REMEDIAL INVESTIGATION WORK PLAN

HAWKEYE TRADE CENTER & RESIDENCES
PARCEL 1B
1447 ST. PAUL STREET
ROCHESTER, NEW YORK 14650
NYSDEC SITE # C828208

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1.0 INTRODUCTION

This document presents details of work activities designed to support a Remedial Investigation (RI) at the future Hawkeye Trade Center & Residences located at 1447 St. Paul Street (Parcel 1B) in Rochester, New York (See **Figure 1**). WBS Capital, Inc. has entered the Brownfield Cleanup Program (BCP), as the volunteer, to conduct an RI and remediate the site for redevelopment into a mixture of commercial/office space, flex space, and manufacturing. A BCP project schedule is provided in **Figure 2**. This Remedial Investigation Work Plan (RIWP) specifically relates to the investigation of Parcel1B (Site). The location of Parcel 1B as it relates to the total complex is shown on **Figure 3**.

Environmental assessments and investigations that have been completed on the overall site concluded that there is impacted groundwater, impacted structures, and potentially impacted soil due to the former use of the overall site as an industrial/manufacturing facility for over 110 years.

The purpose of the RI is to address the following activities and requirements:

- Obtain environmental data from the site under site specific quality assurance and quality control (QA/QC) for sampling, analyses, and data evaluation.
- Provide plans and approaches for health and safety and air monitoring for field activities.
- Summarize previous environmental assessments and investigations.
- Describe and illustrate the physical conditions of the site including wetlands, surface waterbodies, ecological receptors, and significant utility corridors.
- Tabulate and illustrate proposed sampling plan to include location, matrix, depth, analytes, methodologies, rationale, and QA/QC.
- Provide a schedule of activities and details of the proposed investigation team.
- Describe the areas of concern including impacted soils, fill material, groundwater, indoor air, surface waterbodies, and building conditions.
- Determine the necessity of a fish and wildlife impact analysis and, if required, gather data to evaluate impacts.
- Complete a qualitative exposure assessment for human health and fish/wildlife resources.
- Ensure (1) field work is sufficiently comprehensive to evaluate natural attenuation of groundwater, as applicable, and (2) all waste derived from the field work is managed per DER-10 Section 3.3(e).

1.1 SITE HISTORY AND DESCRIPTION

The overall site has been associated with industrial/manufacturing since the early 1900s.The overall site had multiple uses associated with transportation including the New York State Railway machine and repair shop in 1911 and Rochester Transit Corporation rail car maintenance in the late 1930's. Eastman Kodak Company purchased the site in 1942 when they began manufacturing optical lenses and equipment using thoriated glass along with photo processing operations. Parcel 1B encompasses a total of 2.295 acres. Buildings 12, 12A and 4 were historically associated with Kodaks photo processing operations and the buildings were also used for office space, non-hazardous and hazardous waste storage and laboratory use. A former photo-processing wastewater transfer station was located just north of Building 12.

Former thorium glass settling pits were located near the southwest exterior corner of Building 12 and near the southwest exterior corner of Building 12A.

Potential sources of contamination from all past uses on Site including from a machine shop, metal stamping and plating and photographic products production include heavy metals, solvents, kerosene, and petroleum related compounds.

Specific former Parcel 1B building uses include:

Building 4 - Powerhouse Building
Building 12 - Offices, clean room, maintenance/ fabrication shops, photo processing
Building 12A - Offices, clean room, maintenance/ fabrication shops, photo processing

The Site is currently vacant and is zoned for M-1 industrial use. The overall site is surrounded by additional industrial uses, and residential zones begin a few blocks to the south, east and northeast of the Site. A school exists to the immediate north of the property and Seneca park zoned O-S for open space exists to the west along the Genesee River. The property is in the City of Rochester but north of downtown approximately half of a mile south of State Route 104. The Site is located at the intersection of St. Paul Street and Avenue E within the Group 14261 Neighborhood Revitalization Plan BOA. The Site is also in an En-Zone. The Site is surrounded by other former Kodak buildings (i.e., Parcels 3 and 1A) along its east border and the Genesee River to the west. See **Figure 3** for details of major infrastructure, utilities, surface waterbodies, and buildings that currently exist at the Site.

There are no major changes of topography on the Site, which is generally flat with a gentle slope westward towards the river. Site soil has been generally classified as fine sand and fine to coarse gravel with some silt and clay at deeper depths of soil borings. Silt and clay have been noted at shallower depths towards western edge of the property and the Genesee River gorge. Groundwater flow direction has been determined to flow west towards the Genesee River with a depth to groundwater of approximately 8 to 10 feet bgs. Much of the site is covered by impervious features such as building and paved parking lots. Depths and characteristics of the fill and native subsurface material at the Site have yet to be determined. The River is the only surface waterbody or wetland area of significance near the Site, and the Site is not within a floodplain. No known drinking water wells exist in the vicinity. See **Figure 4** for more details on wetlands and surface waterbodies.

1.2 CONTEMPLATED USE OF THE SITE

The proposed project is a multiuse commercial development that will include modifying the former Kodak Parcel 1B buildings into a mixture of commercial, office, storage, and flex space to promote economic growth in the area. The concept is to incentivize a variety of different businesses into the region by creating a business park atmosphere into this section of the City of Rochester. The total square footage per use category and estimated value are unknown currently.

1.3 PROJECT ORGANIZATION

The following personnel constitute the primary members of the project team:

Project Manager – Jason M. Brydges, P.E.
Engineers – John Berry, P.E. and Jason M. Brydges, P.E.
Field Technicians – John Boyd and Cory Lauber
Health and Safety Officer – Peter J. Gorton, CHCM
QA/QC – John Berry, P.E.
Project Geologist – John Boyd
Attorney – FL Gorman, Harris Beach
Asbestos/lead/universal waste subcontractor – AMD Environmental
Drilling/Excavation subcontractors – to be determined
Analytical Laboratory – to be determined

2.0 GOALS AND OBJECTIVES

2.1 RI OBJECTIVES

In general, an RI has the following objectives as described in NYCRR Part 375-1.8(e):

- Delineation of the extent of the contamination at and emanating from all media at the Site and the nature of that contamination;
- Characterization of the surface and subsurface characteristics of the Site, including topography, surface drainage, stratigraphy, depth to groundwater, and any aquifers that have been impacted or have the potential to be impacted;
- Identification of the sources of contamination, the migration pathways, and actual or potential receptors of contaminants;
- Evaluation of actual and potential threats to public health and the environment; and,
- Production of data of sufficient quality and quantity to support the necessity for, and the proposed extent of, remediation and to support the evaluation of proposed alternatives.

2.2 SPECIFIC GOALS

Based on the data collected to date and history of the Site, RI activities have been developed that will allow for determining depth of fill material, depth of native soil, depth to bedrock, and depth to groundwater. Limited Site knowledge to date indicates that depth to groundwater is approximately 8’ to 10’ bgs, but it is unknown if groundwater resides in the native soils, urban fill, or potentially bedrock. Vapor impacts to existing structures has already been established; however, the exact source in the subsurface has not been identified. Specific goals for the RI are as follows:

- Perform enough soil borings or test pits across the Site in a quasi-grid pattern primarily focusing on areas not investigated during the Phase II. Borings and pits will better delineate contamination and confirm depth of fill, native soil, groundwater, and bedrock, if sufficiently shallow.
- Collect and analyze representative surface/subsurface soil samples to supplement samples collected in the Phase II and better characterize fill soils and native soils to quantify and assess contamination;
- Install and sample groundwater wells to assess known contamination and its sources (i.e., on or off-Site), direction of groundwater flow, and potential impacts to the

Genesee River and adjacent properties including the school located adjacent north of the site;
- Investigate soils beneath the three (3) Site buildings as a potential source of the known chlorinated solvents/heavy metals in groundwater;
- Conduct building environmental condition assessments within the three (3) Site buildings;
- Perform a hydraulic assessment of the groundwater in the subsurface using the installed wells; and
- Fill any data gaps resulting from previous assessments.

To the extent possible, RI field work will also include the identification of any significant structures, sensitive areas, or appurtenances that could have an impact on contaminant migration or remediation, such as, subsurface utilities, drains leading from the Site buildings and known outfalls from the parcel to the Genesee River.

2.3 CONTAMINANTS AND AREAS OF CONCERN

Based on the previous environmental investigations, the primary contaminants of concern at the Site are metals, SVOCs and VOCs. Chlorinated solvent and metal compounds were detected in groundwater above NYSDEC TOGs groundwater standards in Phase 2 ESA monitoring wells west of Building12 and south of Building 12A. Elevated metals and petroleum related VOC and SVOC compounds above TOGs standards were detected in the monitoring wells directly north of Building 4. Sub-slab vapor analyses indicated TCE was present in sub slab and indoor air samples in all of the Site buildings the at concentrations requiring mitigation (buildings 12 and 12A) or resample/mitigate (building 4). The former UST area north of Building 4 and the dry well southeast of Building 2 are also considered areas of concern. See **Figure 5** for details on exceedances and areas of concern.

Drains and sumps within the buildings are also potential areas of concern regarding contamination sources based upon past use of Parcel 1B. These areas could be the source of some of the TCE contamination observed in site groundwater and sub-slab soil vapor. Site buildings have also been assessed for thorium contamination, and an unrestricted use determination from the NYSDOH has been granted, though, the former thorium glass settling pits depicted in Figure 7 within Parcel 1B are still to be considered areas of concern. The PCB Release Outlet at the west property line is also to be considered an area of concern. Asbestos containing material (ACM), lead-based paint, PCBs, mercury, etc. has not yet been surveyed within the buildings; however, through various site visits, the Site is anticipated to contain various quantities of these materials. These contaminants will not be the subject of the RI but will be addressed during development activities and selective demolition.

3.0 PAST ENVIRONMENTAL CONDITIONS/INVESTIGATIONS

3.1 DECEMBER 2003 – PHASE I ESA

There were significant findings of environmental conditions at the Site, which has been used for industrial or commercial operations since the 1880's. Most notably, the Site was used for manufacturing of optical and photographic products, maintenance of railcars, a gasoline filling station, and tool and dye operations. The following are Recognized Environmental Conditions (“RECs”) summarized from the Phase I ESA:

- The site of three former (removed) underground storage tanks (“USTs”) at Building 4, used for fuel oil. Contaminated soil and groundwater were discovered at the Building 4 UST site in 1989 during the tank removals; however, due to the low levels of contamination, no remediation was required by the New York State Department of Environmental Conservation (“NYSDEC”). The current environmental quality conditions of soil and groundwater at the former UST site are undetermined.

- The presence of or potential presence of thorium residue in or on the following areas or features: drain pipes and sewers in and/or adjacent to Buildings 5, 11A, 12 and 12A; apparatus inside Shed 1 and the Generator Shed (both located in the Building 5/12A courtyard); Building 12A return-air duct (4th floor to 9th floor fan room); and Building 12A fan room (9th floor). Thorium assessment and remediation were performed at several of the Hawkeye buildings in the early 1990’s. The New York State Department of Labor approved the remediation activities report and closed the site Radioactive Materials License; however, the report recognized that thorium residue remains in some inaccessible areas of the facility.

- Former (closed) thorium glass settling pits located at the following sites: west of Building 5; near the southwest exterior corner of Building 12; near the southwest exterior corner of Building 12A; and inside Building 11A (northwest corner). The current environmental quality conditions of soil and groundwater at the sites are undetermined.

- The site of a release at a former (inactive) photo processing wastewater transfer station located north of Building 12. The impact to the subsurface at the release site, if any, was not determined.

- The area formerly occupied by the Rochester Transit Corporation for use as an equipment repair shop (area currently below Buildings 5 and 12A), plus a coincidental area formerly occupied by a gasoline station (area currently below the southeast corner of Building 5). The impact from the operations, if any, is undetermined.

See **Figure 6** illustrating the proximity of various characteristics of the surrounding areas of the Site including sensitive receptors, sites logged in environmental databases, and floodplain areas.

3.2 JUNE 2005 – PHASE II ESA

The Phase II ESA was conducted to address the RECs established in the Phase I from 2003. Accordingly, soil and groundwater were investigated throughout the Site in areas known to contain previous manufacturing operations and commercial/industrial activities. See **Tables 1 and 2** for Phase II results from 2005. In summary, the investigation determined the following with respect to the Site and potential contaminants of concern:

- Some soil and groundwater samples collected within the Hawkeye manufacturing site indicate impacts of trichloroethylene and 1,2- dichloroethylene. 1,2-dichloroethylene may be a breakdown product of the trichloroethylene, but the absence of vinyl chloride, also a breakdown product of trichloroethylene, may indicate that trichloroethylene and 1,2-dichloroethylene have been used as industrial chemicals at the site by Kodak or previous property owners.
- The presence of TAL metals in soil and groundwater is ubiquitous across the project Site as anticipated. Common metals such as calcium, iron, magnesium, manganese and sodium were detected in the highest concentrations and widest ranges, but because they are common mineral-forming metals, their presence is not considered to be significant. Other metals concentrations in several samples exceed background levels.
- The analysis of a groundwater sample from the monitoring well just north of Building 4 included five VOCs that exceed the TOGS 1.1.1 levels: acetone, benzene, ethylbenzene, toluene and xylene. The detected VOCs are consistent with those chemicals in the related soil sample with the exception of carbon disulfide, which was not detected in the groundwater sample. The sample analysis detected the four SVOCs at concentrations that exceed TOGS 1.1.1 levels: acenaphthene; 2 methyl phenol; 3&4 methyl phenol; and phenol. Five TAL metals were detected at concentrations that exceed TOGS 1.1.1 levels: iron; magnesium; manganese; sodium; and thallium.

3.3 OCTOBER 2017 – PHASE II ESA

A second ESA was conducted in 2017 that included 31 soil borings, 13 overburden groundwater monitoring wells, 4 test pits, laboratory analysis of soil and groundwater samples, and a limited SVI assessment of Site buildings. This ESA was performed to further evaluate impacts identified in 2005, and results indicate potential impacts related to petroleum, chlorinated solvents, metals, PCBs, soil vapor, and thorium. Only two new monitoring wells were installed in Parcel 1B, however, both were dry at the time of sampling. Four (4) wells installed during the 2004 ESA were resampled and only acetone and Sodium were detected above TOGs standards.

IN parcels other than Parcel 1B, Chlorinated solvents were detected at low-levels in soil and groundwater at the Hawkeye Facility (i.e., proximate Site Buildings and not at adjacent parking lots). Chlorinated solvents were not detected in soil above Unrestricted Use SCOs; however, chlorinated solvents including TCE and cis-1,2-dichloroethene were detected in groundwater in several wells at the Hawkeye Facility slightly above NYSDEC Groundwater Standards. TCE was detected up to 15.4 ppb (MW-07) and cis-1,2-dichloroethene was detected up to 5.4 ppb (IB11AW). Refer Table 3 for historical testing data.

A specific source of the chlorinated solvent impacts identified in groundwater at the Site has not been identified; however, the low-level, wide-spread nature of these impacts may be indicative of multiple discrete sources (e.g., failed drains/piping, poor housekeeping, waste storage, etc.) from the prior historical uses of chlorinated solvents at the Site. SVI results (see below) indicate sources of the low-level concentrations of chlorinated solvents observed in groundwater may be present beneath building footprints.

Urban fill material consisting of wood, glass and brick was observed in various parking lots throughout the entire Hawkeye facility at depths ranging from 0.5 to 4.0-ft bgs. Several metals were identified in soil and groundwater samples at concentrations exceeding SCOs, and these results are consistent with the 2005 Phase II (e.g., cadmium, lead, sodium magnesium, and iron). The presence of these metals in groundwater may be from naturally occurring conditions.

SVI sampling at the Hawkeye facility identified concentrations of TCE in sub-slab vapor and indoor air in 6 of the 8 buildings that warrant mitigation including Buildings 5, 10, 11, 11A, 12, and 12A. Although SVI testing did not result in mitigation for Buildings 4 and 6, additional monitoring and investigation in these buildings was recommended. Since the footprint of the entire complex includes approximately 120,000-square feet and only 9 locations were selected for SVI investigation, all buildings should be considered as candidates for installation for sub-slab depressurization systems. Lastly, thorium isotopes were detected in soil and groundwater, but at concentrations below applicable regulatory comparison criteria (i.e., concentrations in soil were compared to the General Soil Screening Levels for Radionuclides: Migration to Groundwater: 20DAF obtained from Appendix A of the USEPA's Soil Screening Guidance for Radionuclides, and concentrations in groundwater were compared to the Radionuclide Drinking Water Maximum Contaminant Levels obtained from the USEPA's Soil Screening Guidance for Radionuclides Technical Background Document). See **Tables 3-5** for Phase II results from 2017.

4.0 INTERIM REMEDIAL MEASURE (IRM)

A primary objective of remediation is to stabilize sources of contamination identified in media to reduce or eliminate receptor exposure to contaminants or to contain migration of contamination. IRMs are actions taken to mitigate exposures before the completion of the RI and remedial alternative selection. Examples of typical IRMs include the removal of source areas/hotspots/wastes, construction of collection or recovery systems, installation of engineered barriers and controls, and installation of vapor control systems.

If the need for implementing an IRM is determined, then the DEC must be notified and the IRM defined as emergency or non-emergency. Emergency IRMs are addressed as a spill response and are time-critical that are not subject to DER-10 (i.e., other guidance applies, such as CERCLA, spill response guidance manual, etc.). Non-emergency IRMs such as drum removals, construction of fencing, and posting of warning signs can be performed at any time during the BCP, but in response to existing or potential exposures at the Site. These are best utilized when it is cost effective to complete the IRM prior to the remedial investigation and remedy selection process. In these cases, DER-10 should be followed and include corresponding documentation and oversight/approval by DEC.

The most significant advantage to using IRMs is the reduction in schedule of any impending remedial activities since they may be conducted concurrently with sampling to delineate the contamination and to confirm contaminant removal. The entire Hawkeye facility possesses potential exposures from SVI and scheduling issues that require the use of an IRM. A comprehensive inspection, building design plan review, and sub slab vacuum analysis of the Hawkeye Facility has been performed. Based upon the data obtained, a Sub-Slab Depressurization System (SSDS) has been designed and installed in Buildings 12 and 12A to prevent suspect air contaminants from entering the building via soil vapor intrusion.

5.0 INVESTIGATION SCOPE OF WORK

5.1 INTRODUCTION

The investigation will include soil analyses, groundwater analyses, hydraulic assessment, and building assessments. Additional soil vapor assessment will not be required, as the proposed IRM (i.e., SSDS) as described above will be performed. All field work will be completed in accordance with the Health and Safety Plan (HASP) provided in **Appendix A**. Asbestos, lead based paint, mold, and universal waste will also be surveyed and provided to the NYSDEC upon completion. This survey and selective interior demolition anticipated for Site re-development will occur independently of the following RI work activities:

- Soil investigation (soil borings, test pits and sampling and analyses);
- Groundwater investigation (well installation, sampling, and analyses);
- Hazardous materials inspection (ACM, LBP, and universal waste);
- Building inventory assessment (as a supplement to SSDS installation);
- Outfall assessments and sampling; and,
- Hydraulic assessment of subsurface groundwater.

It is important to note that the soil investigation will address sampling and analyses beneath and in proximity to the Site buildings based on building access.

5.2 SURFACE AND SUBSURFACE SOIL

Soil borings will be completed across the Site with a focus on (1) previously identified impacted areas, (2) areas where no investigation has been performed, and (3) interior locations of potential sources of contamination, such as drains and sumps (See **Figure 7**). The precise sampling locations will be based on real-time field observations and will specifically target potential contaminant features while ensuring that areas of concern are examined (e.g., proximity to drains/sumps, soils/groundwater below buildings, etc.).

It is anticipated that approximately 21 soil borings will be completed within Parcel 1B. At least six (6) borings are proposed within the Three (3) buildings (two each Building) to better understand the nature and extent of soil impacts beneath the buildings, particularly the TCE exceedances in the sub-slab vapors noted in the SVI investigations. Three (3) soil borings are proposed at the former Thorium Glass Settling Pits (one (1) at each of the three (3) pits).

The primary purpose of the subsurface assessment is to visually inspect and characterize surface and subsurface soil conditions across the entire Site. Secondarily, the extent of known contamination should be quantified as data allows. The borings will be advanced to a depth of approximately 16 feet below ground surface (bgs) or to refusal using Geoprobe® direct push technology. Continuous soil sampling will be conducted using the Geoprobe® with a two-inch diameter sampler. At each boring location the following will be recorded:

- Thickness and characteristics of the cover/fill material;
- Depth to bedrock, if encountered;
- Depth to the water table, if encountered;

- Thickness and characteristics of the native soil, if encountered;
- Photoionization detector (PID) screening results; and
- Samples collected at an estimated depth.

A detailed log of these records will be maintained to assist field personnel in selecting most appropriate sample at each location, and to supplement future analytical results. An estimated 30 soil samples from the surface and subsurface will be collected for laboratory analyses. Surface samples will be collected from 0-2" in depth. Samples will be selected based upon (1) areas that appear to be impacted whether native or fill, (2) areas of natural soil at interface with fill material, and (3) known fill material that may or may not be impacted but believed to represent Site soils. Proposed soil samples to be collected are summarized in **Appendix B** – Quality Assurance/Quality Control Plan.

The soil samples will be analyzed by a NYSDOH environmental laboratory accreditation program (ELAP) certified laboratory that produces NYSDEC Category B data package deliverables. Data Usability Summary Reports (DUSRs) will be prepared for all samples. All samples will be analyzed for the full Part 375 Brownfields constituent list plus Tentatively Identified Compounds (TICs), and emerging contaminants which includes the following:

- VOCs (not for surface samples)
- SVOCs
- Metals
- PCBs
- Pesticides
- 1,4-dioxane
- PFOA/PFOS

In addition to soil sampling for the above constituent list at the three Former Thorium Glass Settling Pits soil samples will be collected at each pit and sent for alpha spectroscopy – isotopic thorium and gamma spectroscopy. Any subsurface disturbance, boring or test pit, will be performed at a minimum distance of 2.5 feet away from marked utilities to reduce the risk damaging an underground utility line. All boreholes will be filled with indigenous soil or clean sand prior to leaving each location. Field equipment will be operated in accordance with standard practices and in a safe and efficient manner as to minimize any hydraulic system leaks or lubricant and fuel leaks (See **Appendix A** – HASP for details).

Additional field activities performed by the geologist/technician include properly labeling, packaging, delivering samples to the laboratory; supervising field operations; and completing boring logs, which can be performed in the office after recording field notes. The geologist/technician will update the Project Manager at least daily on progress in the field and results of the subsurface investigation. No major changes in the subsurface investigations will occur unless approved by the Project Manager, who will also notify the Client and NYSDEC regarding project developments. A detailed description of the sampling methods is provided in the **Appendix C** – Field Sampling Plan.

5.3 GROUNDWATER

Seven (7) groundwater monitoring wells will be installed (see **Figure 7**) using a conventional truck mounted drill rig as accessibility allows. Groundwater was detected in the most recent Phase II ESA at approximately 6 feet bgs within the overburden; however, bedrock appears to be shallow as well at approximately 10 feet bgs. This is not unusual as the Site is in proximity to the Genesee River gorge and the presence of bedrock is evident within 100 yards to the west. Accordingly, it is anticipated that most of the groundwater wells will be installed into bedrock with a minimum quantity of three bedrock wells. The wells will have a 4-inch diameter PVC casing installed into overburden and bedrock materials. The casing will be allowed to set over night with the core approximately 10 feet into the observed groundwater table. The location of wells within the buildings will be subject to access conditions which may limit where a conventional drill rig may be used. Geoprobe installed wells within certain buildings maybe an alternative and will be discussed with NYSDEC after access is assessed.

The data obtained from the initial well installation, such as soil type and bedrock/groundwater depth, will be used to guide the installation of the remaining wells with the understanding that at least 3 wells will be installed into bedrock. In addition, the location of interior wells will consider the presence of drains or sumps within the building and information obtained from interior soil borings. Installation of wells will also adhere to the requirements provided in the Field Sampling Plan provided in **Appendix C**. Boring logs and well completion diagrams will be provided in the RI report. All field work will adhere to the HASP provided in **Appendix A**.

A minimum of 1 groundwater sample will be collected from each of the seven (7) wells. A second round of groundwater sampling will be determined, in consultation with the NYSDEC, to glean more physical and contamination data based upon the results of the first round of sampling (e.g., seasonal influences on water table, modification of analyte list, changes in number of wells, etc.). Well development and sampling will be in accordance with the **Appendix C** Field Sampling Plan. Sampling of emerging contaminates (PFAS) will follow the NYSDEC July 2018 Groundwater Sampling for Emerging Contaminates and its August 8,2018 revision provided in Attachment A of the **Appendix C** Field Sampling Plan. Groundwater samples will be submitted to the same New York State ELAP-certified laboratory and analyzed for the following Part 375 brownfield constituents and emerging contaminants:

- VOCs + TICs
- SVOCs + TICs
- Metals
- PCBs
- Pesticides
- 1,4-dioxane
- PFOA/PFOS

All sample analysis will be in accordance with ASP, Cat B requirements. QA/QC requirements for all sample analysis are provided in **Appendix B** QA/QC Plan that summarizes the number of Groundwater samples to be collected. All detected sample concentrations will be included in a table and compared to NYSDEC Groundwater Standards (TOGS).

5.4 SOIL VAPOR INTRUSION INVESTIGATION

The three (3) buildings on Site have already undergone a soil vapor intrusion investigation. The

2017 Phase II ESA results from the evaluation indicate concentrations of TCE in sub-slab vapor and indoor air that warrants mitigation in buildings 12 and 12A and resampling or mitigation in building 4 (see **Table 5**). As a result, the IRM described in Section 4 will be undertaken to remedy the elevated concentrations of TCE beneath and within the buildings. Therefore, no additional SVI investigation will be warranted during this RI effort. An inventory assessment of all buildings will be performed, however, to help identify any potential volatile contaminant sources originating from within the building that could impact the vapor exceedances.

5.5 HAZARDOUS MATERIALS BUILDING INSPECTION

A building inspection will be performed to qualify and quantify, where possible, various hazardous materials such as asbestos containing materials (ACM), lead based paint, PCB containing materials, mercury, and other universal waste within all three (3) buildings. ACM sampling activities will be performed in accordance with guidelines and techniques identified in NY Code Rule 56. Bulk sample analyses will be performed via PLM / TEM according to EPA Method 198.4 with a 5 Day TAT upon receipt of samples. An inspection-specific Health and Safety Plan will be developed to comply with NYS HCR project requirements. Representative lead-based paint inspection services will be conducted for all renovations areas according to Title X chapter 7 of the HUD Guidelines. Lastly, representative PCB caulk sampling in accordance with EPA guidelines and regulations in representative locations throughout each building will also be conducted.

5.6 OUTFALL INVESTIGATION/ASSESSMENT

There are four (4) outfalls identified extending to the west from the Parcel 1B western property line. They are identified as 1 through 4 on Figure 8 and identified as below:

1 – Photo Process Waste Release Outfall
2 – PCB Release Outfall
3 – Thorium Settling Pit Outfall
4 – Thorium Settling Pit Outfall

With the use of a backhoe each outfall will be uncovered within the Parcel 1B property. Where possible sediment samples will be collected from the outfall pipes or uncovered basins within the property.

5.7 GROUNDWATER HYDRAULIC ASSESSMENT

Hydraulic assessment includes the completion of hydraulic conductivity tests and the measurement of water levels in monitoring wells. Hydraulic conductivity testing will be performed on the newly installed monitoring wells using a variable head method. Variable head tests will be completed using a stainless steel or PVC slug to displace water within the well or by removing water from the well with a bailer or pump. The recovery of the initial water level is then measured with respect to time. Data obtained using this test procedures will be evaluated using procedures presented in “The Bouwer and Rice Slug Test - An Update”, Bouwer, H., Groundwater Journal, Vol. 27, No. 3, May-June 1989, or similar method.

5.8 PERIMETER SOIL GAS INVESTIGATION

To evaluate the possibility of soil gas concerns at the northern off-site property perimeter a soil vapor sample will be collected along the Northern parcel 1B boundary. A single probe hole will be installed along the northern perimeter by use of a Geoprobe at the location shown on **Figure 7.** The Geoprobe will install a 2-inch diameter hole to the approximate top of groundwater level (6+/- feet below grade) or bedrock which ever encountered first. A stainless-steel vapor probe will be set at this level with ¼ inch tubing to the surface and connected with a Summa canister. The sample will be submitted to a NYSDEC certified contract laboratory and analyzed for TCL VOCs by EPA method TO-15.

5.9 SUPPLEMENTAL FIELD INVESTIGATIONS

As previously described in Sections 2 and 3, the Hawkeye facility has a history of producing thoriated glass using the thorium 232 isotope, and the facility was released for unrestricted use upon license termination in 1995. Despite past investigations, surveys, and remedial efforts for addressing thorium wastes, the areas and soils encountered during this investigation will be surveyed and documented. For example, the following standard radiological protocol will be utilized:

- Use of calibrated gamma radiation equipment,
- Source check gamma radiation equipment,
- Obtain daily gamma radiation background measurements,
- Survey surface area for intended well or boring,
- Record downhole measurements of gamma radiation,
- Survey spoils, as produced, from soil borings and well cuttings, and
- Document gamma radiation readings in counts per minute (cpm).

Additionally, with respect to gamma radiation protocol, samples collected for Part 375/BCP RI purposes in an area that exhibits gamma radiation in excess of twice background will be analyzed for alpha and gamma spectroscopy. This will be indicted by the field technician on the chain of custody.

Laboratory data generated from the RI activities described in Section 5 will be submitted to NYSDEC as electronic data deliverables (EDD) that comply with the State's Electronic Data Warehouse Standards. The data will be evaluated by NYSDEC to determine if additional investigation activities are needed beyond what is described herein. Additional assessment may include an additional subsurface boring or test trench and sample analysis limited to contaminants identified during the RI program. Should the site investigations indicate the likelihood of site contaminants leaching outside the Site boundary, additional assessment for potential off-site soil vapor intrusion may also be necessary.

6.0 QUALITATIVE EXPOSURE ASSESSMENT

Qualitative exposure assessments will be completed in accordance with DER-10 sections 3.3(c) 3 & 4. The assessments will include what impacts site contaminates and field activities may have, if any, on human health and fish and wildlife resources considering all media (ground/surface water, soil, soil vapor, ambient air and biota).

The qualitative human health exposure assessment will evaluate the five elements (DER-10 Appendix 3B) associated with exposure pathways and describe how each of these elements pertains to the Site. The exposure pathway elements that will be addressed include:

- A description of the contaminant source(s) including the location of the contaminant release to the environment (any waste disposal area or point of discharge) or if the original source is unknown, the contaminated environmental medium (soil, indoor or outdoor air, biota, water) at the point of exposure;
- An explanation of the contaminant release and transport mechanisms to the exposed population;
- Identification of all potential exposure point(s) where actual or potential human contact with a contaminated medium may occur;
- Description(s) of the route(s) of exposure (i.e., ingestion, inhalation, dermal absorption); and,
- A characterization of the receptor populations who may be exposed to contaminants at a point of exposure.

As called for in DER-10 for volunteers in the BCP, sufficient field information and sampling data will be provided to identify the presence of contamination, if any, that maybe leaving the Site to support qualitative off-site exposure assessments by others.

DER-10 section 3.10.1 and Appendix 3C provide guidance on determining if a fish and wildlife resource impact analysis (FWRIA) is necessary. After or during the RI field activities, the determination will be made regarding the process to perform an FWRIA Part 1, Part 2 or both. Should the decision key indicate a Part 1 impact analyses is required, resource characterization activities performed by a qualified individual per DER-10 section 1.5(a)3.ii will be implemented and include the following:

1. Identify all fish and wildlife resources based upon knowledge of the site and a search of DEC records and/or other sources
2. Describe the resources on the site and within one-quarter mile of the site
3. Identify contaminant migration pathways and any fish and wildlife exposure pathways
4. Identify contaminants of ecological concern
5. Based upon the resources and pathways identified and the toxicity of the contaminants of ecological concern, the FWRIA Part 1 should draw conclusions regarding the actual or potential adverse impacts to fish and wildlife resources

Documentation and results from the FWRIA Part 1 will be submitted to the NYSDEC, who will determine whether the fish and wildlife resources identified constitute an important component of the environment at or near the site; and whether there are actual or potential impacts to the resources. For sites where, further evaluation or definition of ecological impact is necessary, DEC will identify the need for a FWRIA Part 2 ecological impact assessment and request a work plan that includes provisions for gathering the necessary data to define and evaluate the adverse impacts to the resources. It should be noted that DEC's Division of Fish Wildlife and Marine Resources shall be contacted at least 7 calendar days prior to the initiation of any field work or biota sampling related to the FWRIA.

7.0 REPORTING

An RI report will be prepared in accordance with the applicable requirements of DER-10 and Part 375. A conceptual site model, as defined and in accordance with DER-10 Section 3.2.2 will be provided in the RI report. Pertinent field logs and forms generated during the remedial investigation activities are presented in **Appendix D**. A schedule of all BCP activities including the RI field work is provided in **Figure 2**. The RI report will be drafted soon after all work plan activities have been completed. It is anticipated that the RI report will include a corresponding alternatives analysis report (AAR) that (1) evaluates remedial alternatives based upon the data obtained in the RI, and (2) initiates the 45-day public comment period for the generation of the remedial action work plan (RAWP) and final decision document produced by the NYSDEC.

A Citizen Participation Plan (CPP) has been prepared for the Site in accordance with the requirements outlined in NYSDEC's DER- 23 Citizen Participation Handbook for Remedial Programs, issued January 2010, as amended. The CPP provides for issuance of fact sheets and public meetings at various stages in the investigation/remedial process. A fact sheet will be prepared by NYSDEC to announce the availability of the RIWP for review, followed by a 30-day comment period. A public meeting will be held, if requested, during the public comment period. A copy of this RIWP will be made available for public review at Lincoln Branch Library, and an announcement will be issued in the Environmental Notice Bulletin. The major components of the CPP are as follows:

- Names and addresses of the interested public as set forth on the Brownfield site contact list provided with the BCP application;
- Identification of major issues of public concern related to the site and that may be encountered during the remediation project;
- A description of citizens participation activities already performed and to be performed during remediation;
- Identification of document repositories for the project; and,
- A description and schedule of public participation activities that are either required by law or needed to address public concerns related to the Site.

Fact sheets documenting the goals and progress of the project will be prepared at key milestones during the project and distributed to those on the project mailing list. The distribution list is included in the CPP, which is provided in **Appendix E.**

8.0 WORK PLAN CERTIFICATION

Jason M. Brydges certifies that he is currently a NYS registered professional engineers as defined in 6 NYCRR Part 375 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).

8-21-20

Jason M. Brydges, PE

FIGURES

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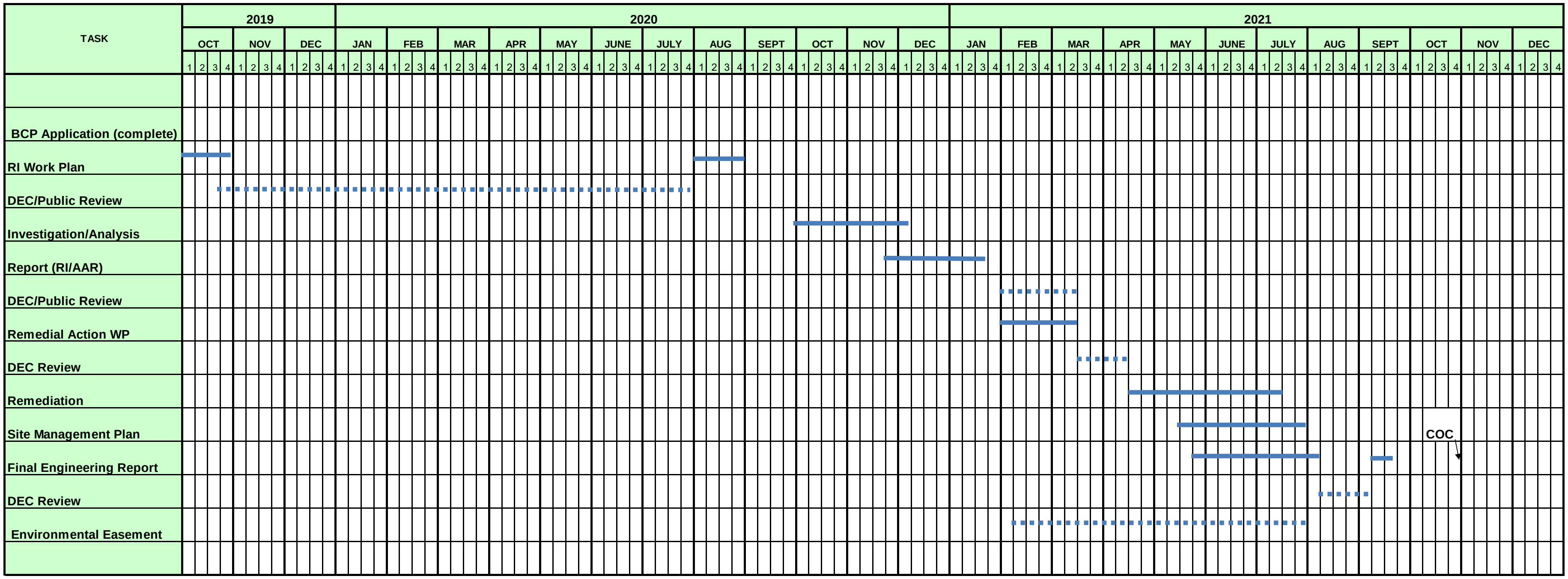
Figure 1: USGS Topo Map

1405 St. Paul Street	5/21/2019
Rochester, NY	WBS Capital, Inc.

FIGURE 2

BCP PROJECT SCHEDULE (1)   AUGUST 2020

HAWKEYE TRADE CENTER AND RESIDENCES- PARCEL 1B



(1) - Assumes a 2021 COC required

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Figure 3
Site Survey Details

WBS Capital, INC.
Hawkeye Parcel 1A, 1B, 3 BCP Project
Rochester, New York

06-12-2019	SCALE: N/A	SHEET 1 OF 1

U.S. Fish and Wildlife Service, National Standards and Support Team, wetlands_team@fws.gov

🟦 Estuarine and Marine Deepwater

🟩 Estuarine and Marine Wetland

🟩 Freshwater Emergent Wetland

🟩 Freshwater Forested/Shrub Wetland

🟦 Freshwater Pond

🟪 Lake

🟫 Other

🟦 Riverine

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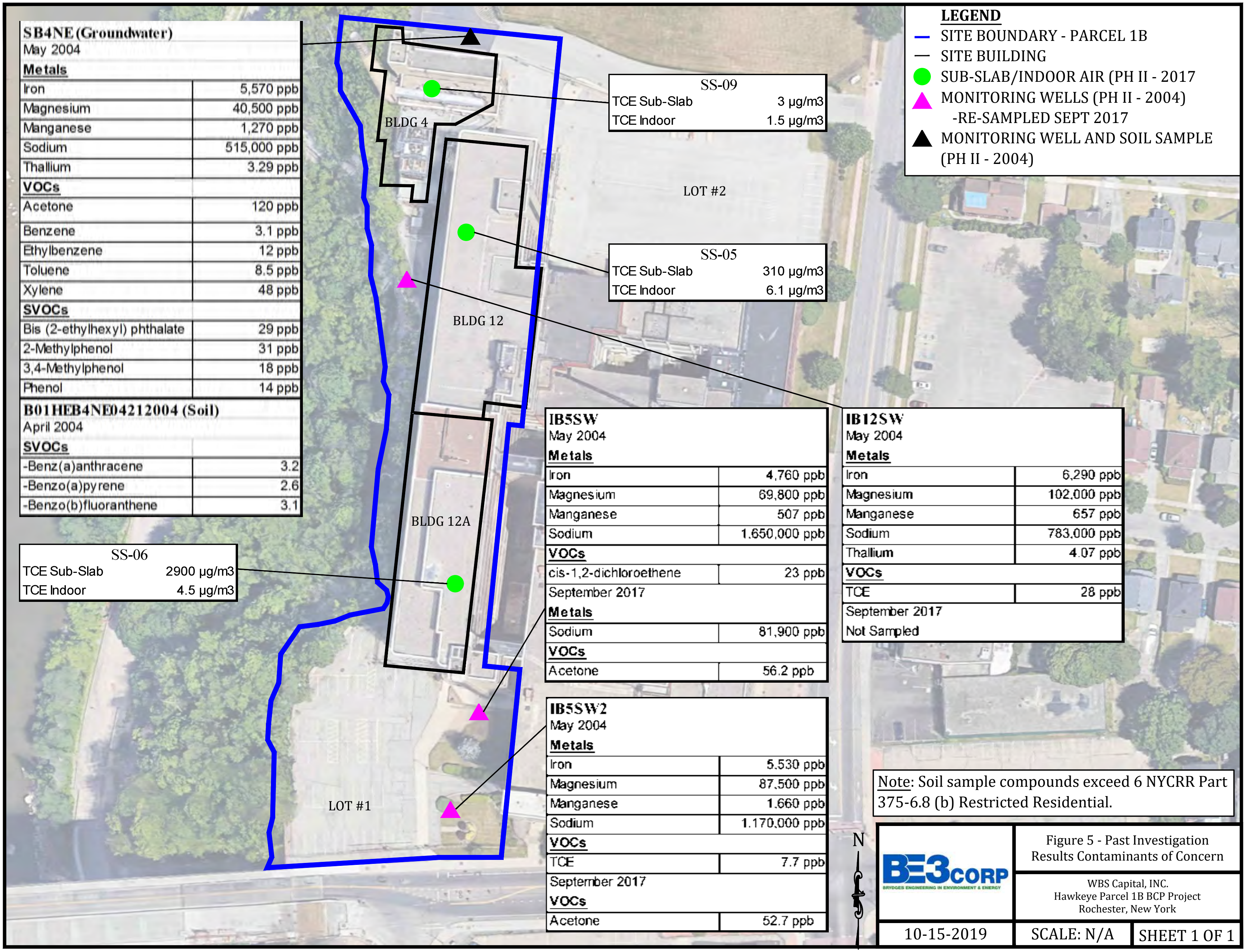
Figure 4: Wetland and Surface Waterbodies

WBS Capital, INC.
Hawkeye Parcel 1A, 1B,3 BCP Project
Rochester, New York

06-05-2019
SCALE: N/A
SHEET 1 OF 1



SB4NE (Groundwater)
May 2004

Metals	
Iron	5,570 ppb
Magnesium	40,500 ppb
Manganese	1,270 ppb
Sodium	515,000 ppb
Thallium	3.29 ppb
VOCs	
Acetone	120 ppb
Benzene	3.1 ppb
Ethylbenzene	12 ppb
Toluene	8.5 ppb
Xylene	48 ppb
SVOCs	
Bis (2-ethylhexyl) phthalate	29 ppb
2-Methylphenol	31 ppb
3,4-Methylphenol	18 ppb
Phenol	14 ppb

B01HEB4NE04212004 (Soil)
April 2004

SVOCs	
-Benz(a)anthracene	3.2
-Benzo(a)pyrene	2.6
-Benzo(b)fluoranthene	3.1

SS-09

TCE Sub-Slab	3 µg/m3
TCE Indoor	1.5 µg/m3

SS-05

TCE Sub-Slab	310 µg/m3
TCE Indoor	6.1 µg/m3

SS-06

TCE Sub-Slab	2900 µg/m3
TCE Indoor	4.5 µg/m3

IB5SW
May 2004

Metals	
Iron	4,760 ppb
Magnesium	69,800 ppb
Manganese	507 ppb
Sodium	1,650,000 ppb
VOCs	
cis-1,2-dichloroethene	23 ppb
September 2017	
Metals	
Sodium	81,900 ppb
VOCs	
Acetone	56.2 ppb

IB12SW
May 2004

Metals	
Iron	6,290 ppb
Magnesium	102,000 ppb
Manganese	657 ppb
Sodium	783,000 ppb
Thallium	4.07 ppb
VOCs	
TCE	28 ppb
September 2017	
Not Sampled	

IB5SW2
May 2004

Metals	
Iron	5,530 ppb
Magnesium	87,500 ppb
Manganese	1,660 ppb
Sodium	1,170,000 ppb
VOCs	
TCE	7.7 ppb
September 2017	
VOCs	
Acetone	52.7 ppb

LEGEND
— SITE BOUNDARY - PARCEL 1B
— SITE BUILDING
● SUB-SLAB/INDOOR AIR (PH II - 2017
▲ MONITORING WELLS (PH II - 2004)
-RE-SAMPLED SEPT 2017
▲ MONITORING WELL AND SOIL SAMPLE (PH II - 2004)

Note: Soil sample compounds exceed 6 NYCRR Part 375-6.8 (b) Restricted Residential.

