments, and other applicable agencies. The HSO will notify emergency response agencies and establish emergency procedures prior to commencing remedial activities at the Site.

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9.2 EMERGENCY PROCEDURES

Due to the nature of the tasks to be conducted at the Site, the emergency situations that may occur are most likely limited to personnel accidents (i.e., slip, trip, and fall accidents; equipment related accidents, etc.) requiring first aid. The following procedures shall be followed in the event of an emergency:

- On-site personnel shall report all accidents and unusual events to the HSO.
- The HSO will assess the situation. If off-site assistance and medical treatment is required, the HSO will designate a person to call the proper authorities.
- First-aid or other applicable treatment will be provided by properly trained individuals.

The HSO will inform the Owner of the injury/accident, and an Accident Report Form detailing the causes and consequences of the injury/accident will be submitted to the Project Manager within 48 hours of the incident. The Accident Report Form shall include:

- Names and social security numbers of accident victims and witnesses
- Date and time of accident
- Location, cause, and duration of accident
- A description of corrective actions implemented
- Off-site persons and agencies notified and time of arrival at the Site.

Personnel shall make all reasonable attempts to conduct themselves in a calm manner in the event of an accident.

9.3 ACCIDENT AND INJURIES

Every accident is a unique event that must be dealt with by trained personnel working in a calm, controlled manner. In the event of an accident, the prime consideration is to provide the appropriate initial response to assist those in jeopardy without placing additional personnel at unnecessary risk. Several types of emergencies are outlined in the following subsections. These are not intended to cover all emergency situations.

If a person working on the Site is physically injured, basic first-aid procedures will be followed. Depending on the severity of the injury, outside medical assistance may be sought. If the person can be moved, the person will be taken outside of the Work Area, PPE will be removed, and first aid administered. If necessary, transportation to a medical facility will be provided. If the person can only be moved by emergency medical personnel, the HSO will decide what type of PPE (if any) will be required to be worn by emergency personnel.

If the injury to on-site personnel involves chemical exposure, the following first aid procedures will be initiated as soon as possible:

Eye Exposure - If solid or liquid gets into the eyes, wash eyes immediately at the emergency eyewash station using water and lifting the lower and upper lids occasionally. This emergency eyewash station shall be a portable station provided by the Contractor and set up within the CRZ. If an acute exposure is identified, then obtain medical attention immediately. Otherwise, consultation with a doctor shall be discretionary based on the severity of the incident.

Skin Exposure - If solid or liquid gets on the skin causing irritation or pain, wash skin immediately at the emergency eyewash station using water. If an acute exposure is identified, then obtain medical attention immediately. Otherwise, consultation with a doctor shall be discretionary based on the severity of the incident.

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Inhalation – In the rare event that a person inhales large amounts of organic vapor or dust, and is overcome, move the person to fresh air at once. Obtain medical attention immediately. If breathing has stopped, appropriately trained personnel and/or medical personnel should perform cardiopulmonary resuscitation. Keep the affected person warm and at rest.

Ingestion - If solid or liquid is swallowed, medical attention must be obtained immediately and the Poison Control Center consulted.

9.4 FIRE

On-site personnel will be knowledgeable in fire-extinguishing techniques. They will be instructed in proper use and maintenance of the fire extinguishers supplied at the work areas. Fire extinguishers should be used only for small fires which are in the early stages of development. Where the fire cannot be controlled through extinguisher use, the area should be evacuated immediately, and the local fire department should be called to extinguish the fire. Fire extinguishers shall be provided by the Contractor.

9.5 EMERGENCY EVACUATION

In extraordinary circumstances, emergency evacuation of the Site may be necessary. On-site personnel will be notified of the need to evacuate verbally or by signaling with an air horn or similar signaling device. If the situation is deemed an emergency, personnel will be instructed to leave the Site immediately, using the closest available evacuation route; otherwise, personnel will be expected to go through normal decontamination procedures before leaving the Site.

In either case, personnel will be instructed to meet at a central location to be determined by the HSO prior to the start of Work. A head count will be made to ensure that all personnel are safe and accounted for.

