REMEDIAL INVESTIGATION WORK PLAN

FORMER GLASS PLANT - SUNTRU STREET SITE
NYSDEC SITE NO. C828225

Prepared For:

BAUSCH + LOMB

HELPING PEOPLE SEE BETTER TO LIVE BETTER

170 YEARS

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DECEMBER 2024

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LIST OF ACRONYMS

ACRONYM	Definition
Ac-228	Actinium-228
AOC	area of concern
ASTM	American Society for Testing and Materials International
bgs	below ground surface
B+L	Bausch + Lomb Corporation
BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
BMP	Best Management Practices
BNA	Base/Neutral Acid
BTEX	benzene, toluene, ethylbenzene, xylene
CAMP	Community Air Monitoring Plan
CFR	Code of Federal Regulations
cfs	cubic feet per second
cm^2	square centimeters
COC	Contaminant of concern
COPC	Contaminants of potential concern
CVOC	chlorinated volatile organic compounds
CSM	Conceptual Site Model
DOT	U.S. Department of Transportation
dpm	disintegrations per minute
EC	electroconductivity survey
EM	electromagnetic induction
ESA	Environmental Site Assessment
GPR	ground-penetrating radar
HFM	historical fill material
ID	inner diameter
IDW	investigation derived waste
MDL	method detection limit
MGP	manufactured gas plant
MNA	monitored natural recovery
μR/hr	microroentgens per hour
mrem/yr	millirem per year
NaI	Sodium Iodide
NAPL	non-aqueous phase liquid
NES	NES, Inc.
NRC	U.S. Nuclear Regulatory Commission
NYCRR	New York Codes, Rules and Regulations
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PAH	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyls
PDI	pre-design investigation
PFOA	perfluorooctanoic acid
PFOS	Perfluorooctane sulfonic acid
OD	outer diameter
OSHA	Occupational Health and Safety Administration
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyls
pCi/gm	picocuries per gram
PID	photoionization detector
PSHEP	Project Safety, Health, & Environment Plan
QAPP	Quality Assurance Project Plan
Ra-226	Radium-226
REC	recognized environmental conditions
RF	radio frequency
RG&E	Rochester Gas and Electric Corporation
RI	Remedial Investigation
RIWP	Remedial Investigation Work Plan
ROD	Record of Decision
PID	photoionization detector
SCO	soil cleanup objective
SCR	Site Characterization Report
Site	Former Glass Plant – Suntru Street Site
SMP	Site Management Plan
SOP	standard operating procedure
SPT	standard penetration testing
SVOC	semivolatile organic compound
TAL	target analyte list
TCL	target compound list
TCLP	Toxicity Characteristic Leaching Procedure
Th-232	Thorium 232
U-238	Uranium-238
USCS	Unified Soil Classification System
USEPA	U.S. Environmental Protection Agency
VOC	volatile organic compound

CERTIFICATION STATEMENT

I, Nathan Kranes, certify that I am currently a New York State-registered Professional Geologist and that this RI-Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with DER Technical Guidance for Site Investigation and Remediation (DER-10, May 2010) and DER Green Remediation (DER-31, August 2010).

December 30, 2024

Date

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1.0 INTRODUCTION

This Remedial Investigation Work Plan (RIWP) was prepared on behalf of Bausch and Lomb (B+L) (the Applicant) for the Former Glass Plant Site (the Site), NYSDEC Site No. C828225 located at 10 Bausch Street in the City of Rochester, Monroe County, New York. The Applicant will implement the RIWP after the Site is enrolled in the New York State Brownfield Cleanup Program (BCP), pursuant to the forthcoming Brownfield Cleanup Agreement (BCA) with the New York State Department of Environmental Conservation (NYSDEC).

The objective of the Remedial Investigation (RI) is to characterize the nature and extent of environmental impacts at the Site and to provide sufficient information to evaluate remedial alternatives, as required. This RIWP was developed in accordance with the process and requirements identified in the NYSDEC Division of Environmental Remediation (DER)-10 Technical Guidance for Site Investigation and Remediation (May 2010), DER-31 Green Remediation (August 2010), and Per- and Polyfluoroalkyl Substances (PFAS) Guidance Values obtained from NYSDEC Sampling, Analysis, and Assessment of PFAS (April 2023).