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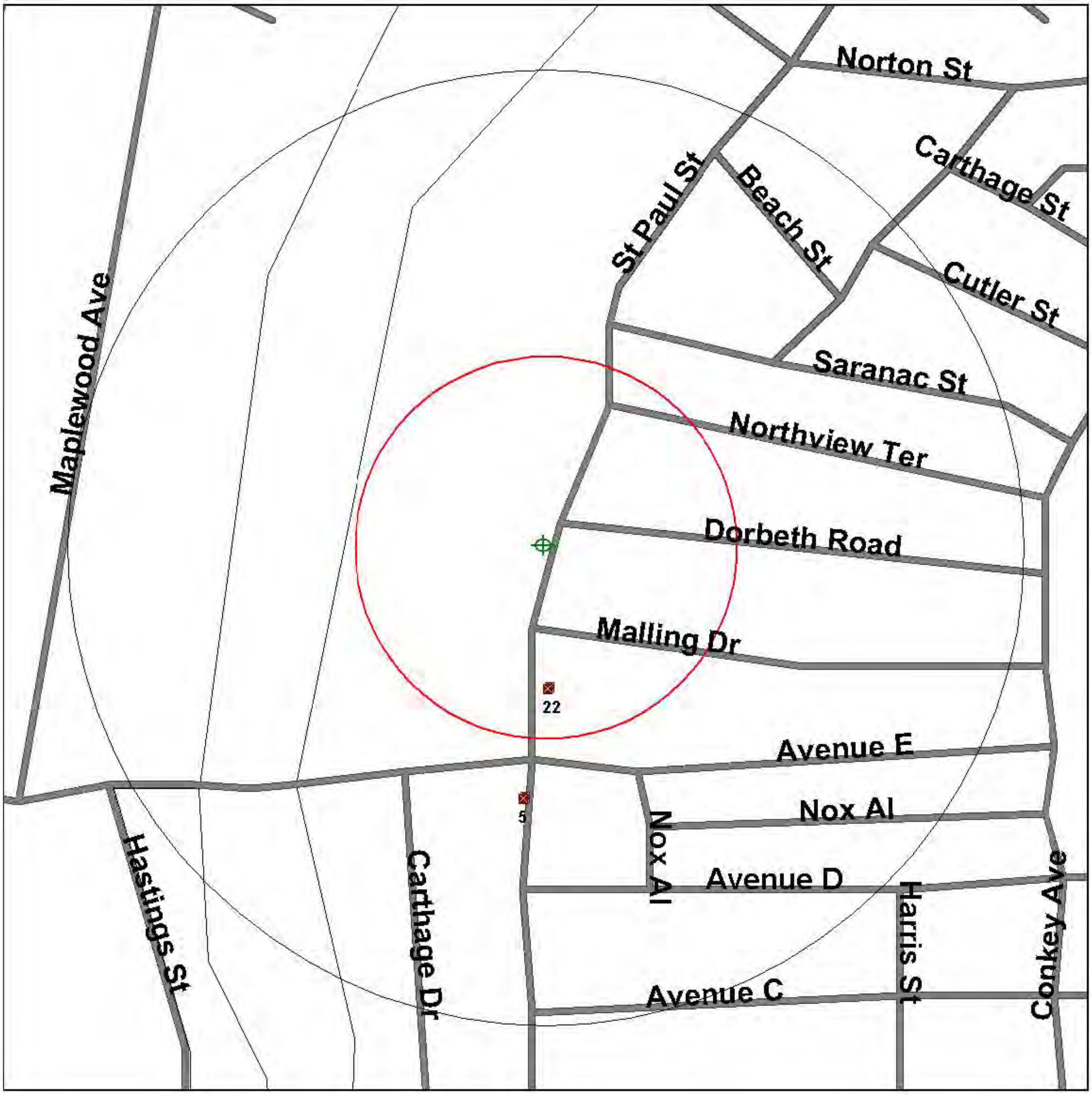
Figure 5 - Past Investigation Results Contaminants of Concern

WBS Capital, INC.
Hawkeye Parcel 1B BCP Project
Rochester, New York

10-15-2019
SCALE: N/A
SHEET 1 OF 1



Source: 1999 U.S. Census TIGER Files

Target Site (Latitude: 43.182788 Longitude: -77.625232) .... ⌖

Identified Site, Multiple Sites, Receptor .... ☒ ☒ ⚑

NPL, Solid Waste Landfill (SWL) or Hazardous Waste .... ▨

Railroads .... —

Black Rings Represent 1/4 Mile Radii; Red Ring Represents 500 ft. Radius

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Figure 6: Environmental Records Radius Map

Hawkeye Parcel 1B BCP
Project Rochester, New York
WBS Capital, Inc.

05-30-2019

SCALE: N/A

SHEET OF 1

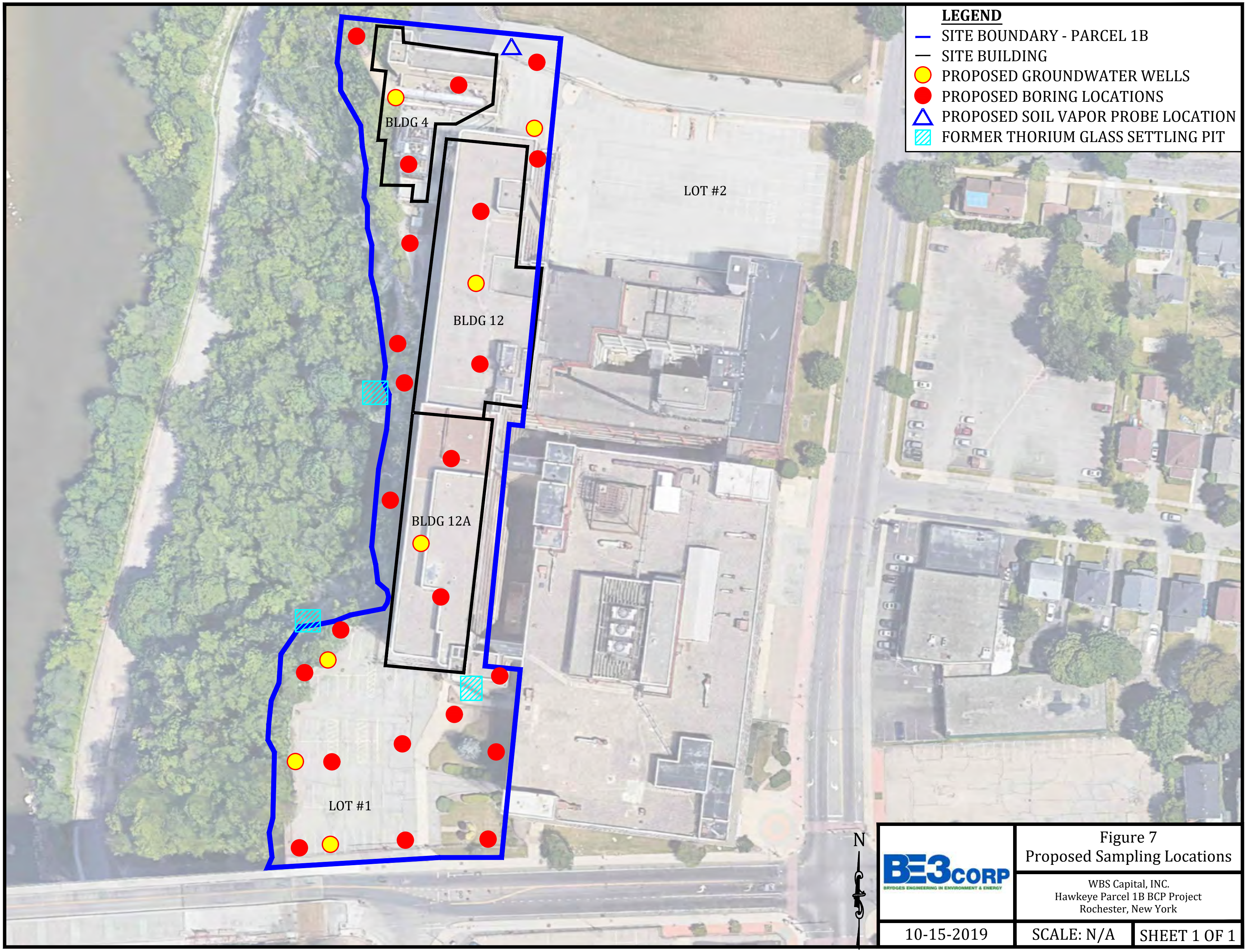
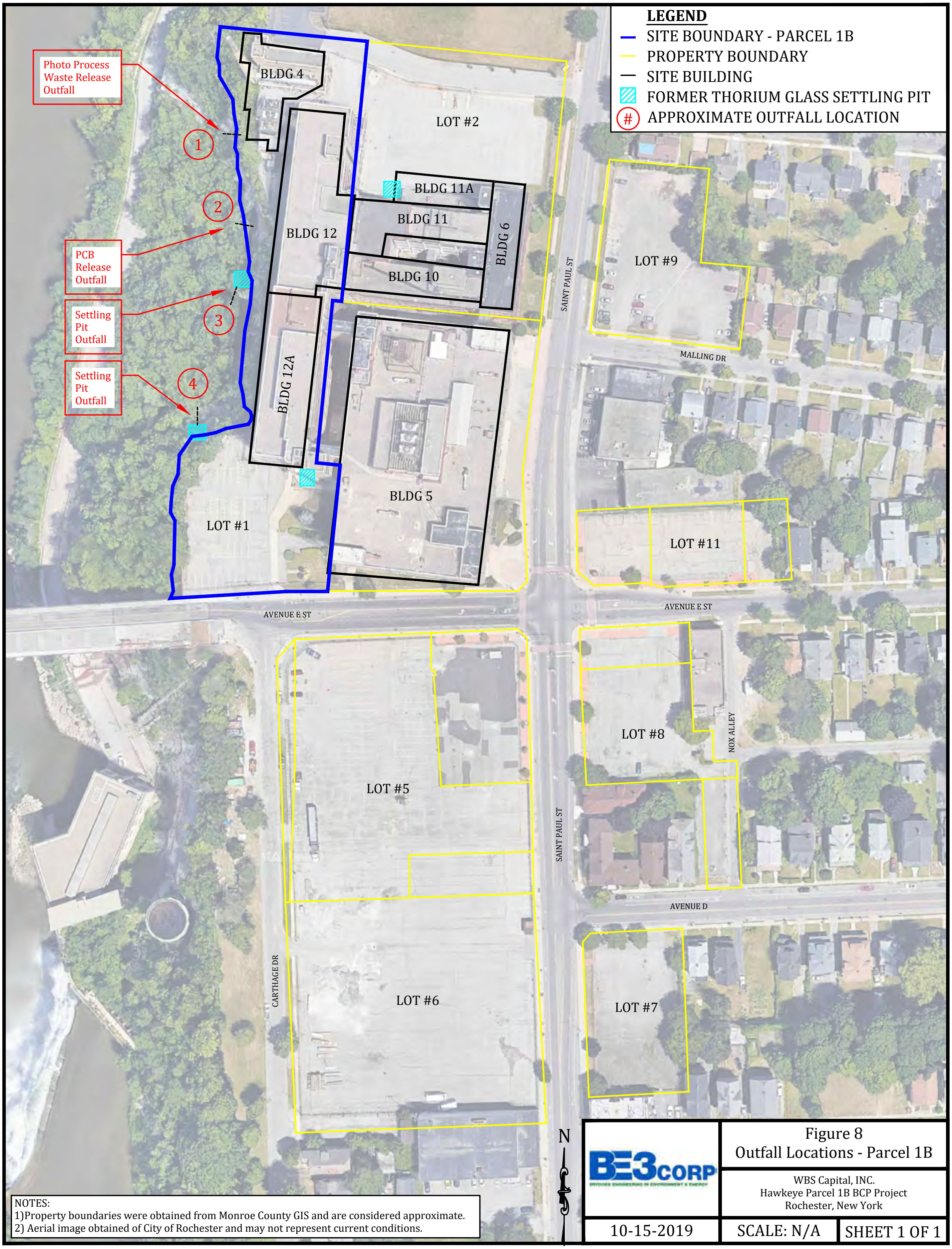


Figure 7
Proposed Sampling Locations

WBS Capital, INC.
Hawkeye Parcel 1B BCP Project
Rochester, New York

10-15-2019	SCALE: N/A	SHEET 1 OF 1



NOTES:
1)Property boundaries were obtained from Monroe County GIS and are considered approximate.
2) Aerial image obtained of City of Rochester and may not represent current conditions.

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Figure 8
Outfall Locations - Parcel 1B

WBS Capital, INC.
Hawkeye Parcel 1B BCP Project
Rochester, New York

10-15-2019	SCALE: N/A	SHEET 1 OF 1

TABLES

TABLES

TABLE 1 - 2005 Phase II ESA (Page 1)

DETECTED SOIL ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS, SEMI-VOLATILE ORGANIC COMPOUNDS AND INORGANIC COMPOUNDS
HAWKEYE FACILITY, ROCHESTER, NEW YORK

Sample Location:	*Recommended*	*B01HEB4NE04212004*	*B01HEB5NE04152004*	*B01HEB5SW04192004*	*B01HEB5SW04202004*	*B01HEB12N04192004*	*B01HEB12SW04202004*	*B01HEB12W04212004*	*B01HEB12ASW04202004*		*B01HEPL204182004*	*B02HEPL204182004*
Sample Date:	*Soil Cleanup*	*4/21/2004*	*4/15/2004*	*4/19/2004*	*4/20/2004*	*4/19/2004*	*4/20/2004*	*4/21/2004*	*4/20/2004*		*4/18/2004*	*4/18/2004*
Sample ID:	*Objectives*	*L22483-3*	*L22455-1*	*L22477-4*	*L22480-2*	*L22477-3*	*L22480-5*	*L22483-2*	*L22480-3*	*L22480-4*	*L22468-1*	*L22468-2*
Sample Depth:	*TAGM 4046*	*11-12.3 ft*	*20-25 ft*	*6-7.5 ft*	*6-8 ft*	*6-7.9 ft*	*8-10 ft*	*5-7 ft*	*4-6 ft*	*8-9.2 ft*	*8-8.5 ft*	*4-6 ft*
Sample Matrix Code:	*(Jan. 24, 1994)*	*SO*	*SO*	*SO*	*SO*	*SO*	*SO*	*SO*	*SO*	*SO*	*SO*	*SO*
Class Code:		*Boring*	*Boring*	*Boring*	*Boring*	*Boring*	*Boring*	*Boring*	*Boring*	*Boring*	*Boring*	*Boring*
Volatiles												
ACETONE	0.2	--	NA	0.013	0.0087 J	0.012	0.01 J	0.0084 J	NA	--	--	0.0098 J
BUTANONE, 2- (MEK)	0.3	--	NA	--	--	--	--	--	NA	--	--	--
ETHYLBENZENE	5.5	--	NA	--	--	0.0021 SJ	--	--	NA	0.0022 IJ	--	--
METHYLENE CHLORIDE	0.1	0.014 DJ	NA	0.011	0.036	0.024	0.017	0.012	NA	0.016	--	--
TETRACHLOROETHYLENE	1.4	--	NA	--	--	0.0023 SJ	--	--	NA	--	--	--
TOLUENE	1.5	0.024 DJ	NA	0.0056	0.024	0.025	0.015	0.0094	NA	0.0043 IJ	0.0041 J	0.0036 J
TRICHLOROETHYLENE	0.7	--	NA	--	--	0.0034 J	--	--	NA	0.093 I	0.063	--
XYLENE (TOTAL)	1.2	--	NA	--	--	0.0018 SJ	--	--	NA	0.0025 IJ	--	--
Semi-Volatiles												
ACENAPHTHENE	50	1 DJ	NA	--	--	--	--	--	NA	--	--	--
ANTHRACENE	50	1.1 DJ	NA	--	--	--	--	--	NA	--	--	--
BENZO(A)ANTHRACENE	0.224 or MDL	3.2 DJ	NA	--	--	--	--	0.083 J	NA	--	--	--
BENZO(A)PYRENE	0.061 or MDL	2.6 DJ	NA	--	--	--	--	--	NA	--	--	--
BENZO(B)FLUORANTHENE	1.1	3.1 DJ	NA	--	--	--		--	NA	--	--	--
BENZO(G,H,I)PERYLENE	50	1.4 DJ	NA	--	--	--	--	--	NA	--	--	--
BENZO(K)FLUORANTHENE	1.1	1.2 DJ	NA	--	--	--	--	--	NA	--	--	--
BIS(2-ETHYLHEXYL)PHTHALATE	50	0.48 DJ	NA	0.45 J	0.16 J	1.4	0.29 J	0.14 J	NA	1	0.095 J	--
CHRYSENE	0.4	3.7 DJ	NA	--	--	--	--	0.085 J	NA	--	--	--
DI-N-BUTYLPHTHALATE	8.1	--	NA	--	--	0.098 J	--	--	NA	--	--	--
FLUORANTHENE	50	5.1 DJ	NA	--	--	--	--	0.18 J	NA	--	--	--
FLUORENE	50	0.88 DJ	NA	--	--	--	--	--	NA	--	--	--
INDENO(1,2,3-CD)PYRENE	3.2	1.5 DJ	NA	--	--	--	--	--	NA	--	--	--
METHYLNAPHTHALENE, 2-	36.4	6.7 D	NA	--	--	--	--	--	NA	--	--	--
NAPHTHALENE	13.0	1.7 DJ	NA	--	--	--	--	--	NA	--	--	--
NITROSODIPHENYLAMINE, N-	NV	1.2 DJ	NA	--	--	--	--	--	NA	--	--	--
PHENANTHRENE	50	4.3 DJ	NA	--	--	--	--	0.11 J	NA	--	--	--
PYRENE	50	6.2 DJ	NA	--	--	--	--	0.17 J	NA	--	--	--
Metals												
ALUMINUM	SB	4980	NA	5540	3910	2890	3080	3730	NA	3030	6420	5720
ANTIMONY	SB	--	NA	--	--	1.8 NJ	--	1.84 NJ	NA	1.64 NJ	--	--
ARSENIC	7.5 or SB	3.71	NA	3.85	8.17	15.1	2.93	5.37	NA	5.77	4.76	4.65
BARIUM	300 or SB	29.4	NA	39.3	21.6 J	48.8	15.8 J	29.8	NA	14.1 J	88.5	28.8
BERYLLIUM	0.16 (HEAST) or SB	0.242 J	NA	0.261 J	0.325 J	0.374 J	0.155 J	0.231 J	NA	0.26 J	0.333 J	0.269 J
CADMIUM	1 or SB	--	NA	0.666 N*	--	--	--	--	NA	--	--	--
CALCIUM	SB	136000 D	NA	77000 D	154000 D	181000 D	9650	117000 D	NA	224000 D	180000 D	22000
CHROMIUM	10 or SB	7.91	NA	9.37	5.64	5.25	5.04	8.05	NA	4.86	9.42	15.5
COBALT	30 or SB	3.8 J	NA	3.43 J	4.77 J	9.76	3.66 J	4.5 J	NA	4.31 J	4.08 J	6.74
COPPER	25 or SB	14.5	NA	24.5	6.39	24.1	6.34	11.4	NA	8.83	14.1	38.3
IRON	2000 or SB	10100	NA	10800	11900	19900	8960	11300	NA	8910	10800	12300
LEAD	SB****	13.8 *	NA	29.8 *	15.4 *	41.3 *	5.25 *	16.1 *	NA	12.3 *	34.5 *	6.84 *
MAGNESIUM	SB	29500	NA	20700	19400	7060	6160	29000	NA	13700	21400	7700
MANGANESE	SB	363	NA	261	298	901	204	316	NA	343	367	570
MERCURY	0.1	0.046	NA	--	--	--	--	--	NA	--	--	--
NICKEL	13 or SB	11.5	NA	9.96	12.7	21.4	9.56	12.2	NA	12.3	11.9	134
POTASSIUM	SB	1840	NA	1220	3110	1780	506 J	1800	NA	2900	2370	1060
SELENIUM	2 or SB	0.23 J	NA	0.22 J	0.32 J	0.28 J	0.19 J	0.23 J	NA	0.21 J	0.25 J	0.28 J
SILVER	SB	5.64	NA	2.75	1.37	0.336 J	3.43	0.347 J	NA	0.854 J	12	0.625 J
SODIUM	SB	364 J	NA	345 J	644	1860	456 J	405 J	NA	581	905	439 J
VANADIUM	150 or SB	12.1	NA	16.1	7.09	12.7	8.02	9.27	NA	6.19	13.1	13.9
ZINC	20 or SB	44.9	NA	68.2	8.36	11.1	31.3	29.5	NA	37.7	73.8	124
Radiology												
THORIUM-228 (pCi/g)	NV	NA	0.37	0.33	NA	NA	0.29	NA	0.49	NA	NA	NA
THORIUM-230 (pCi/g)	NV	NA	0.42	0.22	NA	NA	0.29	NA	0.2	NA	NA	NA
THORIUM-232 (pCi/g)	NV	NA	0.45	0.3	NA	NA	0.26	NA	0.42	NA	NA	NA
General Chemistry												
pH (s.u.)	NV	NA	NA	NA	NA	8.7 H	NA	9.6 H	NA	NA	NA	NA
CYANIDE (TOTAL)	***	NA	NA	NA	NA	0.598	NA	0.382	NA	NA	NA	NA
NITRATE	NV	NA	NA	NA	NA	4.7 J	NA	7.7 J	NA	NA	NA	NA
SULFATE	NV	NA	NA	NA	NA	84	NA	83	NA	NA	NA	NA

Notes:
All results are reproted in milligrams per kilogram (mg/kg) unless otherwise noted.
Analytical qualifiers and other notes are presented on final page.
Highlighted cells indicate the concentration shown is above the cleanup guidance value.

TABLE 1 - 2005 Phase II ESA (Page 2)

DETECTED SOIL ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS, SEMI-VOLATILE ORGANIC COMPOUNDS AND INORGANIC COMPOUNDS
HAWKEYE FACILITY, ROCHESTER, NEW YORK

Sample Location:	*Recommended*	*B03HEPL204182004*	*B01HEPL504172004*	*B02HEPL504172004*	*B01HEPL604172004*	*B02HEPL604172004*	*B01HEPL1104182004*		*B01HEPL1104192004*
Sample Date:	*Soil Cleanup*	*4/18/2004*	*4/17/2004*	*4/17/2004*	*4/17/2004*	*4/17/2004*	*4/18/2004*		*4/19/2004*
Sample ID:	*Objectives*	*L22468-3*	*L22467-4*	*L22467-5*	*L22467-2*	*L22467-3*	*L22468-4*	*L22468-5*	*L22477-2*
Sample Depth:	*TAGM 4046*	*6-8 ft*	*10-12 ft*	*6-8 ft*	*4-6 ft*	*8-10 ft*	*4-6 ft*	*8-10 ft*	*6-8 ft*
Sample Matrix Code:	*(Jan. 24, 1994)*	*SO*	*SO*	*SO*	*SO*	*SO*	*SO*	*SO*	*SO*
Class Code:		*Boring*	*Boring*	*Boring*	*Boring*	*Boring*	*Boring*	*Boring*	*Boring*
Volatiles									
ACETONE	0.2	--	0.0098 J	--	0.033	--	0.065 D	0.015	--
BUTANONE, 2- (MEK)	0.3	--	--	--	0.011 J	--	--	0.0062 J	--
ETHYLBENZENE	5.5	--	--	--	0.036	--	0.046 D	0.0023 J	29 DJ
METHYLENE CHLORIDE	0.1	--	--	--	0.0016 J	--	0.017 DJ	0.0072	--
TETRACHLOROETHYLENE	1.4	0.015	--	--	--	--	--	--	--
TOLUENE	1.5	0.0041 J	0.004 J	0.0016 J	0.0069	--	0.011 DJ	0.0026 J	--
TRICHLOROETHYLENE	0.7	0.021	--	--	--	--	--	--	--
XYLENE (TOTAL)	1.2	--	--	--	0.35 DH	--	0.079 D	0.0073	27 DJ
Semi-Volatiles									
ACENAPHTHENE	50	--	--	--	--	--	--	--	0.095 J
ANTHRACENE	50	--	--	--	--	--	--	--	--
BENZO(A)ANTHRACENE	0.224 or MDL	--	--	--	0.1 J	--	--	--	--
BENZO(A)PYRENE	0.061 or MDL	--	--	--	0.13 J	--	--	--	--
BENZO(B)FLUORANTHENE	1.1	--	--	--	--	--	--	--	--
BENZO(G,H,I)PERYLENE	50	--	--	--	0.12 J	--	--	--	--
BENZO(K)FLUORANTHENE	1.1	--	--	--	--	--	--	--	--
BIS(2-ETHYLHEXYL)PHTHALATE	50	1.3	--	--	--	--	0.1 J	0.099 J	20 D
CHRYSENE	0.4	--	--	--	0.12 J	--	--	--	--
DI-N-BUTYLPHTHALATE	8.1	0.12 J	--	--	--	0.096 J	--	--	0.12 J
FLUORANTHENE	50	--	--	--	0.2 J	--	--	--	--
FLUORENE	50	--	--	--	0.17 J	--	--	--	0.16 J
INDENO(1,2,3-CD)PYRENE	3.2	--	--	--	0.11 J	--	--	--	--
METHYLNAPHTHALENE, 2-	36.4	--	--	--	--	--	--	--	19 D
NAPHTHALENE	13.0	--	--	--	--	--	--	--	10
NITROSODIPHENYLAMINE, N-	NV	--	--	--	--	--	--	--	--
PHENANTHRENE	50	--	--	--	0.23 J	--	0.089 J	--	0.29 J
PYRENE	50	--	--	--	0.23 J	--	--	--	0.096 J
Metals									
ALUMINUM	SB	4500	3540	3340	5710	5980	3570	NA	3460
ANTIMONY	SB	2.04 NJ	--	--	--	--	--	NA	--
ARSENIC	7.5 or SB	8.09	4.13	3.1	5.58	6.92	2.23	NA	1.94
BARIUM	300 or SB	31.5	36.3	46.4	51.3	37.4	17.4 J	NA	15.9 J
BERYLLIUM	0.16 (HEAST) or SB	0.373 J	0.19 J	0.18 J	0.327 J	0.314 J	0.164 J	NA	0.155 J
CADMIUM	1 or SB	--	--	--	6.2 N*	--	--	NA	--
CALCIUM	SB	140000 D	92400 D	85500 D	18500	35100	38400	NA	29300
CHROMIUM	10 or SB	7.51	6.07	6.63	8.56	10.4	5.62	NA	6.11
COBALT	30 or SB	4.84 J	3.73 J	4.48 J	5.28 J	9.73	4.29 J	NA	3.69 J
COPPER	25 or SB	10.9	7.92	7.83	38.1	21.7	11.2	NA	7.41
IRON	2000 or SB	13600	9800	9650	11500	21700	9070	NA	8900
LEAD	SB****	22.3 *	4.53 *	7.03 *	1080 *	8.57 *	5.86 *	NA	4.94 *
MAGNESIUM	SB	17700	20500	12000	4880	4850	7840	NA	6370
MANGANESE	SB	360	488	333	259	441	480	NA	315
MERCURY	0.1	--	--	--	0.0559	--	--	NA	--
NICKEL	13 or SB	16.3	9.36	10.3	14.6	18.9	9.77	NA	8.73
POTASSIUM	SB	3190	1290	1430	942	1510	846	NA	723
SELENIUM	2 or SB	0.27 J	0.22 J	0.2 J	0.24 J	0.4 J	0.18 J	NA	0.19 J
SILVER	SB	0.323 J	--	--	--	--	--	NA	--
SODIUM	SB	1660	743	642	902	1250	1730	NA	1680
VANADIUM	150 or SB	9.15	11.9	10.7	14.3	22.1	10.3	NA	12.8
ZINC	20 or SB	10.5	18.7	24.1	244	36.7	46.7	NA	16.7
Radiology									
THORIUM-228 (pCi/g)	NV	NA	NA	NA	NA	NA	NA	NA	NA
THORIUM-230 (pCi/g)	NV	NA	NA	NA	NA	NA	NA	NA	NA
THORIUM-232 (pCi/g)	NV	NA	NA	NA	NA	NA	NA	NA	NA
General Chemistry									
pH (s.u.)	NV	NA	NA	NA	NA	NA	NA	NA	NA
CYANIDE (TOTAL)	***	NA	NA	NA	NA	NA	NA	NA	0.257 J
NITRATE	NV	NA	NA	NA	NA	NA	NA	NA	NA
SULFATE	NV	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
All results are reproted in milligrams per kilogram (mg/kg) unless otherwise noted.
Analytical qualifiers and other notes are presented on final page.
Highlighted cells indicate the concentration shown is above the cleanup guidance value.

TABLE 2 - 2005 Phase II ESA

DETECTED GROUNDWATER ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS, SEMI-VOLATILE ORGANIC COMPOUNDS AND INORGANIC COMPOUNDS
HAWKEYE FACILITY, ROCHESTER, NEW YORK

Well ID:	*NYS Ambient*	*SB4NE*	*SB4NE*	*IB5NE*	*IB5SW*	*IB5SW2*	*IB6NE*	*IB11AW*	*IB12SW*	*IL2NE*	*SL6SE*	*SL11W*
Loc Group:	*Water Quality*	*B4NE*	*B4NE*	*B5NE*	*B5SW*	*B5SW2*	*B6NE*	*B11AW*	*B12SW*	*L2NE*	*L6SE*	*L11W*
Flow Zone:	*Standards*	*OVR/TOR*	*OVR/TOR*	*OVR/TOR*	*OVR/TOR*	*OVR/TOR*	*OVR/TOR*	*OVR/TOR*	*OVR/TOR*	*OVR/TOR*	*OVR*	*OVR*
Sample ID:	*Guidance Values*	*L22580-4*	*L22591-6*	*L22591-4*	*L22580-6*	*L22580-7*	*L22591-3*	*L22580-2*	*L22580-3*	*L22580-5*	*L22591-2*	*L22591-5*
Sample Type:	*(TOGs 1.1.1)*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
Sample Date:	*(June 1998)*	*5/6/2004*	*5/7/2004*	*5/7/2004*	*5/6/2004*	*5/6/2004*	*5/7/2004*	*5/6/2004*	*5/6/2004*	*5/6/2004*	*5/7/2004*	*5/7/2004*
Volatile Organics												
ACETONE	0.050	0.12 P	NA	--	--	--	--	--	--	--	--	--
BENZENE	0.001	0.0031 JP	NA	--	--	--	--	--	--	--	--	0.029 DJ
BUTANONE, 2- (MEK)	0.050	0.018 P	NA	--	--	--	--	--	--	--	--	--
CARBON DISULFIDE	NV	0.0055 P	NA	--	--	0.0031 JP	--	--	0.0028 JP	--	--	--
DICHLOROETHYLENE, 1,2- (TOTAL)	0.005	--	NA	--	0.023	0.0035 JP	--	0.012	--	--	--	--
ETHYLBENZENE	0.005	0.012 P	NA	--	--	--	--	--	--	--	--	0.87 D
TOLUENE	0.005	0.0085 P	NA	--	--	--	--	--	0.0015 JP	--	--	0.38 D
TRICHLOROETHYLENE	0.005	--	NA	--	0.0048 J	0.0077 P	--	0.016	0.028 P	0.0039 J	--	--
XYLENE (TOTAL)	0.005	0.048 P	NA	--	--	--	--	--	--	--	0.13 D	1.7 D
TOTAL VOCs	NV	0.2151	NA	0	0.0278	0.0143	0	0.028	0.0323	0.0039	0.13	2.979
Semi-Volatiles												
ACENAPHTHENE	0.020	NA	0.0059 DJ	--	--	--	--	--	--	--	--	--
BENZOIC ACID	NV	NA	0.042 DJ	--	--	--	--	--	--	--	--	--
BIS(2-ETHYLHEXYL)PHTHALATE	0.005	NA	0.029 D	0.0071 J	--	--	0.0027 J	--	0.0031 J	--	0.003 J	0.011 DJ
FLUORENE	0.050	NA	0.0046 DJ	--	--	--	--	--	--	--	--	--
METHYLNAPHTHALENE, 2-	NV	NA	0.02 D	--	--	--	--	--	--	--	0.016	0.056 D
METHYLPHENOL, 2-	0.001	NA	0.031 D	--	--	--	--	--	--	--	--	--
METHYLPHENOL, 3&4-	0.001	NA	0.018 D	--	--	--	--	--	--	--	--	--
NAPHTHALENE	0.010	NA	0.0047 DJ	--	--	--	--	--	--	--	0.018	0.31 D
PHENANTHRENE	0.050	NA	0.013 DJ	--	--	--	--	--	--	--	--	--
PHENOL	0.001	NA	0.014 DJ	--	--	--	--	--	--	--	--	--
PYRENE	0.050	NA	0.0057 DJ	--	--	--	--	--	--	--	--	--
Metals												
ALUMINUM	NV	7.16	NA	2.43	1.71	0.499	0.437	2.1	0.827	2.11	0.611	5.12
ARSENIC	0.025	0.0108	NA	0.00549 J	--	--	--	--	0.00683 J	--	0.0047 J	0.00323 J
BARIUM	1	0.168 J	NA	0.173 J	0.343	0.135 J	0.296	0.253	0.107 J	0.127 J	2.49	0.796
CALCIUM	NV	1450 D	NA	761 D	447	1400 D	1220 D	408	363	481	1370 D	1050 D
CHROMIUM	0.050	0.00646 J	NA	0.00351 J	0.00524 J	--	--	0.0039 J	0.00256 J	0.00851 J	--	0.0104
COBALT	NV	--	NA	--	--	0.0341 J	--	--	0.0133 J	--	--	--
COPPER	0.2	0.00955 J	NA	0.0165 J	0.0073 J	--	--	--	0.00961 J	0.00809 J	--	0.0307
IRON	0.3	5.57	NA	7.1	4.76	5.53	6.19	4.93	6.29	6.87	20.4	13.7
LEAD	0.025	0.00921	NA	0.0219	0.0164	0.00144 J	0.00286 J	0.012	0.018	0.0185	0.00519	0.0349
MAGNESIUM	35	40.5	NA	203	69.8	87.5	82.2	92.2	102	78.4	101	98.5
MANGANESE	0.3	1.27	NA	1.34	0.507	1.66	2.04	0.464	0.657	0.612	1.31	4.11
NICKEL	0.1	0.0293 J	NA	0.0108 J	0.00931 J	0.0404	0.0187 J	0.00754 J	0.0306 J	0.0241 J	0.0113 J	0.0101 J
POTASSIUM	NV	159 D	NA	32.8	31	54.3 D	15.9	16	44.9	20.5	17.8	80.6 D
SELENIUM	0.010	0.00179 J	NA	0.0014 J	0.00144 J	0.00157 J	0.00168 J	0.00144 J	0.00139 J	0.00141 J	0.0018 J	0.00194 J
SILVER	0.050	0.00865 J	NA	0.00543 J	0.00267 J	0.00784 J	0.00757 J	--	--	0.00361 J	0.00847 J	0.00576 J
SODIUM	20	515	NA	3150 D	1650 D	1170 D	362	367	783	1300 D	3640 D	11700 D
THALLIUM	0.0005	0.00329 J	NA	--	--	--	--	0.00452 J	0.00407 J	0.00439 J	0.00795 J	--
ZINC	2	0.0375 B	NA	0.0277 B	0.0175 J	0.015 JB	0.0226 B	0.0365 B	0.0368 B	0.0305 B	0.0329 B	0.0632 B
Radiology												
THORIUM-228 (pCi/L)	NV	NA	NA	NA	--	NA	NA	0.58	0.53	1.1	NA	NA
THORIUM-230 (pCi/L)	NV	NA	NA	NA	--	NA	NA	1.3	2.1	2.1	NA	NA
THORIUM-232 (pCi/L)	NV	NA	NA	NA	3.7	NA	NA	0.54	0.46	1.1	NA	NA

Notes:
All results are reported in milligrams per liter (mg/L) unless otherwise noted.
Qualifiers are presented on final page.
Highlighted cells indicate the concentration shown is above the guidance value.

Phase II ESA
Eastman Kodak Company
Hawkeye Facility
St. Paul Street
Rochester, New York

Table 3 - 2017 Phase II ESA (Page 1)

Summary of Detected Compounds in Soil

Sample ID	Units	NYCRR Part 375 Unrestricted Use SCOs	NYCRR Part 375 Restricted Residential Use SCOs	NYCRR Part 375 Commercial Use SCOs	TP-1B	TP-4	SB-01	SB-02	SB-10	SB-10	SB-11	SB-13	SB-13	SB-13	SB-13	SB-14	SB-15	SB-16	SB-17	SB-18	SB-18
Sample Depth (ft bgs)					5-6	5-6	11-13	8-10	9-10	10-11	11-12	6-8	7-10	8-11	11-11.8	1.9-2.4	4-6	4-9.8	0.5-2.3	0.4-1.7	4-5
Sample Date					9/14/2017	9/14/2017	8/30/2017	8/30/2017	8/31/2017	8/31/2017	8/31/2017	8/31/2017	8/31/2017	8/31/2017	8/31/2017	8/31/2017	8/31/2017	8/31/2017	8/31/2017	8/31/2017	8/31/2017
Metals																					
Aluminum	mg/kg	NL	NL	NL	NA	NA	3470	NA	NA	NA	NA	3780	NA	NA	NA	NA	8350	4240	4310	5700	NA
Antimony	mg/kg	NL	NL	NL			<3.4					<3.3					<3.9	<3.8	<3.2	<3.1	
Arsenic	mg/kg	13	16	16			4.6					6.6					**14.3**	7.0	6.2	5.2	
Barium	mg/kg	350	400	400			36.5					25.5					83.1	22.7	26.5	75.2	
Beryllium	mg/kg	7.2	72	590			0.21 J					0.28					0.35	0.22 J	0.28	0.10 J	
Cadmium	mg/kg	2.5	4.3	9.3			0.25					0.31					0.50	1.6	0.33	0.52	
Calcium	mg/kg	NL	NL	NL			157000					134000					14000	119000	137000	145000	
Chromium	mg/kg	30	180	1500			2.0					2.0					5.3	3.3	2.8	8.0	
Cobalt	mg/kg	NL	NL	NL			3.2					3.4					6.9	4.1	3.1	3.0	
Copper	mg/kg	50	270	270			14.1					17.3					25.8	**53.8**	10.4	12.6	
Iron	mg/kg	NL	NL	NL			9210					10300					22100	11000	10400	9480	
Lead	mg/kg	63	400	1000			16.6					15.7					16.6	18.8	20.6	21.2	
Magnesium	mg/kg	NL	NL	NL			14800					21900					4570	18200	22100	48800	
Manganese	mg/kg	1600	2000	10000			342					334					898	367	277	319	
Nickel	mg/kg	30	310	310			8.2					7.1					16.8	**95.5**	8.4	7.9	
Potassium	mg/kg	NL	NL	NL			1930					2330					1580	1870	2550	1420	
Selenium	mg/kg	3.9	180	1500			<0.57					<5.5					<0.66	<6.3	<5.3	<5.2	
Silver	mg/kg	2	180	1500			<0.57					<0.55					1.2	1.5	1.3	**2.3**	
Sodium	mg/kg	NL	NL	NL			2240					1890					1720	2040	2680	2760	
Thallium	mg/kg	NL	NL	NL			<0.57					0.34 J					0.97	<0.63	0.30 J	<0.52	
Vanadium	mg/kg	NL	NL	NL			6.7					6.7					16.6	8.0	6.9	13.0	
Zinc	mg/kg	109	10000	10000			16.8					43.1					62.3	91.7	59.7	80.2	
Mercury	mg/kg	0.18	0.81	2.8			0.13					0.057					0.13	**0.29**	0.052	0.091	
PCBs																					
PCB-1242	mg/kg	0.1	1	1	NA	NA	NA	NA	<0.0364	NA	<0.0386	NA	<0.0371	NA	NA	NA	NA	NA	NA	NA	NA
Total PCBs	mg/kg	0.1	1	1					ND		ND		ND								
VOCs																					
2-Butanone (MEK)	mg/kg	0.12	100	500	NA	NA	<0.0027	<0.121	NA	<0.0023	<0.0023	NA	NA	NA	<0.0021	0.0035	NA	NA	NA	NA	<0.0025
Acetone	mg/kg	0.05	100	500	NA	NA	<0.0027	<0.121		0.0069	0.0012 J				0.0036	0.0114					0.0131
Cyclohexane	mg/kg	NL	NL	NL	NA	NA	<0.0027	1.7		<0.0023	<0.0023				<0.0021	<0.0026					<0.0025
Ethylbenzene	mg/kg	1	41	390	0.913	**115**	<0.0027	0.100 J		<0.0023	<0.0023				<0.0021	<0.0026					<0.0025
Isopropylbenzene (Cumene)	mg/kg	NL	NL	NL	1.41	23.3	<0.0027	0.255		<0.0023	<0.0023				<0.0021	<0.0026					<0.0025
Methylcyclohexane	mg/kg	NL	NL	NL	NA	NA	<0.0027	8.31		<0.0023	<0.0023				<0.0021	<0.0026					<0.0025
Methylene Chloride	mg/kg	0.05	100	500	NA	NA	0.0024 J	<0.121		0.0018 J	0.0016 J				0.0016 J	0.0014 J					<0.0025
Tetrachloroethene	mg/kg	1.3	19	150	NA	NA	<0.0027	<0.121		<0.0023	<0.0023				<0.0021	0.008					<0.0025
Trichloroethene	mg/kg	0.47	21	200	NA	NA	<0.0027	<0.121		<0.0023	0.0012 J				<0.0021	0.0436					0.0017 J
Xylene (Total)	mg/kg	0.26	100	500	<0.5	**134**	<0.0055	0.120 J		<0.0047	<0.0046				<0.0043	<0.0052					<0.0049
cis-1,2-Dichloroethene	mg/kg	0.25	100	500	NA	NA	<0.0027	<0.121		<0.0023	<0.0023				<0.0021	0.0014 J					<0.0025
n-Butylbenzene	mg/kg	12	NL	NL	9.38	**52.5**	<0.0027	NA		NA	NA				NA	NA					NA
sec-Butylbenzene	mg/kg	11	100	500	4.43	<2.82	<0.0027	NA		NA	NA				NA	NA					NA
tert-Butylbenzene	mg/kg	5.9	100	500	<0.25	<2.82	<0.0027	NA		NA	NA				NA	NA					NA
p-Isopropyltoluene	mg/kg	NL	NL	NL	0.983	9.6	<0.0027	NA		NA	NA				NA	NA					NA
Methyl tert-butyl ether	mg/kg	0.93	100	500	<0.25	<2.82	<0.0027	<0.121		<0.0023	<0.0023				<0.0021	0.0014 J					<0.0025
Naphthalene	mg/kg	12	100	500	0.365	**28.3**	<0.0027	NA		NA	NA				NA	NA					NA
n-Propylbenzene	mg/kg	3.9	100	500	**8.02**	**97.4**	<0.0027	NA		NA	NA				NA	NA					NA
Toluene	mg/kg	0.7	100	500	<0.25	<2.82	<0.0027	<0.121		<0.0023	<0.0023				<0.0021	0.0014 J					<0.0025
1,2,4-trimethylbenzene	mg/kg	3.6	52	190	<0.25	**585**	<0.0027	NA		NA	NA				NA	NA					NA
1,3,5-trimethylbenzene	mg/kg	8.4	52	190	<0.25	**63.5**	<0.0027	NA		NA	NA				NA	NA					NA
SVOCs																					
2-Methylnaphthalene	mg/kg	NL	NL	NL	NA	NA	<0.0800	NA	NA	NA	NA	NA	NA	<0.0751	NA	<0.0822	NA	NA	NA	NA	NA
Naphthalene	mg/kg	12	100	500	<0.0817	7.05	<0.0800							<0.0751		<0.0822					
Phenanthrene	mg/kg	100	100	500	<0.0817	0.0925	<0.0800							<0.0751		<0.0822					
Thorium																					
Thorium-228	pCi/g	6.06(A)	6.06(A)	6.06(A)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thorium-230	pCi/g	6.06(A)	6.06(A)	6.06(A)																	
Thorium-232	pCi/g	6.06(A)	6.06(A)	6.06(A)																	

NOTES:
"<" indicates compound not detected above laboratory method detection limit (MDL) with the limit shown
Thorium data displayed as "Activity (± Uncertainty - 95% Confidence Interval)".
(A)Part 375 comparison criteria not listed for radionuclides. Values shown are the "General Soil Screening Levels for Radionuclides: Migration to Groundwater: 20DAF" obtained from Appendix A of the USEPA's Soil Screening Guidance for Radionuclides Technical Background Document.
"20 DAF" indicates a dilution factor of 20 to account for natural processes that reduce contaminant concentrations in the subsurface.
VOCs analyzed by USEPA Method 8260
SVOCs analyzed by USEPA Method 8270
Metals analyzed by USEPA Method 6010/7470
PCBs analyzed by USEPA Method 8082
Thorium Isotopes analyzed by USEPA Method HSL 300
Bold font indicates value above NYCRR Part 375 6-8 (a) Unrestricted Use SCOs
Yellow highlighted cells indicates value above NYCRR Part 375 6-8 (b) Restricted Residential Use SCOs
Red font indicates value above NYCRR Part 375-6.8(b) Commercial Use SCOs
NL indicates Not Listed

NA indicates Not Analyzed

ND indiates non-detect

J indicates an estimated value
* indicates data not yet received from laboratory.