The HSO will contact appropriate response agencies, as warranted. Motorized equipment / machinery will be shut off before the Site is evacuated.

9.6 EMERGENCY RESPONSE AND AREA HOSPITALS

In case of emergency, call 911 or the appropriate individual authority:

EMERGENCY CONTACT NUMBERS	
Nearest Hospital	UHS Wilson Medical Center 33-57 Harrison Street Johnson City, New York 13790 Telephone: (607) 763-6000
Emergency Response Number	911
Poison Control Center	(800) 222-1222
State Police (Endwell) 3121 East Main Street, Endwell, New York 13760	(607) 754-3854
Johnson City Police Department 31 Avenue C, Johnson City, New York 13790	(607) 729-9321

Johnson City Fire Department 320 Harry L Drive, Johnson City, New York 13790	(607) 797-2311

<u>Directions to Nearest Hospital (UHS WILSON MEDICAL CENTER; Distance ~0.5 miles; Time ~11 minutes)</u>

1. Travel west on Avenue C to intersection with Main Street
2. Turn right onto Main Street
3. In approximately 0.2 mile, turn left onto Harrison Street
4. Approximately 0.1 mile after Main Street, UHS Wilson Medical Center Emergency Room will be on left

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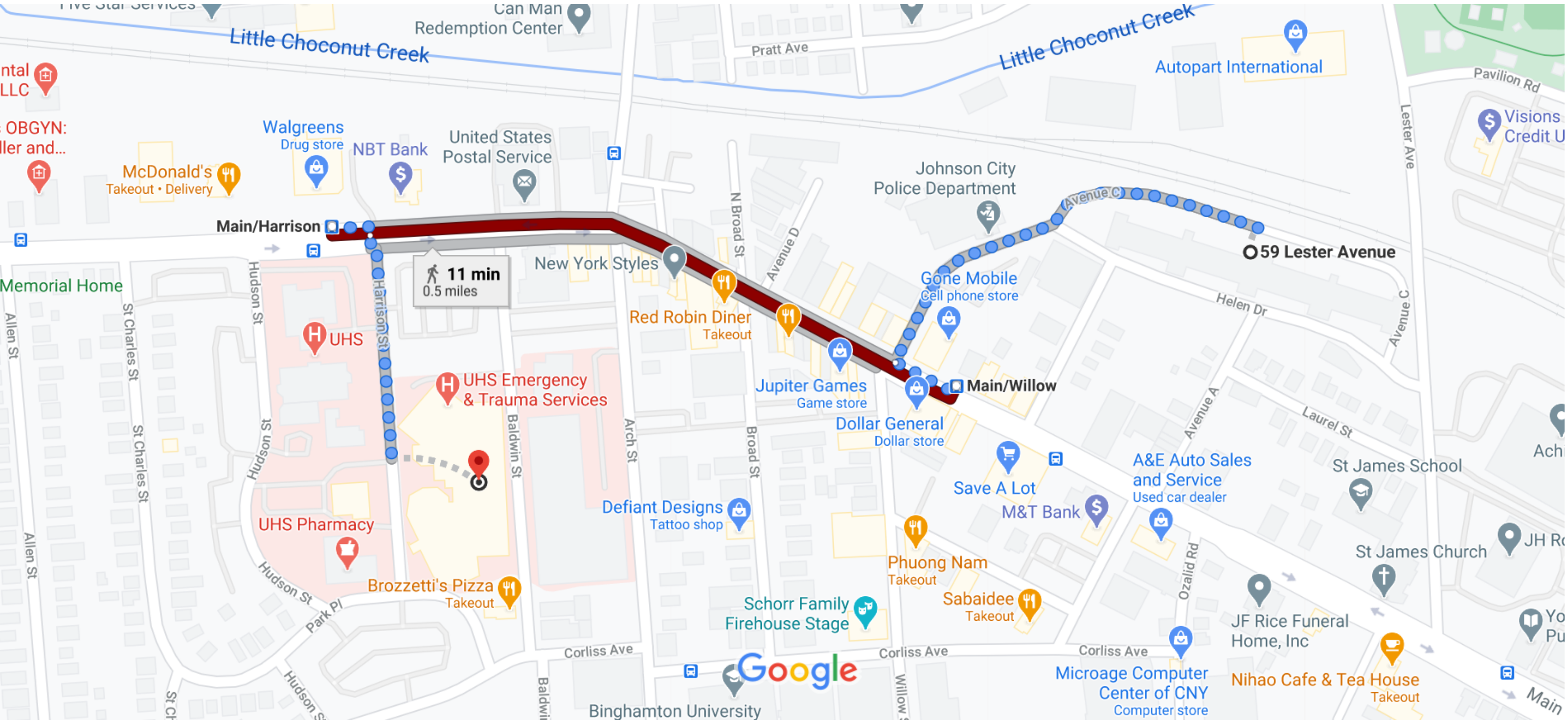
Google Maps 59 Lester Avenue, Johnson City, NY to UHS Wilson Medical Center 9:20 AM - 9:28 AM (8 min)