2.0 SITE BACKGROUND

2.1 Site Location and Description

The property at 10 Bausch Street (Site) (**Figure 1**) is the location of a former glass manufacturing facility situated in an industrial/commercial area of Rochester, Monroe County, New York. The property (Tax Parcel No. 106.45-1-32) is currently owned by Bausch and Lomb Corporation (B+L) and is approximately 7.8 acres in size. The property is bordered to the west by the Genesee River and a New York state-owned parcel (Tax Parcel No. 106.53-1-9), to the north by a railroad bridge, to the east by the Genesee River gorge wall, and to the south by Suntru Street and the former Rochester Gas and Electric (RG&E) East Station manufactured gas plant (MGP; Tax Parcel No. 106.53-1-10; New York State Department of Environmental Conservation [NYSDEC] Site No. 828204) (**Figure 2**). The property is zoned "M-1 Industrial", and the Site is currently vacant. Site surface features include the former glass manufacturing facility building footprint and slab, unpaved areas, and partially wooded areas.

2.2 Site History

According to the Phase I Environmental Site Assessment (ESA) prepared by Leader Professional Services, Inc. (May 2002), initial development of the Site likely started around 1850 with the development of the property for the use of two raceways and possibly ferry slips. Multiple fill periods took place on the property by the previous landowners, including the infilling of the raceways, prior to purchase of the property by B+L. According to the Phase I ESA, the two raceways were present at the Site from at least 1851 to 1869, and then were filled in sometime between 1869 and 1875. Another single raceway was present on the east portion of the Site between 1880 and 1890. The second raceway on the Site was filled by 1900, and the Site property appeared to remain undeveloped, with the RG&E Gas Plant in operation on the adjoining property to the south. The Phase I ESA also suggested that additional general fill periods occurred at the Site prior to 1850 and again prior 1910 to create the elevated river flat area for general development. The first glass manufacturing facility was constructed by B+L in 1910 and was later reconstructed and expanded after a 1914 fire. The glass manufacturing facility was operated until the mid-1980s for the manufacture of glass lenses for military and commercial uses. The manufacturing process used thorium and radioactive potassium as well as non-radioactive metals.

Following cessation of operations, the facility was decommissioned in December 1994. An Asbestos/Metals Survey (Paradigm 1993) was prepared to evaluate the decontamination activities and disposal requirements of the building prior to the demolition of the glass plant. The former Glass Plant building interior was cleaned and decontaminated prior to demolition in 1995. Hazardous waste profiles were prepared for the following materials prior to removal and disposal from 1993 to 1994: chromium oxide, lead oxide, baghouse dust (includes iron oxide, arsenic, barium, lead), cerium hydrate, floor sweepings and debris, pit clean-out materials, sodium carbonate, wash water, and used wash water filters.

According to the Phase I ESA, a radiological investigation and limited removal activities were conducted in association with the plant decommissioning. Integrated Environmental Services, a division of NES Inc. (NES), conducted the Decontamination and Final Release Survey of the Bausch & Lomb Glass Plant Batch Room in December 1994. The waste removed consisted of thorium contaminated concrete, sheet metal, miscellaneous debris and radioactive potassium (NES 1995).

Following decontamination activities, the building was demolished and building materials were removed from the Site for disposal. A Radiological Assessment of the surface soils at the property was conducted in 1995 and is documented in the Final Project Report for the Decontamination and Release of the Bausch & Lomb Batch Room Report (NES 1995).

2.3 Surrounding Property Land Use

The Site is vacant and is presently zoned M-1 for industrial use. Industrial and commercial properties primarily line the east side of the Site along Saint Paul Street. The surrounding area has mixed zoning with R-1 Low Density Residential zoning to the north and east and CCD-R Center City Riverfront zoning to the south.

2.4 Proposed Development Plan

The Site is currently vacant and zoned for Industrial Use. There is interest in this property from NYS Empire State Development to use the B+L parcel for a park with a rezoned use of Restricted Residential. This parcel would support the development of the City of Rochester's "ROC the Riverway" project, in conjunction with NYS Parks, which would require B+L to sell the property to the City of Rochester or NYS.