Phase II ESA
Eastman Kodak Company
Hawkeye Facility
St. Paul Street
Rochester, New York

Table 3 - 2017 Phase II ESA (Page 2)

Summary of Detected Compounds in Soil

Sample ID	Units	NYCRR Part 375 Unrestricted Use SCOs	NYCRR Part 375 Restricted Residential Use SCOs	NYCRR Part 375 Commercial Use SCOs	SB-22	SB-24	SB-26	SB-27	SB-29	SB-29	SB-29	SB-30	SB-31	BLIND DUP 1 (SB-10)	BLIND DUP 1 (SB-10)	BLIND DUP 2 (SB-13)	BLIND DUP 3 (SB-15)	BLIND DUP-4 (SB-26)	BLIND DUP-5 (SB-27)	BLIND DUP-6 (SB-29)	BLIND DUP-6 (SB-29)	BLIND DUP-7 (SB-30)
Sample Depth (ft bgs)					8-10	6-9	6.5-10	7-10	4-4.8	6-8	8-8.4	6-8.6	3-6	9-10	10-11	8-11	4-6	6.5-10	7-10	8-8.4	6-8	6-8.6
Sample Date					9/1/2017	9/1/2017	9/1/2017	9/1/2017	9/6/2017	9/6/2017	9/6/2017	9/6/2017	9/6/2017	8/31/2017	8/31/2017	8/31/2017	8/31/2017	9/1/2017	9/1/2017	9/6/2017	9/6/2017	9/6/2017
Metals																						
Aluminum	mg/kg	NL	NL	NL	3530	NA	3870	NA	NA	NA	NA	3500	NA	NA	NA	NA	10000	6500	NA	NA	NA	6120
Antimony	mg/kg	NL	NL	NL	<3.5		<3.7					<3.2					<4.0	<3.5				<3.7
Arsenic	mg/kg	13	16	16	2.7		4.3					8.1					11.5	8.0				8.1
Barium	mg/kg	350	400	400	43.1		36.3					44.9					93.3	47.1				37
Beryllium	mg/kg	7.2	72	590	<0.29		0.058 J					0.20 J					0.47	0.14 J				0.26 J
Cadmium	mg/kg	2.5	4.3	9.3	0.19		0.24					0.37					0.71	0.42				0.36
Calcium	mg/kg	NL	NL	NL	27800		42400					156000					33700	99700				14400
Chromium	mg/kg	30	180	1500	3.0		6.1					2.2					9.3	8.3				4.5
Cobalt	mg/kg	NL	NL	NL	3.7		4.1					4.5					8.2	6.3				7.6
Copper	mg/kg	50	270	270	9.6		13.9					12.5					40.8	19.8				15.9
Iron	mg/kg	NL	NL	NL	9320		9690					11600					21100	14900				16100
Lead	mg/kg	63	400	1000	1.9		7.2					9.6					40.1	10.8				12.7
Magnesium	mg/kg	NL	NL	NL	6060		10500					7630					13600	13800				6250
Manganese	mg/kg	1600	2000	10000	311		350					862					1030	778				630
Nickel	mg/kg	30	310	310	7.6		8.7					9.1					25.4	13.3				16.5
Potassium	mg/kg	NL	NL	NL	698		1060					1230					2330	1770				986
Selenium	mg/kg	3.9	180	1500	<0.58		<0.62					<0.53					<6.7	<0.59				<6.2
Silver	mg/kg	2	180	1500	<0.58		<0.62					<0.53					**3.6**	<0.59				<0.62
Sodium	mg/kg	NL	NL	NL	814		1330					1290					2380	1840				<312
Thallium	mg/kg	NL	NL	NL	0.22 J		0.26 J					0.49 J					0.98	0.79				0.31 J
Vanadium	mg/kg	NL	NL	NL	11.8		11.5					6.7					20.1	15.5				11.6
Zinc	mg/kg	109	10000	10000	18.2		53.3					37.1					90.4	47.5				45.9
Mercury	mg/kg	0.18	0.81	2.8	0.029 J		0.045					0.057					**0.21**	0.043				0.06
PCBs																						
PCB-1242	mg/kg	0.1	1	1	NA	NA	NA	NA	NA	0.0647	NA	<0.0370	NA	<0.0398	NA	NA	NA	NA	NA	NA	<0.0398	NA
Total PCBs	mg/kg	0.1	1	1						0.0647		ND		ND							ND	
VOCs																						
2-Butanone (MEK)	mg/kg	0.12	100	500	<0.0024	**0.141**	<0.124	0.105	NA	NA	<0.0026	NA	NA	NA	<0.0023	NA	NA	0.0977	NA	<0.0023	NA	NA
Acetone	mg/kg	0.05	100	500	<0.0024	<0.111	<0.124	<0.0852			<0.0026				<0.0023			<0.0824		<0.0023		
Cyclohexane	mg/kg	NL	NL	NL	<0.0024	<0.111	<0.124	<0.0852			<0.0026				<0.0023			<0.0824		<0.0023		
Ethylbenzene	mg/kg	1	41	390	<0.0024	<0.111	0.143	0.221			<0.0026				<0.0023			0.856		<0.0023		
Isopropylbenzene (Cumene)	mg/kg	NL	NL	NL	<0.0024	<0.111	<0.124	0.180			<0.0026				<0.0023			0.349		<0.0023		
Methylcyclohexane	mg/kg	NL	NL	NL	<0.0024	<0.111	<0.124	<0.0852			<0.0026				<0.0023			<0.0824		<0.0023		
Methylene Chloride	mg/kg	0.05	100	500	0.0021 J	<0.111	<0.124	<0.0852			<0.0026				0.0019 J			<0.0824		<0.0023		
Tetrachloroethene	mg/kg	1.3	19	150	<0.0024	<0.111	<0.124	<0.0852			<0.0026				<0.0023			<0.0824		<0.0023		
Trichloroethene	mg/kg	0.47	21	200	<0.0024	<0.111	<0.124	<0.0852			0.0121				<0.0023			<0.0824		<0.0023		
Xylene (Total)	mg/kg	0.26	100	500	<0.0047	<0.223	<0.248	0.114 J			<0.0052				<0.0046			0.115 J		<0.0045		
cis-1,2-Dichloroethene	mg/kg	0.25	100	500	<0.0024	<0.111	<0.124	<0.0852			<0.0026				<0.0023			<0.0824		<0.0023		
n-Butylbenzene	mg/kg	12	NL	NL	NA	NA	NA	NA			NA				NA			NA		NA		
sec-Butylbenzene	mg/kg	11	100	500	NA	NA	NA	NA			NA				NA			NA		NA		
tert-Butylbenzene	mg/kg	5.9	100	500	NA	NA	NA	NA			NA				NA			NA		NA		
p-Isopropyltoluene	mg/kg	NL	NL	NL	NA	NA	NA	NA			NA				NA			NA		NA		
Methyl tert-butyl ether	mg/kg	0.93	100	500	<0.0024	<0.111	<0.124	<0.0852			<0.0026				<0.0023			<0.0824		<0.0023		
Naphthalene	mg/kg	12	100	500	NA	NA	NA	NA			NA				NA			NA		NA		
n-Propylbenzene	mg/kg	3.9	100	500	NA	NA	NA	NA			NA				NA			NA		NA		
Toluene	mg/kg	0.7	100	500	<0.0024	<0.111	<0.124	<0.0852			<0.0026				<0.0023			<0.0824		<0.0023		
1,2,4-trimethylbenzene	mg/kg	3.6	52	190	NA	NA	NA	NA			NA				NA			NA		NA		
1,3,5-trimethylbenzene	mg/kg	8.4	52	190	NA	NA	NA	NA			NA				NA			NA		NA		
SVOCs																						
2-Methylnaphthalene	mg/kg	NL	NL	NL	NA	NA	NA	1.430	NA	NA	NA	NA	NA	NA	NA	<0.0747	NA	NA	0.194	NA	NA	NA
Naphthalene	mg/kg	12	100	500				1.240								<0.0747			0.139			
Phenanthrene	mg/kg	100	100	500				<0.0857								<0.0747			<0.0745			
Thorium																						
Thorium-228	pCi/g	6.06$^{(A)}$	6.06$^{(A)}$	6.06$^{(A)}$	NA	NA	NA	NA	0.560 (±0.212)	NA	NA	NA	0.443 (±0.222)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thorium-230	pCi/g	6.06$^{(A)}$	6.06$^{(A)}$	6.06$^{(A)}$					0.473 (±0.184)				0.415 (±0.196)									
Thorium-232	pCi/g	6.06$^{(A)}$	6.06$^{(A)}$	6.06$^{(A)}$					0.742 (±0.239)				0.478 (±0.212)									

NOTES:
"<" indicates compound not detected above laboratory method detection limit (MDL) with the lin
Thorium data displayed as "Activity (± Uncertainty - 95% Confidence Interval)".
$^{(A)}$Part 375 comparison criteria not listed for radionuclides. Values shown are the "General Soil S
"20 DAF" indicates a dilution factor of 20 to account for natural processes that reduce contamina
VOCs analyzed by USEPA Method 8260
SVOCs analyzed by USEPA Method 8270
Metals analyzed by USEPA Method 6010/7470
PCBs analyzed by USEPA Method 8082
Thorium Isotopes analyzed by USEPA Method HSL 300
Bold font indicates value above NYCRR Part 375 6-8 (a) Unrestricted Use SCOs
Yellow highlighted cells indicates value above NYCRR Part 375 6-8 (b) Restricted Residential Use
Red font indicates value above NYCRR Part 375-6.8(b) Commercial Use SCOs
NL indicates Not Listed
NA indicates Not Analyzed
ND indiates non-detect
J indicates an estimated value
* indicates data not yet received from laboratory.

Phase II ESA
Eastman Kodak Company
Hawkeye Facility
St. Paul Street
Rochester, New York

On-Site Monitoring Well

Table 4 - 2017 Phase II ESA (Page 1)

Summary of Detected Compounds in Groundwater

Sample ID	Units	NYSDEC Groundwater Quality Standards	MW-01	MW-02	MW-03	MW-04	MW-07	MW-08	MW-09	MW-10	MW-11	MW-12
Screened Interval (ft bgs)			5-10	7-12	4-9	3.5-8.5	4.5-9.5	8.3-18.3	10.8-15.8	8.5-13.5	2.5-12.5	3.6-8.6
Sample Date			9/6/2017	9/6/2017	9/6/2017	9/6/2017	9/6/2017	9/7/2017	9/6/2017	9/7/2017	9/7/2017	9/7/2017
Metals												
Aluminum	ug/L	NL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	ug/L	25										
Barium	ug/L	1,000										
Cadmium	ug/L	5										
Calcium	ug/L	NL										
Chromium	ug/L	50										
Cobalt	ug/L	NL										
Copper	ug/L	200										
Iron	ug/L	300										
Lead	ug/L	25										
Magnesium	ug/L	35,000										
Manganese	ug/L	300										
Nickel	ug/L	100										
Potassium	ug/L	NL										
Selenium	ug/L	10										
Silver	ug/L	50										
Sodium	ug/L	20,000										
Thallium	ug/L	0.5										
Vanadium	ug/L	NL										
Zinc	ug/L	2,000										
Mercury	ug/L	0.7										
VOCs												
2-Butanone (MEK)	ug/L	50	<5.0	1.5 J	1.8 J	<5.0	<5.0	<5.0	1.8 J	<5.0	1.7 J	3.1 J
2-Hexanone	ug/L	50	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	1.8 J
Acetone	ug/L	50	45.2	69	73.5	40.9	50.1	40.8	34.7	57.4	31.3	15.9
Benzene	ug/L	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	0.72 J
Carbon disulfide	ug/L	60	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.2
Ethylbenzene	ug/L	5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.1	<1.0	<1.0
Isopropylbenzene (Cumene)	ug/L	5	<1.0	<1.0	<1.0	1.5	<1.0	<1.0	<1.0	8.3	<1.0	<1.0
Methyl acetate	ug/L	NL	<1.0	<1.0	5.3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Methyl-tert-butyl ether	ug/L	10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Methylcyclohexane	ug/L	NL	<1.0	<1.0	<1.0	3.9	1.2	<1.0	<1.0	<1.0	<1.0	1.3
Tetrachloroethene	ug/L	5	<1.0	<1.0	<1.0	<1.0	2.2	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	ug/L	5	<1.0	<1.0	1.1	1.5	1.3	<1.0	<1.0	<1.0	<1.0	1.9
Trichloroethene	ug/L	5	<1.0	<1.0	<1.0	<1.0	15.4	<1.0	<1.0	<1.0	<1.0	13.6
Xylene (Total)	ug/L	5	<2.0	<2.0	<2.0	1.3 J	1.0 J	<2.0	<2.0	3.0	<2.0	1.5 J
cis-1,2-Dichloroethene	ug/L	5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
trans-1,2-Dichloroethene	ug/L	5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene (Total)	ug/L	5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs												
2-Methylnaphthalene	ug/L	NL	NA	<5.0	NA	NA	NA	NA	NA	NA	<5.0	NA
Acenaphthene	ug/L	20		<5.0							<5.0	
Benzoic Acid	ug/L	NL		NA							NA	
Bis(2-ethylhexyl)phthalate	ug/L	5		NA							NA	
Fluorene	ug/L	50		<5.0							<5.0	
2-Methylphenol	ug/L	1		NA							NA	
3,4-Methylphenol	ug/L	1		NA							NA	
Phenanthrene	ug/L	50		<5.0							<5.0	
Phenol	ug/L	1		NA							NA	
Pyrene	ug/L	50		<5.0							<5.0	
Naphthalene	ug/L	10		<5.0							<5.0	
Cyanide												
Cyanide	ug/L	200	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thorium												
Thorium-228	pCi/L	15[(A)]	NA	NA	NA	NA	NA	NA	NA	NA	0.020 (±0.119)	0.098 (±0.231)
Thorium-230	pCi/L	15[(A)]									0.045 (±0.088)	0.040 (±0.111)
Thorium-232	pCi/L	15[(A)]									0.024 (±0.088)	0.009 (±0.111)

NOTES:
"<" indicates compound not detected above laboratory method detection limit (MDL) with the limit shown
Thorium data displayed as "Activity (± Uncertainty - 95% Confidence Interval)".
(A)NYCRR Part 703 Groundwater Quality Standard not listed. Values shown are the "Radionuclide Drinking Water Maximum Contaminant Levels" obtained from the USEPA's Soil Screening Guidance for Radionuclides Technical Background Document.
VOCs analyzed by USEPA Method 8260
SVOCs analyzed by USEPA Method 8270
Metals analyzed by USEPA Method 6010/7470
Cyanide analzyed by USEPA Method 9012
Thorium Isotopes analyzed by USEPA Method HSL 300
Yellow highlighted cells indicates value above NYSDEC NYCRR Part 703 Groundwater Quality Standards
NL indicates Not Listed
NA indicates Not Analyzed
2004 samples collected by Leader and the data was obtained from the 2005 Phase II ESA Report by Leader. ND indicates compound not detected
J indicates an estimated value
D indicates result is from a dilution
P indicates preservation
B indicates analyte detected in a blank
* indicates data not yet received from laboratory.

Phase II ESA
Eastman Kodak Company
Hawkeye Facility
St. Paul Street
Rochester, New York

Table 4 - 2017 Phase II ESA (Page 2)

Summary of Detected Compounds in Groundwater

Sample ID	Units	NYSDEC Groundwater Quality Standards	IB5NE		IB5SW		IB5SW2		IB6NE		IB11AW		IB12SW		IL2NE		SL6SE		SL11W	SB4NE
Screened Interval (ft bgs)			19.8-29.8		5-15		4.5-19.5		14.5-24.5		13-23		5-15		14-24		5.5-14.5		8.5-22.5	5.6-13.6
Sample Date			5/7/2004	9/7/2017	5/6/2004	9/6-7/2017	5/6/2004	9/6-7/2017	5/7/2004	9/7/2017	5/6/2004	9/7/2017	5/6/2004	9/6-7/2017	5/6/2004	9/7/2017	5/7/2004	9/6-7/2017	5/7/2004	5/6-7/2004
Metals																				
Aluminum	ug/L	NL	2430	NA	1710	97.0 J	499	NA	437	NA	2,100	<200	827	NA	2,110	NA	611	<200	5120	7160
Arsenic	ug/L	25	5.49 J		ND	<10.0	ND		ND		ND	<10.0	6.83 J		ND		4.7 J	<10.0	3.23 J	10.8
Barium	ug/L	1,000	173 J		343	14.2 J	135 J		296		253	122 J	107 J		127 J		2490	63.2 J	796	168 J
Cadmium	ug/L	5	ND		ND	0.19 J	ND		ND		ND	<2.5	ND		ND		ND	<2.5	ND	ND
Calcium	ug/L	NL	761,000 D		447,000	21,800	1,400,000 D		1,220,000 D		408	166,000	363,000		481,000		1,370,000 D	14,400	1,050,000 D	1,450 D
Chromium	ug/L	50	3.51 J		5.24 J	<10.0	ND		ND		3.9 J	<10.0	2.56 J		8.51 J		ND	<10.0	10.4	6.46 J
Cobalt	ug/L	NL	ND		ND	<50.0	34.1 J		ND		ND	1.1 J	13.3 J		ND		ND	<50.0	ND	ND
Copper	ug/L	200	16.5 J		7.3 J	<25.0	ND		ND		ND	<25.0	9.61 J		8.09 J		ND	<25.0	30.7	9.55 J
Iron	ug/L	300	7100		4760	131	5530		6190		4,930	<200	6290		6870		20,400	1,290	13,700	5570
Lead	ug/L	25	21.9		16.4	1.6 J	1.44 J		2.86 J		12	2.3 J	18		18.5		5.19	<5.0	34.9	9.21
Magnesium	ug/L	35,000	203,000		69,800	6,800	87,500		82,200		92,200	63,700	102,000		78,400		101,000	2,210	98,500	40500
Manganese	ug/L	300	1340		507	2.3 J	1660		2040		464	44.2	657		612		1,310	6.2 J	4110	1270
Nickel	ug/L	100	10.8 J		9.31 J	<40.0	40.4		18.7 J		7.54 J	2.1 J	30.6 J		24.1 J		11.3 J	<40.0	10.1 J	29.3 J
Potassium	ug/L	NL	32,800		31,000	2,710 J	54300		15,900		16,000	9,100	44,900		20,500		17,800	2,400 J	80600 D	159,000 D
Selenium	ug/L	10	1.4 J		1.44 J	<10.0	1.57 J		1.68 J		1.44 J	<10.0	1.39 J		1.41 J		1.8 J	<10.0	1.94 J	1.79 J
Silver	ug/L	50	5.43 J		2.67 J	<10.0	7.84 J		7.57 J		ND	<10.0	ND		3.61 J		8.47 J	<10.0	5.76 J	8.65 J
Sodium	ug/L	20,000	3,150,000		1,650,000	81,900	1,170,000 D		362,000		367,000	648,000	783,000		1,300,000 D		3,640,000	498,000	11,700,000 D	515000
Thallium	ug/L	0.5	ND		ND	<10.0	ND		ND		4.52 J	<10.0	4.07 J		4.39 J		7.95 J	<10.0	ND	3.29 J
Vanadium	ug/L	NL	ND		ND	1.4 J	ND		ND		ND	1.0 J	ND		ND		ND	1.9 J	ND	ND
Zinc	ug/L	2,000	27.7 B		17.5 J	<20.0	15 JB		22.6 B		36.5 B	21.5	36.8 B		30.5 B		32.9 B	<20.0	63.2 B	37.5 B
Mercury	ug/L	0.7	ND		ND	0.066 J	ND		ND		ND	<0.20	ND		ND		ND	0.056 J	ND	ND
VOCs																				
2-Butanone (MEK)	ug/L	50	ND	<5.0	ND	<5.0	ND	<5.0	ND	<5.0	ND	<5.0	ND	<5.0	ND	<5.0	ND	<5.0	ND	18 P
2-Hexanone	ug/L	50	ND	<5.0	ND	<5.0	ND	<5.0	ND	<5.0	ND	<5.0	ND	<5.0	ND	<5.0	ND	<5.0	ND	ND
Acetone	ug/L	50	ND	22.8	ND	56.2	ND	52.7	ND	10.9	ND	16.2	ND	41.2	ND	19	ND	34.4	ND	120 J
Benzene	ug/L	1	ND	<1.0	ND	<1.0	ND	<1.0	ND	<1.0	ND	<1.0	ND	<1.0	ND	<1.0	ND	<1.0	29 DJ	3.1 JP
Carbon disulfide	ug/L	60	ND	<1.0	ND	<1.0	3.1 JP	<1.0	ND	<1.0	ND	<1.0	2.8 JP	<1.0	ND	<1.0	ND	<1.0	ND	5.5 P
Ethylbenzene	ug/L	5	ND	<1.0	ND	<1.0	ND	<1.0	ND	<1.0	ND	<1.0	ND	<1.0	ND	<1.0	ND	2.0	870 D	12
Isopropylbenzene (Cumene)	ug/L	5	ND	<1.0	ND	<1.0	ND	<1.0	ND	<1.0	ND	<1.0	ND	<1.0	ND	<1.0	ND	14.8	ND	ND
Methyl acetate	ug/L	NL	ND	<1.0	ND	<1.0	ND	<1.0	ND	<1.0	ND	<1.0	ND	<1.0	ND	<1.0	ND	<1.0	ND	ND
Methyl-tert-butyl ether	ug/L	10	ND	<1.0	ND	<1.0	ND	<1.0	ND	3.1	ND	4.8	ND	<1.0	ND	<1.0	ND	<1.0	ND	ND
Methylcyclohexane	ug/L	NL	ND	<1.0	ND	<1.0	ND	<1.0	ND	<1.0	ND	<1.0	ND	<1.0	ND	<1.0	ND	16.2	ND	ND
Tetrachloroethene	ug/L	5	ND	<1.0	ND	<1.0	ND	<1.0	ND	<1.0	ND	<1.0	ND	<1.0	ND	2.2	ND	<1.0	ND	ND
Toluene	ug/L	5	ND	<1.0	ND	<1.0	ND	<1.0	ND	1.0	ND	<1.0	1.5 JP	<1.0	ND	<1.0	ND	<1.0	380 D	8.5 P
Trichloroethene	ug/L	5	ND	<1.0	4.8 J	<1.0	7.7 P	2.1	ND	<1.0	16	13.9	28 P	<1.0	3.9 J	8.1	ND	<1.0	ND	ND
Xylene (Total)	ug/L	5	ND	<2.0	ND	<2.0	ND	<2.0	ND	<2.0	ND	<2.0	ND	<2.0	ND	<2.0	130 D	21.9	1700 D	48 P
cis-1,2-Dichloroethene	ug/L	5	NA	<1.0	NA	<1.0	NA	<1.0	NA	<1.0	NA	5.4	NA	1.6	NA	<1.0	NA	<1.0	NA	NA
trans-1,2-Dichloroethene	ug/L	5	NA	<1.0	NA	<1.0	NA	<1.0	NA	<1.0	NA	<1.0	NA	1.3	NA	<1.0	NA	<1.0	NA	NA
1,2-Dichloroethylene (Total)	ug/L	5	ND	NA	23	NA	3.5 JP	NA	ND	NA	12	NA	ND	NA	ND	NA	ND	NA	ND	ND
SVOCs																				
2-Methylnaphthalene	ug/L	NL	ND	NA	ND	NA	ND	NA	ND	NA	ND	NA	ND	NA	ND	NA	16	2.2 J	56 D	20 D
Acenaphthene	ug/L	20	ND		ND		ND		ND		ND		ND		ND		ND	<5.0	<5.0	5.9 DJ
Benzoic Acid	ug/L	NL	ND		ND		ND		ND		ND		ND		ND		ND	NA	ND	42 DJ
Bis(2-ethylhexyl)phthalate	ug/L	5	7.1 J		ND		ND		2.7 J		ND		3.1 J		ND		3 J	NA	11 DJ	29 D
Fluorene	ug/L	50	ND		ND		ND		ND		ND		ND		ND		ND	<5.0	ND	4.6 DJ
2-Methylphenol	ug/L	1	ND		ND		ND		ND		ND		ND		ND		ND	NA	ND	31 D
3,4-Methylphenol	ug/L	1	ND		ND		ND		ND		ND		ND		ND		ND	NA	ND	18 D
Phenanthrene	ug/L	50	ND		ND		ND		ND		ND		ND		ND		ND	<5.0	ND	13 DJ
Phenol	ug/L	1	ND		ND		ND		ND		ND		ND		ND		ND	NA	ND	14 DJ
Pyrene	ug/L	50	ND		ND		ND		ND		ND		ND		ND		ND	<5.0	ND	5.7 DJ
Naphthalene	ug/L	10	ND		ND		ND		ND		ND		ND		ND		18	9.4	310 D	4.7 DJ
Cyanide																				
Cyanide	ug/L	200	NA	NA	NA	<10.0	NA	NA	NA	NA	NA	NA	NA	<10.0	NA	NA	NA	NA	NA	NA
Thorium																				
Thorium-228	pCi/L	15$^{(A)}$	NA	NA	ND	0.029 (±0.141)	NA	0.117 (±0.166)	NA	0.004 (±0.401)	0.58	1.30 (±0.458)	0.53	0.185 (±0.191)	1.1	NA	NA	NA	NA	NA
Thorium-230	pCi/L	15$^{(A)}$			ND	-0.007 (±0.110)		-0.022 (±0.108)		-0.061 (±0.115)	1.3	0.061 (±0.122)	2.1	0.061 (±0.110)	2.1					
Thorium-232	pCi/L	15$^{(A)}$			3.7	-0.007 (±0.110)		-0.007 (±0.108)		-0.008 (±0.114)	0.54	0.522 (±0.258)	0.46	0.030 (±0.109)	1.1					

NOTES:
"<" indicates compound not detected above laboratory method detection limit (MDL) with the limit shown
Thorium data displayed as "Activity (± Uncertainty - 95% Confidence Interval)".
$^{(A)}$NYCRR Part 703 Groundwater Quality Standard not listed. Values shown are the "Radionuclide Drinking Water Maximum Contaminant Levels" obtained from the USEPA's Soil Screening Guidance for Radionuclides Technical Background Document.
VOCs analyzed by USEPA Method 8260
SVOCs analyzed by USEPA Method 8270
Metals analyzed by USEPA Method 6010/7470
Cyanide analzyed by USEPA Method 9012
Thorium Isotopes analyzed by USEPA Method HASL 300
Yellow highlighted cells indicates value above NYSDEC NYCRR Part 703 Groundwater Quality Standards
NL indicates Not Listed
NA indicates Not Analyzed
2004 samples collected by Leader and the data was obtained from the 2005 Phase II ESA Report by Leader. ND indicates compound not detected
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Phase II ESA
Eastman Kodak Company
Hawkeye Facility
St. Paul Street
Rochester, New York

Table 4 - 2017 Phase II ESA (Page 3)

Summary of Detected Compounds in Groundwater

Sample ID	Units	NYSDEC Groundwater Quality Standards	BLIND DUPLICATE (SL6SE)	BLIND DUPLICATE 2 (IB5SW)	BLIND DUPLICATE 3 (IB5SW)	BLIND DUPLICATE 4 (IB12SW)	TRIP BLANK 1	TRIP BLANK 2
Screened Interval (ft bgs)			5.5-14.5	5-15	5-15	5-15	NA	NA
Sample Date			9/7/2017	9/6/2017	9/6/2017	9/6/2017	9/7/2017	9/7/2017
Metals								
Aluminum	ug/L	NL	NA	129 J	NA	NA	NA	NA
Arsenic	ug/L	25		<10.0				
Barium	ug/L	1,000		14.8 J				
Cadmium	ug/L	5		0.20 J				
Calcium	ug/L	NL		22,000				
Chromium	ug/L	50		1.6 J				
Cobalt	ug/L	NL		<50.0				
Copper	ug/L	200		<25.0				
Iron	ug/L	300		146				
Lead	ug/L	25		<5.0				
Magnesium	ug/L	35,000		6,960				
Manganese	ug/L	300		2.6 J				
Nickel	ug/L	100		1.2 J				
Potassium	ug/L	NL		2,640 J				
Selenium	ug/L	10		<10.0				
Silver	ug/L	50		<10.0				
Sodium	ug/L	20,000		82,600				
Thallium	ug/L	0.5		<10.0				
Vanadium	ug/L	NL		2.4 J				
Zinc	ug/L	2,000		<20.0				
Mercury	ug/L	0.7		0.046 J				
VOCs								
2-Butanone (MEK)	ug/L	50	NA	NA	NA	<5.0	<5.0	<5.0
2-Hexanone	ug/L	50				<5.0	<5.0	<5.0
Acetone	ug/L	50				66.9	27.9	46.1
Benzene	ug/L	1				<1.0	<1.0	<1.0
Carbon disulfide	ug/L	60				<1.0	<1.0	<1.0
Ethylbenzene	ug/L	5				<1.0	<1.0	<1.0
Isopropylbenzene (Cumene)	ug/L	5				<1.0	<1.0	<1.0
Methyl acetate	ug/L	NL				<1.0	<1.0	<1.0
Methyl-tert-butyl ether	ug/L	10				<1.0	<1.0	<1.0
Methylcyclohexane	ug/L	NL				<1.0	<1.0	<1.0
Tetrachloroethene	ug/L	5				<1.0	<1.0	<1.0
Toluene	ug/L	5				<1.0	<1.0	<1.0
Trichloroethene	ug/L	5				<1.0	<1.0	<1.0
Xylene (Total)	ug/L	5				<2.0	<2.0	<2.0
cis-1,2-Dichloroethene	ug/L	5				1.8	<1.0	<1.0
trans-1,2-Dichloroethene	ug/L	5				1.5	<1.0	<1.0
1,2-Dichloroethylene (Total)	ug/L	5						
SVOCs								
2-Methylnaphthalene	ug/L	NL	3.2 J	NA	NA	NA	NA	NA
Acenaphthene	ug/L	20	<5.0					
Benzoic Acid	ug/L	NL	NA					
Bis(2-ethylhexyl)phthalate	ug/L	5	NA					
Fluorene	ug/L	50	1.4 J					
2-Methylphenol	ug/L	1	NA					
3,4-Methylphenol	ug/L	1	NA					
Phenanthrene	ug/L	50	<5.0					
Phenol	ug/L	1	NA					
Pyrene	ug/L	50	<5.0					
Naphthalene	ug/L	10	10.9					
Cyanide								
Cyanide	ug/L	200	NA	NA	<10.0	NA	NA	NA
Thorium								
Thorium-228	pCi/L	15(A)	NA	NA	NA	NA	NA	NA
Thorium-230	pCi/L	15(A)						
Thorium-232	pCi/L	15(A)						

NOTES:
"<" indicates compound not detected above laboratory method detection limit (MDL) with the limit shown
Thorium data displayed as "Activity (± Uncertainty - 95% Confidence Interval)".
(A)NYCRR Part 703 Groundwater Quality Standard not listed. Values shown are the "Radionuclide Drinking Water Maximum Contaminant Levels" obtained from the USEPA's Soil Screening Guidance for Radionuclides Technical Background Document.
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Phase II ESA
Eastman Kodak Company
Hawkeye Facility
St. Paul Street
Rochester, New York

Table 5 - 2017 Phase II ESA (Page 1)
Summary of Soil Vapor Intrusion Testing

Building Number	Building 11		Building 11a		Building 6		Building 10		Building 12				
Sample ID	SS-01	IAQ-01	SS-02	IAQ-02	SS-03	IAQ-03	SS-04	IAQ-04	SS-05	IAQ-05	NYSDOH Sub-Slab Vapor Concentration Decision Matrix (minimum action level) (1)	NYSDOH Indoor Air Concentration (minimum action level) (1)	NYSDOH Guidance Table C2. USEPA BASE Database - 90th Percentile (2)
Sample Type	Sub-Slab	Indoor Air	Sub-Slab	Indoor Air	Sub-Slab	Indoor Air	Sub-Slab	Indoor Air	Sub-Slab	Indoor Air			
Sample Date	9/8/2017	9/8/2017	9/8/2017	9/8/2017	9/8/2017	9/8/2017	9/8/2017	9/8/2017	9/8/2017	9/8/2017			
1,1,1-Trichloroethane	13	<0.82	13	<0.82	2.0	<0.82	2.7	<0.82	<0.82	<0.82	100***	3***	20.6
1,2,4-Trimethylbenzene	3.4	<0.74	9.0	0.54 J	6.3	0.64 J	6.7	0.59 J	6.3	0.59 J	NL	NL	9.5
1,3,5-Trimethylbenzene	1.3	<0.74	3.5	<0.74	2.7	<0.74	2.7	<0.74	2.5	<0.74	NL	NL	3.7
4-ethyltoluene	0.98	<0.74	2.4	<0.74	2.1	<0.74	1.9	<0.74	1.9	<0.74	NL	NL	3.6
Acetone	110	7.0	250	19	68	14	1300	17	380	18	NL	NL	98.9
Benzene	3.5	0.35 J	11	0.35 J	5.7	0.45 J	23	0.48	11	0.38 J	NL	NL	9.4
Carbon Disulfide	3.4	<0.47	16	<0.47	2.7	<0.47	26	<0.47	3.5	<0.47	NL	NL	4.2
Carbon Tetrachloride	0.82 J	0.63	1.0	0.50	0.88 J	0.69	<0.94	0.63	0.69 J	0.69	6 **	0.2**	<1.3
Chloroform	1.5	<0.73	7.0	<0.73	0.93	<0.73	1.1	<0.73	10	<0.73	NL	NL	1.1
Chloromethane	1.1	1.4	4.5	0.93	1.8	1.2	1.5	1.2	<0.31	1.2	NL	NL	3.7
cis-1,2-Dichloroethene	<0.59	<0.59(3)	0.71	<0.59(3)	<0.59	<0.59(3)	<0.59	<0.59(3)	50	<0.59(3)	6**	0.2**	NL
Cyclohexane	16	<0.52	35	<0.52	10	<0.52	42	<0.52	20	<0.52	NL	NL	NL
Ethyl acetate	<0.54	<0.54	<0.54	0.50 J	<0.54	0.61	<0.54	0.50 J	<0.54	0.47 J	NL	NL	5.4
Ethylbenzene	0.82	<0.65	1.5	<0.65	1.1	<0.65	1.3	<0.65	2.0	<0.65	NL	NL	5.7
Freon 11	6.1	1.6	4.6	3.0	3.3	2.2	12	2.1	2.5	1.5	NL	NL	18.1
Freon 113	2.3	<1.1	2.3	<1.1	1.9	<1.1	1.5	<1.1	1.1 J	<1.1	NL	NL	<5.0
Freon 12	1.8	2.7	2.9	2.9	3.6	3.0	2.9	2.9	3.1	2.8	NL	NL	16.5
Heptane	50	<0.61	96	<0.61	20	<0.61	89	0.45 J	43	0.45 J	NL	NL	NL
Hexane	49	<0.53	79	0.56	16	0.49 J	79	0.53	44	0.67	NL	NL	10.2
Isopropyl alcohol	48	2.1	53	3.0	29	1.7	47	2.5	41	1.8	NL	NL	NL
m&p-xylene	2.1	<1.3	3.9	0.48 J	3.0	0.56 J	3.0	0.52 J	4.6	0.78 J	NL	NL	22.2
Methyl Ethyl Ketone	6.0	0.47 J	5.6 J	0.91	6.0	1.3	26	0.71 J	9.4	0.59 J	NL	NL	NL
Methyl Isobutyl Ketone	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	5.7	NL	NL	NL
Methylene chloride	6.9	1.5	15	1.6	14	1.4	19	2.6	11	0.97	100***	3***/60*	NL
o-xylene	0.82	<0.65	1.6	<0.65	1.2	<0.65	1.4	<0.65	1.6	<0.65	NL	NL	7.9
Styrene	0.60 J	<0.64	0.98	<0.64	0.89	<0.64	0.94	<0.64	0.89	<0.64	NL	NL	1.9
Tetrachloroethylene	0.95 J	<1.0	2.2	<1.0	1.1	<1.0	9.9	<1.0	2.6	<1.0	100***	3***/30*	NL
Tetrahydrofuran	<0.44	<0.44	<0.44	<0.44	1.3	<0.44	<0.44	<0.44	2.1	<0.44	NL	NL	3.3
Toluene	29	0.90	26	1.6	16	1.6	27	1.1	22	1.9	NL	NL	43
trans-1,2-Dichloroethene	<0.59	<0.59	<0.59	<0.59	<0.59	<0.59	<0.59	<0.59	0.87	<0.59	NL	NL	NL
Trichloroethene	180	<0.21	190	1.6	11	0.75	74	0.75	310	6.1	6 **	0.2** / 2*	4.2
Vinyl chloride	0.41	<0.10	0.56	<0.10	0.97	<0.10	2.3	<0.10	1.2	<0.10	6****	0.2****	< 1.9

Notes:

Concentrations in micrograms per cubic meter (ug/m^3)

Samples analyzed by USEPA Method TO-15

< indicates the concentration was not detected above the reporting limit

(1) *New York State Department of Health (NYSDOH), Guidance for Evaluating Soil Vapor Intrusion in the State of New York* , October 2006 and subsequent updates. [Note: This Guidance uses a combination of indoor air and sub-slab soil vapor when comparing to the matrices. In addition, for compounds not listed in the matrices an overall site approach is employed which utilizes the USEPA BASE Database (see 2. below) as typical background for commercial buildings and also uses the outdoor air sample, refer to Guidance document for details.]

(2) USEPA Building Assessment and Survey Evaluation (BASE) Database (90th Percentile). As recommended in Section 3.2.4 of the NYSDOH Guidance (Refer to Footnote "1") this database is referenced for the indoor air sampling results. This database is also referenced to provide initial benchmarks for comparison to the air sampling data and does not represent regulatory standards or compliance values.

(3) The reporting limit of 0.59 ug/m3 is above the minimum action level in the decision matrix of 0.2 ug/m3, therefore although the compound was not detected it is possible for the compound to be present above 0.2 ug/m^3

***** = Air Guideline Values obtained from Table 3.1, NYSDOH, Guidance for Evaluating Soil Vapor Intrusion in the State of New York and updates in September 2013 for PCE and August 2015 for TCE.

****** = Guideline Value obtained from Soil Vapor/Indoor Air Matrix A (minimum action level), NYSDOH, Guidance for Evaluating Soil Vapor Intrusion in the State of New York May 2017.

******* = Guidance Value obtained from Soil Vapor/Indoor Air Matrix B (minimum action level), NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York May 2017.

******** = Guidance Value obtained from Soil Vapor/Indoor Air Matrix C (minimum action level), NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York May 2017.

Red values are above Air Guideline Derived by NYSDOH in Table 3.1 of NYSDOH Guidance titled "Evaluating Soil Vapor Intrusion in the State of New York", October 2006 (and subsequent updates).

J indicates an estimated value

***NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York* , May 2017 Decision Matrices Notes:**

NO FURTHER ACTION:

Given that the compound was not detected in the indoor air sample and that the concentration detected in the sub -slab vapor sample is not expected to significantly affect indoor air quality, no additional actions are needed to address human exposures.

IDENTIFY SOURCE(S) AND RESAMPLE OR MITIGATE:

The concentration detected in the indoor air sample is likely due to indoor and/or outdoor sources rather than soil vapor intrusion given the concentration detected in the sub-slab vapor sample. Therefore, steps should be taken to identify potential source(s) and to reduce exposures accordingly (e.g., by keeping containers tightly capped or by storing volatile organic compound-containing products in places where people do not spend much time, such as a garage or outdoor shed). Resampling may be recommended to demonstrate the effectiveness of actions taken to reduce exposures.

MONITOR:

Monitoring, including sub-slab vapor, basement air, lowest occupied living space air, and outdoor air sampling, is needed to determine whether concentrations in the indoor air or sub-slab vapor have changed. Monitoring may also be needed to determine whether existing building conditions (e.g., positive pressure heating, ventilation and air-conditioning systems) are maintaining the desired mitigation endpoint and to determine whether changes are needed. The type and frequency of monitoring is determined on a site-specific and building-specific basis, taking into account applicable environmental data and building operating conditions. Monitoring is an interim measure required to evaluate exposures related to soil vapor intrusion until contaminated environmental media are remediated.

MITIGATE:

Mitigation is needed to minimize current or potential exposures associated with soil vapor intrusion. The most common mitigation methods are sealing preferential pathways in conjunction with installing a sub-slab depressurization system, and changing the pressurization of the building in conjunction with monitoring. The type, or combination of types, of mitigation is determined on a building-specific basis, taking into account building construction and operating conditions. Mitigation is considered a temporary measure implemented to address exposures related to soil vapor intrusion until contaminated environmental media are remediated.

APPENDIX A

HEALTH AND SAFETY PLAN
for
SITE INVESTIGATIONS AND REMEDIAL OVERSIGHT

HAWKEYE TRADE CENTER & RESIDENCES
PARCEL 1B
1405 ST. PAUL STREET
ROCHESTER, NEW YORK 14650
NYSDEC SITE # C828203

Prepared for:

WBS Capital, Inc.
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Flushing, New York 11354

Prepared by:

BE3 CORP
PANAMERICAN
ENVIRONMENT • ENGINEERING • ENERGY

1270 Niagara Street
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May 2019

Table of Contents

ATTACHMENTS

1.0 INTRODUCTION

The following health and safety procedures apply to BCP project personnel, including subcontractors, performing activities described in the RI Work Plan for the Hawkeye Parcel 1A BCP Project. Please note, however, contractors performing remedial work are required to either develop their own plans meeting these requirements at a minimum or adopt this plan.

1.1 PURPOSE

Directed at protecting the health and safety of the field personnel during field activities, the following Health and Safety Plan (HASP) was prepared to provide safe procedures and practices for personnel engaged in conducting the field activities associated with this project. The plan has been developed using the Occupational Safety and Health Administration (OSHA) 1910 and 1926 regulations and NYSDEC Brownfields DER-10 as guidance. The purpose of this HASP is to establish personnel protection standards and mandatory safety practices and procedures for this task specific effort. This plan assigns responsibilities, establishes standard operating procedures, and provides for contingencies that may arise during the field efforts.

1.2 APPLICABILITY

The provisions of the plan are mandatory for all personnel engaged in field activities. All personnel who engage in these activities must be familiar with this plan and comply with its requirements. The plan is based on available information concerning the project area and planned tasks. If more data concerning the project area becomes available that constitute safety concerns, the plan will be modified accordingly. A member of each contractor on the BCP project will be designated as Field Safety Officer and will be responsible for field safety. Any modifications to the plan will be made by the Field Safety Officer after discussion with the Project Manager and Health and Safety Officer. All modifications will be documented and provided to the Project Manager and the Health and Safety Officer for approval. A copy of this plan will be available to all on-site personnel, including subcontractors prior to their initial entry onto the site.

Before field activities begin, all personnel will be required to read the plan. All personnel must agree to comply with the minimum requirements of the plan, be responsible for health and safety, and sign the Statement of Compliance before site work begins.