Map data ©2020 Google 200 ft

APPENDIX D

Community Air Monitoring Plan

COMMUNITY AIR MONITORING PLAN

Remedial Investigation Work Plan
EJ Victory Building
Johnson City, New York

October 2020

TABLE OF CONTENTS

1.0 INTRODUCTION

A Community Air Monitoring Plan (CAMP) requires real-time observation / monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites.

The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and / or work shutdown.

Continuous monitoring will be required for all ground intrusive activities, including but not limited to, soil excavation and handling, trenching, and the installation of monitoring wells.

2.0 GENERAL SITE CONDITIONS

The prevailing wind generally blows from west to east. However, monitoring locations will be adjusted on a daily or more frequent basis based on actual wind directions to provide an upwind and at least one downwind monitoring station. The attached Figure 1 illustrates the likely location of monitoring stations associated with the site.

At this time, the primary chemicals of concern include the following:

- Particulates (containing SVOC, metals)
- VOC

To date, the site has not been investigated for pesticides, herbicides, 1,4-Dioxane, or PFAS compounds, since these contaminants were not expected to be of primary of concern. As the investigation progresses and soil and groundwater data is collected for these other classes of chemicals, this CAMP will be updated to reflect this information.

3.0 VOC MONITORING, RESPONSE LEVELS, AND ACTIONS

VOCs will be monitored at the downwind perimeter of the immediate work area (i.e. – exclusion zone) on a continuous basis. Upwind concentrations will be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The monitoring of VOCs will be performed using a photo-ionization detector (PID), which will be calibrated daily. The PID will be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below:

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

- If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities will be halted, the source of vapors identified, corrective actions taken to abate emissions, and

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monitoring continued. After these steps, work activities will resume provided that the total organic vapor level half the distance to the nearest potential receptor or residential / commercial structure (but not less than 20 feet), is below 5 ppm over background for the 15-minute average.

- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities will be shut down.

All 15-minute readings will be recorded and be available for NYSDEC and NYSDOH personnel to review. Instantaneous readings, if any, used for decision purposes will also be recorded.

4.0 PARTICULATE MONITORING, RESPONSE LEVELS, AND ACTIONS

Particulate concentrations will be monitored continuously at the upwind and downwind perimeters of the work area or exclusion zone at temporary particulate monitoring stations. The particulate monitoring will be performed using a DUSTTRAK™ Aerosol Monitor Model 8520 (or similar). The device will be capable of measuring particulate matter less than 10 micrometers in size (PM-10), integrating over a period of 15 minutes for comparison to the airborne particulate action level, and equipped with an audible alarm to indicate exceedance of the following action levels:

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

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

In addition, fugitive dust migration will be visually assessed during all work activities.

All readings will be recorded and be available for NYSDEC and NYSDOH review.

5.0 MONITORING DURING NON-INTRUSIVE ACTIVITIES

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of groundwater samples from monitoring wells. Periodic monitoring during non-intrusive sample collection will consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap, monitoring during well baling/purging, and taking a reading prior to leaving a sample location.

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