2.5 Geology and Hydrogeology

2.5.1 Regional Geology and Hydrogeology

The Site is located within the Interior Lowlands Physiographic Province which is characterized by generally flat to gently dipping sedimentary rocks overlain by glacial and post-glacial sedimentary deposits (Van Diver 1985). This Physiographic Province encompasses all of northwestern New York in the vicinity of Lake Ontario. The Lowlands Province is bounded by the Appalachian Plateau Province to the south, the Adirondack Highlands Province to the east, and the Canadian Shield to the north. Sedimentary rocks observed within the Lowlands Province of northwestern New York are part of the Niagaran Provincial Series which includes the Medina, Clinton, and Lockport Groups. This Series consists of approximately 400 feet of fossiliferous dolomite, limestone, shale, and sandstone deposited in shallow epeiric seas during the Silurian (439-408 Ma.) (Brett et al. 1995). In the Rochester vicinity, sedimentary rocks of the Lockport Group through the Clinton Group are observed and are present in a homoclinal structure known as the Niagara Escarpment with a generally east-northeast strike and south-southwest dip of approximately 55 feet per mile (Kappel and Young 1988).

2.5.2 Site Geology and Hydrogeology

The overburden at the Site is composed of fill overlying unconsolidated alluvial deposits, which overlies bedrock. Fill at the Site is a complex mixture of demolition debris, imported excavation materials, coal cinder and ash, and reworked fill/alluvial deposits. The unconsolidated alluvial deposits consist of sands, silts, and clays and are reportedly difficult to distinguish from reworked fill.

Bedrock depths are reportedly between eight to 47 feet below grade at the Site. In general, the bedrock surface slopes from the exposed cliff surface to the river. Approximately one to three feet of weathered bedrock is present below the fill and alluvial deposits and consists of the Rochester Shale and Irondequoit Limestone formations, which are in turn underlain by several other bedrock formations.

Overburden groundwater is typically encountered six to 20 feet below ground surface (bgs) and flows westerly toward the Genesee River. The Genesee River, a Class B waterway, flows north adjacent to the Site, eventually discharging to Lake Ontario.

2.5.3 Surface Waters and Wetlands

The Site is located along the east bank of the Genesee River between the Upper and Lower Falls. The Genesee River flows to the north and discharges to Lake Ontario approximately 5.8 miles from the Site. The mean discharge of the Genesee River Station #04231600, located approximately two miles upstream of the Site, is 6,670 cubic feet per second (cfs).

While the Genesee River is located directly adjacent to the Site to the west, neither the land bordering the River nor any other portions on the Site contain federal or NYS mapped wetlands. Mapped surface waters/wetlands on/near the Site are presented on **Figure 3**.

2.6 Summary of Previous Environmental Investigation

Previous environmental investigations were conducted at the Site to determine the potential impact from historical operations and to evaluate the nature and extent of contamination. As discussed above, these investigations include a Phase I ESA (Leader Professional Services 2002) and a Phase II Site Characterization (S2C2 Inc. 2011). As noted above in the **Section 2.2 Site History**, additional investigations and reports were also completed at the Site prior to the cessation of operations and the facility decommissioning in December 1994. An Asbestos/Metals Survey (Paradigm 1993) and the Final Project Report for the Decontamination and Release of the Bausch & Lomb Batch Room (NES 1995) provide documentation of decommissioning. Descriptions for each investigation are presented in the sections below.

Additionally, RG&E has completed several field investigations and collected numerous soil and groundwater samples to delineate MGP impacts on the B+L Site from historical MGP operations at the adjacent former RG&E East Station MGP site (NYSDEC Site No. 828204). A summary of the data, combined with data collected by B+L during the Phase II Site Characterization is presented in comparison to Restricted Residential and Industrial Use Soil Cleanup Objectives (SCOs) as presented in 6 New York Codes, Rules and Regulations (NYCRR) Part 375 Environmental Remediation Programs guidance (NYSDEC 2006). A set of figures showing analytical data results exceeding Restricted Residential and Industrial Use SCOs can be found for reference in **Appendix A**.

2.6.1 Asbestos/Metals Survey October 18-20, 1993

Paradigm Environmental Services, Inc. conducted an asbestos and metals inspection at the Bausch & Lomb Glass Plant, Rochester, NY from October 18 - 20, 1993 to identify and test potential materials suspected to contain asbestos and identify and test areas of the plant for potential process-related metal contamination. The inspection identified 24 approximate locations for potential asbestos containing materials within the plant. Four locations were selected for collection of random wipe samples to analyze for process-related metals including arsenic, barium, cadmium, chromium, lead, nickel, and selenium. All samples were transported to the Paradigm laboratory for analysis.