1.3 FIELD ACTIVITIES

The work addressed by this HASP includes remedial investigation (RI) activities such as assessment of subsurface conditions related to soil and groundwater and oversight activities related to remediation. Field work will be conducted that can include test trenches/soil borings, monitoring well installation, groundwater and soil sampling, building demolition, soil excavation, etc.

1.4 PERSONNEL REQUIREMENTS

Key personnel are as follows:

Health and Safety Officer - Peter J. Gorton, CHCM
Engineer and Project Manager - Jason Brydges, P.E.

Geologist – John Boyd, PG
Technicians – Cory Lauber
QA/QC – John Berry, P.E.

Responsibilities of some of the key personnel are as follows:

Project Manager
- Assuring that personnel are aware of the provisions of the HASP and are proficient in work practices necessary to ensure safety and in emergencies;
- Verifying that the provisions of this plan are implemented;
- Assuring that appropriate personnel protective equipment (PPE), if necessary, is available and properly utilized by all personnel;
- Assuring that personnel are aware of the potential hazards associated with Site operations;
- Supervising the monitoring of safety performance by all personnel and ensuring that required work practices are employed; and,
- Maintaining sign-off forms and safety briefing forms.

Health and Safety Officer:
- Monitoring work practices to determine if potential hazards are present, such as heat/cold stress, safety rules near heavy equipment, etc.;
- Determining changes to work efforts or equipment to ensure the safety of personnel;
- Evaluating on-site conditions and recommend to the Project Manager modifications to work plans needed to maintain personnel safety;
- Determining that appropriate safety equipment is readily available and monitor its proper use;
- Stopping work if unsafe conditions occur or if work is not being performed in compliance with this plan:
- Monitoring personnel performance to ensure that the required safety procedures are followed.
- Documenting incident and reporting to Project Manager within 48 hours of occurrence if established safety rules and practices are violated; and,
- Conducting safety meetings as necessary.

Field Personnel, including geologists and technicians:
- Understanding the procedures outlined in this plan;
- Taking precautions to prevent injury to themselves and co-workers;
- Performing only those tasks believed to be safe;
- Reporting accidents or unsafe conditions to the Health and Safety Officer and Project Manager;
- Notifying the Health and Safety Officer and Project Manager of special medical problems (e.g., allergies, medical restrictions, etc.);
- Thinking about safety first while conducting field work; and,
- Not eating, drinking or smoking in work areas.

All Site personnel has the authority to stop work if conditions are deemed to be unsafe. Visitors will be required to report to the overall Site PM or designee and follow the requirements of this plan and the Contractor’s HASP (if different).

2.0 SITE DESCRIPTION AND SAFETY CONCERNS

2.1 SITE BACKGROUND AND DESCRIPTION

The Site had multiple uses associated with transportation including the New York State Railway machine and repair shop in 1911 and Rochester Transit Corporation rail car maintenance in the late 1930's. A former gasoline filling station was also located at the Site in the early to mid-1900s. Eastman Kodak Company purchased the Site in 1942 when they began manufacturing optical lenses and equipment using thoriated glass. Building 5 was used for office space, equipment assembly, non-hazardous and hazardous waste storage laboratory, and cafeteria. A building labeled "kerosene" was utilized in the northwest corner of the Site since at least the 1950s. Potential sources of contamination include a former drywell of unknown use, solvents below Building 5, past releases from kerosene, and petroleum migration from on and off-Site sources.

The site is currently vacant and is zoned for M-1 industrial use within the City of Rochester but north of downtown approximately half of a mile south of State Route 104. The Site is located at the intersection of St. Paul Street and Avenue E within the Group 14261 Neighborhood Revitalization Plan BOA. The Site is also in an En-Zone. A large manufacturing/office building comprises most of the parcel aside from a driveway located north of St. Paul Street that wraps around the building. The Site is surrounded by other former Kodak buildings (i.e., Parcels 1A and 1B) along its west and north borders.

2.2 HAZARD EVALUATION

Specific health and safety concerns to the project tasks include working around low levels of metals, PCBs, SVOCs and VOCs in the soil and groundwater. Physical hazards include those associated with working near open excavations and adjacent to manual/mechanical field equipment. Contractors will have separate detailed health and safety procedures/requirements for excavations and the transportation and disposal of impacted material that will meet or exceed requirements in this plan. A table of potential hazards and OSHA Standards for consideration during investigation and remedial activities is provided in **Attachment 1**.

2.2.1 Chemical Hazards

Chemical hazards detected at the site include metals and organic compounds that were detected in soil samples at elevated concentrations that exceed Part 375 soil cleanup objectives. These compounds could be encountered during the RI and remedial activities and potential routes of exposure include:

- Skin contact;
- Inhalation of vapors or particles;
- Ingestion; and,
- Entry of contaminants through cuts, abrasions or punctures.

The anticipated levels of personnel protection will include Level D PPE that includes the following:

1. Long sleeve shirt and long pants
2. Work boots with steel toe
3. Hard hats when heavy equipment or overhead hazards are present
4. Safety glasses
5. Work gloves and chemical resistant gloves when sampling potentially contaminated

materials
6. High visibility vests or outer gear when Site traffic is significant

Modifications may include booties, overalls, hearing protection, or respiratory protection if air monitoring levels indicate sustained PID readings greater than 5 ppm above established background. When these levels are reached, work will be halted pending discussions with field and office management. If any readings are recorded above background, work will proceed with caution and breathing zone monitoring will be conducted.

2.2.2 Other Physical Hazards

Depending on the time of year, weather conditions or work activity, some of the following physical hazards could result from project activities:

- Noise
- Heat Stress
- Cold Stress
- Slips, trips, and falls
- Exposure to moving machinery during drilling and excavation activities
- Physical eye hazards
- Lacerations and skin punctures
- Back strain from lifting equipment
- Electrical storms and high winds
- Contact with overhead or underground utilities

Slips, Trips, and Falls. Field personnel shall become familiar with the general terrain and potential physical hazards that is associated with the risk of slips, trips, and falls. Special care shall be taken when working near demolition and excavation operations and material stockpiles. Workers will observe all pedestrian and vehicle rules and regulations. Extra caution will be observed while working near roadways and while driving in reverse to ensure safety.

Noise. All personnel shall wear hearing protection devices, such as ear muffs or ear plugs, if work conditions warrant. These conditions would include difficulty hearing while speaking to one another at a normal tone within three feet. If normal speech is interfered with due to work noise, the Health and Safety Officer or designee will mandate the use of hearing protection or other noise-producing equipment or events.

Heat/Cold Stress. Heat stress work modification may be necessary during ambient temperatures of greater than 29° C (85° F) while wearing normal clothing or exceeding 21° C (70° F) while wearing PPE. Because heat stress is one of the most common and potentially serious illnesses at work sites, regular monitoring and preventive measures will be utilized such as additional rest periods, supplemental fluids, restricted consumption of drinks containing caffeine, use of cooling vests, or modification of work practices. Most of the work to be conducted during the oversight and monitoring operations is expected to consist of light manual labor and visual observation. Given the nature of the work and probable temperatures, heat stress hazards are not anticipated. See **Attachment 2** for heat stress management procedures.

If work is to be conducted during winter conditions, cold stress may be a concern to the health and safety of personnel. Wet clothes combined with cold temperatures can lead to hypothermia. If air temperature is less than 40° F (4° C) and a worker perspires, the worker should change to dry clothes. The following summary of the signs and symptoms of cold stress are provided as a guide for field personnel.

1. Incipient frostbite is a mild form of cold stress characterized by sudden blanching or whitening of the skin.
2. Chilblain is an inflammation of the hands and feet caused by exposure to cold moisture. It is characterized by a recurrent localized itching, swelling, and painful inflammation of the fingers, toes, or ears. Such a sequence produces severe spasms, accompanied by pain.
3. Second-degree frostbite is manifested by skin with a white, waxy appearance and the skin is firm to the touch. Individuals with this condition are generally not aware of its seriousness because the underlying nerves are frozen and unable to transmit signals to warn the body. Immediate first aid and medical treatment are required.
4. Third-degree frostbite will appear as blue blotchy skin. The tissue is cold, pale, and solid. Immediate medical attention is required.
5. Hypothermia develops when body temperature falls below a critical level. In extreme cases, cardiac failure and death may occur. Immediate medical attention is warranted when the following symptoms are observed:
    - Involuntary shivering
    - Irrational behavior
    - Slurred speech
    - Sluggishness

Fire and Explosion. These hazards will be minimal for activities associated with this project. All heavy equipment will be equipped with a fire extinguisher.

Trenching and Excavations. There are a variety of potential health and safety hazards associated with excavations. These include:

- Surface encumbrances, such as structures, fencing, stored materials, etc.;
- Below- and above-ground utilities, such as water and sewer lines, gas lines, telephone lines, and optical cable lines, etc.;
- Overhead power lines and other utilities;
- Vehicle and heavy equipment traffic around the excavations;
- Falling loads from lifting or digging equipment;
- Water accumulation within excavations;
- Hazardous atmospheres, such as oxygen deficiency, flammable gases, and toxic gases;
- Falling into or driving equipment into unprotected or unmarked excavations; and,
- Cave-in of loose rocks and soil at the excavation face.

OSHA requirements for trenching and excavations are contained in 29 CFR, subpart P, 1926:650 thru 1926.652. See **Attachment 3** for details on excavation and trenching safety requirements, which include the following basic minimum excavation requirements:

- Personnel entry into excavations should be minimized whenever possible and no entry will occur in pits greater than 4 feet bgs. Sloping, shoring or equivalent means should be utilized.
- Surface encumbrances such as structures, fencing, piping, stored material etc. that may interfere with safe excavations should be avoided, removed or adequately supported prior to the start of excavations. Support systems should be inspected daily.
- Underground utility locations should be checked and determined, and permits should be obtained prior to initiating excavations. Local utility companies will be contacted at least two days in advance, advised of proposed work, and requested to locate underground

installations. When excavations approach the estimated location of utilities, the exact location should be determined by careful probing or hand digging and when it is uncovered, proper supports should be provided.

- A minimum safe distance of 15 feet should be maintained when working around overhead high-voltage lines or the line should be de-energized following appropriate lock-out and tag- out procedures by qualified utility personnel.
- Excavations five feet or more, if entered, will require an adequate means of exit, such as a ladder, ramp, or steps and located to require no more than 25 feet of lateral travel. Under no circumstances should personnel be exited/entered an excavation using heavy equipment.
- Personnel working around heavy equipment, or who may be exposed to public vehicular traffic should wear high visibility clothes, especially at night.
- Heavy equipment or other vehicles operating next to or approaching the edge of an excavation will require that the operator have a clear view of the edge of the excavation, or that warning systems such as barricades, hand or mechanical signals, or stop logs be used. If possible, the surface grade should slope away from the excavation.
- Personnel should be safely located in and around the trench/excavation face and should not work underneath loads handled by lifting or digging equipment.
- Hazardous atmospheres, such as oxygen deficiency (atmospheres containing less than 19.5% oxygen), flammable gases (airborne concentrations greater than 20% of the lower explosive limit), and toxic gases (airborne concentrations above the OSHA Permissible Exposure Limit or other exposure limits) may occur in excavations. Monitoring should be conducted for hazardous atmospheres prior to entry and at regular intervals. Ventilation or respiratory protection may be provided to prevent personnel exposures to oxygen deficient or toxic atmospheres. Periodic retesting (at least each shift) of the excavation will be conducted to verify that the atmosphere is acceptable. A log or field book records should be maintained.
- Personnel should not work in excavations that have accumulated water or where water is accumulating unless adequate precautions have been taken. These precautions can include shield systems, water removal systems, or safety harnesses and lifelines. Groundwater entering the excavation should be properly directed away and down gradient from the excavation.
- Safety harnesses and lifelines should be worn by personnel entering excavations that qualify as confined spaces.
- Excavations near structures should include support systems such as shoring, bracing, or underpinning to maintain the stability of adjoining buildings, walls, sidewalks, or other structures endangered by the excavation operations.
- Loose rock, soil, and spoils should be piled at least two and preferably 5 feet or more from the edge of the excavation. Barriers or other effective retaining devices may be used to prevent spoils or other materials from falling into the excavation.
- Walkways or bridges with standard guardrails that meet OSHA specifications will be provided where employees, the public, or equipment are required to cross over excavations.
- Adequate barrier physical protection should be provided, and excavations should be barricaded or covered when not in use or left unattended. Excavations should be backfilled as soon as possible when completed.
- Safety personnel should conduct inspections prior to the start of work and as needed throughout the work shift and after occurrence that increases the hazard of collapse (i.e., heavy rain, vibration from heavy equipment, freezing and thawing, etc.).

- Personnel working in excavations should be protected from cave-ins by sloping or benching of excavation walls, a shoring system or some other equivalent means in accordance with OSHA regulations. Soil type is important in the determination of the angle of repose for sloping and benching, and the design of shoring systems.

2.2.3 Biological Hazards

Biological hazards can result from encounters with mammals, insects, snakes, spiders, ticks, plants, parasites, and pathogens. Mammals can bite or scratch when cornered or surprised. The bite or scratch can result in local infection with systemic pathogens or parasites. Insect and spider bites can result in severe allergic reactions in sensitive individuals. Exposure to poison ivy, poison oak or poison sumac results in skin rash. Ticks are a vector for several serious diseases. Dead animals, organic wastes, and contaminated soil and water can harbor parasites and pathogens. These hazards are reduced if work is conducted during late fall and winter months. The following are highlighted because they represent more likely concerns for the site-specific tasks and location:

Bees, Ants, Wasps and Hornets. Sensitization by the victim to the venom from repeated stings can result in anaphylactic reactions. If a stinger remains in the skin, it should be removed by teasing or scraping, rather than pulling. An ice cube placed over the sting will reduce pain. An analgesic corticosteroid lotion is often useful. People with known hypersensitivity to such stings should consult with their doctor about carrying a kit containing an antihistamine and aqueous epinephrine in a pre-filled syringe when in endemic areas. Nests and hives for bees, wasps, hornets and yellow jackets often occur in the ground, trees and brush. Before any nests or hives are disturbed, an alternate sampling location should be selected. If the sample location cannot be relocated, site personnel who may have allergic reactions shall not work in these areas.

Ticks. The incidence of Lyme disease is correlated to outdoor workers in areas where the disease is widespread and heightened risk of encountering ticks infected with B. burgdorferi, which varies from state to state, within states, and even within counties. Preventing tick bites is of utmost importance in preventing Lyme disease and other tickborne illnesses. Tick bite prevention strategies include avoidance or clearing of tick-infested habitats and use of personal protective measures (e.g., repellents and protective clothing). Tick checks should be done regularly, and ticks should be removed promptly. If a worker in a high-risk area develops flu-like symptoms (fever, chills, muscle aches, joint pains, neck stiffness, headache) or a bulls-eye rash, they should seek medical attention even if there is no recall of a tick bite. Workers who have experienced a tick bite should remove the tick and seek medical attention if signs and symptoms of tick-borne diseases occur.

Storm Conditions. When lightening is within 10 miles of the work site, all personnel should evacuate to a safe area.

Sun. When working in the sun, personnel should apply appropriate sun screening lotions (30 sun screen or above), and/or wear long sieve clothing and hats.

2.2.4 Activity Hazard Analysis

Table 1 presents a completed activity hazard analysis for the performance of an RI.

Table 1. Activity Hazard Analysis

PRINCIPAL STEPS	POTENTIAL SAFETY/HEALTH HAZARDS	RECOMMENDED CONTROLS
RI soil/groundwater investigation	Potential exposure to low levels of petroleum products	1. Use of administrative controls (site control and general safety rules), work cloths, dust suppression 2. Use of real-time monitoring and action levels 3. Use Physical Hazards SOPs
EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
Excavation and other heavy equipment, Backhoe or Geoprobe	1. Daily inspection of equipment 2. Continuous safety oversight	1. Safety plan review 2. Routine safety briefings

3.0 MONITORING

The purpose of air monitoring for potential airborne contaminants is to verify that protection levels are suitable. Monitoring will be performed for dust/particulates and volatile organic compounds during excavation activities. Daily background and calibration readings will be recorded prior to the start of field activities. All monitoring equipment used during this investigation will be maintained and calibrated and records of calibration and maintenance will be kept in accordance with 29 CFR 1910.120(b)4(11)E.

3.1 PARTICULATE MONITORING

Real-time air monitoring readings are obtained from upwind and downwind locations in accordance with DER-10 for community air-monitoring. Daily field reports will be completed that document activities performed, equipment and manpower onsite, screening and monitoring results, general Site conditions, and weather conditions.

3.2 AIR MONITORING FOR WORKER PROTECTION

Real time air monitoring will be conducted whenever site soils are disturbed during sampling, excavation, grading, etc. A real time personal aerosol monitor (i.e., TSI SidePak AM5 10 Personal Aerosol monitor or equivalent) will be used. This monitor is a laser photometer that measures data as both real-time aerosol mass-concentration and 8-hour time weighted average (TWA). The monitor will be used to measure real-time concentrations in milligrams per meter cubed (mg/m^3). Action levels are based on potential exposure to calcium carbonate and will be as follows:

- 15 mg/m^3 total dust
- 5 mg/m^3 respirable fraction for nuisance dusts

Dust suppression techniques should be employed prior to exceeding the action levels. However, if these levels are exceeded, then work will be halted, and additional dust suppression techniques employed until safe levels are reached.

3.3 TOTAL VOLATILE ORGANICS MONITORING

Monitoring of VOCs will be conducted using a photo-ionization detector (PID). If a sustained reading of 5 ppm above background occurs, then work will be halted, and personnel will evacuate the work area. Levels will be allowed to stabilize, and another reading will be taken in the breathing zone. If background levels continue to be exceeded, then work will not continue at that location and the project manager will be notified of the situation. Action levels will remain the same.

4.0 SAFE WORKING PRACTICES

The following general safe work practices always apply to a construction site:

- Eating, drinking, chewing gum or tobacco and smoking are prohibited within the work area.
- Contact with potentially contaminated substances should be avoided.
- Puddles, pools, mud, etc. should be avoided if possible.
- Kneeling, leaning, or sitting on equipment or on the ground should be avoided if possible.
- Upon leaving the work area, hands, face and other exposed skin surfaces should be thoroughly washed.
- Unusual site conditions shall be promptly conveyed to the project manager, health and safety officer, or site superintendent for resolution.
- A first-aid kit shall be available at the site.
- Field personnel should use all their senses to alert themselves to potentially dangerous situations (i.e., presence of strong, irritating, or nauseating odors).
- If severe dusty conditions are present, then soils will be dampened to mitigate dust.
- All equipment will be cleaned before leaving the work area.
- Field personnel must attend safety briefings and should be familiar with the physical characteristics of the investigation, including:
  1. Accessibility to personnel, equipment, and vehicles.
  2. Areas of known or suspected contamination.
  3. Site access.
  4. Routes and procedures to be used during emergencies.
- Personnel will perform all investigation activities with a “buddy” who is able to:
  - Provide his or her partner with assistance.
  - Notify management or emergency personnel if needed.
- Excavation activities shall be terminated immediately in event of thunder or electrical storm.

- The use of alcohol or drugs at the site is strictly prohibited.

5.0 PERSONAL SAFETY EQUIPMENT AND SITE CONTROL

5.1 PERSONAL SAFETY EQUIPMENT

As required by OSHA in 29 CFR 1920.132, this plan constitutes a workplace hazard assessment to select personal protective equipment (PPE) to perform the site investigation. The PPE to be donned by on-site personnel during this investigation are those associated with the industry standard of level D. Protective clothing and equipment to initiate the project will include:

- Work clothes, pants and long sleeves
- Work boots with steel toe
- Work gloves as necessary
- Hard hat if work is conducted near equipment
- Safety glasses
- Hearing protection as necessary

Modifications may include chemically resistant gloves, booties, and overalls. If air monitoring indicates levels are encountered that require respiratory protection (sustained readings at or above action levels above a daily established background), then work will be halted, and an adequate resolution of PPE will be made by the health and safety manager, field manager, and project manager.

5.2 SITE CONTROL

Site control will be established near each work zone by the Contractor. The purpose is to control access to the immediate work areas from individuals not associated with the project. All work zones will be fenced off with controlled access and appropriately designated as an exclusion area.

Each excavation or drilling area where heavy equipment is being utilized will be set up as a work zones and include an exclusion area and support zone. Exact configuration of each zone is dependent upon location, weather conditions, wind direction and topography. The Contractor's safety manager will establish the control areas daily at each excavation.

An area of 10 feet (as practical) around each excavation will be designated as the exclusion area. This is the area where potential physical hazards are most likely to be encountered by field personnel. The size of the exclusion area may be altered to accommodate site conditions and the drilling/excavation location. If levels of protection higher than level D are used, this plan will be modified to include decontamination procedure. The Site excavation contractor will be required to have eye/face wash equipment/means available on-site.

A support area will be defined for each field activity where support equipment will be located. Normal work clothes are appropriate within this area. The location of this area depends on factors such as accessibility, wind direction (upwind of the operation.), and resources (i.e., roads, shelter, utilities). The location of this zone will be established daily. Excavation areas will be filled or secured (fencing) to prevent access from the public.

6.0 EMERGENCY INFORMATION

In the event of an emergency, the field personnel or the health and safety manager will employ emergency procedures. A copy of emergency information will be kept in the field and will be reviewed during the initial site briefing. Copies of emergency telephone numbers and directions to the nearest hospital will be prominently posted in the field.

6.1 MEDICAL TREATMENT AND FIRST AID

A first aid kit adequate for anticipated emergencies will be maintained in the field. If any injury should require advanced medical assistance, emergency personnel will be notified, and the victim will be transported to the hospital. The Contractor will establish his own first aid station and details will be provided in his HASP.

In the event of an injury or illness, work will cease until the field safety and oversight inspector has examined the cause of the incident and taken appropriate corrective action. Any injury or illness, regardless of extent, is to be reported to the project manager and health and safety officer.

6.2 EMERGENCY CONTACTS

Emergency telephone numbers will be posted in the field and are listed below:

• Ambulance, Fire, Police	911
• Poison Control Center	800-222-1222
• NYSDEC Spills Hotline	800-457-7362
• Jason M. Brydges, PM	716-830-8636
• Danielle Miles, NYSDEC PM	585-226-5349
• Harolyn Hood, NYSDOH	518-402-7860
• Rochester General Hospital	585-922-4000 See **Attachment 4** for route to facility.

Verbal communications between workers or use of a vehicle horn repeatedly at intervals of three short beeps shall be used to signal all on-site personnel to immediately evacuate the area and report to the vehicle parking area.

6.3 EMERGENCY STANDARD OPERATING PROCEDURES

The following standard operating procedures are to be implemented by on-site personnel in the event of an emergency. The health and safety manager and Contractor's field manager shall manage response actions.

1. Upon notification of injury to personnel, the designated emergency signal shall be sounded. All personnel are to terminate their work activities and assemble in a safe location. The emergency facility listed above shall be notified. If the injury is minor, but requires medical attention, the Contractor's field manager or the health and safety manager shall accompany the victim to the hospital and help in describing the circumstances of the accident to the attending physician.
2. Upon notification of an equipment failure or accident, the Contractor's field manager or the health and safety manager shall determine the effect of the failure or accident on site operations. If the failure or accident affects the safety of personnel or prevents completion of the scheduled operations, all personnel are to leave the area until the

situation is evaluated, and appropriate actions taken.

3. Upon notification of a natural disaster, such as tornado, high winds, flood, thunderstorm or earthquake, on-site work activities are to be terminated and all personnel are to evacuate the area.

6.4 EMERGENCY RESPONSE FOLLOW-UP ACTIONS

Following activation of an emergency response, the health and safety officer shall notify the project manager, and the Contractor’s field manager shall submit a written report documenting the incident to the project manager.

6.5 MEDICAL TREATMENT

The Contractor’s field manager shall be informed of any site-related injury, exposure or medical condition resulting from work activities. All personnel are entitled to medical evaluation and treatment in the event of a site accident or incident.

6.6 SITE MEDICAL SUPPLIES AND SERVICES

The Contractor’s field manager or a trained first aid crew member shall evaluate all injuries at the site and render emergency first-aid treatment, as appropriate. If an injury is minor but requires professional medical evaluation, the field manager shall escort the employee to the appropriate emergency room. For major injuries occurring at the site, emergency services shall be requested. A first-aid kit shall be readily accessible, fully supplied, and maintained at specified locations used for on-site operations.

6.7 PRECAUTIONS

Universal precautions shall be followed on-site that consist of treating all human blood and certain body fluids as being infected with Human Immune Deficiency Virus (HIV), Hepatitis B virus (HBV), or other blood borne pathogens. Clothing and first-aid materials visibly contaminated with blood or other body fluids will be collected and placed into a biohazard bag. Individuals providing first aid or cleanup of blood- or body-fluid contaminated items should wear latex gloves. If providing CPR, a one-way valve CPR device should be used. Biohazard bags, latex gloves, and CPR devices will be included in the site first-aid kits.

Work areas visibly contaminated with blood or body fluids shall be cleaned using a 1:10 dilution of household bleach. If equipment becomes contaminated with blood or body fluids, and can not be sufficiently cleaned, the equipment shall be placed in a plastic bag and sealed. Any personnel servicing the equipment shall be made aware of the contamination, so that proper precautions can be taken.

7.0 RECORDKEEPING

The Contractor’s field manager and health and safety officer are responsible for site record keeping. Prior to the start of work, they will review this Plan along with the Contractor’s HASP. A Site safety briefing will be completed prior to the initiation of field activities. This shall be recorded in the field log book. An accident report should be completed by the Field Manager if an accident occurs and forwarded to the project manager.

8.0 PERSONNEL TRAINING REQUIREMENTS

8.1 INITIAL SITE BRIEFING

Prior to site entry, the Contractor's health and safety manager shall provide all personnel (including site visitors) with site-specific health and safety training. A record of this training shall be maintained. This training shall consist of the following:

- Discussion of the elements contained within this plan
- Discussion of responsibilities and duties of key site personnel
- Discussion of physical, biological and chemical hazards present at the site
- Discussion of work assignments and responsibilities
- Discussion of the correct use and limitations of the required PPE
- Discussion of the emergency procedures to be followed at the site
- Safe work practices to minimize risk
- Communication procedures and equipment
- Emergency notification procedures

8.2 DAILY SAFETY BRIEFINGS

The Contractor's health and safety manager will determine if a daily safety briefing is required. The briefing shall discuss the specific tasks scheduled for that day and the following topics:

- Specific work plans
- Physical, chemical or biological hazards anticipated
- Fire or explosion hazards
- PPE required
- Emergency procedures, including emergency escape routes, emergency medical treatment, and medical evacuation from the site
- Weather forecast for the day
- Buddy system
- Communication requirements
- Site control requirements
- Material handling requirements

9.0 COMMUNITY AIR MONITORING PROGRAM (CAMP)

A Community Air Monitoring Program (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the upwind and downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The program 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 and on-site workers not directly involved with work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. A NYSDOH generic CAMP obtained from NYSDEC DER-10 is presented in **Attachment 5** that will be followed and adhered to for work activities that could generate dust from an impacted area.

A program for suppressing fugitive dust and particulate matter monitoring will also be conducted in accordance *NYSDEC DER-10* titled *Appendix 1B Fugitive Dust and Particulate Monitoring,* which is also provided in **Attachment 5**. The fugitive dust suppression and particulate monitoring program will be employed at the site during building demolition, IRM site remediation and other intrusive activities which warrant its use.

Both the CAMP and the fugitive dust and particulate monitoring program will be administered by the environmental engineer/consultant. Monitoring results of the CAMP will be reported to the New York State Department of Health daily for review.

ATTACHMENT 1

Table of Potential Hazards and OSHA Standards

Potential Hazards and OSHA Standards for Consideration during IRMs

Site Exposure/Control	Potentially Applicable OSHA Standard*	
	1910 General Industry	1926 Construction
Hazard Assessmen & Employee Training	29 CFR 1910.132(d)	29 CFR 1926.21(b)
Chemical Exposure	29 CFR 1910.1000	29 CFR 1926.55
Noise Exposure	29 CFR 1910.95	29 CFR 1926.52
Sanitation	29 CFR 1910.141	29 CFR 1926.51
Wiring Methods (temporary wiring)	29 CFR 1910.305(a)(2) 29 CFR 1910.333	29 CFR 1926.405(a)(2)
Electrical Hazards		29 CFR 1926.416
Emergency Action Planning	29 CFR 1910.38	29 CFR 1926.35
Excavation	covered by 1926	29 CFR 1926 Subpart P
Confined Space Entry	29 CFR 1910.146	29 CFR 1926.21(b)(6)29 CFR 1926.353(b)
Material Handling	29 CFR Subpart N	29 CFR Subpart N29 CFR 1926.600-60229 CFR 1926.604
Building Demolition	covered by 1926	29 CFR 1926 Subpart T
Site ContaminantAbatement	29 CFR 1910.1000-1029 29 CFR 1910.1043-1052	29 CFR 1926.5529 CFR 1926.6229 CFR 1926.1101-1152
Elevated Work Surfaces	29 CFR 1910 Subpart D 29 CFR 1910 Subpart F	29 CFR 1926 Subpart L29 CFR 1926 Subpart M29 CFR 1926.552
Chemical Storage	29 CFR 1910 Subpart H29 CFR 1910.1200	29 CFR 1926.5929 CFR 1926 Subpart F
Personal Protective Equipment	29 CFR 1910 Subpart I	29 CFR 1926 Subpart E
Heavy Equipment Operation	29 CFR 1910.9529 CFR 1910 Subpart N	29 CFR 1926.5229 CFR 1926 Subpart 0
Tasks-Long Duration	29 CFR 1910.141-142	29 CFR 1926.51

The Federal General Industry and Construction citations are provided above

ATTACHMENT 2

Heat Stress Management Program and Procedures

INTRODUCTION

Panamerican employees engage in a variety of activities with potential exposure to excessive ambient temperatures and humidity, with the overall result being Aheat stress@. This procedure establishes the Panamerican Heat Stress Management Program. It establishes responsibilities and basic requirements for personnel who may be required to work in situations where the ambient temperature exceeds 21° C (70° F) while wearing protective equipment (e.g., hazardous waste site investigations) or when the ambient temperature exceeds 29° (85° F) while wearing normal clothing. Because heart stress is one of the most common and potentially serious illnesses at job sites and particularly hazardous waste sites, regular monitoring and other preventive measures are warranted.

There are no regulations addressing heat stress. However, it should be noted that OSHA does recognize heat stress as a potentially serious health hazard and can site employers under the Ageneral duty clause@ of the Occupational Safety Health Act if heat-related illness is occurring or likely to occur.

PROGRAM ADMINISTRATION AND RESPONSIBILITIES

The Heat Stress Management Program is administered by Panamerican Managers and Health and Safety personnel.

These Individuals:

- Oversee the implementation of the Heat Stress Management Program;
- Periodically audit and evaluate program implementation;
- Evaluate this procedure on an ongoing basis to see that it reflects current practice and regulations;
- Assist field crews in their implementation of this procedure.

Project Managers (PM) and Safety Personnel are responsible for:

- Implementing this Procedure in all field operations:
- Providing guidance to staff regarding heat stress management as described in the Procedure; and
- Providing feedback to management regarding program effectiveness.

Staff Members are responsible for:

- Complying with this Procedure as it applies to their activities; and
- Providing feed back to their supervisor regarding program effectiveness.

HEAT STRESS HAZARDS AND RISK FACTORS

Heat Stress is defined as the total net load on the body with contributions from both exposure to external sources, such as sunshine and hot surfaces, and from internal metabolic heat production. A person=s exposure to the increased ambient temperatures and humidity produces physiological responses referred to as heat stress which are characterized by an increase in the: a) Acore@ or Adeep body temperature@. b) heart rate, c) blood flow to the skin, and d) water and salt loss due to sweating. Conditions of excessive heat stress may occur either when the physical work is too heavy or the environment is too hot in relation to the work being performed. If work is performed under hot environmental conditions, the work load effort must be reviewed and the heat exposure limit maintained at or below the levels to protect the worker from the risk of acute heat illness.

In general, there are four types of physiological disorders associated with heat stress. They include:

- Heat Rash - a skin reaction occurring as a result of obstructed sweat glands, often associated with impermeable clothing.

- Heat Cramps - painful muscle spasms of extremities and abdomen, resulting from inadequate balance of electrolytes which are lost from sweating.

- Heat Exhaustion - a mild form of heat stroke due to depletion of body fluids and electrolytes. Blood vessels dilate despite decreased volume of blood. Symptoms include weakness, dizziness, nausea, rapid pulse, and a small increase in body temperature.

- Heatstroke - a potentially fatal disorder resulting from failure of the body=s thermoregulatory system. The classical description of heatstroke includes (1) a major disruption of central nervous function (unconsciousness of convulsions), (2) a lack of sweating (3) hot, dry, red or mottled skin, and (4) a core temperature in excess of 41° C (105.8° F). Heatstroke is a serious medical condition which calls for emergency medical action.

Seven factors play significant roles in the development of or predisposition to, heat stress disorders. These factors include:

- Acclimatization - Heat acclimatization leads to increased and quicker sweating, cooler skin due to an increase in evaporative cooling and a lower, more stable core body temperature. Maximal sweating rates in unacclimatized persons are lower, but salt concentrations in their perspiration are higher, requiring a higher rate of salt replacement.

- Age - Older individuals are generally more susceptible to heat stress than younger individuals. However, older healthy workers are able to perform well in hot jobs if permitted to proceed at a self-regulated pace.

- Gender - The average woman has a lower aerobic capacity than a similar-sized man. Nevertheless, when working at similar proportions of their maximum aerobic capacity, women perform similarly or only slightly less well than men.

- Body Fat - The lower level of physical fitness, decreased maximum work capacity and decreased cardiovascular capacity frequently associated with obesity predispose individuals to heat disorders.

- Water and Electrolyte Balance - Sustained, effective work performance in heat requires a replacement of body water and electrolytes lost through sweating. If this water is not replaced by drinking, continued sweating will draw on water reserves from both tissues and body cells leading to dehydration.

- Use of Alcohol and Medication - Not withstanding the potential hazards from impaired coordination and judgment, the ingestion of alcohol before or during work in the heat should not be permitted because it reduces heat tolerance and increases the risk of heat illness, Many drugs, including diuretics and antihypertensives, can interfere with the body=s thermoregulation.

- Physical Fitness - Physical conditioning enhances heat tolerance by increasing the functional capacity of the cardiovasculatory system, and reduces the time required to develop heat acclimatization by about 50% over those not physically fit.

The factors listed above are to be taken into account by all project personnel when planning or executing a project subject to heat stress conditions. The factors should be taken into consideration for:

- the development of the project schedule;
- the ordering of supplies/equipment;
- the support facilities to be made available at the site;
- the execution of work tasks; and
- the after work hours activities.

The following is a summary of signs and symptoms of heat stress:

Heat Rash may result from continuous exposure to heat or humid air .

Heat cramps are caused by heavy sweating with inadequate electrolyte replacement. Signs and symptoms include:

- Muscle Spasms
- Pain in the hands, feet and abdomen.

Heat Exhaustion occurs from increased stress on various body organs, including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Signs and symptoms include:

- Pale, cool and moist skin
- Heavy sweating
- Dizziness, fainting and nausea

Heat stroke is the most serious form of heat stress. Temperature regulation fails, and the body temperature rises to critical levels. Immediate action must be taken to cool the body before serious injury or death occurs. Competent medical help must be obtained. Signs and symptoms are:

- Red, hot and unusually dry skin
- Lack of or reduced perspiration
- Dizziness and confusion

- Strong, rapid pulse and coma.

HEAT AND STRESS PREVENTION

Preventive measures should be taken to prevent personnel from experiencing heat stress illness. Prevention of heat stress is also important because if an individual has experienced a heat illness incident, he has an increased likelihood of future occurrences. Preventive measures include: favorable work scheduling, acclimatization of workers to hot environments, drinking sufficient quantities of fluids, providing cool, sheltered work and rest areas, and utilizing cooling devices as appropriate of feasible. Heat stress monitoring/work rest regimens are discussed below.

Work Schedules and Activity

If possible, work should be scheduled during the coolest part of the day. Early morning and evening work can be considerably more effective than working midday when the additional time for breaks and heat stress monitoring are taken into account.

Employees should also be encourages to maintain a certain level of activity during the work shift. Prolonged standing in hot environments can lead to heat illness because the blood pools in the lower extremities. Workers should periodically walk about to encourage blood circulation from the feet and legs.

Acclimatization of Workers

A properly designed and applied heat acclimatization program will dramatically increase the ability of workers to work at a hot job and will decrease the risk of heat-related illnesses and unsafe acts. Heat acclimatization can usually be induced in 5 to 7 days of exposure to the hot job. For workers who have had previous experience with the job, the acclimatization regimen should be exposure for 50% on day 1, 60% on day 2, 80% on day 3 and 100% on day 4. For workers new to job the schedule should be 20% on day 1 with a 20% increase in each additional day.

Acclimatization can be induced by sustained elevations of the skin and core body temperatures above levels for the same work in cool environments for an hour or more per day. Acclimatization needs periodic reinforcement such as occurs daily during the work week. Persons may show some loss of acclimatization on the first day of the new shift after being idle for two days or over a weekend. After vacations of two weeks or longer he loss of acclimatization is substantial, several days at work will be needed before heat tolerance is fully restored.

Drinking Sufficient Quantities of Fluids

Under hot conditions where sweat production may reach 6 to 8 liters per day, voluntary replacement of the water lost is usually incomplete. The normal thirst mechanism is not sensitive enough to urge us to drink enough water to prevent dehydration. Individuals are seldom aware of the exact amount of seat they produce of how much water is needed to replace that lost in sweat; 1 liter/hour is not an uncommon rate of water loss. Every effort should be made to encourage individuals to drink water, low-sodium noncarbonated beverages or electrolyte replacement fluids (e.g., Gatorade). Lightly salted water (1 gram/liter of water (0.1%) or one level teaspoon per 15 quarts of water), should be provided to unacclimated workers. The salt should be dissolved completely and the water kept cool. Salt tablets as dietary supplements are not generally recommended.

Workers should drink at least 500 ml (one pint) of water before beginning work. The fluid should be maintained at temperatures of 10° to 15° (50 to 59° F). If possible, small quantities of fluids should be consumed at frequent intervals (e.g., 150 to 250 milliliters (ml), or at least a quarter pint, every 20 minutes) rather than the intake of 750 ml (3 cups) or more once per hour. Individuals vary, but water intake should total 4 to 8 liters (quarts) per day. When heat stress is considered a potential problem, a minimum of 1 liter/hour/person of water are to be maintained onsite. Individual paper or plastic cups will be provided in order to prevent the spread of communicable disease.

Alcohol and diuretics such as caffeine (contained in coffee, tea and soft drinks) can increase dehydration. Therefore employees with potential exposure to heat stress should be discouraged from the consumption of these types of fluids during and after working hours.

Cool, sheltered Work and Rest Areas

Exposure to direct sunlight significantly increases the overall thermal loading of the body, thereby increasing an individuals susceptibility to heat stress illnesses. Whenever possible work should be conducted under suspended tarps, in shady areas or in other sheltered areas in order to reduce thermal loading caused by the sun. Cool sheltered areas should be provided also for rest breaks. A rest area should be situated so that part of it is in the contamination reduction area so that workers can take breaks without being required to undertake a full decontamination procedure. Canopies or tarps and open air tents, are types of cool shelters which can provide shaded rest areas.

Cooling Devices

Auxiliary cooling devices can be successfully used to provide body cooling, especially to workers wearing protective garments at hazardous waste sites. Vortex coolers utilize high velocity air which is directed inside the protective clothing. Vortex coolers have been used successfully in some operations. Cooling vests utilizing Ablue ice@ type packs can provide some cooling to the torso, but add weight for the wearer and can inhibit body movements.

Newer, more sophisticated tube and refrigerant systems woven into undergarments are also available. However, some of these systems ,,may not be effective in situations where the work involves considerable motion, since bending and lifting can crimp the tubes, impending the flow of refrigerant.

Heat Stress Monitoring

Several heat stress monitoring systems have been devised to help manage heat stress in hot work environments. Panamerican performs heat stress monitoring when: 1) employees are wearing normal work clothing in ambient temperatures exceeding 29° C, (85° F) and 2) employees wearing chemical protective clothing (including paper coveralls) working in ambient temperatures exceeding 21° C (70° F). The temperature differential is related to the reduced ability of a person to maintain a core temperature of ± 37° C (98.6° F) when wearing chemical protective clothing.

It should be noted by personnel that there are no Afast and true@ methods of heat stress monitoring; likewise there are no regulations concerning heat stress monitoring. Individual susceptibility to heat stress is highly variable. Some individuals are highly susceptible to any increase in their internal body temperature while other individuals can work very well with internal body temperatures of 39°C (102.2° F) or higher.

The heat stress monitoring systems should be used by Site Safety Officers as guidelines and not necessarily as hard, fast rules. Individuals working in elevated temperatures should be queried on a regular basis regarding their perceived state of heat stress. If the calculated heat stress index value indicates that work can continue but a person states that they believe they are experiencing heat stress, the work effect should be discontinued and a rest break taken.

Likewise, if the calculated heat stress index value indicates that a rest break should be taken but the workers believe they can work longer, they should be permitted to work longer providing that their heart rates do not exceed 110 beats per minute. If the individual's heart rate rates exceed 110 beats per minute a rest break will be taken. In all cases, individual workers should not be permitted or expected to perform excessive work which could result in heat stress. If a SSO has any concerns that an individual may be pushing himself/herself past the Abreaking point@ the calculated work/rest regimen will be followed.

For strenuous field activities that are part of ongoing site work activities in hot weather, the following procedures shall be used to monitor the body=s physiological response to heat, and to monitor the work cycle of each site worker. There are two phases to this monitoring: the initial work/rest cycle is used to estimate how long the first work shifts of the day should be. Heart rate monitoring of each worker will establish the length of the successive work periods. Both phases are to be used are to be used for heat stress monitoring. Failure to use either one could place workers at risk of heat-related disorders.

Phase 1 - Determination of the Initial Work - Rest Regimen

The determination of the initial work - rest regimen can be performed using either of two methods:

-The Modified Dry Bulb Index; or
-The Wet Bulb Globe Thermometer (WBGT) Index

After the initial work - rest regimen has been determined, environmental conditions must be monitored for changes which would require a modification to the work - rest regimen. This, coupled with the heart rate monitoring, determines the work cycles to be followed on a site.

The Modified Dry Bulb Index accounts for the effects caused by solar, load, air temperature, and chemical protective clothing, under a light work load (walking at approximately 3 mph). A mercury thermometer, shielded from direct sunlight, is used to measure ambient temperature. The percentages of (of time) of sunlight and cloud cover are then estimated to determine a sunshine quality factor (e.g., 100% sunshine - no cloud cover = 1.0; 50% sunshine - 50% cloud cover = 0.5; 0% sunshine - 100% cloud cover = 0.0). When these two sets of values have been obtained, they are inserted into the following equation to calculate the adjusted temperature:

$$T\ (^{o}C,\ \text{adjusted}) = T\ (^{o}C,\ \text{actual}) + (7.2 \times \text{sunshine quality factor})$$

-OR-

$$T\ (^{o}F,\ \text{adjusted}) = T\ (^{o}F,\ \text{actual}) + (13 \times \text{sunshine quality factor})$$

After the adjusted temperature has been calculated, the length of the first work shift can be determined using the following table:

Initial Break and Physiological Monitoring Cycles

ADJUSTED TEMPERATURE	NORMAL WORK CLOTHES	PROTECTIVE CLOTHING
90^{0}F (32.2^0 C) or above	After each 45 minutes of work	After each 15 minutes of work
87.5^0-90^0 F (30.8^0-32.2^0 C)	After each 60 minutes of work	After each 30 minutes of work
82.5^0-87.5^0 F (28.1^0-30.8^0 C)	After each 90 minutes of work	After each 60 minutes of work
77.5^0-82.5^0 F (25.3^0-28.1^0 C)	After each 120 minutes of work	After each 90 minutes of work
72.5^0-77.5^0 F (22.5^0-25.3^0 C)	After each 150 minutes of work	After each 120 minutes of work

NOTE: The standard rest period is 15 minutes

WET BULB GLOBE THERMOMETER INDEX

The Wet Bulb Globe Thermometer (WBGT) Index was developed by the U.S. Army in the 1950s to prevent heat stress in army recruits. The WBGT Index accounts for the effects caused by humidity, air movement, evaporation, air temperature and work rate. It does not, however, account for the effects of chemical protective clothing, non-acclimatized workers, age, or other factors which may affect the likelihood of heat stress. Because of this, it is necessary to make adjustments to the index and conduct Heart Rate Monitoring.