The Asbestos/Metals Survey report results indicated that asbestos containing material was present in several locations. In summary, eight samples were found to be asbestos containing. The asbestos containing materials are presented in the report; these materials generally included pipe insulation, multiple transite panels, and some mudded joint packing material. The report also detailed the approximate quantities of the asbestos containing materials. The random wipe samples collected from four locations all exceeded the Method Detection Limit (MDL) except for one wipe sample which did not exceed the MDL for selenium.

2.6.2 Radiological Investigation and Limited Removal Activities, 1994 - 1995

A Radiological Assessment of the facility at the Site was conducted in 1995 and is documented in the Final Project Report for the Decontamination and Release of the Bausch & Lomb Batch Room Report (NES, 1995). The documents and reports detailing the radiological investigation and limited removal activities were conducted in association with the plant decommissioning in the early 1994 and 1995 The Phase I ESA includes the following summary:

Integrated Environmental Services, a division of NES Inc. ("NES"), conducted the Decontamination and Final Release Survey of the Bausch & Lomb Glass Plant Batch Room in December 1994. Four unaffected areas were also surveyed for unrestricted release of radioactive waste. A final release survey was performed in the Batch Room at the close of decontamination activities to verify that decontamination efforts were successful. The following items were noted:

- All building surface decontamination efforts were successful, according to the final release survey. Surface contamination release level results complied with applicable guidelines of the New York Department of Labor Industrial Code and United States Nuclear Regulatory Commission.
- No personnel exposure to ionizing radiation in excess of 10% of New York State standards was noted.
- Radioactive waste was packaged for disposal at Envirocare of Utah, Inc., pending sample analysis. The waste consisted of thorium contaminated concrete, sheet metal, miscellaneous debris and radioactive potassium (NES 1995).

2.6.3 Phase I ESA Report (May 2002)

Leader Professional Services, Inc. conducted a Phase I ESA Report in May 2002. The objective of the Phase I ESA was to evaluate the current and historical operations at the Site as well as the surrounding properties and to identify and quantify areas and substances on or near the property (i.e., recognized environmental conditions (RECs) as defined in the ASTM Standard), which may pose an environmental liability or hazard associated with the Site.

The Phase I ESA consisted of historical and regulatory records review, a Site reconnaissance, and interviews with current owners and/or occupants of the Site. State and Federal regulatory agency database file records were reviewed to identify reported spills, hazardous activities, and adjacent properties of concern. The Site reconnaissance consisted of a walkthrough of the Site and surrounding properties.

In **Section 9.2 Findings** the report concluded that there were no on-Site RECs directly observed on the property. However, the report concluded "Possible areas of concern on-Site including former piping systems and wastewater discharge points along the riverbank; septic tank system; former dust collector and sand blast house at southwest side of building; a laboratory at the southwest corner of the plant; and stormwater trenches."

The report also concluded that there were historical on-Site RECs related to use and practices on the property prior to the B+L Glass Plant operations in addition to the off-site RECs that warrant further investigation.

A summary of the RECs from the report include:

- Three raceways with ferry slips were present at the site and were filled on at least two separate instances prior to 1900. Since coal gasification activities occurred at the site, coal-related wastes may have been used to fill the raceways and could be an environmental concern to the property.

- While noting that the former Glass Plant was decontaminated prior to the 1995 demolition and the Final Project Report for the Decontamination and Release of the Bausch & Lomb Batch Room (NES, 1995) included documentation of proper disposal of hazardous waste materials including chromium oxide, lead oxide, baghouse dust (includes iron oxide, arsenic, barium, lead), cerium hydrate, floor sweepings and debris, pit clean-out materials, sodium carbonate, wash water, and used wash water filters. The report noted that no subsurface investigation or sampling activities were conducted. The report noted possible areas of concern on-Site include former piping systems and wastewater discharge points along the riverbank; septic tank system; former dust collector and sand blast house at southwest side of building; a laboratory at the southwest corner of the plant; and stormwater trenches.
- Two facilities on the adjoining property south present historic environmental concerns. The former C.D. Brown and Company Tannery is shown on the 1911 and 1926 Sanborn Fire Insurance Maps. A coal carbonization manufactured gas plant (MGP) facility was first constructed at the RG&E East Station property in 1872. Citizens Gas Works is depicted on the adjoining property south on an 1875 plat map. Several large coal gasification ASTs, tar and oil ASTs, and associated structures are depicted on the RG&E property from 1892 to 1971, according to fire insurance maps reviewed.