WBGT measurements are usually obtained through the use of are-contained electronic devices. Such devices are easy to set up and can provide the user with the capabilities to store data and download to print out a hard copy.

Heat produced by the body and the environmental heat together determine the total heat load. Therefore, after the WBGT Index has been obtained, the anticipated work load category of each job shall be determined and the initial-rest regimen established using the table below.

The work load category may be determined by ranking each job into light, medium and heavy categories on the basis of type of operation. Examples of each category are:

Light work:	sitting or standing to control machines, performing light hand work
Moderate work:	walking about with moderate lifting and pushing; and
Heavy work:	pick and shovel work.

PERMISSIBLE HEAT EXPOSURE

WORK-REST REGIMEN	WORK LOAD		
	LIGHT	MODERATE	HEAVY
	30.0^0 C/86^0 F	26.7^0 C/80.1^0 F	25^{0}C/77^{0}F
75% Work-25% Rest Each Hour	30.6^0 C/87.1^0 F	28^0 C/82.4^0 F	25.9^0 C/78.6^0 F
50% Work-50% Rest Each Hour	31.4^0 C/88.5^0 F	29.4^0 C/85.0^0 F	27.9^0 C/82.2^0 F
25%Work-75 % Rest Each Hour	32.2^0 C/90.0^0 F	31.1^0 C/88.0^0 F	30.0^0 C/86.0^0 F

The table reads as follows:

Light, continuous work is possible at any WBGT reading up to 30^0 C (86^{0}F) but above that limit work breaks are needed to recover from the heat; light work at temperatures of between 30.0 and 30.6^{0}C (86 to 87^{0}F) can be conducted, but 15 minute breaks must be taken every hour, etc. It is important to note that this table is applicable primarily to healthy, acclimatized personnel; wearing standard work clothing.

NOTE: An additional 6 to 11^{0}C (42.8 to 51.8^{0}F) must be added to the calculated WBGT temperature for personnel wearing chemical protective clothing prior to determining the initial work - rest regimen from this table. Because the WBGT Index does not take into account unacclimatized workers, or individual susceptibilities, the addition to the WBGT value does not eliminate the requirement for Heart Rate Monitoring after work has begun.

Phase 2 - Heart Rate Monitoring

An increase in the heart rate is a significant indication of stress, whether induced by exposure to heat or through physical labor. Although baseline heart rates can vary significantly between individuals and during the day for an individual, a heart rate of 110 beats per minute or greater is an indication of physiological stress. To prevent heat stress illnesses, the heart rate (HR) should be measured by radial (wrist) or carotid (neck) pulse for 30 seconds as early as possible in the rest period. The HR at the beginning of the rest period should not exceed 110 beats/minute. If the HR is higher, the next work period should be shortened by 33 percent while the length of the rest period stays the same. If the pulse rate still exceeds 110 beats/minute at the beginning of the next rest period, the following work period should be further shortened by 33 percent while the length of the rest period stays the same.

ATTACHMENT 3

Trenching and Excavation Health and Safety Requirements

REGULATORY AUTHORITY

Excavations will be performed in accordance with OSHA 29 CFR, subpart P, 1926:650-1926.652 and USACOE EM 385-1-1 section 25 requirements as they apply to project activities.

GENERAL

- **At all times the need for personnel to enter excavations will be minimized. Inspections or sample removal will be done from above the excavation, whenever possible.**

- **Personnel will only enter excavations after the requirements of this plan have been met.**

- **Personnel protective equipment including hard hat, safety glasses and steel-toe work boots may be required.**

SURFACE ENCUMBRANCES

Surface encumbrances such as structures, fencing, piping, stored material etc. which may interfere with safe excavations will be avoided, removed or adequately supported prior to the start of excavations. Support systems will be inspected daily.

UNDERGROUND UTILITIES

Underground utility locations will be checked and determined and permits as necessary will be in place prior to initiating excavations. Local utility companies will be contacted at least two days in advance, advised of proposed work, and requested to locate underground installations. When excavations approach the estimated location of utilities, the exact location will be determined by careful probing or hand digging and when it is uncovered, proper supports will be provided.

OVERHEAD OBSTACLES

A minimum safe distance of 20 feet will be maintained when working around overhead high-voltage lines or the line will be de-energized following appropriate lock-out and tag-out procedures by qualified utility personnel.

ENTRY/EXIT ROUTES

Excavations five feet or more deep will require an adequate means of exit, such as a ladder, ramp, or steps and located so as to require no more than 25 feet of lateral travel. Under no circumstances will

personnel be raised.

VEHICLE CONTROL/SAFETY

Personnel working around heavy equipment, or who may be exposed to public vehicular traffic will wear a traffic warning vest consisting of at least 400 square inches of red or orange material. At night, at least 400 square inches of florescent or other reflective material will be worn.

For excavation work on or adjacent to highways or streets, signs, signals, and barricades tat conform to the requirements of the current American National Standards Institute (ANSI) D6.1, Manual on Uniform Traffic Control Devices for Streets and Highways will be used to protect work areas. Signs, signals, and barricades will be adequately lighted at night. Flagmen will be provided when signs, signals and barricades do not provide adequate protection. Flagmen will use signals and procedures contained in the current issue of ANSI D6.1. At night, flagmen will be clearly illuminated so as to be easily seen by approaching traffic.

For mobile equipment operating next to or approaching the edge of an excavation, the operator will have a clear view of the edge of the excavation, or a warning system such as barricades, hand or mechanical signals, or stop logs will be used. If possible the surface grade will slope away from the excavation.

Personnel will be safely located in and around the trench and will not be permitted to work underneath loads handled by lifting or digging equipment. Personnel are required to stand away from vehicles being loaded and unloaded. Operators can remain in the cabs of vehicles being loaded or unloaded provided the vehicles are equipped to provide adequate protection to the operator.

HAZARDOUS ATMOSPHERES

Hazardous atmospheres, such as oxygen deficiency (atmospheres containing less than 19.5% oxygen), flammable gases or vapors (airborne concentrations greater than 20% of the lower explosive limit), and toxic gases or vapors (airborne concentrations above the OSHA Permissible Exposure Limit or other exposure limits) may occur in excavations, especially around landfills and hazardous waste sites.

In locations where oxygen deficiency or hazardous gaseous conditions are possible, the air in the excavation will be tested before personnel are permitted to enter an excavation deeper than 4 feet. When flammable gases are present, adequate ventilation will be provided and sources of ignition will be eliminated. Ventilation or respiratory protection will be provided to prevent personnel exposures to oxygen deficient or toxic atmospheres. Periodic retesting (at least each shift) of the excavation will be conducted to verify that the atmosphere is acceptable. A log or field book records will be maintained of all test results.

WATER ACCUMULATION HAZARDS

Personnel will not work in excavations that have accumulated water or where water is accumulating unless adequate precautions have been taken. These precautions can include special support or shield systems, water removal systems such as pumps, or safety harnesses and lifelines. Water removal systems will be operated and monitored by experienced personnel. Diversion ditches or dikes will be used to prevent surface water from entering the excavation and to provide adequate drainage of the area around the excavation. Adequate precautions, as described above, will be taken for excavating

subject to heavy rains.

STABILITY OF ADJACENT STRUCTURES

Support systems such as shoring, bracing, or underpinning will be provided to maintain the stability of adjoining buildings, walls, or other structures endangered by the excavation operations. Excavations below a foundation or retaining wall that could be reasonably expected to pose a hazard to personnel will not be permitted unless:

- a support system is provided
- The excavation is in stable rock; or
- A Registered Professional Engineer has determined that the structure will not be effected by the excavation activity or that the excavation work will pose a hazard to employees. The Professional Engineer is required to demonstrate how the above determination was made on the basis of appropriate calculations.

Sidewalks will not be undermined unless shored to protect from possible collapse.

PROTECTION FROM LOOSE ROCK, MATERIALS OR SPOILS

In excavations and trenches that personnel may be required to enter, loose rock, excavated or other material, and spoils will be effectively stored and retained at least two feet or more from the edge of the excavation.

As an alternative to the clearance prescribed above, barriers or other effective retaining devices may be used in order to prevent spoils or other materials from falling into the excavation.

Walkways, runways, and sidewalks will be kept clear of excavated material from other obstructions.

Scaling operations may be used to remove loose material and will be performed only by experienced crews under the direct supervision of a competent supervisor. The scalers will be provided with scaler=s lifelines, safety belts, boatswain chair, and other safety equipment necessary for their protection.

FALL PROTECTION

Walkways or bridges with standard guardrails that meet OSHA specifications will be provided where employees, the public, or equipment are required to cross over excavations.

Adequate barrier physical protection will be provided at all remotely located excavations. All excavations will be barricaded or covered.

EMERGENCY RESCUE

In the event of a cave-in, the Emergency Rescue Squad will be immediately notified. The caller should provide his name, location, nature of the accident (an excavation collapse), the dimensions of the excavation, and number of people trapped in the excavation. Personnel are not to enter a collapsed trench to attempt rescue. This may cause a further collapse of the trench. Under no circumstance is heavy equipment to be used to attempt rescue of personnel in a collapsed excavation; injury or decapitation could be the result. All heavy equipment and traffic in the area is to be shut down and

stopped to reduce vibration. Pumps should be started if water ensues.

INSPECTION PROGRAM

Safety personnel will conduct daily inspections of the excavation, the adjacent areas, and protective systems. Inspections will be conducted prior to the start of work and as needed throughout the work shift. Inspections will also be made after every rainstorm or other occurrence that increases the hazard of collapse (i.e., vibration from heavy equipment, freezing and thawing, etc.).

The excavation inspection will include a check for the following:

- **Evidence if situations that could result in possible cave-in (i.e. soil crumbling or sloughing, water saturated soils, freezing and thawing, unusual vibrations such as from heavy equipment, heavy rains, surface run off entering trench, etc.);**
- **Indications of failure of protective systems;**
- **Hazardous atmosphere (oxygen deficiency, flammable and toxic gases and vapors);**
- **Condition and support of exposed underground installations;**
- **Adequate means of egress;**
- **Signs, signals, and barricades for work area protection;**
- **Precautionary measures to control water accumulation;**
- **Stability and support of adjacent structures; and**
- **Adequate protection from loose rock and soil.**

PROTECTIVE SYSTEMS

Personnel working in excavations will be protected from cave-ins by sloping and/or benching of excavation walls, a shoring system or some other equivalent means except when:

- **The excavation is made entirely in stable rock; or**
- **Excavations are less than five feet deep and safety personnel have determined that there is no indication of potential cave-in. Depending on site and soil conditions protective measures may be taken for the excavations less than five feet in depth.**

The most important factor influencing the choice of protective systems is the soil type classification. Once the soil type has been classified, selection of the protective system, the determination of the angle of repose for sloping and benching, and the design of shoring systems will be made. Decisions will be based on careful evaluation of pertinent factors such as depth of cut; possible variation in water content of the material while the excavation is open; anticipated changes in materials from exposure to air, sun, water, or freezing; loading imposed structures equipment, overlying material, or stored material; and vibration from equipment, blasting traffic or other sources.

Soil Classification

Appendix A of the OSHA Excavation Standard describes a methjod to classify soils into four types:

1. Stable Rock - Solid mineral matter that can be excavated with vertical sides.

2. Type A - cohesive soils with an unconfined compressive strength of 1.5 ton per square foot (tsf) or greater. Examples include: clay; silty clay; sandy clay; clayey loam; and cemented soils such as caliche and hardpan. No soil is considered to be Type A if it is fissured, subject to vibration, previously disturbed, or part of a sloped, layered system.

3. Type B - cohesive soils with an unconfined compressive strength of greater than 0.5 tsf but less than 1.5 tsf. Examples include: angular gravel similar to crushed rock; silt; silty loam; and sandy loam; Type B soils also include : previously disturbed soils that are not type C; Type A soils that are fissured or subject to vibration; and dry rock that is not stable.

4. Type C - cohesive soils with an unconfined compressive strength of 0.5 tsf or less. Examples include: gravel; sand; loamy sand; submerged soil or soil from which water is seeping; submerged rock that is not stable.

The engineer, geologist, or safety personnel will conduct at least one visual and at least one manual test as described in the OSHA excavation standard in order to classify soils. Visual tests include looking for : particle size and soil cohesiveness (clumping); cracking in the excavation sides which suggests fissured material; underground installations ans previously disturbed soils; layered soil systems that slope toward the excavation; evidence of surface water and water seeping from the sides of the excavation; and sources of vibration that may affect the excavation stability. Manual tests include: plascticity; dry strength; tumb penetration; drying test; and strength tests using a pocket penetrometer or hand-operated shearvane.

Sloping and Benching

One of the following options for sloping and benching systems described in section 1926.652(b) of the OSHA Excavation Standard will be used in excavations of .5 foot or deeper or at the discretion of the safety personnel:

- **The walls of excavation will be sloped at an angle not steeper than 0ne-and one-half horizontal to one vertical. Sloping configurations will follow the slopes shown for Type C soils in Appendix B of the OSHA Excavation Standard.**

- **Maximum allowable slopes and sloping and benching configurations will be determined according to soil type as described in Appendices A and B of the OSHA Excavation Standard.**

- **Use of other written tabulated data and designs, such as tables and charts, to design sloping and benching systems. A copy of the tabulated data must be approved by a registered Professional Engineer. A copy of the tabulated data must be kept at the job site.**

Personnel are not allowed to work on the faces of sloped or benched excavations above other workers unless the workers at the lower levels are protected from falling material or equipment. Similar protection will be provided for personnel working in excavations below other workers.

Support Systems, Shield Systems, and Other Protective Devices

One of the following options described in OSHA (1926.652 (c)) will be followed.

- **Timber shoring, designed according to the conditions and requirements of Appendix C of the OSHA Excavation Standard or aluminum hydraulic shoring designed according to manufacturers tabulated data or Appendix D of the OSHA Excavation Standard. In order to use the information in Appendices C or D, the soil type must first be determined using the classification system in Appendix A. For each soil type the size and spacing of the cross braces, uprights, and walls that comprise the shoring system are then selected based on the depth and width of the trench.**

- **Use of the manufacturer=s written tabulated to design support systems, shielded systems, and other protective devices. Any deviation from this tabulated data must be approved by the manufacturer. A copy of the tabulated data as well as any approvals to deviate from the tabulated data must be kept at the job site.**

- **Use of other written tabulated data to design support systems, shield systems, and other protective devices. The tabulated data must be approved by a Registered Professional Engineer. A copy of the tabulated data must be kept at the job site.**

- **Use of a written support system, shield system, and other protective device design that has been approved by a Registered Professional Engineer. A copy of the written design must be kept at the job site.**

Installation and Removal of Support

Cross braces or trench jacks, uprights, and walls will be secured together to prevent sliding, falling or kickouts.

Additional precautions by way of shoring and bracing will be taken to prevent slides or cave-ins when excavations or trenches are made in locations adjacent to backfilled excavations, or where excavations are subjected to vibrations from railroad or highway traffic, the operation of machinery, or any other source.

If it is necessary to place or operate power shovels, derricks, trucks, materials, or other heavy objects on a level above or near any excavation, the side of the excavation will be sheetpiled, shored, and braced as necessary to resist the extra pressure due to such superimposed loads.

Backfilling and removal of trench supports will progress together from the bottom of the trench. Jacks or braces will be released slowly and , in unstable soil, ropes will be used to pull out the jacks or braces from above after employees have cleared the trench.

Shield Systems

Portable trench boxes or sliding trench shields may be used for protection of personnel in lieu of a shoring system or sloping. Where such trench boxes or shields are used, they will be designed, constructed and maintained in a manner which will provide protection equal to or greater than the sheeting or shoring required for the trench. Shields will be installed so as to restrict lateral or other hazardous movement. Personnel are not allowed inside shields when shields are being moved.

EXCAVATION SAFETY LIST

To be completed prior to each work shift, or prior to personnel entering a new trench for the first time, by the Site Safety Officer/Competent Person:

Project_______________________Location_______________________________________

Job Number____

Competent Person(CP)*___________________________Date___________________

		Yes	**No**	**N/A**
1.	**Has the site been cleared for utilities and other underground obstructions?**	____	____	____
2.	**If on public property, has the regional utility locating service been notified?**	____	____	____
3.	**Has the excavation equipment been safety checked by the operator?**	____	____	____
4.	**Are copies of relevant OSHA excavation regulations available on site?**	____	____	____
5.	**Will the excavation be 5 feet or more in depth?**	____	____	____
6.	**If 4 is yes, will personnel enter the excavation at any time?**	____	____	____
7.	**If 4a is yes, have provisions been made for shoring, sloping, or benching the excavation? Describe:** ______________________________________ ______________________________________ ______________________________________	____	____	____
8.	**Has an inspection of the site and excavation been conducted by the SSO?**	____	____	____
9.	**Has the Competent Person conducted visual and manual tests to classify the soil?**	____	____	____

*** According to Federal OSHA, A Competent Person is a person who is capable of identifying existing and predictable hazards in the surroundings; or working conditions which are unsanitary, hazardous, or dangerous to employees; and who has the authority to take prompt corrective measures to eliminate them.**

10. G Visual Test ______________________________(type)
G Manual Test______________________________(type)
G Soil Classification__________________________(type)

11.	**Are there any conditions that might expose employees to injury from possible moving ground?**	____	_____	____
12.	**Is excavated material being placed at least 2 feet from the edge of the excavation?**	____	____	____
13.	**Is work in the excavation at all times under the immediate supervision of the SSO or other competent person?**	____	____	____
14.	**Is there a stairway, ladder, or ramp securely fastened in place to provide ingress and egress from the excavation?**	____	____	____
15.	**If the excavation is 4 feet or more in depth, are safe means of access (see 8) provided so as to require no more than 25 feet of lateral travel to reach them?**	____	____	____
16.	**If structural ramps are installed that are used for access/egress: were they designed by a qualified engineer?**	____	____	____
17.	**Do the structural ramps have appropriate means to prevent slipping and are the ramps uniform in thickness?**	____	____	____
18.	**Are walkways or bridges provided across the excavation to safe crossing?**	____	____	____
19.	**If excavations are 71/2 or more feet in depth, do the walkways have guardrails and toeboards?**	____	____	____
20.	**Are undermined structures adequately supported to safely carry all anticipated loads and protect workers?**	____	____	____
21.	**Are there adequate means provided to prevent mobile equipment from inadvertently entering the excavation?**	____	____	____
22.	**Is the excavation well marked and barricaded to prevent personnel from falling IN?**	____	____	____
23.	**Are means available to prevent surface water from entering the excavation and to provide**	____	____	____

	adequate drainage of the area adjacent to the trench?			
24.	**Where it is reasonable to expect hazardous atmospheres, including oxygen deficiency, to exist in the excavation, is appropriate atmosphere testing equipment available.**	____	____	____
25.	**Has the testing equipment been calibrated, and the calibrations recorded, today?**	____	____	____
26.	**Are employees trained in proper use of this equipment?**	____	____	____
27.	**Has a harness and lifeline been provided whenever an employee is required to enter a confined footing excavation?**	____	____	____
28.	**Is appropriate personal protective equipment (hardhat, safety boots, eye protection, etc.) available and in use?**	____	____	____

Notes:____
____
____
____

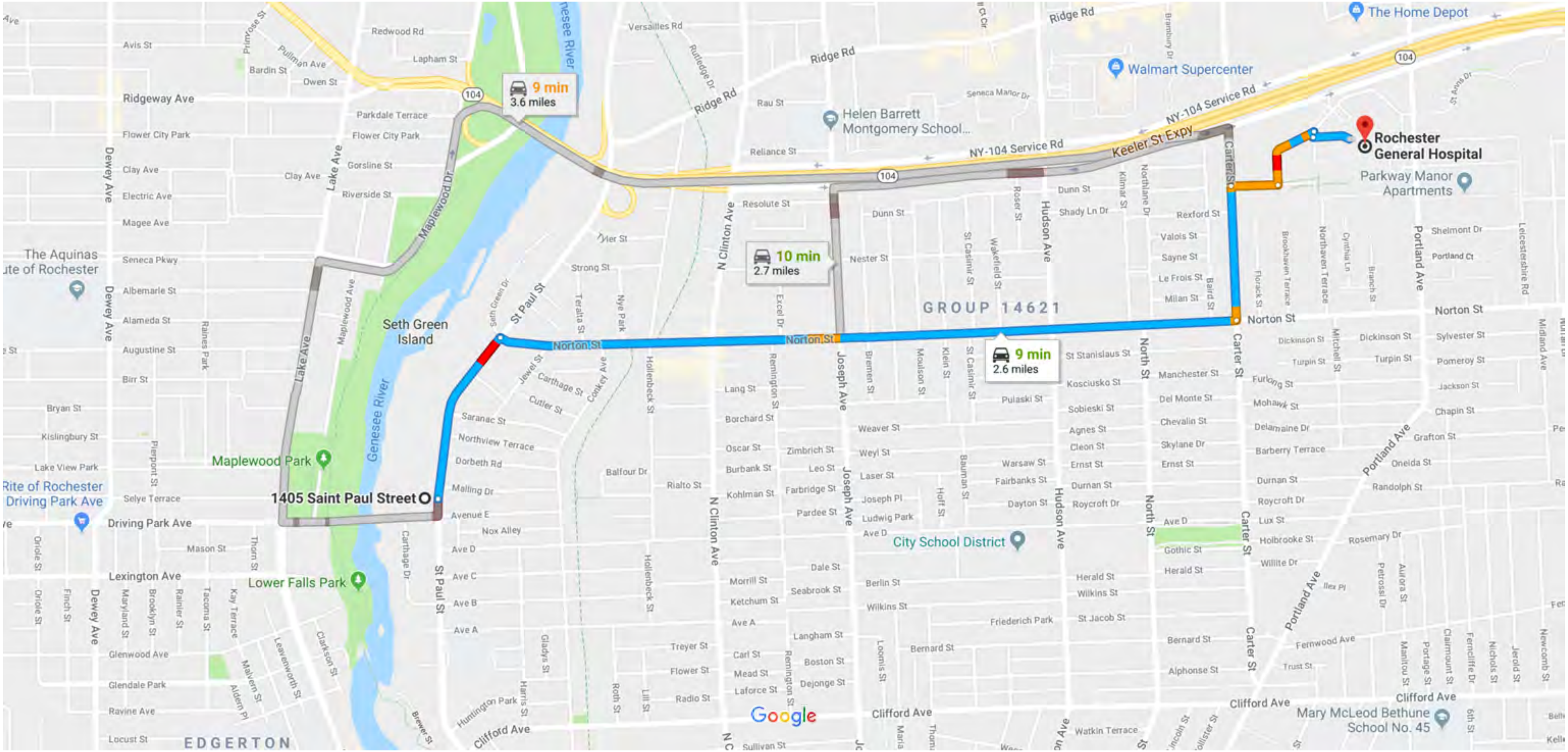
____________________________ ____________________________________

CPs Name (Print) **Signature**

ATTACHMENT 4

Map to Hospital

Drive 2.6 miles, 9 min



Map data ©2018 Google 1000 ft

ATTACHMENT 5

NYSDOH Generic CAMP
and
Fugitive Dust and Particulate Monitoring

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

Overview

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

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

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

Community Air Monitoring Plan

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

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

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. "Periodic" monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

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

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

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

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

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

Particulate Monitoring, Response Levels, and Actions

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

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

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

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

December 2009

Appendix 1B
Fugitive Dust and Particulate Monitoring

A program for suppressing fugitive dust and particulate matter monitoring at hazardous waste sites is a responsibility on the remedial party performing the work. These procedures must be incorporated into appropriate intrusive work plans. The following fugitive dust suppression and particulate monitoring program should be employed at sites during construction and other intrusive activities which warrant its use:

1. Reasonable fugitive dust suppression techniques must be employed during all site activities which may generate fugitive dust.

2. Particulate monitoring must be employed during the handling of waste or contaminated soil or when activities on site may generate fugitive dust from exposed waste or contaminated soil. Remedial activities may also include the excavation, grading, or placement of clean fill. These control measures should not be considered necessary for these activities.

3. Particulate monitoring must be performed using real-time particulate monitors and shall monitor particulate matter less than ten microns (PM10) with the following minimum performance standards:

(a) Objects to be measured: Dust, mists or aerosols;

(b) Measurement Ranges: 0.001 to 400 mg/m3 (1 to 400,000 :ug/m3);

(c) Precision (2-sigma) at constant temperature: +/- 10 :g/m3 for one second averaging; and +/- 1.5 g/m3 for sixty second averaging;

(d) Accuracy: +/- 5% of reading +/- precision (Referred to gravimetric calibration with SAE fine test dust (mmd= 2 to 3 :m, g= 2.5, as aerosolized);

(e) Resolution: 0.1% of reading or 1g/m3, whichever is larger;

(f) Particle Size Range of Maximum Response: 0.1-10;

(g) Total Number of Data Points in Memory: 10,000;

(h) Logged Data: Each data point with average concentration, time/date and data point number

(i) Run Summary: overall average, maximum concentrations, time/date of maximum, total number of logged points, start time/date, total elapsed time (run duration), STEL concentration and time/date occurrence, averaging (logging) period, calibration factor, and tag number;

(j) Alarm Averaging Time (user selectable): real-time (1-60 seconds) or STEL (15 minutes), alarms required;

(k) Operating Time: 48 hours (fully charged NiCd battery); continuously with charger;

(l) Operating Temperature: -10 to 50° C (14 to 122° F);

(m) Particulate levels will be monitored upwind and immediately downwind at the working site and integrated over a period not to exceed 15 minutes.

4. In order to ensure the validity of the fugitive dust measurements performed, there must be appropriate Quality Assurance/Quality Control (QA/QC). It is the responsibility of the remedial party to adequately supplement QA/QC Plans to include the following critical features: periodic instrument calibration, operator training, daily instrument performance (span) checks, and a record keeping plan.

5. The action level will be established at 150 ug/m3 (15 minutes average). While conservative,

this short-term interval will provide a real-time assessment of on-site air quality to assure both health and safety. If particulate levels are detected in excess of 150 ug/m3, the upwind background level must be confirmed immediately. If the working site particulate measurement is greater than 100 ug/m3 above the background level, additional dust suppression techniques must be implemented to reduce the generation of fugitive dust and corrective action taken to protect site personnel and reduce the potential for contaminant migration. Corrective measures may include increasing the level of personal protection for on-site personnel and implementing additional dust suppression techniques (see paragraph 7). Should the action level of 150 ug/m3 continue to be exceeded work must stop and DER must be notified as provided in the site design or remedial work plan. The notification shall include a description of the control measures implemented to prevent further exceedances.

6. It must be recognized that the generation of dust from waste or contaminated soil that migrates off-site, has the potential for transporting contaminants off-site. There may be situations when dust is being generated and leaving the site and the monitoring equipment does not measure PM10 at or above the action level. Since this situation has the potential to allow for the migration of contaminants off-site, it is unacceptable. While it is not practical to quantify total suspended particulates on a real-time basis, it is appropriate to rely on visual observation. If dust is observed leaving the working site, additional dust suppression techniques must be employed. Activities that have a high dusting potential--such as solidification and treatment involving materials like kiln dust and lime--will require the need for special measures to be considered.

7. The following techniques have been shown to be effective for the controlling of the generation and migration of dust during construction activities:

(a) Applying water on haul roads;
(b) Wetting equipment and excavation faces;
(c) Spraying water on buckets during excavation and dumping;
(d) Hauling materials in properly tarped or watertight containers;
(e) Restricting vehicle speeds to 10 mph;
(f) Covering excavated areas and material after excavation activity ceases; and
(g) Reducing the excavation size and/or number of excavations.

Experience has shown that the chance of exceeding the 150ug/m3 action level is remote when the above-mentioned techniques are used. When techniques involving water application are used, care must be taken not to use excess water, which can result in unacceptably wet conditions. Using atomizing sprays will prevent overly wet conditions, conserve water, and provide an effective means of suppressing the fugitive dust.

8. The evaluation of weather conditions is necessary for proper fugitive dust control. When extreme wind conditions make dust control ineffective, as a last resort remedial actions may need to be suspended. There may be situations that require fugitive dust suppression and particulate monitoring requirements with action levels more stringent than those provided above. Under some circumstances, the contaminant concentration and/or toxicity may require additional monitoring to protect site personnel and the public. Additional integrated sampling and chemical analysis of the dust may also be in order. This must be evaluated when a health and safety plan is developed and when appropriate suppression and monitoring requirements are established for protection of health and the environment.

APPENDIX B

QUALITY ASSURANCE/QUALITY CONTROL PLAN

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May 2019

Table of Contents

1.0 INTRODUCTION

This Quality Assurance/Quality Control (QA/QC) Plan provides an overview of QA/QC procedures required for the project. It also provides methods for laboratory testing of environmental samples obtained from the Site, which helps to ensure the quality of the data produced. The organizational structure for this project is presented in the Work Plan, which identifies the names of key project personnel. The project manager is responsible for verifying that QA procedures are followed in the field so that quality, representative samples are collected. The Project Manager is in contact with the analytical laboratory to monitor laboratory activities so that holding times and other QA/QC requirements are met. The anticipated quantity of field samples collected, and corresponding analytical parameters/methods are provided below.

ANALYTICAL SUMMARY TABLE

PARAMETER	ANALYTICAL METHOD	QUANTITY(GW)[A]	Soil[B]	Air[C]
Part 375 VOCs	8260	9	34	NA
Part 375 SVOCs	8270	9	34	NA
Part 375 Metals	6010/7470/7471	9	34	NA
Part 375 PCBs	8082	9	34	NA
Part 375 Pesticides	8081	9	34	NA
Air	TO-15	NA	NA	NA
Emerging Contaminants	537/8270	9	34	NA

Holding Times: 8260-14 days and 8270, 8081, and 8082-7 days
A = 1 MS, 1 MSD and 1 duplicate,
B = 2 MS, 2 MSD and 2 duplicates,

The analytical laboratory proposed for use for the analysis of samples will be a certified NYSDOH ELAP laboratory. The QA Manager of the laboratory will be responsible for performing project-specific audits and for overseeing the quality control data generated. The field geologist/technician coordinates all personnel involved with field sampling, verifies that all sampling is conducted per the FSP, and communicates regularly with the Project Manager. The ultimate responsibility for maintaining quality throughout the project rests with the Project Manager, including field and laboratory QA/QC.

2.0 DATA QUALITY OBJECTIVES

2.1 BACKGROUND

Data quality objectives (DQOs) are qualitative and quantitative statements, which specify the quality of data required supporting the investigation for the site. DQOs focus on the identification of the end use of the data to be collected. The project DQOs are achieved utilizing the definitive data category as outlined in *Guidance for the Data Quality Objectives Process,* EPA QA/G-4 (September 1994). All sample analyses will provide definitive data, which are generated using rigorous analytical methods such as reference methods approved by the United States

Environmental Protection Agency (USEPA). The purpose of this investigation is to determine the nature and extent of contamination at the site.

Within the context of the purpose stated above, the project DQOs for data collected during this investigation are:

- To assess the nature and extent of contamination in soil, groundwater, and soil vapor, as applicable
- To maintain the highest possible scientific/professional standards for each procedure
- To develop enough data to assess whether the levels of contaminates identified in the media sampled exceed regulatory guidelines

2.2 QA OBJECTIVES FOR CHEMICAL DATA MEASUREMENT

Sample analytical methodology for the media sampled and data deliverables are required to adhere to the requirements in NYSDEC Analytical Services Protocol. Laboratories are instructed to complete Sample Preparation and Analysis Summary forms and submit with the data packages. The laboratory is instructed that matrix interferences must be fixed to the extent practicable. To achieve the definitive data category described above, the data quality indicators of precision, accuracy, representativeness, comparability, and completeness are measured during analysis.

2.2.1 Precision

Precision examines the distribution of the reported values about their mean. The distribution of reported values refers to how different the individual reported values are from the average reported value. Precision may be affected by the natural variation of the matrix or contamination within that matrix and by errors made in field or laboratory handling procedures. Precision is evaluated using analyses of a laboratory matrix spike/matrix spike duplicate (for organics) and matrix duplicates (for inorganics), which indicate analytical precision through the reproducibility of the analytical results. Relative Percent Difference (RPD) is used to evaluate precision and it must meet the method requirements.

2.2.2 Accuracy

Accuracy measures the analytical bias in a measurement system. Sources of error are the sampling process, field contamination, preservation, handling, sample matrix, sample preparation, and analysis techniques. These data help to assess the potential concentration contribution from various outside sources. The laboratory objective for accuracy is to equal or exceed the accuracy demonstrated for the applied analytical methods on samples of the same matrix. The percent recovery criterion is used to estimate accuracy based on recovery in the matrix spike/matrix spike duplicate and matrix spike blank samples. The spike and spike duplicate, which will give an indication of matrix effects that may be affecting target compounds is also a good gauge of method efficiency.

2.2.3 Representativeness

Representativeness expresses the degree to which the sample data accurately and precisely represent the characteristics of a population of samples, parameter variations at a sampling point, or environmental conditions. Representativeness is a qualitative parameter, which is most concerned with the proper design of the sampling program or sub-sampling of a given sample. Objectives for representativeness are defined for sampling and analysis tasks and are a function of the investigative objectives. The sampling procedures described in the Field Sampling Plan have been selected with the goal of obtaining representative samples for the media of concern.

2.2.4 Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. A DQO for this program is to produce data with the greatest possible degree of comparability. This goal is achieved through using standard techniques to collect and analyze representative samples and reporting analytical results in appropriate units. Complete field documentation will support the assessment of comparability. Comparability is limited by the other parameters (e.g., precision, accuracy, representativeness, completeness, comparability), because only when precision and accuracy are known can data sets be compared with confidence. For data sets to be comparable, it is imperative that contract-required methods and procedures be explicitly followed.

2.2.5 Completeness

Completeness is defined as a measure of the amount of valid data obtainable from a measurement system compared to the amount that was expected to be obtained under normal conditions. It is important that appropriate QA procedures be maintained to verify that valid data are obtained to meet project needs. For the data generated, a goal of 90% is required for completeness (or usability) of the analytical data. If this goal is not met, then project personnel will determine whether the deviations might cause the data to be rejected.

3.0 SAMPLING LOCATIONS, CUSTODY, AND HOLDING TIMES

Sampling locations are discussed in Work Plan. Procedures addressing field and laboratory sample chain-of-custody and holding times details are presented in the Field Sampling Plan. The laboratory must meet the method required detection limits which are referenced within the methods.

4.0 CALIBRATION PROCEDURES AND FREQUENCY

To obtain a high level of precision and accuracy during sample processing procedures, laboratory instruments must be calibrated properly. Several analytical support areas must be considered so the integrity of standards and reagents is upheld prior to instrument calibration. The following sections describe the analytical support areas and laboratory instrument calibration procedures.

4.1 ANALYTICAL SUPPORT AREAS

Prior to generating quality data, several analytical support areas must be considered; these are detailed in the following paragraphs.

Standard/Reagent Preparation - Primary reference standards and secondary standard solutions shall be obtained from National Institute of Standards and Technology (NIST), or other reliable commercial sources to verify the highest purity possible. The preparation and maintenance of standards and reagents will be accomplished according to the methods referenced. All standards and standard solutions are to be formally documented (i.e., in a logbook) and should identify the supplier, lot number, purity/concentration, receipt/preparation date, preparers name, method of preparation, expiration date, and any other pertinent information. All standard solutions shall be validated prior to use. Care shall be exercised in the proper storage and handling of standard solutions (e.g., separating volatile standards from nonvolatile standards). The laboratory shall continually monitor the quality of the standards and reagents through well documented procedures.

Balances - The analytical balances shall be calibrated and maintained in accordance with manufacturer specifications. Calibration is conducted with two Class AS" weights that bracket the expected balance use range. The laboratory shall check the accuracy of the balances daily and they must be properly documented in permanently bound logbooks.

Refrigerators/Freezers - The temperature of the refrigerators and freezers within the laboratory shall be monitored and recorded daily. This will verify that the quality of the standards and reagents is not compromised, and the integrity of the analytical samples is upheld. Appropriate acceptance ranges (2 to 6°C for refrigerators) shall be clearly posted on each unit in service.

Water Supply System - The laboratory must maintain enough water supply for all project needs. The grade of the water must be of the highest quality (analyte-free) to eliminate false-positives from the analytical results. Ultraviolet cartridges or carbon absorption treatments are recommended for organic analyses and ion-exchange treatment is recommended for inorganic tests. Appropriate documentation of the quality of the water supply system(s) will be performed on a regular basis.

4.2 LABORATORY INSTRUMENTS

Calibration of instruments is required to verify that the analytical system is operating properly and at the sensitivity necessary to meet established quantitation limits. Each instrument for organic and inorganic analyses shall be calibrated with standards appropriate to the type of instrument and linear range established within the analytical method(s). Calibration of laboratory instruments will be performed according to specified methods.

In addition to the requirements stated within the analytical methods, the contract laboratory will be required to analyze an additional low-level standard at or near the detection limits. In general, standards will be used that bracket the expected concentration of the samples. This will require the use of different concentration levels, which are used to demonstrate the instrument's linear range of calibration.

Calibration of an instrument must be performed prior to the analysis of any samples and then at periodic intervals (continuing calibration) during the sample analysis to verify that the instrument is still calibrated. If the contract laboratory cannot meet the method required calibration requirements, corrective action shall be taken. All corrective action procedures taken by the contract laboratory are to be documented, summarized within the case narrative, and submitted with the analytical results.

5.0 INTERNAL QUALITY CONTROL CHECKS

Internal QC checks are used to determine if analytical operations at the laboratory are in control, as well as determining the effect sample matrix may have on data being generated. Two types of internal checks are performed and are described as batch QC and matrix-specific QC procedures. The type and frequency of specific QC samples performed by the contract laboratory will be according to the specified analytical method and project specific requirements. Acceptable criteria and target ranges for these QC samples are presented within the referenced analytical methods.

QC results which vary from acceptable ranges shall result in the implementation of appropriate corrective measures, potential application of qualifiers, and/or an assessment of the impact these corrective measures have on the established data quality objectives. Quality control samples including any project-specific QC will be analyzed are discussed below.

5.1 BATCH QC

Method Blanks - A method blank is defined as laboratory-distilled or deionized water that is carried through the entire analytical procedure. The method blank is used to determine the level of laboratory background contamination. Method blanks are analyzed at a frequency of one per analytical batch.

Matrix Spike Blank Samples - A matrix spike blank (MSB) sample is an aliquot of water spiked (fortified) with all the elements being analyzed for calculation of precision and accuracy to verify that the analysis that is being performed is in control. An MSB will be performed for each matrix and organic parameter only.

5.2 MATRIX-SPECIFIC QC

Matrix Spike Samples - An aliquot of a matrix is spiked with known concentrations of specific compounds as stipulated by the methodology. The matrix spike (MS) and matrix spike duplicate (MSD) are subjected to the entire analytical procedure to assess both accuracy and precision of the method for the matrix by measuring the percent recovery and relative percent difference of the two spiked samples. The samples are used to assess matrix interference effects on the method, as well as to evaluate instrument performance. MS/MSDs are analyzed at a frequency of one each per 20 samples per matrix.

Matrix Duplicates - The matrix duplicate (MD) is two representative aliquots of the same sample which are prepared and analyzed identically. Collection of duplicate samples provides for the evaluation of precision both in the field and at the laboratory by comparing the analytical results of two samples taken from the same location. Obtaining duplicate samples from a soil matrix requires homogenization (except for volatile organic compounds) of the sample aliquot prior to filling sample containers, to best achieve representative samples. Every effort will be made to obtain replicate samples; however, due to interferences, lack of homogeneity, and the nature of the soil samples, the analytical results are not always reproducible.

Rinsate (Equipment) Blanks - A rinsate blank is a sample of laboratory demonstrated analyte- free water passed through and over the cleaned sampling equipment. A rinsate blank is used to indicate potential contamination from ambient air and from sample instruments used to collect and transfer samples. This water must originate from one common source within the laboratory and must be the same water used by the laboratory performing the analysis. The rinsate blank should be collected, transported, and analyzed in the same manner as the samples acquired that day. Rinsate blanks for nonaqueous matrices should be performed at a rate of 10 percent of the total number of samples collected throughout the sampling event. Rinse blanks will not be performed on samples (i.e., groundwater) where dedicated disposable equipment is used.

Trip Blanks - Trip blanks are not required for nonaqueous matrices. Trip blanks are required for aqueous sampling events. They consist of a set of sample bottles filled at the laboratory with laboratory demonstrated analyte free water. These samples then accompany the bottles that are prepared at the lab into the field and back to the laboratory, along with the collected samples for analysis. These bottles are never opened in the field. Trip blanks must return to the lab with the same set of bottles they accompanied to the field. Trip blanks will be analyzed for volatile organic parameters. Trip blanks must be included at a rate of one per volatile sample shipment.

6.0 CALCULATION OF DATA QUALITY INDICATORS

6.1 PRECISION

Precision is evaluated using analyses of a field duplicate or a laboratory MS/MSD that indicate analytical precision through the reproducibility of the analytical results. RPD is used to evaluate precision by the following formula:

$$RPD = \frac{(X_1 - X_2)}{[(X_1 + X_2)/2]} \times 100\%$$

where:

X_1 = Measured value of sample or matrix spike
X_2 = Measured value of duplicate or matrix spike duplicate

Precision will be determined using MS/MSD (for organics) and matrix duplicates (for inorganics) analyses.

6.2 ACCURACY

Accuracy is defined as the degree of difference between the measured or calculated value and the true value. The closer the numerical value of the measurement comes to the true value or actual concentration, the more accurate the measurement is. Analytical accuracy is expressed as the percent recovery of a compound or element that has been added to the environmental sample at known concentrations before analysis. Analytical accuracy may be assessed using known and unknown QC samples and spiked samples. It is presented as percent recovery. Accuracy will be determined from matrix spike, matrix spike duplicate, and matrix spike blank samples, as well as from surrogate compounds added to organic fractions (i.e., volatiles, semi volatiles, PCB), and is calculated as follows:

$$Accuracy\ (\%R) = \frac{(X_s - X_u)}{K} \times 100\%$$

where:

X_s = Measured value of the spike sample
X_u = Measured value of the unspiked sample
K = Known amount of spike in the sample

6.3 COMPLETENESS

Completeness is calculated on a per matrix basis for the project and is calculated as follows:

$$\text{Completeness } (\%C) = \frac{(X_v - X_n)}{N} \times 100\%$$

where:

X_v = Number of valid measurements
X_n = Number of invalid measurements
N = Number of valid measurements expected to be obtained

7.0 CORRECTIVE ACTIONS

Laboratory corrective actions shall be implemented to resolve problems and restore proper functioning to the analytical system when errors, deficiencies, or out-of-control situations exist at the laboratory. Full documentation of the corrective action procedure needed to resolve the problem shall be filed in the project records, and the information summarized in the case narrative. A discussion of the corrective actions to be taken is presented in the following sections.

7.1 INCOMING SAMPLES

Problems noted during sample receipt shall be documented by the laboratory. The Project Manager shall be contacted immediately for problem resolution. All corrective actions shall be documented thoroughly.

7.2 SAMPLE HOLDING TIMES

If any sample extraction or analyses exceed method holding time requirements, the Project Manager shall be notified immediately for problem resolution. All corrective actions shall be documented thoroughly.

7.3 INSTRUMENT CALIBRATION

Sample analysis shall not be allowed until all initial calibrations meet the appropriate requirements. All laboratory instrumentation must be calibrated in accordance with method requirements. If any initial/continuing calibration standards exceed method QC limits, recalibration must be performed and, if necessary, reanalysis of all samples affected back to the previous acceptable calibration check.

7.4 REPORTING LIMITS

The laboratory must meet the method required detection limits listed in NYSDEC ASP, 10/95 criteria. If difficulties arise in achieving these limits due to a sample matrix, the laboratory must notify PEI project personnel for problem resolution. To achieve those detection limits, the laboratory must utilize all appropriate cleanup procedures to retain the project required detection limits. When any sample requires a secondary dilution due to high levels of target analytes, the laboratory must document all initial analyses and secondary dilution results. Secondary dilution will be permitted only to bring target analytes within the linear range of calibration. If samples are analyzed at a secondary dilution with no target analytes detected, the Project Manager will be immediately notified so that appropriate corrective actions can be initiated.

7.5 METHOD QC

All QC method-specified QC samples shall meet the method requirements referenced in the analytical methods. Failure of method-required QC will result in the review and possible qualification of all affected data. If the laboratory cannot find any errors, the affected sample(s) shall be reanalyzed or re-extracted/redigested, then reanalyzed within method-required holding times to verify the presence or absence of matrix effects. If matrix effect is confirmed, the corresponding data shall be flagged accordingly using the flagging symbols and criteria. If matrix effect is not confirmed, then the entire batch of samples may have to be reanalyzed or re-extracted/redigested, then reanalyzed at no cost. Project Manager shall be notified as soon as possible to discuss possible corrective actions should unusually difficult sample matrices be encountered.

7.6 CALCULATION ERRORS

All analytical results must be reviewed systematically for accuracy prior to submittal. If upon data review calculation or reporting errors exist, the laboratory will be required to reissue the analytical data report with the corrective actions appropriately documented in the case narrative.

8.0 DATA REDUCTION, VALIDATION, AND USABILITY

8.1 DATA REDUCTION

Laboratory analytical data are first generated in raw form at the instrument. These data may be either in a graphic or printed tabular format. Specific data generation procedures and calculations are found in each of the referenced methods. Analytical results must be reported consistently. Identification of all analytes must be accomplished with an authentic standard of the analyte traceable to NIST or USEPA sources. Individuals experienced with an analysis and knowledgeable of requirements will perform data reduction.

8.2 DATA VALIDATION

Data validation is a systematic procedure of reviewing a body of data against a set of established criteria to provide a specified level of assurance of validity prior to its intended use. All analytical results from soil and groundwater samples will have ASP Category B deliverables and DUSRs. The data validation will be in accordance with DER-10 Section 2.2 with ASP - Category B data deliverables provided by the laboratory and a DUSR provided for validation. Where possible, discrepancies will be resolved by the project manager.

- Technical holding times will be in accordance with NYSDEC ASP, 7/2005 edition.
- Organic calibration and QC criteria will be in accordance with NYSDEC ASP, 7/2005 edition. Data will be qualified if it does not meet NYSDEC ASP, 7/2005 criteria.

9.0 REFERENCES

Comprehensive Environmental Response Compensation and Liability Act (CERCLA) Quality Assurance Manual, Final Copy, Revision I, October 1989.

National Enforcement Investigations Center of USEPA Office of Enforcement. *NEIC Policies and Procedures.* Washington: USEPA.

New York State Department of Environmental Conservation (NYSDEC) 2005. *Analytical Services Protocol*, (ASP) 7/2005 Edition. Albany: NYSDEC.

NYSDEC "DER-10 Technical Guidance for Site Investigation and Remediation (DER-10)," dated May 3, 2010, Appendix 2

APPENDIX C

FIELD SAMPLING PLAN

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May 2019

Table of Contents

1.0 INTRODUCTION

This Field Sampling Plan (FSP) provides procedures for the field activities designed in the Work Plan where soil, groundwater, and vapor sampling are required at the Site. The field procedures presented in this manual should be followed by all field personnel, as adherence can help to ensure the quality and usability of the data collected. The FSP should be used collectively with and comply with the following documents:

- The HASP;
- The QA/QC Plan;
- The RI Work Plan.

2.0 SOIL SAMPLING

Soil samples are obtained as outlined in the Work Plan, considering the following general protocol:

1. Inspect newly created test pit or boring core stratigraphy once obtained in/from the subsurface.
2. Sample soil, and record depth and any physical characteristics (e.g., contamination, odor, discoloration, debris, etc.) in the logbook.
3. Quickly place the calibrated PID into the exposed soil and record the instrument readings in the logbook.
4. Samples should be collected at locations and frequency per the Work Plan and QA/QC Plan.
5. Decontaminate sampling implements after use and between sample locations. When using dedicated sampling equipment, decontamination can be minimized.
6. Label each sample container with the appropriate sample identification and place sample in a cooler (cooled to 4 degrees C.) for shipment to the laboratory.
7. Initiate chain-of-custody procedures.

2.1 TEST PIT PROCEDURES

Test pit sampling is a standard method of soil sampling to obtain representative samples for identification as well as to serve as a means of obtaining a significant information about the subsurface. The following steps describe the procedures for test pit operations.

2.1.1 Field Preparation

1. Verify underground utilities have been found.
2. Review scope of work, safety procedures and communication signals with site personnel.
3. Pre-clean the sampling equipment prior to use, as necessary.
4. Mark and review trench locations. Specific locations are determined in the field and are selected based on areas of visible or potential surface contamination or debris, pre-determined locations representing specific Site areas, and field obstructions.

2.1.2 Excavation and Sample Collection

1. Position backhoe/equipment into appropriate area considering direction of excavation, obstructions, safety concerns, etc.
2. Commence excavation with the backhoe upwind of the excavation, as possible.
3. Ensure continuous air monitoring has been activated.

4. Screen soil regularly for VOCs as excavation progresses and soil is stockpiled.
5. As directed by field technician for each test trench, topsoil or cover soil (if any) is excavated and placed on poly/plastic sheeting.
6. Soil/material below the topsoil is excavated to the depth as directed by field technician and placed on poly/plastic sheeting separate from the topsoil/cover soil.
7. Segregate ‘clean’ material from impacted material, as possible, using visual observations and PID screening.
8. Record geologic log as trenches are excavated visually inspecting subsurface material for discoloration or staining and documenting pit/trench with photos. The following information will be recorded for each test pit log:
   - Depth, length, and width of the excavation.
   - Description of each lithological unit including depth and thickness of distinct soil, fill, or rock layers.
   - Description of any man-made impacts or apparent contamination.
   - Depth to groundwater and bedrock, if encountered.
9. Collect soil samples using dedicated stainless-steel spoons directly from the bucket of the backhoe at ground surface. No personnel shall enter the excavation to collect samples unless provisions in the HASP have been addressed for entering an excavation.
10. Place each soil sample directly into appropriate sample bottles/jars.
11. Clearly label the sample bottles and jars.
12. Place each jar in an ice-filled cooler.
13. Ship samples to laboratory as soon as possible, but no later than 24 hours after collection.
14. Document the types and numbers of samples collected on Chain-of-Custody.
15. Record time and date of sample collection and a description of the sample and any associated air monitoring measurements in the field logbook.
16. After sampling, backfill and compact (e.g., bucket and equipment tracks/wheels) the excavated material from each trench or pit prior to moving to next location.
17. Backfill with indigenous soil in the order in which the material was removed with the topsoil/cover soil placed last to cover the trench, placing impacted material at bottom of pit/trench and covering with ‘clean’ material.
18. Decontaminate sampling and excavation equipment between sampling locations (i.e., if not dedicated) and at completion over top of excavation area using dry methods initially and steam cleaning, as needed.

2.2 GEOPROBE PROCEDURES

Geoprobe direct push sampling is a standard method of soil sampling to obtain representative samples from the subsurface. Field preparation, sample collection, and data logging activities for Geoprobe sampling are identical to that of test pitting/trenching listed above. The following procedures detail activities, as directed by the field technician, for the execution of Macro Core drilling operations after rig is in a downwind position and continuous air monitoring and VOC screening activities have commenced:

1. Startup drill rig and raise mast.
2. Use star bit with rig in rotary setting to penetrate pavement (if applicable).
3. Excavate a hole large enough to set a road box before you advance the borehole (if applicable).
4. Unthread the shoe from the bottom of the sample tube and inset a sample liner and rethread the shoe on the bottom of the sample tube.

5. Thread the drive cap on the top of the sample tube.
6. Align the sample tube so it is plumb in both directions to ensure a straight borehole is drilled.
7. Drive the top of the sample tube into ground surface.
8. Unthread the drive cap from the top of the sample tube and thread the pull cap in its place.
9. Pull the sample tube from the ground using caution to not pinch your hand between the drill rods, pull cap, or rig.
10. Unthread the cutting shoe and pull the sample liner from the bottom of the sample tube. Use pliers to reach in the sample tube and grab the liner, if needed.
11. Cut the sample liner lengthwise in two places and present the sample on a table or plastic sheeting (or similar) to ensure all sample material is contained.
12. Insert a new liner and thread on the cutting shoe and repeat steps from #4 to #11 with the addition of a 4-foot long drill rod onto the top of the sample tube to advance a second 4-foot interval.
13. Proceed with this procedure until the desired depth or refusal is reached.
14. Upon completion of probing, decontaminate all equipment in contact with the soil/fill in a decontamination area using Alconox and water.
15. Backfill borings with indigenous soil in the order in which the material was removed with the topsoil/sand/cover soil placed last to cover the hole.

Reference: American Society for Testing Material (ASTM), 1992, ASTM D1586-84, Standard Method for Penetration Test and Split Barrel Sampling of Soils.

3.0 GROUNDWATER SAMPLING

3.1 WELL INSTALLATION PROCEDURES

The following procedure outlines a NYSDEC-approved method of constructing groundwater wells within unconsolidated material to monitor groundwater elevation and acquiring groundwater samples for laboratory testing. The following is a step-by-step method for the open-hole method of installing a groundwater well once a boring or augured hole has been drilled to a desired depth within the subsurface:

1. Thread a cap on the bottom section of well screen. If more than one section of well screen is required, thread the last section.
2. Lower the screen into the borehole with the riser section ready.
3. Add the riser sections to the screen. Do not drop the screen in the borehole.
4. Add riser sections as required until the bottom screen section touches the bottom of the borehole.
5. If completing the well with a road box, mark the riser two inches below the lid of the road box and then cut the riser.
6. Place a slip cap over the top of the rise section.
7. Place sand in the space between the borehole and the PVC screen and riser to the required depth. Place the sand in very slowly so it does not bridge in the well bore.
8. Place bentonite and cement above the sand-pack.
9. Grout in the road box with concrete mix.

3.2 WELL DEVELOPMENT PROCEDURES

At least 24 hours after completion of drilling and installation, well development is completed through pumping or bailing until the discharged water is relatively sediment free and the indicator parameters (e.g., pH, temperature, specific conductivity, etc.) have reached steady-state. Development removes sediment and can improve the hydraulic properties of the sand pack. The effectiveness of this process is monitored to minimize the volume of discharged waters to obtain sediment-free samples. As approved by the regulatory agency, well development water can be discharged onto the ground surface downgradient of the well. Otherwise, this water must be containerized and sampled prior to discharge or disposal.

1. Select an appropriate well development method based upon water depth, well productivity, and sediment content of the water. Well development options include: (a) bailing; (b) manual pumping; and (c) submersible pumps. These options utilized with surging of the well screen using an appropriately sized surge block.
2. Decontaminate, as needed, and assemble equipment in the monitoring well based upon the method selected. Care should be taken not to introduce contaminants into the equipment or well during installation.
3. Proceed with development by repeated removal of water from the well until the discharged water is relatively sediment-free (i.e., < 50 NTUs). Volume of water removed, pH and conductivity measurements are recorded on the Well Development/Purging Logs.

3.3 WELL PURGING PROCEDURES

To collect representative samples, groundwater wells must be adequately purged prior to sampling. Purging will require removing three to five volumes of standing water in rapidly recharging wells and at least one volume from wells with slow recharge rates. Sampling should commence as soon as adequate recharge has occurred. Although not required, it is recommended that purging and sampling occur at least 24 hours after development.

1. Remove well cover ensuring no foreign material enters the well.
2. Monitor the interior of the riser pipe for organic vapors using a PID. If reading of greater than 5 ppm is recorded, the well will be vented until levels are below 5 ppm before pumping is started.
3. Measure the water level below top of casing using an electronic water level indicator.
4. Determine the volume of water within the well by knowing the total depth of the well.
5. Wash the end of the probe with soap and rinse with deionized-water between wells.
6. Utilize dedicated, new polyethylene discharge and intake tubing (preferably ½ inch diameter HDPE and can't use LDPE for emerging contaminants) for each well.
7. Purge using bailers until the required volume is removed. If the well purges to dryness and recharges within 15 minutes, water can be removed as it recharges. If the well purges to dryness and is greater than 15 minutes, purging is terminated.
8. Purge until at least 1 volume of water is removed, but 3-5 volumes of water is preferred if recharge is sufficiently fast.
9. Calculate well volumes and record measurements for pH, temperature, turbidity, and conductivity during the purging along with physical observations.

3.4 WELL SAMPLING PROCEDURES

1. Perform well sampling within 24 hours of purging if well has recovered sufficiently to sample. If sufficient volume for analytical testing cannot be obtained from a well or if recharge exceeds 24 hours, then DEC should be consulted on analytical priorities and validity of the sample.
2. Collect sample using bailers into appropriate containers.

3. Label sample bottles using a waterproof permanent marker per procedures outlined below.
4. Use verifiably clean sample bottles (containing required preservatives) and place samples on ice in coolers for transport to the analytical laboratory, who will certify bottles are analyte-free.
5. Initiate chain-of-custody.
6. Collect separate sample into a 120 milliliter (mL) plastic container to measure pH, conductivity, turbidity, and temperature in the field.
7. Record well sampling data field notebook and on the Well Development/Purging Log.

4.0 SAMPLE DOCUMENTATION

Each soil and groundwater sample is logged in a bound field notebook by the technician or geologist. Field notes should include, but are not limited to the following:

- descriptions of subsurface material encountered during sampling,
- sample numbers and types of samples recovered, and
- date and time of sampling event.

The technician or geologist also completes a daily drilling or sampling record and chains-of-custody for all samples collected that are being transported to the laboratory. Once sampling program is complete, the geologist or technician transfers field notes/logs onto standard forms (e.g., boring logs, sampling logs, daily reports, etc.) to be included with the formal investigation report.

5.0 SAMPLING CONTAINER SELECTION

The selection of sample containers is based on the media being sampled and the required analysis. Container selection should be completed in advance of mobilizing into the field with close communications with the laboratory.

6.0 SAMPLE LABELING

The following procedure helps to prevent misidentification of samples and to clarify the location and purpose of environmental samples collected during the investigation:

1. Fix a non-removable (when wet) label to each container.
2. Wrap each sample bottle within 2-inch cellophane tape.
3. Write the following information with permanent marker on each label:
    - A. Site name
    - B. Sample identification
    - C. Project number
    - D. Date/time
    - E. Sampler's initials
    - F. Sample preservation
    - G. Analysis required

Each sample is assigned a unique identification alpha-numeric code, such as RR-ss1 or WS- TP1 (2-3'), where the abbreviations represent RR – River Road (site), surface sample 1 and Waste Site, test pit 1, obtained at 2-3' bgs. Other common abbreviations include the following:

- BH = Geoprobe Borehole
- SW = Surface Water
- SED = Sediment
- SB = Soil Boring
- MSB = Matrix Spike Blank
- NSS = Near Surface Soil (1' - 2' depth)
- EB = Equipment Rinse Blank
- HW = Hydrant Water (Decon/Drilling Water)
- GW = Groundwater
- TB = Trip Blank
- RB = Rinse Blank
- MS/MSD =Matrix Spike/Matrix Spike Duplicate

7.0 SAMPLE SHIPPING

Proper documentation of sample collection and the methods used to control these documents are referred to as chain-of-custody procedures. Chain-of-custody procedures are essential for (1) presenting analytical results in a legal or regulatory forum (e.g., evidence in litigation or administrative hearings), (2) minimizing loss or misidentification of samples, and (3) ensuring that unauthorized persons do not tamper with collected samples.

The following chain-of-custody guidelines should be utilized during sample collection as outlined in and prepared by the National Enforcement Investigations Center (NEIC) Policies and Procedures of the USEPA Office of Enforcement:

1) Complete chain-of-custody record with all relevant information.
2) Send original chain with the samples in a sealed, waterproof bag taped inside the sample cooler.
3) Place adequate inert cushioning material (e.g., corrugated plastic, polypropylene foam wrap, etc.) in bottom of cooler.
4) Place bottles in cooler so they do not touch (use cushioning material for dividers).
5) Place VOA vials in sealed/waterproof bags in the center of the cooler.
6) Pack cooler with ice in sealed/waterproof plastic bags.
7) Pack cooler with cushioning material.
8) Place any additional paperwork in sealed bag with original chain.
9) Tape cooler drain shut.
10) Wrap cooler with packing tape at two locations to secure lid. Do not cover labels.
11) Place lab address on top of cooler.
12) Ship samples via overnight carrier the same day that they are collected.
13) Label cooler with "This side up" on all sides and "Fragile" on at least two sides.
14) Fix custody seals on front right and left of cooler and cover with packaging tape.

8.0 SOIL VAPOR INTRUSION SAMPLING

Soil vapor intrusion (SVI) investigation consist of sampling contaminant vapors that may exist beneath the building slabs, inside the buildings, and outside the buildings. Sample collection includes the following procedures per New York State Department of Health *Guidance for Evaluating Soil Vapor Intrusion in the State of New York*.

8.1 SUB-SLAB AIR SAMPLING PROCEDURES

8.1.1 Sampling Locations

Select the sub-slab sample collection points by observing the condition of the building floor slab for apparent penetrations such as concrete floor cracks, floor drains, or sump holes. The floor conditions will be noted, and potential locations of subsurface probes will be selected. The locations will ideally be away from the foundation walls, apparent penetrations and buried pipes.

8.1.2 Sampling Probes

Construct a sampling probe using a ¼-inch Swagelok union connected to a short length of ¼- inch diameter stainless steel tubing. Select a length of stainless steel tubing so that the bottom of the probe is close to but does not extend below the bottom of the slab (typically a 4-inch probe for a 6-inch thick slab).

Attach a 2 ft. length of Teflon or polyethylene tubing to the other end of the union using a ¼-inch Swagelok nut and ferrules. Plug up the other end of the tubing with a small piece of modeling clay to seal the system and prevent air flow in or out of the sub slab while the probe and tubing sits idle.

8.1.3 Installation of the Sampling Probe

Drill through and about 1 inch below the concrete slab using a portable coring drill and 2-inch diameter core drill bit. Record the thickness of the concrete slab. When installing the probe, first put a few inches of driller's sand at the bottom of the cored hole so that the grout will sit on top of the sand and not go all the way to the bottom of the hole and plug the probe inlet.

Install the probe into the hole, with the tubing already attached. Use the tubing to hold the union at the correct height in the hole (just below the top). Mix hydraulic cement and water is a ziplok bag. Cut a hole in one corner of the bag and use it like a pastry chef's bag to grout the probe in place. Use a small rod to push/tap in the grout. Leave the top 1-inch or so of the hole unfilled, being sure that the threaded top of the union (where the tubing attaches) is above the cement. Allow the probe to sit in place for at least one hour to allow the cement to set. If possible, install the probe one day and allow it to sit overnight.

8.1.4 Helium Tracer Gas Testing

Place a 2-quart (or similar size) bucket over the sample probe after threading the Teflon sample tube through a hole in the top of the bucket. Seal the tube to the bucket with clay. The bucket should also have another hole drilled in the top for the injection of helium, and a hole in the side near the floor for the measurement of helium gas concentrations.

Connect helium (99.999% pure) cylinder tubing to the top port of bucket enclosure and seal with clay or other sealing material. Insert a helium detector probe in the bottom port of the bucket. Release enough helium to displace any ambient air in the bucket until the concentration of helium reaches a minimum of 90%. Maintain this minimum concentration by testing with a helium detector. The Helium cylinder should be open during the purge time to cause a slight positive pressure within the enclosure.

Connect the sample tubing to a GilAir vacuum pump or equivalent using 3/8-inch O.D. silicone tubing. Connect a 1-liter Tedlar bag to the outlet of the pump using silicone tubing and collect a 1-liter sample. Purging flow rates must not exceed 0.2 liters per minute (L/min). Analyze the Tedlar bag for helium using a helium detector and record the results on the Summa Canister Data Sheet. A concentration of helium 10% or greater indicates a poor seal of the sample probe and it must be reinstalled and retested. After purging, remove the bucket enclosure from over the sample probe.

8.1.5 Sample Collection

Assign sample identification to the Summa canister sample identification tag and record on chain of custody (COC), and the Summa Canister Data Sheet. Also record the Summa canister and flow controller (regulator) serial numbers on the COC and Summa Canister Data Sheet. Attach a pre-calibrated/certified 2-hour flow controller, and particulate filter to the Summa canister. Attach the sample tube to the Summa canister using a ¼-inch Swagelok nut with appropriate ferrules, to the end of the flow controller/particulate filter assembly.

Open canister valve to initiate sample collection and record sample start time, date and initial canister vacuum on the canister identification tag and on the Summa Canister Data Sheet. If the canister does not show sufficient vacuum (generally less than 25 " Hg"), do not use. Take a digital photograph of canister setup and surrounding area. Include in the photograph a dry erase board or similar display which presents sample ID, location and date.

After 2 hours, record sample end time and canister pressure on the Summa Canister Data Sheet, and close valve. Disconnect the Teflon tubing and remove flow controller/particulate filter assembly from canister. Seal canister with laboratory supplied brass plug. Ship the samples, with COCs, overnight, to the selected laboratory for standard TO-15 analysis.

8.1.6 Removing the Sample Probe

If the probe is to be reused, remove the ¼-inch tubing and place a Swagelok cap on the exposed part of the union. The cap should be flush or below the level of the floor. If the probe is not to be reused, remove the probe by drilling around the probe with a hammer drill and a ¼ or 3/8-inch drill bit until loose. Keep the tubing attached to the implant to aid in its removal. Fill the core hole with hydraulic cement.

8.2 INDOOR/OUTDOOR AIR SAMPLING PROCEDURES

Place the indoor air Summa canister/flow controller inlet at breathing height in the approximate center of the space being sampled, or, for the outdoor air sample, elevated on a table or other object in a location upwind of the building being sampled. The breathing height is defined as four to six feet above the floor or ground. As an option, a length of Teflon tubing can be attached to the Summa canister/flow controller inlet and raised to breathing zone height.

Record the canister and flow controller serial numbers on the canister identification tag, COC and the Summa Canister Data Sheet. Assign sample identification to the canister identification tag, and record on the COC and the Summa Canister Data Sheet. Remove brass plug from canister fitting and save.

Attach a pre-calibrated/certified 8-hour flow controller and particulate filter to the Summa canister. For the outside air sample, also connect the laboratory supplied “candy cane” fitting to the flow controller. Open canister valve to initiate sample collection and record start time, date and gauge vacuum reading on the canister identification tag and on the Summa Canister Data Sheet. Take a photograph of canister setup and surrounding area.

After 8 hours, record the gauge vacuum reading, close the Summa canister valve completely and record the end time on the Summa Canister Data Sheet. There should still be a slight vacuum in the Summa canister. If no vacuum remains in the canister, or the canister does not show a significant net loss in vacuum after sampling, the sample should be re-collected using a new Summa canister and flow controller. Disconnect any tubing and candy cane fittings from the Summa canister and remove the flow controller. Replace the brass plug on the canister. Ship canister, with COCs, overnight, to the selected laboratory

8.3 QUALITY CONTROL

The number of Quality Control samples (duplicates) to be taken during sub-slab sampling may be found in the QA/QC Plan. The duplicate sample rate is usually 10 percent. Field duplicates for sub-slab, indoor air and outdoor air samples will be collected by attaching the T-fitting supplied by the laboratory to two Summa canisters with attached regulators. For sub-slab samples, the inlet of the T-fitting will then be attached to the sub-slab sample tubing using a Swagelok fitting. For indoor and outdoor air samples, any tubing used to raise the sampling height will also be attached to the inlet of the T fitting. For sampling, both Summa canister valves are opened and closed simultaneously.

8.4 SAMPLE LABELING

Each sub-slab sample should have the following information at a minimum placed on the laboratory supplied sample label:

- Site name
- Sample identification – see below
- Date/time
- Sampler's initials
- Analysis required – **TO-15**

The serial number of the canister and regulator used during sampling is also noted on the Summa canister identification tag and on the COC. Each sub-slab, indoor air and outdoor air sample will be assigned a unique alpha-numeric code. An example of this code and a description of its components are presented below. Field duplicate samples will be assigned a unique identification alphanumeric code that specifies the date of collection, the letters FD (for field duplicate) and an ascending number that records the number of duplicate samples collected that day. For example, the first field duplicate collected on February 22, 2009 would be assigned the sample number in the format YYYYMMDD-FD-1 = 20090222-FD-1.

Subsequent duplicates collected on the same day will be assigned FD-2, FD-3 etc. Field sampling crew will record the duplicate sample information on the Summa Canister Data Sheets and in the field book.

8.5 FIELD DOCUMENTATION

Field notebooks are used during all on-site work. A dedicated field notebook is maintained by the field technician overseeing the site activities. Sub-slab sampling procedures should be photo-documented. The field sampling team will maintain sampling records that include the following data:

- Sample Identification
- Date and time of sample collection
- Identity of samplers
- Sampling methods and devices
- Purge volumes (soil vapor)
- Volume of soil vapor sample extracted
- The Summa canister vacuum before and after samples collected
- Chain of Custody and shipping information

The proper completion of the following forms/logs is considered correct procedure for documentation during the indoor air-sampling program:

1. Field Log Book - weather-proof hand-bound field book
2. Summa Canister Data Sheet
3. Chain of Custody Form

8.6 SAMPLE SHIPPING

Proper documentation of sample collection and the methods used to control these documents are referred to as chain-of-custody procedures. Chain-of-custody procedures are essential for presentation of sample analytical chemistry results as evidence in litigation or at administrative hearings held by regulatory agencies. Chain-of-custody procedures also serve to minimize loss or misidentification of samples and to ensure that unauthorized persons do not tamper with collected samples.

The following chain-of-custody guidelines should be utilized during sample collection as outlined in and prepared by the National Enforcement Investigations Center (NEIC) Policies and Procedures of the USEPA Office of Enforcement:

- Complete the chain-of-custody (COC) record with all relevant information.
- Ship original COC with the samples in a sealed waterproof plastic bag and place inside the box containing a Summa canister.
- Retain a copy of the COC for field records.
- Ship Summa canisters in the same boxes the laboratory used for shipping.
- Place the lab address on top of sample box/cooler.
- Fix numbered custody seals across box lid flaps and cooler lid.
- Cover seals with wide, clear tape.
- Ship samples via overnight carrier within three days of sample collection if possible.

ATTACHMENT A

Groundwater Sampling for Emerging Contaminants

July 2018

Issue: NYSDEC has committed to analyzing representative groundwater samples at remediation sites for emerging contaminants (1,4-dioxane and PFAS) as described in the below guidance.

Implementation

NYSDEC project managers will be contacting site owners to schedule sampling for these chemicals. Only groundwater sampling is required. The number of samples required will be similar to the number of samples where “full TAL/TCL sampling” would typically be required in a remedial investigation. If sampling is not feasible (e.g., the site no longer has any monitoring wells in place), sampling may be waived on a site-specific basis after first considering potential sources of these chemicals and whether there are water supplies nearby.

Upon a new site being brought into any program (i.e., SSF, BCP), PFAS and 1,4-dioxane will be incorporated into the investigation of groundwater as part of the standard “full TAL/TCL” sampling. Until an SCO is established for PFAS, soil samples do not need to be analyzed for PFAS unless groundwater contamination is detected. Separate guidance will be developed to address sites where emerging contaminants are found in the groundwater. The analysis currently performed for SVOCs in soil is adequate for evaluation of 1,4-dioxane, which already has an established SCO.

Analysis and Reporting

Labs should provide a full category B deliverable, and a DUSR should be prepared by an independent 3rd party data validator. QA/QC samples should be collected as required in DER-10, Section 2.3(c). The electronic data submission should meet the requirements provided at: https://www.dec.ny.gov/chemical/62440.html ,

The work plan should explicitly describe analysis and reporting requirements.

PFAS sample analysis: Currently, ELAP does not offer certification for PFAS compounds in matrices other than finished drinking water. However, laboratories analyzing environmental samples (ex. soil, sediments, and groundwater) are required, by DER, to hold ELAP certification for PFOA and PFOS in drinking water by EPA Method 537 or ISO 25101.

Modified EPA Method 537 is the preferred method to use for groundwater samples due to the ability to achieve 2 ng/L (ppt) reporting limits. If contract labs or work plans submitted by responsible parties indicate that they are not able to achieve similar reporting limits, the project manager should discuss this with a DER chemist. Note: Reporting limits for PFOA and PFOS should not exceed 2 ng/L.

PFAS sample reporting: DER has developed a PFAS target analyte list (below) with the intent of achieving reporting consistency between labs for commonly reportable analytes. It is expected that reported results for PFAS will include, at a minimum, all the compounds listed. This list may be updated in the future as new information is learned and as labs develop new capabilities. If lab and/or matrix specific issues are encountered for any particular compounds, the NYSDEC project manager will make case-by-case decisions as to whether particular analytes may be temporarily or permanently discontinued from analysis for each site. Any technical lab issues should be brought to the attention of a NYSDEC chemist.

Some sampling using this full PFAS target analyte list is needed to understand the nature of contamination. It may also be critical to differentiate PFAS compounds associated with a site from other sources of these chemicals. Like routine refinements to parameter lists based on investigative findings, the full PFAS target analyte list may not be needed for all sampling intended to define the extent of contamination. Project managers may approve a shorter analyte list (e.g., just the UCMR3 list) for some reporting on a case by case basis.

1,4-Dioxane Analysis and Reporting: The method detection limit (MDL) for 1,4-dioxane should be no higher than 0.35 µg/l (ppb). Although ELAP offers certification for both EPA Method 8260 SIM and EPA Method 8270 SIM, DER is advising the use of method 8270 SIM. EPA Method 8270 SIM provides a more robust extraction procedure, uses a larger sample volume, and is less vulnerable to interference from chlorinated solvents.

Full PFAS Target Analyte List

Group	Chemical Name	Abbreviation	CAS Number
Perfluoroalkyl sulfonates	**Perfluorobutanesulfonic acid**	**PFBS**	**375-73-5**
	Perfluorohexanesulfonic acid	**PFHxS**	**355-46-4**
	Perfluoroheptanesulfonic acid	PFHpS	375-92-8
	Perfluorooctanessulfonic acid	**PFOS**	**1763-23-1**
	Perfluorodecanesulfonic acid	PFDS	335-77-3
Perfluoroalkyl carboxylates	Perfluorobutanoic acid	PFBA	375-22-4
	Perfluoropentanoic acid	PFPeA	2706-90-3
	Perfluorohexanoic acid	PFHxA	307-24-4
	Perfluoroheptanoic acid	**PFHpA**	**375-85-9**
	Perfluorooctanoic acid	**PFOA**	**335-67-1**
	Perfluorononanoic acid	**PFNA**	**375-95-1**
	Perfluorodecanoic acid	PFDA	335-76-2
	Perfluoroundecanoic acid	PFUA/PFUdA	2058-94-8
	Perfluorododecanoic acid	PFDoA	307-55-1
	Perfluorotridecanoic acid	PFTriA/PFTrDA	72629-94-8
	Perfluorotetradecanoic acid	PFTA/PFTeDA	376-06-7
Fluorinated Telomer Sulfonates	6:2 Fluorotelomer sulfonate	6:2 FTS	27619-97-2
	8:2 Fluorotelomer sulfonate	8:2 FTS	39108-34-4
Perfluorooctane-sulfonamides	Perfluroroctanesulfonamide	FOSA	754-91-6
Perfluorooctane-sulfonamidoacetic acids	N-methyl perfluorooctanesulfonamidoacetic acid	N-MeFOSAA	2355-31-9
	N-ethyl perfluorooctanesulfonamidoacetic acid	N-EtFOSAA	2991-50-6

Bold entries depict the 6 original UCMR3 chemicals

APPENDIX D

FIELD LOGS & FORMS

BE3CORP
PANAMERICAN
ENVIRONMENT • ENGINEERING • ENERGY

FIELD REPORT

PROJECT:

DATE:

CLIENT:

DAY:

LOCATION:

PROJECT NUMBER:

COMPILED BY:

WEATHER

Morning	Temperature: Conditions: Wind: Humidity:
Afternoon	Temperature: Conditions: Wind: Humidity:

PERSONNEL

Name	Company	Position	Field Hours		
			From	To	Total
				Total Field Hours	

MATERIALS/EQUIPMENT USED ON-SITE:

-
-
-
-

WORK LOG/MINUTES:

7:00 am:

8:00 am:

9:00 am:

10:00 am:

11:00 am:

12:00 pm:

1:00 pm:

2:00 pm:

3:00 pm:

4:00 pm:

5:00 pm:

GENERAL NOTES:

-
-
-
-
-

ISSUES/OBSERVATIONS/CONFLICTS:

CORRECTIVE ACTIONS:

TABLE 6 - RI LOCATION COORDINATES

Sample Identification	Coordinates-North American Datum 1983	
	Latitude	Longitude
Boreholes		
RI-01	42.94581299	-78.83109916
RI-02	42.94557094	-78.83132759
RI-03	42.94522445	-78.83173512
RI-04	42.94498956	-78.83157115
RI-05	42.94476895	-78.8312339
RI-06	42.94494019	-78.8312264
RI-07	42.94502744	-78.83104505
RI-08	42.94515401	-78.83084264
RI-09	42.94507127	-78.83113081
Test Pits		
TP- 1	42.94413062	-78.82989107
TP- 2	42.94433419	-78.82994854
TP- 3	42.94434849	-78.83011513
TP- 4	42.94422419	-78.83022626
TP- 5	42.94426382	-78.82962807
TP- 6	42.94432126	-78.82986831
TP- 7	42.94451227	-78.82980189
TP- 8	42.94485758	-78.83014617
TP- 9	42.94503356	-78.83034457
TP- 10	42.94504888	-78.83008949
TP- 11	42.94456481	-78.83078284
TP- 12	42.94475828	-78.83042199
TP- 13	42.94487106	-78.83042832
TP- 14	42.94459834	-78.83020924
Monitoring Wells		
MW- 1	42.94527897	-78.83206184
MW- 2	42.94581151	-78.83154516
MW- 3	42.94507659	-78.83109739
MW- 4	42.94424236	-78.82960957
MW- 5	42.94412154	-78.82993412
MW- 6	42.94466699	-78.83018561

TEST PIT LOG

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1270 Niagara Street
Buffalo, NY 14213
716.249.6880 be3corp.com

Project:	Sheet: of
Client:	Job Number:
Contractor:	Location:
Date Started:	Ground Elevation:
Date Completed:	Operator:
Pit Number:	Geologist/Technician
	Ground Water:

Depth (ft)	Sample		Description
	#	Type	
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

Comments:

DRILLING SUMMARY

Geologist:

Contractor:

Operator:

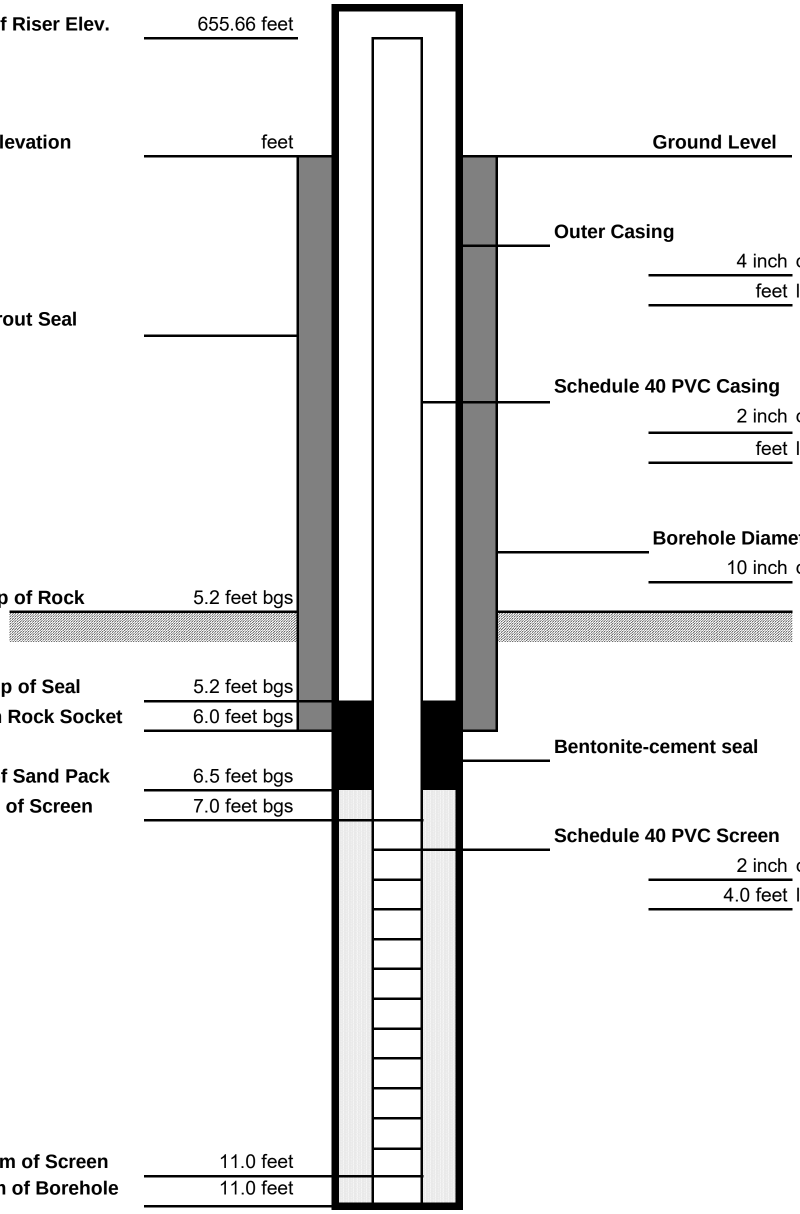
Model:

Date: 1/12/2018

GEOLOGIC LOG

Depth(ft.)	Description
	See boring log.

WELL DESIGN



655.85 feet **Top of Casing Elev.**

Top of Riser Elev. 655.66 feet

Elevation feet

Ground Level

Outer Casing
4 inch diameter
feet length

Grout Seal

Schedule 40 PVC Casing
2 inch diameter
feet length

Borehole Diameter
10 inch diameter

Top of Rock 5.2 feet bgs

Top of Seal 5.2 feet bgs
Bottom Rock Socket 6.0 feet bgs

Bentonite-cement seal

Top of Sand Pack 6.5 feet bgs
Top of Screen 7.0 feet bgs

Schedule 40 PVC Screen
2 inch diameter
4.0 feet length

Bottom of Screen 11.0 feet
Bottom of Borehole 11.0 feet

CASING MATERIAL	SCREEN MATERIAL	FILTER MATERIAL
Surface: 4" Steel protective cover	**Type:** 2" Schedule 40 PVC	**Type:** #0 sand **Setting:** 6.5 feet to 11.0 feet bgs.
Monitor: 2" Schedule 40 PVC placed inside a 4-inch diameter cored bedrock borehole.	**Slot Size:** 0.010" **Setting:** 7.0 feet to 11.0 feet bgs	**SEAL MATERIAL** **Type 1:** Bentonite chips **Setting:** 5.2 feet to 6.5 feet bgs. **Type 2:** Bentonite-cement grout **Setting:** Ground level to 6.0 feet bgs

COMMENTS:

Ground elevation at well not measured.

LEGEND

▨ Bentonite-Cement Grout

■ Bentonite-Cement Seal

□ Sand Pack

Client:	**Location:**	**Project No.:**
BE3CORP PANAMERICAN ENVIRONMENT • ENGINEERING • ENERGY	**MONITORING WELL CONSTRUCTION DETAILS**	**Well Number: MW-5**

DRILLING SUMMARY

Geologist/Technician:

Drilling Company:

Driller:

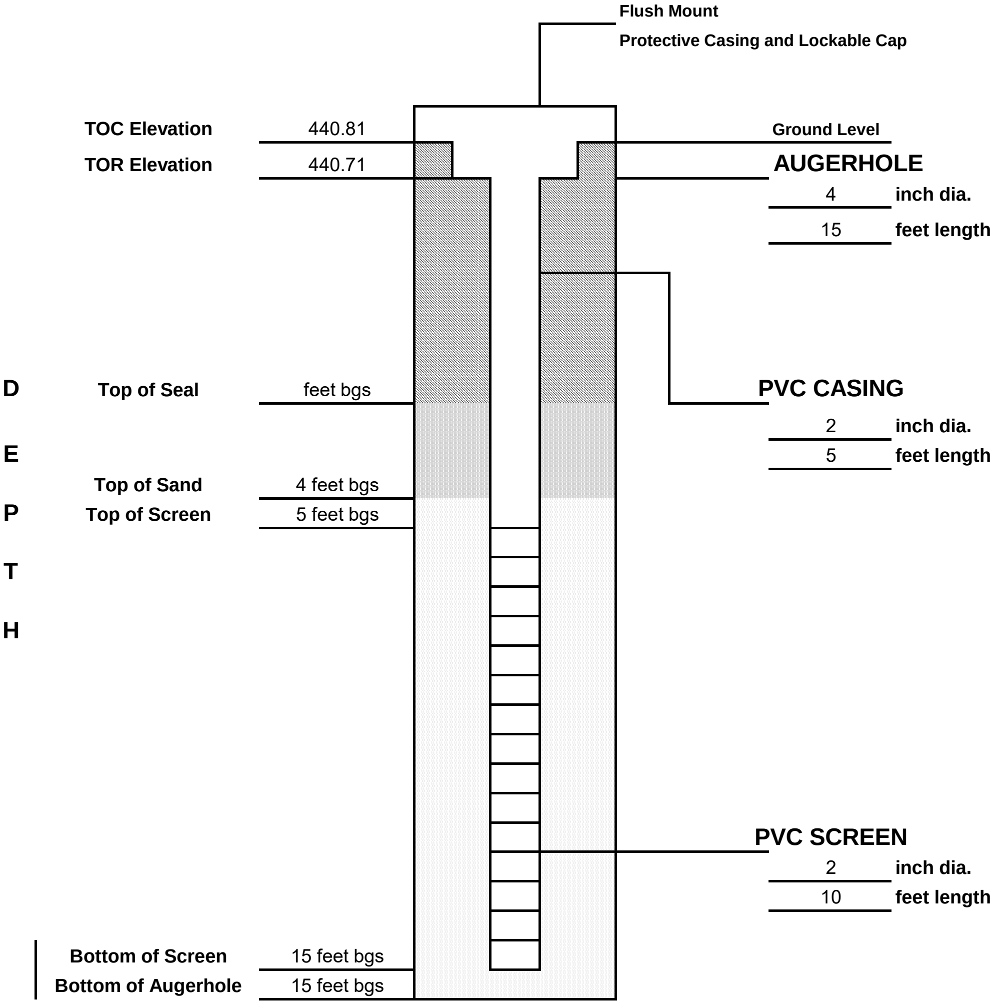
Rig Make/Model:

Date:

GEOLOGIC LOG

Depth(ft.)	Description

WELL DESIGN



Flush Mount
Protective Casing and Lockable Cap

TOC Elevation 440.81
TOR Elevation 440.71

Ground Level

AUGERHOLE
4 **inch dia.**
15 **feet length**

D E P T H

Top of Seal feet bgs

PVC CASING
2 **inch dia.**
5 **feet length**

Top of Sand 4 feet bgs
Top of Screen 5 feet bgs

PVC SCREEN
2 **inch dia.**
10 **feet length**

Bottom of Screen 15 feet bgs
Bottom of Augerhole 15 feet bgs

CASING MATERIAL	***SCREEN MATERIAL***	***FILTER MATERIAL***
Surface: Steel grade box	**Type:** 2" PVC	**Type:** #0 Sand **Setting:** 4 to 15 feet bgs
Monitor: N/A	**Slot Size:** .010"	***SEAL MATERIAL***
	Setting: 5 to 15 feet bgs	**Type:** Bentonite Chips **Setting:** 1 to 4 feet bgs

COMMENTS:

LEGEND

▨ Cement Grout
▩ Bentonite Seal
░ Silica Sandpack

Client:	**Location:**	**Project No.:**
BE3CORP PANAMERICAN ENVIRONMENT • ENGINEERING • ENERGY	**MONITORING WELL CONSTRUCTION DETAILS**	**Well Number:** **MW-5**

DRILLING SUMMARY

Geologist:

Contractor:

Operator:

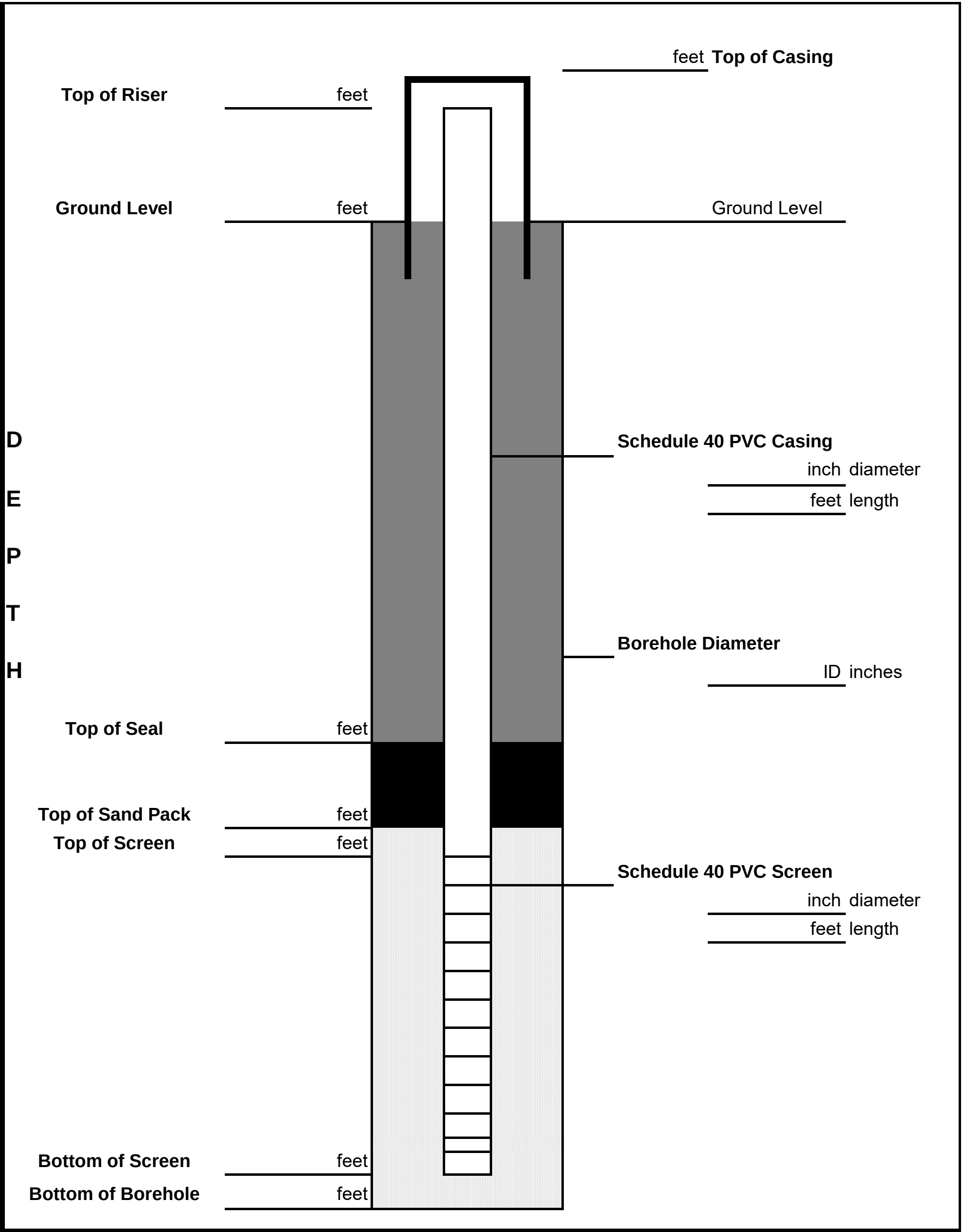
Model:

Date: 1/12/2018

GEOLOGIC LOG

Depth(ft.)	Description

WELL DESIGN



CASING MATERIAL	SCREEN MATERIAL	FILTER MATERIAL
Surface: 4" Steel protective cover (Stick Up)	**Type:** 2" Schedule 40 PVC	**Type:** #0 well sand **Setting:**
Monitor: 2" Schedule 40 PVC	**Slot Size:** 0.010"	**SEAL MATERIAL**
	Setting:	**Type 1:** Bentonite chips **Setting:** **Type 1:** **Setting:**

COMMENTS:

LEGEND

▨ Cement Grout

■ Bentonite Seal

□ Sand Pack

Client:	**Location:**	**Project No.:**
BE3CORP PANAMERICAN ENVIRONMENT · ENGINEERING · ENERGY	**MONITORING WELL CONSTRUCTION DETAILS**	**Well Number:**

DRILLING SUMMARY

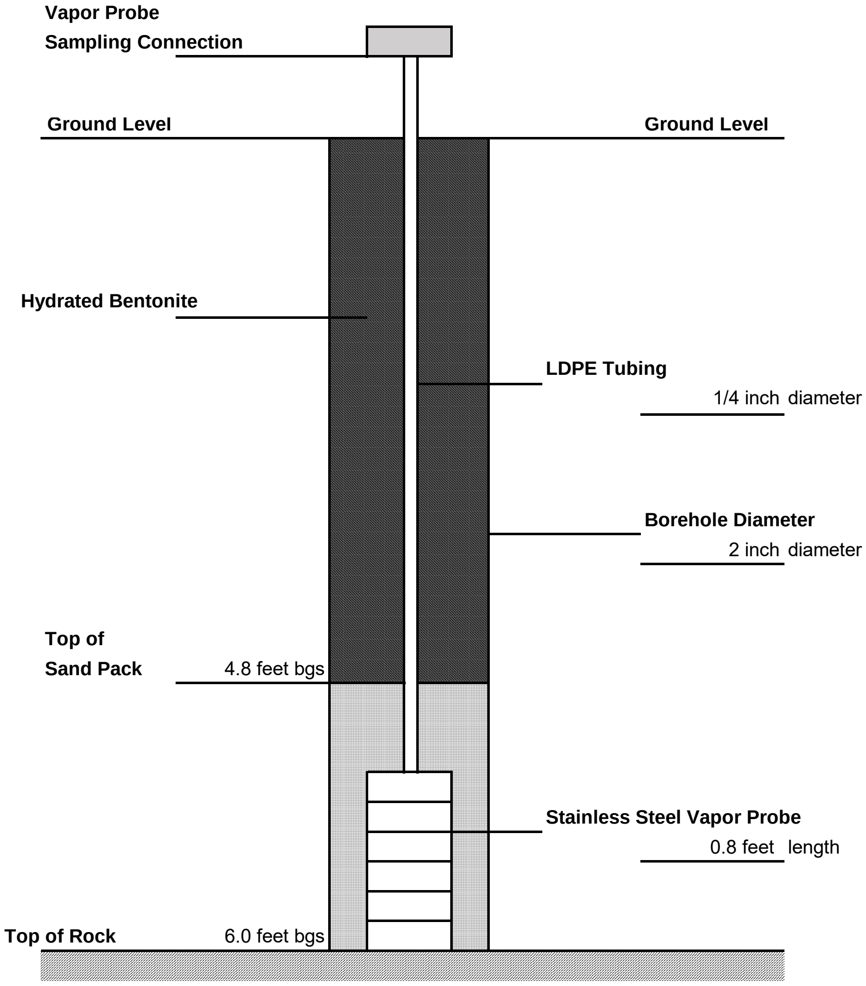
Geologist:

Contractor: Nature's Way

Operator:

Model:

Date:



GEOLOGIC LOG

Depth(ft.)	Description
	N/A

PROBE DESIGN

CASING MATERIAL		SEAL MATERIAL		FILTER MATERIAL	
Surface:	N/A	**Type:**	Bentonite Chips	**Type:**	No. 0 Sand
		Setting:	0.0 feet to 4.8 feet bgs	**Setting:**	4.8 feet to 6.0 feet bgs

COMMENTS:

Ground elevation not measured.
Refusal at 6.0 feet bgs.

LEGEND

▨ Bentonite Chip Seal

░ Sand Pack

Client:	**Location:**	**Project No.**
BE3CORP PANAMERICAN ENVIRONMENT • ENGINEERING • ENERGY	**SOIL VAPOR PROBE CONSTRUCTION DETAILS**	**Probe Number: VP-4**

WELL DEVELOPMENT LOG

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PROJECT TITLE: ______________________ WELL NO.: ______________

PROJECT NO.: ______________________

STAFF: ______________________

DATE(S): ______________________

DEVELOPMENT METHOD: ______________________

____

1. DEPTH TO WELL BOTTOM (FT. BTOR) = ______________
2. WATER LEVEL BELOW TOP OF RISER (FT. BTOR) = ______________
3. NUMBER OF FEET STANDING WATER (#1 - #2) = ______________
4. VOLUME OF WATER/FOOT OF CASING (GALLONS) = ______________
5. VOLUME OF WATER IN CASING (GAL.)(#3 x #4) = ______________
6. VOLUME OF WATER TO REMOVE (GAL.)(#5 x_____) = ______________
7. VOLUME OF WATER ACTUALLY REMOVED (GAL.) = ______________

WELL ID.	VOL. (GAL/FT)
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

OR

$V=0.0408 \times (\text{CASING DIAMETER})^2$

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)										
pH											
TEMPERATURE (°C)											
SPEC. COND. ( )											
ORP (mV)											
DISSOLVED OXYGEN (mg/l)											
TURBIDITY (NTU)											
DEPTH TO WATER (btor)											
TIME											

COMMENTS:

PAGE ____ OF ____

LOW FLOW GROUNDWATER PURGING/SAMPLING LOG

Project: ____________________ Site: ____________ Well I.D.: ____________

Date: ________ Sampling Personnel: ____________________ Company: ____________

Purging/ Sampling Device: ____________________ Tubing Type: ____________ Pump/Tubing Inlet Location: ____________

Measuring Point: ________ Initial Depth to Water: ________ Depth to Well Bottom: ________ Well Diameter: ________ Screen Length: ________

Casing Type: ____________ Volume in 1 Well Casing (liters): ________ Purge Volume (liters): ________

Sample ID: ____________________ Sample ____________ QA/QC: ____________

Sample Parameters: ____

____

____

____

PURGE PARAMETERS

TIME	pH	TEMP (^{0}C)	COND. (mS/cm)	DISS. O_2 (mg/l)	TURB. (NTU)	Eh (mV)	FLOW RATE (ml/min.)	DEPTH TO WATER (btor)
Tolerance:	**0.1**	**---**	**3%**	**10%**	**10%**	**+ or - 10**	**---**	

Information: WATER VOLUMES--0.75 inch diameter well = 87 ml/ft; 1 inch diameter well = 154 ml/ft; 2 inch diameter well = 617 ml/ft;
4 inch diameter well = 2470 ml/ft ($vol_{cyl} = \pi r^2 h$)

Remarks:

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Geoprobe
Bore Hole Log

Project:	Sheet: of
Client:	Location:
Contractor:	Ground Elevation:
Date Started:	Operator:
Date Completed:	Geologist/Technician:
Bore Hole Number:	Ground Water:

Depth (FT)	Sample		Description
	NO	TYPE	
0			
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			

Comments:

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Summa Canister Data Sheet

Site: Hillcrest
Samplers:
Date:

Sample #					
Location					
Summa Canister ID					
Flow Controller ID					
Additional Tubing Added	NO/ YES - How much	NO/ YES - How much	NO/ YES - How much	NO/ YES - How much	NO/ YES - How much
Purge Time (Start)					
Purge Time (Stop)					
Total Purge Time (min)					
Purge Volume					
Initial Tracer Gas Results					
CH4 (ppm)					
O2 (%)					
H2S (ppm)					
CO2 (ppm)					
Pressure Gauge - before sampling					
Sample Time (Start)					
Sample Time (Stop)					
Total Sample Time (min)					
Pressure Gauge - after sampling					
Sample Volume					
Canister Pressure Went To Ambient Pressure?	YES / NO	YES / NO	YES / NO	YES / NO	YES / NO
Final Tracer Gas Results					
Weather 24 hours before and during sampling					

General Comments:

Boyd\Excel\Summa Canister Field Sheet- Hillcrest.xls

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Structure Sampling - Product Inventory

Page ____ of ____

Homeowner Name & Address: ________________ **Date:** ________

Samplers & Company: ________________ **Structure ID:** ________

Site Number & Name: ________________ **Phone Number:** ________

Make & Model of PID: ________________ **Date of PID Calibration:** ________

Identify any Changes from Original Building Questionnaire : ________________

Product Name/Description	Quantity	Chemical Ingredients	PID Reading	Location

13. PRODUCT INVENTORY FORM

Make & Model of field instrument used: ______________________________________

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

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

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

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Soil Vapor Intrusion - Structure Sampling Building Questionnaire

Structure ID : ____________

Site No. : ____________ **Site Name :** ____________

Date: ____________ **Time:** ____________

Structure Address : ____________

Preparer's Name & Affiliation : ____________

Residential ? ☐ **Yes** ☐ **No** **Owner Occupied ?** ☐ **Yes** ☐ **No** **Owner Interviewed ?** ☐ **Yes** ☐ **No**

Commercial ? ☐ **Yes** ☐ **No** **Industrial ?** ☐ **Yes** ☐ **No** **Mixed Uses ?** ☐ **Yes** ☐ **No**

Identify all non-residential use(s) : ____________

Owner Name : ____________ **Owner Phone :** (   ) ______ - ______

Secondary Owner Phone : (   ) ______ - ______

Owner Address (if different) : ____________

Occupant Name : ____________ **Occupant Phone :** (   ) ______ - ______

Secondary Occupant Phone : (   ) ______ - ______

Number & Age of All Persons Residing at this Location : ____________

Additional Owner/Occupant Information : ____________

Describe Structure (style, number floors, size) : ____________

____

Approximate **Year Built :** ____________ Is the building **Insulated**? ☐ Yes ☐ No

Lowest level : ☐ Slab-on-grade ☐ Basement ☐ Crawlspace

Describe Lowest Level (finishing, use, time spent in space) : ____________

____

Floor Type: ☐ Concrete Slab ☐ Dirt ☐ Mixed : ____________

Floor Condition : ☐ Good (few or no cracks) ☐ Average (some cracks) ☐ Poor (broken concrete or dirt)

Sumps/Drains? ☐ Yes ☐ No Describe : ____________

Identify other floor penetrations & details : ____________

____

Wall Construction : ☐ Concrete Block ☐ Poured Concrete ☐ Laid-Up Stone

Identify any wall penetrations : ____________

____

Identify water, moisture, or seepage: location & severity (sump, cracks, stains, etc) : ____________

____

Heating Fuel : ☐ Oil ☐ Gas ☐ Wood ☐ Electric ☐ Other : ____________

Heating System : ☐ Forced Air ☐ Hot Water ☐ Other : ____________

Hot Water System : ☐ Combustion ☐ Electric ☐ Boilermate ☐ Other: ____________

Clothes Dryer : ☐ Electric ☐ Gas Where is dryer vented to? ____________

If combustion occurs, describe where air is drawn from (cold air return, basement, external air, etc.) : ____________

____

Fans & Vents (identify where fans/vents pull air from and where they vent/exhaust to) : ____________

____

Soil Vapor Intrusion - Structure Sampling Building Questionnaire **Structure ID :** ____________

Describe factors that may affect indoor air quality (chemical use/storage, unvented heaters, smoking, workshop):

Attached garage ? ☐ Yes ☐ No Air fresheners ? ☐ Yes ☐ No

New carpet or furniture ? ☐ Yes ☐ No What/Where ? ____________

Recent **painting** or **staining** ? ☐ Yes ☐ No Where ? : ____________

Any **solvent** or **chemical-like** odors ? ☐ Yes ☐ No Describe : ____________

Last time **Dry Cleaned** fabrics brought in ? ____________ What / Where ? ____________

Do any building occupants use solvents at work ? ☐ Yes ☐ No Describe : ____________

Any testing for Radon ? ☐ Yes ☐ No Results : ____________

Radon System/Soil Vapor Intrusion Mitigation System present ? ☐ Yes ☐ No If yes, describe below

Lowest Building Level Layout Sketch

- Identify and label the locations of all sub-slab, indoor air, and outdoor air samples on the layout sketch.
- Measure the distance of all sample locations from identifiable features, and include on the layout sketch.
- Identify room use (bedroom, living room, den, kitchen, etc.) on the layout sketch.
- Identify the locations of the following features on the layout sketch, using the appropriate symbols:

B or F	Boiler or Furnace	o	Other floor or wall penetrations (label appropriately)
HW	Hot Water Heater	xxxxxxx	Perimeter Drains (draw inside or outside outer walls as appropriate)
FP	Fireplaces	######	Areas of broken-up concrete
WS	Wood Stoves	● SS-1	Location & label of sub-slab vapor samples
W/D	Washer / Dryer	● IA-1	Location & label of indoor air samples
S	Sumps	● OA-1	Location & label of outdoor air samples
@	Floor Drains	● PFET-1	Location and label of any pressure field test holes.

APPENDIX E

BROWNFIELD CLEANUP PROGRAM
CITIZEN PARTICIPATION PLAN

HAWKEYE TRADE CENTER & RESIDENCES PARCEL 1B
1447 ST. PAUL STREET
ROCHESTER, NEW YORK 14650
NYSDEC SITE # C828203

Prepared by:

BE3CORP
PANAMERICAN
ENVIRONMENT • ENGINEERING • ENERGY

1270 Niagara Street
Buffalo, New York 14213

May 2019

Table of Contents

APPENDICES

* * * * *

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

Applicant: **WBS Capital, Inc.**
Site Name: **Hawkeye Trade Center and Residences**
Site Address: **1405 Saint Paul Street**
Site County: **Monroe**
Site Number: **C828203**

1.0 What is New York's Brownfield Cleanup Program?

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

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

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

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

2.0 Citizen Participation Activities

Why NYSDEC Involves the Public and Why It Is Important

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

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

- Promoting the development of timely, effective site investigation and cleanup programs that protect public health and the environment
- Improving public access to, and understanding of, issues and information related to a site and that site's investigation and cleanup process
- Providing citizens with early and continuing opportunities to participate in NYSDEC's site investigation and cleanup process
- Ensuring that NYSDEC makes site investigation and cleanup decisions that benefit from input that reflects the interests and perspectives found within the affected community
- Encouraging dialogue to promote the exchange of information among the affected/interested

public, State agencies, and other interested parties that strengthens trust among the parties, increases understanding of site and community issues and concerns, and improves decision making.

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

Project Contacts

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

Locations of Reports and Information

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

Site Contact List

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

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

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

CP Activities

The table at the end of this section identifies the CP activities, at a minimum, that have been and will be conducted during the site's investigation and cleanup program. The flowchart in **Appendix D** shows how these CP activities integrate with the site investigation and cleanup process. The public is informed about these CP activities through fact sheets and notices distributed at significant points during the program. Elements of the investigation and cleanup process that match up with the CP activities are explained briefly in Section 5.

- **Notices and fact sheets** help the interested and affected public to understand contamination issues related to a site, and the nature and progress of efforts to investigate and clean up a site.
- **Public forums, comment periods and contact with project managers** provide opportunities for the public to contribute information, opinions and perspectives that have potential to influence decisions about a site's investigation and cleanup.

The public is encouraged to contact project staff at any time during the site's investigation and cleanup process with questions, comments, or requests for information. This CP Plan may be revised due to changes in major issues of public concern identified in Section 3 or in the nature and scope of investigation and cleanup activities.

Technical Assistance Grant

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

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

An eligible community group must certify that its membership represents the interests of the community affected by the site, and that its members' health, economic well-being or enjoyment of the environment may be affected by a release or threatened release of contamination at the site. For more information about TAGs, go online at http://www.dec.ny.gov/regulations/2590.html

As of the date of this CP Plan, the significant threat determination for the site had not yet been made. To verify the significant threat status of the site, the interested public may contact the NYSDEC project manager identified in **Appendix A**.

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

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

3.0 Major Issues of Public Concern

This section of the CP Plan identifies major issues of public concern as they relate to the site Additional major issues of public concern may be identified during the site's remedial process.

At this juncture the public has not identified major concerns with the project. In the event major concerns are expressed, future communication addressing those concerns will be issued to stakeholders.

Issues of community concern in the future may include noise, odor, dust and/or truck traffic associated with removal of contaminated soil (if subsurface remediation is required.) However, impacts will be mitigated through the implementation of a health and safety plan approved by the Department which will be designed to minimize these impacts. A Community Air Monitoring Plan (CAMP) will also be implemented to monitor dust and vapors to ensure the community is not impacted.

4.0 Site Information

Note: please refer to the BCP Application and RI Work Plan (and corresponding appendices) for more detailed information on the Site. Below is a summary of Site description, future use of Site, historical use of Site, and Site environmental history. **Appendix C** contains a map identifying the location of the site.

Site Description

The property is in a suburban area roughly in the center of the City of Rochester municipality, north of downtown area; approximately a half a mile south of State Route 104; along the Genesee River. The property sits at the northeast corner of the intersection of St. Paul Street and Avenue E. The main site features include a large manufacturing/office building which comprises most of the parcel. A small driveway is located to the north off St. Paul Street and wraps around the northwest corner of the building. The property is surrounded by another former Kodak Company building associated with manufacturing uses (1447 St. Paul Street) along its west and north borders. A parking lot is located adjacent south and R.C. Shaheen Paint is located adjacent east of the site. Seneca Park and the Genesee River gorge sit to the west. Currently the property is vacant and is zoned for M-1; industrial use. The property is surrounded by additional industrial uses. Residential zones begin a few blocks to the south, east and northeast of the property.

Future Use of the Site

The proposed Hawkeye Trade Center and Residences project plans to use the property for a mixture of commercial/office space, flex space, and manufacturing. The site will be used to promote economic growth in the area by drawing in a variety of businesses. The site is phase 1 of 3 phases for redevelopment and the primary use of the building will be associated with the Foreign Trade Zone, warehouse storage/distribution, and wholesale display.

History of Site Use

The property has been associated with industrial/manufacturing since the early 1900's. The property had multiple uses associated with transportation. The New York State Railway machine and repair shop was located on the property in 1911, Rochester Transit Corporation rail car maintenance was previously located at the facility in the late 1930's until Kodak purchased the property in 1942, as well as a former gasoline filling station in the early to mid-1900's. The Kodak Hawkeye Facility manufactured optical lenses and equipment using thorium glass. The current building was erected and was used for office space, equipment assembly, non-hazardous and hazardous waste storage laboratory, and cafeteria. A building labeled "kerosene" was discovered on the property in the northwest corner from the 1950 Sanborn map. Potential sources of contamination include a former drywell of unknown material located southwest of the property, previous contamination of solvents below the building from past site use, past releases from the small kerosene labeled building, and petroleum migration from the former gas station located adjacent east of the site.

A Phase I and Phase II Environmental Assessment have been completed at the site. The Phase II identified chlorinated solvents in a groundwater monitoring well above NYSDEC standards. The source of impacts is currently unknown.

5.0 Investigation and Cleanup Process

Application

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

The Applicant in its Application proposes that the site will be used for restricted purposes. To achieve this goal, the Applicant will conduct investigation and/or cleanup activities at the site with oversight provided by NYSDEC. The Brownfield Cleanup Agreement to be executed by NYSDEC and the Applicant sets forth the responsibilities of each party in conducting these activities at the site.

Investigation

The Applicant will complete a RI as part of the BCP with NYSDEC oversight. When the investigation is complete, the Applicant will prepare and submit a report that summarizes the results. NYSDEC will use the information in the investigation report to determine if the site poses a significant threat to public health or the environment. If the site is a significant threat, it must be cleaned up using a remedy selected by NYSDEC from an analysis of alternatives prepared by the Applicant and approved by NYSDEC. If the site does not pose a significant threat, the Applicant may select the remedy from the approved analysis of alternatives.

Interim Remedial Measures

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

Remedy Selection

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

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

Or

2. The Applicant may recommend in its investigation report that action needs to be taken to address site contamination. Pending approval of the investigation report by the NYSDEC, the Applicant may then develop a cleanup plan, officially called a “Remedial Work Plan”. The Remedial Work Plan describes the Applicant’s proposed remedy for addressing contamination related to the site. When the Applicant submits a draft Remedial Work Plan for approval, NYSDEC would announce the availability of the draft plan for public review during a 45-day public comment period.

Cleanup Action

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

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

Certificate of Completion

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

Site Management

Site management is the last phase of the site cleanup program. This phase begins when the COC is issued. Site management may be conducted by the Applicant under NYSDEC oversight, if contamination will remain in place. Site management incorporates any institutional and engineering controls required to ensure that the remedy implemented for the site remains protective of public health and the environment. All significant activities are detailed in a Site Management Plan.

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

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

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

Appendix A

Project Contacts and Locations of Reports and Information

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

New York State Department of Environmental Conservation (NYSDEC):

Danielle Miles
Project Manager, Division of Environmental Remediation
6274 East Avon-Lima Rd, Avon, NY 14414
P: (585) 226-5349
danielle.miles@dec.ny.gov

Regina Willis
Regional Public Participation Specialist
6274 E Avon-Lima Rd, Avon, NY 14414
P: (585) 226-5324
regina.willis@dec.ny.gov

New York State Department of Health (NYSDOH):

Harolyn Hood
Project Manager
Corning Tower, Empire State Plaza Albany, NY 12237
P: (518) 402-7860
beei@health.ny.gov

Public Repository for Reports and Information:

Lincoln Branch Library
851 Joseph Ave
Rochester, NY 14261
P: (585) 428-8210
Hours: Mon., Tues., Wed. 10 am – 6 pm
Thurs., Fri. 12 pm – 6 pm
Sat. 12 pm – 4 pm
Sun. Closed

NYSDEC Region 8
6274 East Avon-Lima Rd
Avon, NY 14414
Attn: Danielle Miles
P: (585) 226-5353
Hours: Mon.-Fri. 8 am – 4 pm
(Call for an appointment)

Appendix B

Site Contact List

1. THE CHIEF EXECUTIVE OFFICER AND PLANNING BOARD/DEPT. CHAIR OF EACH COUNTY, CITY, TOWN AND VILLAGE IN WHICH THE PROPERTY IS LOCATED.

Monroe County

County Executive – Cheryl Dinolfo
110 County Office Building
39 W. Main St.
Rochester, NY 14614
Phone:(585) 753-1000
Email: countyexecutive@monroecounty.gov

Chief Economic Development Officer – Jeff Adair
City Place
50 W. Main St
Rochester, NY 14614
Phone: (585) 753-2000
Email: mcplanning@monroecounty.gov

City of Rochester

Mayor – Lovely A. Warren
City Hall, Room 307A
30 Church St
Rochester, NY 14614
Phone: (585) 428-7045

City Planning Commission Chair - David L. Watson
Division of Zoning
City Hall, Room 125B
Rochester, NY 14614
Phone: (585) 428-6914

2. RESIDENTS, OWNERS, AND OCCUPANTS OF THE PROPERTY AND PROPERTIES ADJACENT TO THE PROPERTY.

Property Owners

WBS Capital, Inc.
136-20 38th Avenue Suite 9J
Flushing, NY 11354

Adjacent Property Owners

WBS Capital, Inc. (090.84-1-3.001, 090.76-24.002, 090.84-1-22.001, 1364-1368, 090.84-1-39, 090.84-1-42.001, 090.84-1-69, 090.84-1-68)
136-20 38th Avenue Suite 9J
Flushing, NY 11354

RCS Property Holdings LLC (090.84-1-21.001)
1400 St Paul St
Rochester, NY 14621

3. LOCAL NEWS MEDIA FROM WHICH THE COMMUNITY TYPICALLY OBTAINS INFORMATION.

News Papers

CITY Newspaper
250 N. Goodman St.
Rochester, NY 14607
Phone: 585-244-3329
Fax: 585-244-1126

Rochester Democrat and Chronicle
245 E Main St.
Rochester, NY 14604
Phone: 585-232-7100

TV

Spectrum News
71 Mt. Hope Ave.
Rochester, NY 14620
Phone: 585-756-2424

WHAM
4225 W. Henrietta Rd.
Rochester, NY 14623
Phone: 585-334-8700

WROC
201 Humboldt St.
Rochester, NY 14610
585-288-8400

4. THE PUBLIC WATER SUPPLIER WHICH SERVICES THE AREA IN WHICH THE PROPERTY IS LOCATED

Public Water Supplier

City of Rochester Bureau of Water
10 Felix St
Rochester, NY 14608

Monroe County Water Authority
475 Norris Dr
P.O. Box 10999

Rochester, NY 14610

5. ANY PERSON WHO HAS REQUESTED TO BE PLACED ON THE CONTACT LIST.

Monroe County Planning Manager
Thomas Goodwin
8100 City Place
50 W. Main St.
Rochester, NY 14614
Phone: 585-753-2000
Email: mcplanning@monroecounty.gov

Group 14621 Community Association, Inc.
A Subsidiary of North East Area Development, Inc./NEAD
1171 North Clinton Avenue
Rochester, New York 14621
Phone: 585-266-4693
Email: group14621@group14621.com

6. THE ADMINISTRATOR OF ANY SCHOOL OR DAY CARE FACILITY LOCATED ON OR NEAR THE PROPERTY.

There are no schools/day care facilities on the property.

Rochester School for the Deaf
Gary Meyer, Administrator
1545 St Paul St
Rochester, NY 14621
Phone: 585-544-1240

7. THE LOCATION OF A DOCUMENT REPOSITORY FOR THE PROJECT (E.G., LOCAL LIBRARY).

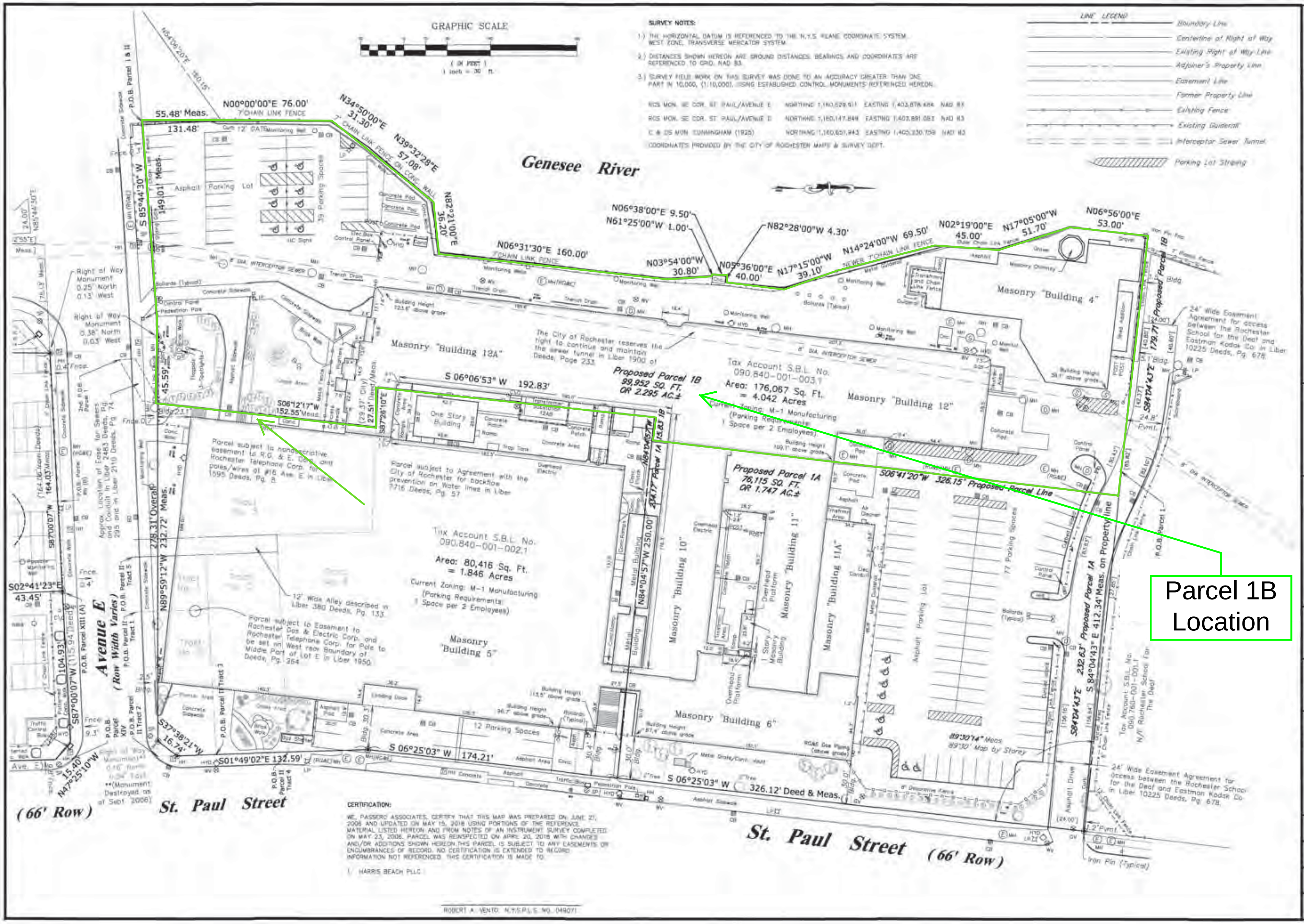
Lincoln Branch Library
851 Joseph Ave
Rochester, NY 14261
Phone: 585-428-8210

8. COMMUNITY BOARD IN A CITY WITH A POPULATION OF ONE MILLION OR MORE

Not Applicable.

Appendix C

Site Location Map



SURVEY NOTES:

1.) THE HORIZONTAL DATUM IS REFERENCED TO THE N.Y.S. PLANE COORDINATE SYSTEM WEST ZONE, TRANSVERSE MERCATOR SYSTEM.

2.) DISTANCES SHOWN HEREON ARE GROUND DISTANCES. BEARINGS AND COORDINATES ARE REFERENCED TO GRID, NAD 83.

3.) SURVEY FIELD WORK ON THIS SURVEY WAS DONE TO AN ACCURACY GREATER THAN ONE PART IN 10,000, (1:10,000), USING ESTABLISHED CONTROL MONUMENTS REFERENCED HEREON.

RCS MON. NE COR. ST. PAUL/AVENUE E	NORTHING 1,160,529.611	EASTING 1,403,878.484	NAD 83
RCS MON. SE COR. ST. PAUL/AVENUE D	NORTHING 1,160,147.849	EASTING 1,403,891.083	NAD 83
C & DS MON. CUNNINGHAM (1925)	NORTHING 1,160,651.943	EASTING 1,405,230.759	NAD 83

COORDINATES PROVIDED BY THE CITY OF ROCHESTER MAPS & SURVEY DEPT.

LINE LEGEND

- Boundary Line
- Centerline of Right of Way
- Existing Right of Way Line
- Adjoiner's Property Line
- Easement Line
- Former Property Line
- Existing Fence
- Existing Guiderail
- Interceptor Sewer Tunnel
- Parking Lot Striping

CERTIFICATION:

WE, PASSERO ASSOCIATES, CERTIFY THAT THIS MAP WAS PREPARED ON JUNE 21, 2006 AND UPDATED ON MAY 15, 2018 USING PORTIONS OF THE REFERENCE MATERIAL LISTED HEREON AND FROM NOTES OF AN INSTRUMENT SURVEY COMPLETED ON MAY 23, 2006. PARCEL WAS REINSPECTED ON APRIL 20, 2018 WITH CHANGES AND/OR ADDITIONS SHOWN HEREON. THIS PARCEL IS SUBJECT TO ANY EASEMENTS OR ENCUMBRANCES OF RECORD. NO CERTIFICATION IS EXTENDED TO RECORD INFORMATION NOT REFERENCED. THIS CERTIFICATION IS MADE TO:

1. HARRIS BEACH PLLC

ROBERT A. VENTO N.Y.S.P.L.S. NO. 049071

PASSERO ASSOCIATES
Engineering + Architecture
www.passero.com

LEGEND	
CB	Catchbasin
CO	Cleanout
GV	Gas Valve
HYD	Hydrant
LP	Lightpole
MH	Manhole (Unknown Type)
MH	Manhole Electric
MH	Manhole Inlet Storm Drainage
MH	Manhole Storm Drainage
MH	Manhole Sanitary Sewer
	Sign Post (Single)
PP	Utility Pole
	Utility Pole Anchor Wire
	Utility Pole with Light
WS	Water Service
WV	Water Valve
SP	Traffic Light Span Pole
PM	Paint Mark for Utility Loc.

Revisions

No.	Date	By	Description

Passero Associates

Principal-in-Charge	Daniel J. Savage
Project Manager	Robert A. Vento
Drafted by	D. Sauzio

Harris Beach PLLC
99 Garnsey Road
Pittsford, New York 14534
Attn.: Francis L. Gorman, III

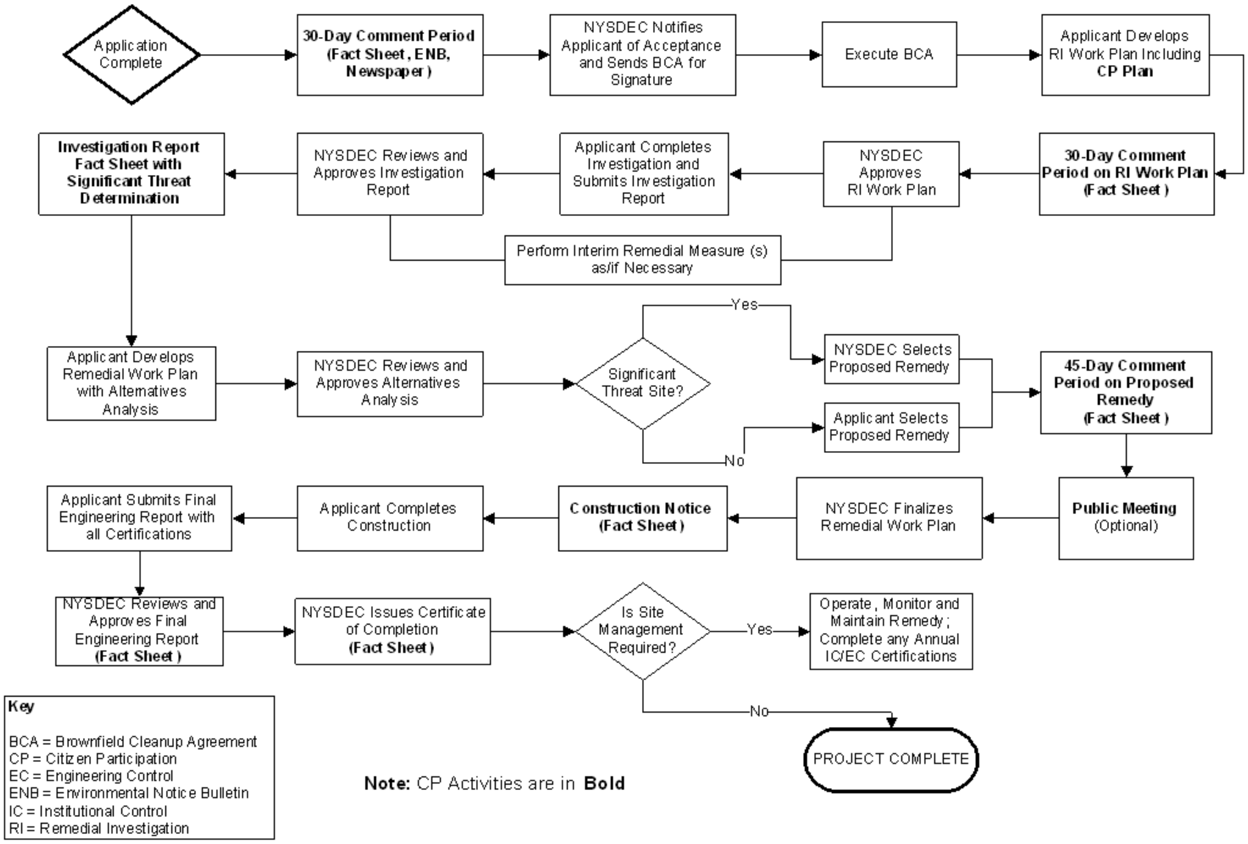
Instrument Survey
Kodak Hawkeye Plant
Showing Tax Account Parcels
090.840-001-002.1
090.840-001-003.1
St. Paul Street at Avenue E

City of Rochester, Monroe County, State of N.Y.

Project No.	20060688.0020
Drawing No.	Instr-1A
Sheet No.	1 of 1
Scale	1" = 30'
Date	05.15.18

Appendix D

BCP Process Flowchart


Application Complete
30-Day Comment Period (Fact Sheet, ENB, Newspaper)
NYSDEC Notifies Applicant of Acceptance and Sends BCA for Signature
Execute BCA
Applicant Develops RI Work Plan Including CP Plan
30-Day Comment Period on RI Work Plan (Fact Sheet)
NYSDEC Approves RI Work Plan
Applicant Completes Investigation and Submits Investigation Report
NYSDEC Reviews and Approves Investigation Report
Investigation Report Fact Sheet with Significant Threat Determination
Perform Interim Remedial Measure (s) as/if Necessary
Applicant Develops Remedial Work Plan with Alternatives Analysis
NYSDEC Reviews and Approves Alternatives Analysis
Significant Threat Site?
Yes
NYSDEC Selects Proposed Remedy
No
Applicant Selects Proposed Remedy
45-Day Comment Period on Proposed Remedy (Fact Sheet)
Public Meeting (Optional)
NYSDEC Finalizes Remedial Work Plan
Construction Notice (Fact Sheet)
Applicant Completes Construction
Applicant Submits Final Engineering Report with all Certifications
NYSDEC Reviews and Approves Final Engineering Report (Fact Sheet)
NYSDEC Issues Certificate of Completion (Fact Sheet)
Is Site Management Required?
Yes
Operate, Monitor and Maintain Remedy; Complete any Annual IC/EC Certifications
No
PROJECT COMPLETE
Key
BCA = Brownfield Cleanup Agreement
CP = Citizen Participation
EC = Engineering Control
ENB = Environmental Notice Bulletin
IC = Institutional Control
RI = Remedial Investigation
Note: CP Activities are in Bold

ATTACHMENT F

NEW YORK STATE OF OPPORTUNITY. | Department of Environmental Conservation

GUIDELINES FOR SAMPLING AND ANALYSIS OF PFAS

Under NYSDEC's Part 375 Remedial Programs

January 2020

www.dec.ny.gov

Contents

ERRATA SHEET for

Guidelines for Sampling and Analysis of PFAS Under NYSDEC's Part 375 Program
Issued January 17, 2020

Citation and Page Number	Current Text	Corrected Text	Date

January 2020

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

Guidelines for Sampling and Analysis of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs

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Objective

New York State Department of Environmental Conservation's Division of Environmental Remediation (DER) performs or oversees sampling of environmental media and subsequent analysis of PFAS as part of remedial programs implemented under 6 NYCRR Part 375. To ensure consistency in sampling, analysis and reporting of PFAS, DER has developed this document to summarize procedures and update previous DER technical guidance pertaining to PFAS.

Applicability

Sampling for PFAS has already been initiated at numerous sites under DER-approved work plans, in accordance with specified procedures. All future work plans should include PFAS sampling and analysis procedures that conform to the guidelines provided herein.

As part of a site investigation or remedial action compliance program, whenever samples of potentially affected media are collected and analyzed for the standard Target Analyte List/Target Compound List (TAL/TCL), PFAS analysis should also be performed. Potentially affected media can include soil, groundwater, surface water, and sediment. Based upon the potential for biota to be affected, biota sampling and analysis for PFAS may also be warranted as determined pursuant to a Fish and Wildlife Impact Analysis. Soil vapor sampling for PFAS is not required.

Field Sampling Procedures

DER-10 specifies technical guidance applicable to DER's remedial programs. Given the prevalence and use of PFAS, DER has developed "best management practices" specific to sampling for PFAS. As specified in DER-10 Chapter 2, quality assurance procedures are to be submitted with investigation work plans. Typically, these procedures are incorporated into a work plan, or submitted as a stand-alone document (e.g., a Quality Assurance Project Plan). Quality assurance guidelines for PFAS are listed in Appendix A - Quality Assurance Project Plan (QAPP) Guidelines for PFAS.

Field sampling for PFAS performed under DER remedial programs should follow the appropriate procedures outlined for soils, sediments or other solids (Appendix B), non-potable groundwater (Appendix C), surface water (Appendix D), public or private water supply wells (Appendix E), and fish tissue (Appendix F).

QA/QC samples (e.g. duplicates, MS/MSD) should be collected as specified in DER-10, Section 2.3(c). For sampling equipment coming in contact with aqueous samples only, rinsate or equipment blanks should be collected. Equipment blanks should be collected at a minimum frequency of one per day or one per twenty samples, whichever is more frequent.

Data Assessment and Application to Site Cleanup

Until such time as Ambient Water Quality Standards (AWQS) and Soil Cleanup Objectives (SCOs) for PFAS are published, the extent of contaminated media potentially subject to remediation should be determined on a case-by-case basis using the procedures discussed below and the criteria in DER-10.

Water Sample Results

PFAS should be further assessed and considered as a potential contaminant of concern in groundwater or surface water if PFOA or PFOS is detected in any water sample at or above 10 ng/L (ppt). In addition, further assessment of water may be warranted if either of the following screening levels are met:

a. any other individual PFAS (not PFOA or PFOS) is detected in water at or above 100 ng/L; or
b. total concentration of PFAS (including PFOA and PFOS) is detected in water at or above 500 ng/L

If PFAS are identified as a contaminant of concern for a site, they should be assessed as part of the remedy selection process in accordance with Part 375 and DER-10.

Soil Sample Results

The extent of soil contamination for purposes of delineation and remedy selection should be determined by having certain soil samples tested by Synthetic Precipitation Leaching Procedure (SPLP) and the leachate analyzed for PFAS. Soil exhibiting SPLP results above 70 ppt for either PFOA or PFOS (individually or combined) are to be evaluated during the cleanup phase.

Sites in the site management phase should evaluate for PFAS to determine if modification to any components of the SMP is necessary (e.g., monitoring for PFAS, upgrading treatment facilities, or performing an RSO).

Testing for Imported Soil

Soil imported to a site for use in a soil cap, soil cover, or as backfill is to be tested for PFAS in general conformance with DER-10, Section 5.4(e) for the *PFAS Analyte List* (Appendix F) using the analytical procedures discussed below and the criteria in DER-10 associated with SVOCs.

If PFOA or PFOS is detected in any sample at or above 1 µg/kg, then soil should be tested by SPLP and the leachate analyzed for PFAS. If the SPLP results exceed 10 ppt for either PFOA or PFOS (individually) then the source of backfill should be rejected, unless a site-specific exemption is provided by DER. SPLP leachate criteria is based on the Maximum Contaminant Levels proposed for drinking water by New York State's Department of Health, this value may be updated based on future Federal or State promulgated regulatory standards. Remedial parties have the option of analyzing samples concurrently for both PFAS in soil and in the SPLP leachate to minimize project delays. Category B deliverables should be submitted for backfill samples, though a DUSR is not required.

Analysis and Reporting

As of January 2020, the United States Environmental Protection Agency (EPA) does not have a validated method for analysis of PFAS for media commonly analyzed under DER remedial programs (non-potable waters, solids). DER has developed the following guidelines to ensure consistency in analysis and reporting of PFAS.

The investigation work plan should describe analysis and reporting procedures, including laboratory analytical procedures for the methods discussed below. As specified in DER-10 Section 2.2, laboratories should provide a full Category B deliverable. In addition, a Data Usability Summary Report (DUSR) should be prepared by an independent, third party data validator. Electronic data submissions should meet the requirements provided at: https://www.dec.ny.gov/chemical/62440.html.

DER has developed a *PFAS Analyte List* (Appendix F) for remedial programs to understand the nature of contamination at sites. It is expected that reported results for PFAS will include, at a minimum, all the compounds listed. If lab and/or matrix specific issues are encountered for any analytes, the DER project manager, in consultation with the DER chemist, will make case-by-case decisions as to whether certain analytes may be temporarily or permanently discontinued from analysis at each site. As with other contaminants that are analyzed for at a site, the *PFAS Analyte List* may be refined for future sampling events based on investigative findings.

Routine Analysis

Currently, New York State Department of Health's Environmental Laboratory Approval Program (ELAP) does not offer certification for PFAS in matrices other than finished drinking water. However, laboratories analyzing environmental samples for PFAS (e.g., soil, sediments, and groundwater) under DER's Part 375 remedial programs need to hold ELAP certification for PFOA and PFOS in drinking water by EPA Method 537.1 or ISO 25101. Laboratories should adhere to the guidelines and criteria set forth in the DER's laboratory guidelines for PFAS in non-potable water and solids (Appendix H - Laboratory Guidelines for Analysis of PFAS in Non-Potable Water and Solids). Data review guidelines were developed by DER to ensure data comparability and usability (Appendix H - Data Review Guidelines for Analysis of PFAS in Non-Potable Water and Solids).

LC-MS/MS analysis for PFAS using methodologies based on EPA Method 537.1 is the procedure to use for environmental samples. Isotope dilution techniques should be utilized for the analysis of PFAS in all media. Reporting limits for PFOA and PFOS in aqueous samples should not exceed 2 ng/L. Reporting limits for PFOA and PFOS in solid samples should not exceed 0.5 µg/kg. Reporting limits for all other PFAS in aqueous and solid media should be as close to these limits as possible. If laboratories indicate that they are not able to achieve these reporting limits for the entire *PFAS Analyte List*, site-specific decisions regarding acceptance of elevated reporting limits for specific PFAS can be made by the DER project manager in consultation with the DER chemist.

Additional Analysis

Additional laboratory methods for analysis of PFAS may be warranted at a site, such as the Synthetic Precipitation Leaching Procedure (SPLP) and Total Oxidizable Precursor Assay (TOP Assay). Commercially methods are also available for biota and air samples.

SPLP is a technique used to determine the mobility of chemicals in liquids, soils and wastes, and may be useful in determining the need for addressing PFAS-containing material as part of the remedy. SPLP by EPA Method 1312 should be used unless otherwise specified by the DER project manager in consultation with the DER chemist.

Impacted materials can be made up of PFAS that are not analyzable by routine analytical methodology. A TOP Assay can be utilized to conceptualize the amount and type of oxidizable PFAS which could be liberated in the environment, which approximates the maximum concentration of perfluoroalkyl substances that could be generated if all polyfluoroalkyl substances were oxidized. For example, some polyfluoroalkyl substances may degrade or transform to form perfluoroalkyl substances (such as PFOA or PFOS), resulting in an increase in perfluoroalkyl substance concentrations as contaminated groundwater moves away from a source. The TOP Assay converts, through oxidation, polyfluoroalkyl substances (precursors) into perfluoroalkyl substances that can be detected by routine analytical methodology.

Please note that TOP Assay analysis of highly-contaminated samples, such as those from an AFFF (aqueous film-forming foam) site, can result in incomplete oxidation of the samples and an underestimation of the total perfluoroalkyl substances.

Commercial laboratories have adopted methods which allow for the quantification of targeted PFAS in air and biota. The EPA's Office of Research and Development (ORD) is currently developing methods which allow for air emissions characterization of PFAS, including both targeted and non-targeted analysis of PFAS. Consult with the DER project manager and the DER chemist for assistance on analyzing biota/tissue and air samples.

Appendix A - Quality Assurance Project Plan (QAPP) Guidelines for PFAS

The following guidelines (general and PFAS-specific) can be used to assist with the development of a QAPP for projects within DER involving sampling and analysis of PFAS.

General Guidelines in Accordance with DER-10

- Document/work plan section title – Quality Assurance Project Plan
- Summarize project scope, goals, and objectives
- Provide project organization including names and resumes of the project manager, Quality Assurance Officer (QAO), field staff, and Data Validator
    - The QAO should not have another position on the project, such as project or task manager, that involves project productivity or profitability as a job performance criterion
- List the ELAP-approved lab(s) to be used for analysis of samples
- Include a site map showing sample locations
- Provide detailed sampling procedures for each matrix
- Include Data Quality Usability Objectives
- List equipment decontamination procedures
- Include an “Analytical Methods/Quality Assurance Summary Table” specifying:
    - Matrix type
    - Number or frequency of samples to be collected per matrix
    - Number of field and trip blanks per matrix
    - Analytical parameters to be measured per matrix
    - Analytical methods to be used per matrix with minimum reporting limits
    - Number and type of matrix spike and matrix spike duplicate samples to be collected
    - Number and type of duplicate samples to be collected
    - Sample preservation to be used per analytical method and sample matrix
    - Sample container volume and type to be used per analytical method and sample matrix
    - Sample holding time to be used per analytical method and sample matrix
- Specify Category B laboratory data deliverables and preparation of a DUSR

Specific Guidelines for PFAS

- Include in the text that sampling for PFAS will take place
- Include in the text that PFAS will be analyzed by LC-MS/MS for PFAS using methodologies based on EPA Method 537.1
- Include the list of PFAS compounds to be analyzed (*PFAS Analyte List*)
- Include the laboratory SOP for PFAS analysis
- List the minimum method-achievable Reporting Limits for PFAS
    - Reporting Limits should be less than or equal to:
        - Aqueous – 2 ng/L (ppt)
        - Solids – 0.5 µg/kg (ppb)
- Include the laboratory Method Detection Limits for the PFAS compounds to be analyzed
- Laboratory should have ELAP certification for PFOA and PFOS in drinking water by EPA Method 537.1, EPA Method 533, or ISO 25101
- Include detailed sampling procedures
    - Precautions to be taken
    - Pump and equipment types
    - Decontamination procedures
    - Approved materials only to be used
- Specify that regular ice only will be used for sample shipment
- Specify that equipment blanks should be collected at a minimum frequency of 1 per day per matrix

Appendix B - Sampling Protocols for PFAS in Soils, Sediments and Solids

General

The objective of this protocol is to give general guidelines for the collection of soil, sediment and other solid samples for PFAS analysis. The sampling procedure used should be consistent with Sampling Guidelines and Protocols – Technological Background and Quality Control/Quality Assurance for NYS DEC Spill Response Program – March 1991 (http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf), with the following limitations.

Laboratory Analysis and Containers

Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1.

The preferred material for containers is high density polyethylene (HDPE). Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory.

Equipment

Acceptable materials for sampling include: stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. Additional materials may be acceptable if pre-approved by New York State Department of Environmental Conservation's Division of Environmental Remediation.

No sampling equipment components or sample containers should come in to contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials including sample bottle cap liners with a PTFE layer.

A list of acceptable equipment is provided below, but other equipment may be considered appropriate based on sampling conditions.

- stainless steel spoon
- stainless steel bowl
- steel hand auger or shovel without any coatings

Equipment Decontamination

Standard two step decontamination using detergent (Alconox is acceptable) and clean, PFAS-free water will be performed for sampling equipment. All sources of water used for equipment decontamination should be verified in advance to be PFAS-free through laboratory analysis or certification. Previous results of "non-detect" for PFAS from the UCMR3 water supply testing program are acceptable as verification.

Sampling Techniques

Sampling is often conducted in areas where a vegetative turf has been established. In these cases, a pre-cleaned trowel or shovel should be used to carefully remove the turf so that it may be replaced at the conclusion of sampling. Surface soil samples (e.g. 0 to 6 inches below surface) should then be collected using a pre-cleaned, stainless steel spoon. Shallow subsurface soil samples (e.g. 6 to ~36 inches below surface) may be collected by digging a hole using a pre-cleaned hand auger or shovel. When the desired subsurface depth is reached, a pre-cleaned hand auger or spoon shall be used to obtain the sample.

When the sample is obtained, it should be deposited into a stainless steel bowl for mixing prior to filling the sample containers. The soil should be placed directly into the bowl and mixed thoroughly by rolling the material into the middle until the material is homogenized. At this point the material within the bowl can be placed into the laboratory provided container.

Sample Identification and Logging

A label shall be attached to each sample container with a unique identification. Each sample shall be included on the chain of custody (COC).

Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at 4 ± 2º Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- Request appropriate data deliverable (Category B) and an electronic data deliverable

Documentation

A soil log or sample log shall document the location of the sample/borehole, depth of the sample, sampling equipment, duplicate sample, visual description of the material, and any other observations or notes determined to be appropriate. Additionally, care should be performed to limit contact with PFAS containing materials (e.g. waterproof field books, food packaging) during the sampling process.

Personal Protection Equipment (PPE)

For most sampling Level D PPE is anticipated to be appropriate. The sampler should wear nitrile gloves while conducting field work and handling sample containers.

Field staff shall consider the clothing to be worn during sampling activities. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials should be avoided. All clothing worn by sampling personnel should have been laundered multiple times.

Appropriate rain gear (PVC, polyurethane, or rubber rain gear are acceptable), bug spray, and sunscreen should be used that does not contain PFAS. Well washed cotton coveralls may be used as an alternative to bug spray and/or sunscreen.

PPE that contains PFAS is acceptable when site conditions warrant additional protection for the samplers and no other materials can be used to be protective. Documentation of such use should be provided in the field notes.

Appendix C - Sampling Protocols for PFAS in Monitoring Wells

General

The objective of this protocol is to give general guidelines for the collection of groundwater samples for PFAS analysis. The sampling procedure used should be consistent with Sampling Guidelines and Protocols – Technological Background and Quality Control/Quality Assurance for NYS DEC Spill Response Program – March 1991 (http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf), with the following limitations.

Laboratory Analysis and Container

Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1.

The preferred material for containers is high density polyethylene (HDPE). Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory.

Equipment

Acceptable materials for sampling include: stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. Additional materials may be acceptable if pre-approved by New York State Department of Environmental Conservation's Division of Environmental Remediation.

No sampling equipment components or sample containers should come in contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials including plumbers tape and sample bottle cap liners with a PTFE layer.

A list of acceptable equipment is provided below, but other equipment may be considered appropriate based on sampling conditions.

- stainless steel inertia pump with HDPE tubing
- peristaltic pump equipped with HDPE tubing and silicone tubing
- stainless steel bailer with stainless steel ball
- bladder pump (identified as PFAS-free) with HDPE tubing

Equipment Decontamination

Standard two step decontamination using detergent (Alconox is acceptable) and clean, PFAS-free water will be performed for sampling equipment. All sources of water used for equipment decontamination should be verified in advance to be PFAS-free through laboratory analysis or certification.

Sampling Techniques

Monitoring wells should be purged in accordance with the sampling procedure (standard/volume purge or low flow purge) identified in the site work plan, which will determine the appropriate time to collect the sample. If sampling using standard purge techniques, additional purging may be needed to reduce turbidity levels, so samples contain a limited amount of sediment within the sample containers. Sample containers that contain sediment may cause issues at the laboratory, which may result in elevated reporting limits and other issues during the sample preparation that can compromise data usability. Sampling personnel should don new nitrile gloves prior to sample collection due to the potential to contact PFAS containing items (not related to the sampling equipment) during the purging activities.

Sample Identification and Logging

A label shall be attached to each sample container with a unique identification. Each sample shall be included on the chain of custody (COC).

Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at 4 ± 2º Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- Collect one equipment blank every day that sampling is conducted and minimum 1 equipment blank per 20 samples. The equipment blank shall test the new and decontaminated sampling equipment utilized to obtain a sample for residual PFAS contamination. This sample is obtained by using laboratory provided PFAS-free water and passing the water over or through the sampling device and into laboratory provided sample containers
- Additional equipment blank samples may be collected to assess other equipment that is utilized at the monitoring well
- Request appropriate data deliverable (Category B) and an electronic data deliverable

Documentation

A purge log shall document the location of the sample, sampling equipment, groundwater parameters, duplicate sample, visual description of the material, and any other observations or notes determined to be appropriate. Additionally, care should be performed to limit contact with PFAS containing materials (e.g. waterproof field books, food packaging) during the sampling process.

Personal Protection Equipment (PPE)

For most sampling Level D PPE is anticipated to be appropriate. The sampler should wear nitrile gloves while conducting field work and handling sample containers.

Field staff shall consider the clothing to be worn during sampling activities. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials should be avoided. All clothing worn by sampling personnel should have been laundered multiple times.

Appropriate rain gear (PVC, polyurethane, or rubber rain gear are acceptable), bug spray, and sunscreen should be used that does not contain PFAS. Well washed cotton coveralls may be used as an alternative to bug spray and/or sunscreen.

PPE that contains PFAS is acceptable when site conditions warrant additional protection for the samplers and no other materials can be used to be protective. Documentation of such use should be provided in the field notes.

Appendix D - Sampling Protocols for PFAS in Surface Water

General

The objective of this protocol is to give general guidelines for the collection of surface water samples for PFAS analysis. The sampling procedure used should be consistent with Sampling Guidelines and Protocols – Technological Background and Quality Control/Quality Assurance for NYS DEC Spill Response Program – March 1991 (http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf), with the following limitations.

Laboratory Analysis and Container

Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1.

The preferred material for containers is high density polyethylene (HDPE). Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory.

Equipment

Acceptable materials for sampling include: stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. Additional materials may be acceptable if pre-approved by New York State Department of Environmental Conservation’s Division of Environmental Remediation.

No sampling equipment components or sample containers should come in contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials including sample bottle cap liners with a PTFE layer.

A list of acceptable equipment is provided below, but other equipment may be considered appropriate based on sampling conditions.

- stainless steel cup

Equipment Decontamination

Standard two step decontamination using detergent (Alconox is acceptable) and clean, PFAS-free water will be performed for sampling equipment. All sources of water used for equipment decontamination should be verified in advance to be PFAS-free through laboratory analysis or certification.

Sampling Techniques

Where conditions permit, (e.g. creek or pond) sampling devices (e.g. stainless steel cup) should be rinsed with site medium to be sampled prior to collection of the sample. At this point the sample can be collected and poured into the sample container.

If site conditions permit, samples can be collected directly into the laboratory container.

Sample Identification and Logging

A label shall be attached to each sample container with a unique identification. Each sample shall be included on the chain of custody (COC).

Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at 4 ± 2º Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- Collect one equipment blank every day that sampling is conducted and minimum 1 equipment blank per 20 samples. The equipment blank shall test the new and decontaminated sampling equipment utilized to obtain a sample for residual PFAS contamination. This sample is obtained by using laboratory provided PFAS-free water and passing the water over or through the sampling device and into laboratory provided sample containers
- Request appropriate data deliverable (Category B) and an electronic data deliverable

Documentation

A sample log shall document the location of the sample, sampling equipment, duplicate sample, visual description of the material, and any other observations or notes determined to be appropriate. Additionally, care should be performed to limit contact with PFAS containing materials (e.g. waterproof field books, food packaging) during the sampling process.

Personal Protection Equipment (PPE)

For most sampling Level D PPE is anticipated to be appropriate. The sampler should wear nitrile gloves while conducting field work and handling sample containers.

Field staff shall consider the clothing to be worn during sampling activities. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials should be avoided. All clothing worn by sampling personnel should have been laundered multiple times.

Appropriate rain gear (PVC, polyurethane, or rubber rain gear are acceptable), bug spray, and sunscreen should be used that does not contain PFAS. Well washed cotton coveralls may be used as an alternative to bug spray and/or sunscreen.

PPE that contains PFAS is acceptable when site conditions warrant additional protection for the samplers and no other materials can be used to be protective. Documentation of such use should be provided in the field notes.

Appendix E - Sampling Protocols for PFAS in Private Water Supply Wells

General

The objective of this protocol is to give general guidelines for the collection of water samples from private water supply wells (with a functioning pump) for PFAS analysis. The sampling procedure used should be consistent with Sampling Guidelines and Protocols – Technological Background and Quality Control/Quality Assurance for NYS DEC Spill Response Program – March 1991 (http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf), with the following limitations.

Laboratory Analysis and Container

Drinking water samples collected using this protocol are intended to be analyzed for PFAS by ISO Method 25101. The preferred material for containers is high density polyethylene (HDPE). Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory.

Equipment

Acceptable materials for sampling include: stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. Additional materials may be acceptable if pre-approved by New York State Department of Environmental Conservation's Division of Environmental Remediation.

No sampling equipment components or sample containers should come in contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials (e.g. plumbers tape), including sample bottle cap liners with a PTFE layer.

Equipment Decontamination

Standard two step decontamination using detergent (Alconox is acceptable) and clean, PFAS-free water will be performed for sampling equipment. All sources of water used for equipment decontamination should be verified in advance to be PFAS-free through laboratory analysis or certification.

Sampling Techniques

Locate and assess the pressure tank and determine if any filter units are present within the building. Establish the sample location as close to the well pump as possible, which is typically the spigot at the pressure tank. Ensure sampling equipment is kept clean during sampling as access to the pressure tank spigot, which is likely located close to the ground, may be obstructed and may hinder sample collection.

Prior to sampling, a faucet downstream of the pressure tank (e.g., wash room sink) should be run until the well pump comes on and a decrease in water temperature is noted which indicates that the water is coming from the well. If the homeowner is amenable, staff should run the water longer to purge the well (15+ minutes) to provide a sample representative of the water in the formation rather than standing water in the well and piping system including the pressure tank. At this point a new pair of nitrile gloves should be donned and the sample can be collected from the sample point at the pressure tank.

Sample Identification and Logging

A label shall be attached to each sample container with a unique identification. Each sample shall be included on the chain of custody (COC).

Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at 4 ± 2º Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- If equipment was used, collect one equipment blank every day that sampling is conducted and minimum 1 equipment blank per 20 samples. The equipment blank shall test the new and decontaminated sampling equipment utilized to obtain a sample for residual PFAS contamination. This sample is obtained by using laboratory provided PFAS-free water and passing the water over or through the sampling device and into laboratory provided sample containers
- Request appropriate data deliverable (Category B) and an electronic data deliverable

Documentation

A sample log shall document the location of the private well, sample point location, owner contact information, sampling equipment, purge duration, duplicate sample, visual description of the material, and any other observations or notes determined to be appropriate and available (e.g. well construction, pump type and location, yield, installation date). Additionally, care should be performed to limit contact with PFAS containing materials (e.g. waterproof field books, food packaging) during the sampling process.

Personal Protection Equipment (PPE)

For most sampling Level D PPE is anticipated to be appropriate. The sampler should wear nitrile gloves while conducting field work and handling sample containers.

Field staff shall consider the clothing to be worn during sampling activities. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials should be avoided. All clothing worn by sampling personnel should have been laundered multiple times.

Appendix F - Sampling Protocols for PFAS in Fish

This appendix contains a copy of the latest guidelines developed by the Division of Fish and Wildlife (DFW) entitled "General Fish Handling Procedures for Contaminant Analysis" (Ver. 8).

Procedure Name: General Fish Handling Procedures for Contaminant Analysis

Number: FW-005

Purpose: This procedure describes data collection, fish processing and delivery of fish collected for contaminant monitoring. It contains the chain of custody and collection record forms that should be used for the collections.

Organization: Environmental Monitoring Section
Bureau of Ecosystem Health
Division of Fish and Wildlife (DFW)
New York State Department of Environmental Conservation (NYSDEC)
625 Broadway
Albany, New York 12233-4756

Version: 8

Previous Version Date: 21 March 2018

Summary of Changes to this Version: Updated bureau name to Bureau of Ecosystem Health. Added direction to list the names of all field crew on the collection record. Minor formatting changes on chain of custody and collection records.

Originator or Revised by: Wayne Richter, Jesse Becker

Date: 26 April 2019

Quality Assurance Officer and Approval Date: Jesse Becker, 26 April 2019

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

GENERAL FISH HANDLING PROCEDURES FOR CONTAMINANT ANALYSES

A. Original copies of all continuity of evidence (i.e., Chain of Custody) and collection record forms must accompany delivery of fish to the lab. A copy shall be directed to the Project Leader or as appropriate, Wayne Richter. All necessary forms will be supplied by the Bureau of Ecosystem Health. Because some samples may be used in legal cases, it is critical that each section is filled out completely. Each Chain of Custody form has three main sections:

  1. The top box is to be filled out **and signed** by the person responsible for the fish collection (e.g., crew leader, field biologist, researcher). This person is responsible for delivery of the samples to DEC facilities or personnel (e.g., regional office or biologist).

  2. The second section is to be filled out **and signed** by the person responsible for the collections while being stored at DEC, before delivery to the analytical lab. This may be the same person as in (1), but it is still required that they complete the section. Also important is the **range of identification numbers** (i.e., tag numbers) included in the sample batch.

  3. Finally, the bottom box is to record any transfers between DEC personnel and facilities. Each subsequent transfer should be **identified, signed, and dated**, until laboratory personnel take possession of the fish.

B. The following data are required on each **Fish Collection Record** form:

  1. Project and Site Name.

  2. DEC Region.

  3. All personnel (and affiliation) involved in the collection.

  4. Method of collection (gill net, hook and line, etc.)

  5. Preservation Method.

C. The following data are to be taken on each fish collected and recorded on the **Fish Collection Record** form:

  1. Tag number - Each specimen is to be individually jaw tagged at time of collection with a unique number. Make sure the tag is turned out so that the number can be read without opening the bag. Use tags in sequential order. For small fish or composite samples place the tag inside the bag with the samples. The Bureau of Ecosystem Health can supply the tags.

  2. Species identification (please be explicit enough to enable assigning genus and species). Group fish by species when processing.

  3. Date collected.

  4. Sample location (waterway and nearest prominent identifiable landmark).

  5. Total length (nearest mm or smallest sub-unit on measuring instrument) and weight (nearest g or

smallest sub-unit of weight on weighing instrument). Take all measures as soon as possible with calibrated, protected instruments (e.g. from wind and upsets) and prior to freezing.

6. Sex - fish may be cut enough to allow sexing or other internal investigation, but do not eviscerate. Make any incision on the right side of the belly flap or exactly down the midline so that a left-side fillet can be removed.

D. General data collection recommendations:

1. It is helpful to use an ID or tag number that will be unique. It is best to use metal striped bass or other uniquely numbered metal tags. If uniquely numbered tags are unavailable, values based on the region, water body and year are likely to be unique: for example, R7CAY11001 for Region 7, Cayuga Lake, 2011, fish 1. If the fish are just numbered 1 through 20, we have to give them new numbers for our database, making it more difficult to trace your fish to their analytical results and creating an additional possibility for errors.

2. Process and record fish of the same species sequentially. Recording mistakes are less likely when all fish from a species are processed together. Starting with the bigger fish species helps avoid missing an individual.

3. If using Bureau of Ecosystem Health supplied tags or other numbered tags, use tags in sequence so that fish are recorded with sequential Tag Numbers. This makes data entry and login at the lab and use of the data in the future easier and reduces keypunch errors.

4. Record length and weight as soon as possible after collection and before freezing. Other data are recorded in the field upon collection. An age determination of each fish is optional, but if done, it is recorded in the appropriate “Age” column.

5. For composite samples of small fish, record the number of fish in the composite in the Remarks column. Record the length and weight of each individual in a composite. All fish in a composite sample should be of the same species and members of a composite should be visually matched for size.

6. Please submit photocopies of topographic maps or good quality navigation charts indicating sampling locations. GPS coordinates can be entered in the Location column of the collection record form in addition to or instead for providing a map. These records are of immense help to us (and hopefully you) in providing documented location records which are not dependent on memory and/or the same collection crew. In addition, they may be helpful for contaminant source trackdown and remediation/control efforts of the Department.

7. When recording data on fish measurements, it will help to ensure correct data recording for the data recorder to call back the numbers to the person making the measurements.

E. Each fish is to be placed in its own individual plastic bag. For small fish to be analyzed as a composite, put all of the fish for one composite in the same bag but use a separate bag for each composite. It is important to individually bag the fish to avoid difficulties or cross contamination when processing the fish for chemical analysis. Be sure to include the fish’s tag number inside the bag, preferably attached to the fish with the tag number turned out so it can be read. Tie or otherwise secure the bag closed. **<u>The Bureau of Ecosystem Health will supply the bags.</u>** If necessary, food grade bags may be procured from a suitable vendor (e.g., grocery store). It is preferable to redundantly label each bag with a manila tag tied between the knot and the body of the bag. This tag should be labeled with the project name, collection location, tag number, collection date, and fish species. If scales are collected, the scale envelope should be labeled with the same information.

F. Groups of fish, by species, are to be placed in one large plastic bag per sampling location. **The Bureau of Ecosystem Health will supply the larger bags.** Tie or otherwise secure the bag closed. Label the site bag with a manila tag tied between the knot and the body of the bag. The tag should contain: project, collection location, collection date, species and **tag number ranges**. Having this information on the manila tag enables lab staff to know what is in the bag without opening it.

G. Do not eviscerate, fillet or otherwise dissect the fish unless specifically asked to. If evisceration or dissection is specified, the fish must be cut along the exact midline or on the right side so that the left side fillet can be removed intact at the laboratory. If filleting is specified, the procedure for taking a standard fillet (SOP PREPLAB 4) must be followed, including removing scales.

H. Special procedures for PFAS: Unlike legacy contaminants such as PCBs, which are rarely found in day to day life, PFAS are widely used and frequently encountered. Practices that avoid sample contamination are therefore necessary. While no standard practices have been established for fish, procedures for water quality sampling can provide guidance. The following practices should be used for collections when fish are to be analyzed for PFAS:

No materials containing Teflon.
No Post-it notes.
No ice packs; only water ice or dry ice.
Any gloves worn must be powder free nitrile.
No Gore-Tex or similar materials (Gore-Tex is a PFC with PFOA used in its manufacture).
No stain repellent or waterproof treated clothing; these are likely to contain PFCs.
Avoid plastic materials, other than HDPE, including clipboards and waterproof notebooks.
Wash hands after handling any food containers or packages as these may contain PFCs. Keep pre-wrapped food containers and wrappers isolated from fish handling.
Wear clothing washed at least six times since purchase.
Wear clothing washed without fabric softener.
Staff should avoid cosmetics, moisturizers, hand creams and similar products on the day of sampling as many of these products contain PFCs (Fujii et al. 2013). Sunscreen or insect repellent should not contain ingredients with “fluor” in their name. Apply any sunscreen or insect repellent well downwind from all materials. Hands must be washed after touching any of these products.

I. All fish must be kept at a temperature <45° F (<8° C) immediately following data processing. As soon as possible, freeze at -20° C ± 5° C. Due to occasional freezer failures, daily freezer temperature logs are required. The freezer should be locked or otherwise secured to maintain chain of custody.

J. In most cases, samples should be delivered to the Analytical Services Unit at the Hale Creek field station. Coordinate delivery with field station staff and send copies of the collection records, continuity of evidence forms and freezer temperature logs to the field station. For samples to be analyzed elsewhere, non-routine collections or other questions, contact Wayne Richter, Bureau of Ecosystem Health, NYSDEC, 625 Broadway, Albany, New York 12233-4756, 518-402-8974, or the project leader about sample transfer. Samples will then be directed to the analytical facility and personnel noted on specific project descriptions.

K. A recommended equipment list is at the end of this document.

page ______ of ______

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF FISH AND WILDLIFE
FISH COLLECTION RECORD

Project and Site Name ____ DEC Region ____________

Collections made by (include all crew) ____

Sampling Method: ☐Electrofishing ☐Gill netting ☐Trap netting ☐Trawling ☐Seining ☐Angling ☐Other ____________________

Preservation Method: ☐Freezing ☐Other ____________________ Notes (SWFDB survey number): ____________________

FOR LAB USE ONLY- LAB ENTRY NO.	COLLECTION OR TAG NO.	SPECIES	DATE TAKEN	LOCATION	AGE	SEX &/OR REPROD. CONDIT	LENGTH ( )	WEIGHT ( )	REMARKS

richter: revised 2011, 5/7/15, 10/4/16, 3/20/17; becker: 3/23/17, 4/26/19

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
CHAIN OF CUSTODY

I, ______________________________, of ____ collected the
(Print Name) (Print Business Address)

following on ____________________, 20____ from ____
(Date) (Water Body)

in the vicinity of ____
(Landmark, Village, Road, etc.)

Town of ____, in __________________________________ County.

Item(s) ____

____

Said sample(s) were in my possession and handled according to standard procedures provided to me prior to collection. The sample(s) were placed in the custody of a representative of the New York State Department of Environmental Conservation on ____________________________________, 20______.

____ ____________________________
Signature Date

I, _________________________________, received the above mentioned sample(s) on the date specified and assigned identification number(s) ____ to the sample(s). I have recorded pertinent data for the sample(s) on the attached collection records. The sample(s) remained in my custody until subsequently transferred, prepared or shipped at times and on dates as attested to below.

____ ___________________
Signature Date

SECOND RECIPIENT (Print Name)	TIME & DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
THIRD RECIPIENT (Print Name)	TIME & DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
FOURTH RECIPIENT (Print Name)	TIME & DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
RECEIVED IN LABORATORY BY (Print Name)	TIME & DATE	REMARKS
SIGNATURE	UNIT	
LOGGED IN BY (Print Name)	TIME & DATE	ACCESSION NUMBERS
SIGNATURE	UNIT	

richter: revised 21 April 2014; becker: 23 March 2017, 26 April, 2019

NOTICE OF WARRANTY

By signature to the chain of custody (reverse), the signatory warrants that the information provided is truthful and accurate to the best of his/her ability. The signatory affirms that he/she is willing to testify to those facts provided and the circumstances surrounding the same. Nothing in this warranty or chain of custody negates responsibility nor liability of the signatories for the truthfulness and accuracy of the statements provided.

HANDLING INSTRUCTIONS

On day of collection, collector(s) name(s), address(es), date, geographic location of capture (attach a copy of topographic map or navigation chart), species, number kept of each species, and description of capture vicinity (proper noun, if possible) along with name of Town and County must be indicated on reverse.

Retain organisms in manila tagged plastic bags to avoid mixing capture locations. Note appropriate information on each bag tag.

Keep samples as cool as possible. Put on ice if fish cannot be frozen within 12 hours. If fish are held more than 24 hours without freezing, they will not be retained or analyzed.

Initial recipient (either DEC or designated agent) of samples from collector(s) is responsible for obtaining and recording information on the collection record forms which will accompany the chain of custody. This person will seal the container using packing tape and writing his signature, the time and the date across the tape onto the container with indelible marker. Any time a seal is broken, for whatever purpose, the incident must be recorded on the Chain of Custody (reason, time, and date) in the purpose of transfer block. Container then is resealed using new tape and rewriting signature, with time and date.

EQUIPMENT LIST

Scale or balance of appropriate capacity for the fish to be collected.

Fish measuring board.

Plastic bags of an appropriate size for the fish to be collected and for site bags.

Individually numbered metal tags for fish.

Manila tags to label bags.

Small envelops, approximately 2” x 3.5”, if fish scales are to be collected.

Knife for removing scales.

Chain of custody and fish collection forms.

Clipboard.

Pens or markers.

Paper towels.

Dish soap and brush.

Bucket.

Cooler.

Ice.

Duct tape.

Appendix G – PFAS Analyte List

Group	Chemical Name	Abbreviation	CAS Number
Perfluoroalkyl sulfonates	Perfluorobutanesulfonic acid	PFBS	375-73-5
	Perfluorohexanesulfonic acid	PFHxS	355-46-4
	Perfluoroheptanesulfonic acid	PFHpS	375-92-8
	Perfluorooctanesulfonic acid	PFOS	1763-23-1
	Perfluorodecanesulfonic acid	PFDS	335-77-3
Perfluoroalkyl carboxylates	Perfluorobutanoic acid	PFBA	375-22-4
	Perfluoropentanoic acid	PFPeA	2706-90-3
	Perfluorohexanoic acid	PFHxA	307-24-4
	Perfluoroheptanoic acid	PFHpA	375-85-9
	Perfluorooctanoic acid	PFOA	335-67-1
	Perfluorononanoic acid	PFNA	375-95-1
	Perfluorodecanoic acid	PFDA	335-76-2
	Perfluoroundecanoic acid	PFUA/PFUdA	2058-94-8
	Perfluorododecanoic acid	PFDoA	307-55-1
	Perfluorotridecanoic acid	PFTriA/PFTrDA	72629-94-8
	Perfluorotetradecanoic acid	PFTA/PFTeDA	376-06-7
Fluorinated Telomer Sulfonates	6:2 Fluorotelomer sulfonate	6:2 FTS	27619-97-2
	8:2 Fluorotelomer sulfonate	8:2 FTS	39108-34-4
Perfluorooctane-sulfonamides	Perfluroroctanesulfonamide	FOSA	754-91-6
Perfluorooctane-sulfonamidoacetic acids	N-methyl perfluorooctanesulfonamidoacetic acid	N-MeFOSAA	2355-31-9
	N-ethyl perfluorooctanesulfonamidoacetic acid	N-EtFOSAA	2991-50-6

Appendix H - Laboratory Guidelines for Analysis of PFAS in Non-Potable Water and Solids

General

New York State Department of Environmental Conservation's Division of Environmental Remediation (DER) developed the following guidelines for laboratories analyzing environmental samples for PFAS under DER programs. If laboratories cannot adhere to the following guidelines, they should contact DER's Quality Assurance Officer, Dana Maikels, at dana.maikels@dec.ny.gov prior to analysis of samples.

Isotope Dilution

Isotope dilution techniques should be utilized for the analysis of PFAS in all media.

Extraction

For water samples, the entire sample bottle should be extracted, and the sample bottle rinsed with appropriate solvent to remove any residual PFAS.

For samples with high particulates, the samples should be handled in one of the following ways:

1. Spike the entire sample bottle with isotope dilution analytes (IDAs) prior to any sample manipulation. The sample can be passed through the SPE and if it clogs, record the volume that passed through.
2. If the sample contains too much sediment to attempt passing it through the SPE cartridge, the sample should be spiked with isotope dilution analytes, centrifuged and decanted.
3. If higher reporting limits are acceptable for the project, the sample can be diluted by taking a representative aliquot of the sample. If isotope dilution analytes will be diluted out of the sample, they can be added after the dilution. The sample should be homogenized prior to taking an aliquot.

If alternate sample extraction procedures are used, please contact the DER remedial program chemist prior to employing. Any deviations in sample preparation procedures should be clearly noted in the case narrative.

Signal to Noise Ratio

For all target analyte ions used for quantification, signal to noise ratio should be 3:1 or greater.

Blanks

There should be no detections in the method blanks above the reporting limits.

Ion Transitions

The ion transitions listed below should be used for the following PFAS:

PFOA	413 > 369
PFOS	499 > 80
PFHxS	399 > 80
PFBS	299 > 80
6:2 FTS	427 > 407
8:2 FTS	527 > 507
N-EtFOSAA	584 > 419
N-MeFOSAA	570 > 419

Branched and Linear Isomers

Standards containing both branched and linear isomers should be used when standards are commercially available. Currently, quantitative standards are available for PFHxS, PFOS, NMeFOSAA, and NEtFOSAA. As more standards become available, they should be incorporated in to the method. All isomer peaks present in the standard should be integrated and the areas summed. Samples should be integrated in the same manner as the standards.

Since a quantitative standard does not exist for branched isomers of PFOA, the instrument should be calibrated using just the linear isomer and a technical (qualitative) PFOA standard should be used to identify the retention time of the branched PFOA isomers in the sample. The total response of PFOA branched and linear isomers should be integrated in the samples and quantitated using the calibration curve of the linear standard.

Secondary Ion Transition Monitoring

Quantifier and qualifier ions should be monitored for all target analytes (PFBA and PFPeA are exceptions). The ratio of quantifier ion response to qualifier ion response should be calculated for each target analyte and the ratio compared to standards. Lab derived criteria should be used to determine if the ratios are acceptable.

Reporting

Detections below the reporting limit should be reported and qualified with a J qualifier.

The acid form of PFAS analytes should be reported. If the salt form of the PFAS was used as a stock standard, the measured mass should be corrected to report the acid form of the analyte.

Appendix H - Data Review Guidelines for Analysis of PFAS in Non-Potable Water and Solids

General

These guidelines are intended to be used for the validation of PFAS analytical results for projects within the Division of Environmental Remediation (DER) as well as aid in the preparation of a data usability summary report. Data reviewers should understand the methodology and techniques utilized in the analysis. Consultation with the end user of the data may be necessary to assist in determining data usability based on the data quality objectives in the Quality Assurance Project Plan. A familiarity with the laboratory's Standard Operating Procedure may also be needed to fully evaluate the data. If you have any questions, please contact DER's Quality Assurance Officer, Dana Maikels, at dana.maikels@dec.ny.gov.

Preservation and Holding Time

Samples should be preserved with ice to a temperature of less than 6°C upon arrival at the lab. The holding time is 14 days to extraction for aqueous and solid samples. The time from extraction to analysis for aqueous samples is 28 days and 40 days for solids.

Temperature greatly exceeds 6ºC upon arrival at the lab*	Use professional judgement to qualify detects and non-detects as estimated or rejected
Holding time exceeding 28 days to extraction	Use professional judgement to qualify detects and non-detects as estimated or rejected if holding time is grossly exceeded

*Samples that are delivered to the lab immediately after sampling may not meet the thermal preservation guidelines. Samples are considered acceptable if they arrive on ice or an attempt to chill the samples is observed.

Initial Calibration

The initial calibration should contain a minimum of five standards for linear fit and six standards for a quadratic fit. The relative standard deviation (RSD) for a quadratic fit calibration should be less than 20%. Linear fit calibration curves should have an R^2 value greater than 0.990.

The low-level calibration standard should be within 50% - 150% of the true value, and the mid-level calibration standard within 70% - 130% of the true value.

%RSD >20%	J flag detects and UJ non detects
R^2 >0.990	J flag detects and UJ non detects
Low-level calibration check <50% or >150%	J flag detects and UJ non detects
Mid-level calibration check <70% or >130%	J flag detects and UJ non detects

Initial Calibration Verification

An initial calibration verification (ICV) standard should be from a second source (if available). The ICV should be at the same concentration as the mid-level standard of the calibration curve.

ICV recovery <70% or >130%	J flag detects and non-detects

Continuing Calibration Verification

Continuing calibration verification (CCV) checks should be analyzed at a frequency of one per ten field samples. If CCV recovery is very low, where detection of the analyte could be in question, ensure a low level CCV was analyzed and use to determine data quality.

CCV recovery <70 or >130%	J flag results

Blanks

There should be no detections in the method blanks above the reporting limits. Equipment blanks, field blanks, rinse blanks etc. should be evaluated in the same manner as method blanks. Use the most contaminated blank to evaluate the sample results.

Blank Result	Sample Result	Qualification
Any detection	<Reporting limit	Qualify as ND at reporting limit
Any detection	>Reporting Limit and >10x the blank result	No qualification
>Reporting limit	>Reporting limit and <10x blank result	J+ biased high

Field Duplicates

A blind field duplicate should be collected at rate of one per twenty samples. The relative percent difference (RPD) should be less than 30% for analyte concentrations greater than two times the reporting limit. Use the higher result for final reporting.

RPD >30%	Apply J qualifier to parent sample

Lab Control Spike

Lab control spikes should be analyzed with each extraction batch or one for every twenty samples. In the absence of lab derived criteria, use 70% - 130% recovery criteria to evaluate the data.

Recovery <70% or >130% (lab derived criteria can also be used)	Apply J qualifier to detects and UJ qualifier to non detects

Matrix Spike/Matrix Spike Duplicate

One matrix spike and matrix spike duplicate should be collected at a rate of one per twenty samples. Use professional judgement to reject results based on out of control MS/MSD recoveries.

Recovery <70% or >130% (lab derived criteria can also be used)	Apply J qualifier to detects and UJ qualifier to non detects of parent sample only
RPD >30%	Apply J qualifier to detects and UJ qualifier to non detects of parent sample only

Extracted Internal Standards (Isotope Dilution Analytes)

Problematic analytes (e.g. PFBA, PFPeA, fluorotelomer sulfonates) can have wider recoveries without qualification. Qualify corresponding native compounds with a J flag if outside of the range.

Recovery <50% or >150%	Apply J qualifier
Recovery <25% or >150% for poor responding analytes	Apply J qualifier
Isotope Dilution Analyte (IDA) Recovery <10%	Reject results

Secondary Ion Transition Monitoring

Quantifier and qualifier ions should be monitored for all target analytes (PFBA and PFPeA are exceptions). The ratio of quantifier ion response to qualifier ion response should be calculated from the standards for each target analyte. Lab derived criteria should be used to determine if the ratios are acceptable. If the ratios fall outside of the laboratory criteria, qualify results as an estimated maximum concentration.

Signal to Noise Ratio

The signal to noise ratio for the quantifier ion should be at least 3:1. If the ratio is less than 3:1, the peak is discernable from the baseline noise and symmetrical, the result can be reported. If the peak appears to be baseline noise and/or the shape is irregular, qualify the result as tentatively identified.

Branched and Linear Isomers

Observed branched isomers in the sample that do not have a qualitative or quantitative standard should be noted and the analyte should be qualified as biased low in the final data review summary report. Note: The branched isomer peak should also be present in the secondary ion transition.

Reporting Limits

If project-specific reporting limits were not met, please indicate that in the report along with the reason (e.g. over dilution, dilution for non-target analytes, high sediment in aqueous samples).

Peak Integrations

Target analyte peaks should be integrated properly and consistently when compared to standards. Ensure branched isomer peaks are included for PFAS where standards are available. Inconsistencies should be brought to the attention of the laboratory or identified in the data review summary report.