2.6.4 Report of Suntru Street Radiological Survey Performed for Bausch and Lomb December 11 and 12, 2006

Following the radiological investigation, decommissioning, demolition, and close-out of the facilities between 1994 and 1995, a site-wide radiological survey was conducted in 2006 to evaluate the remaining facility slabs, subsurface structures and surrounding property for residual radiological activity. Three distinct areas were identified for the survey based on the physical features and accessibility for each: the Upper lot (i.e., Upper Terrace), Lower lot (i.e., Former Building Area), and River lot (i.e., Lower River Terrace). The results summarized in the report are presented as follows:

<u>Upper lot</u>

All locations surveyed in the upper lot had similar readings for both surveys. These are considered to be representative of background radiation levels and background count rates for this site. Radiation levels varied from 8 to 9 microroentgens per hour (μR/hr) with an average of 8.2 and a standard deviation of 0.43 μR/hr. Integrated counts varied from 403 to 498 counts with an average of 451 and a standard deviation of 24.8 counts in a 30 second period. There were no identified hot spots in the upper lot.

<u>Lower lot</u>

Virtually all locations on the lower lot were surveyed and found to have similar radiation levels and integrated counts. Two locations, two of the three tanks noted as areas of interest, had higher radiation levels and integrated counts; these will be discussed in detail below. Radiation levels varied from 6 to 11 μR/hr with an average reading of 7.6 and a standard deviation of 0.98 μR/hr. Integrated counts varied from 300 to 581 with an average of 387 and a standard deviation of 48 counts. These readings include the two Areas of Interest on this lot.

- Former loading dock - Radiation dose rates and integrated counts were obtained via continuous surveying at the former loading dock. Radiation dose rates varied from 7 - 8 μR/hr and integrated counts varied from 358 to 436 counts in a 30-second counting period. These readings are consistent with other readings on the Upper and Lower lots, and it appears as though the Former loading dock area is not contaminated.
- Lower lot settling tanks (i.e., Thorium Slurry Pits) - Radiation dose rates and integrated counts were obtained by surveying just above the tank manhole on all three tanks (above the opening of the middle tank and above the closed manhole covers on the other two tanks). Further readings were obtained inside of all tanks. A large drainpipe was noted in the interior of Tank I that appears to drain the tank to a storm drain beneath the

access road that runs along the eastern side of the building foundation. Interior readings in all of these tanks (including the storm drain) were obtained by lowering the radiation detectors into the tank from above; the tanks were not entered because neither confined space entry equipment nor appropriate personal protective equipment (PPE) were available.

Two subsequent samples were collected from the lower lot settling tanks and submitted for gamma spectroscopy. These samples confirmed the survey findings and the report recommended completing remedial actions of the tanks. A discussion of the remediation completed at the former thorium slurry pits are provided in the following Section 2.6.5.

<u>Riverside lot</u>

Almost all locations on the riverside lot were found to have similar radiation levels, with the exception of the single hot spot near the two pipes that constitute an area of interest - identified on a map as outfalls 2 and 5. Radiation levels varied from 7 to 9 µR/hr with an average of 8.25 and a standard deviation of 0.621 µR/hr. Integrated counts varied from 350 to 482 with an average of 420 and a standard deviation of 38 counts. The sole hot spot, near outfalls 2 and 5, is described below:

- Radiation dose rates and 30-second integrated counts were obtained via continuous surveying at the riverside lot area of interest. Radiation dose rates varied from 8-9 µR/hr and integrated counts varied from 436 to 554 counts in a 30-second period. Both sets of readings were noticeably elevated compared to other locations on the lower and riverside lots.
- Four subsequent samples were collected from the Outfall Area (Outfalls 2 and 5). and submitted for gamma spectroscopy. Three of these samples reported levels of radiological isotopes Uranium-238 (U-238), Radium-226 (Ra-226), and Thorium-232 (Th-232) similar to background radioactivity found in the native soils. One sample, collected from soil near Outfall 2, contained elevated levels of thorium. However, the report notes that the concentrations, while elevated above background levels, were blow the cleanup threshold which was identified as 2.8 picocuries per gram (pCi/gm) above background. As a result of this elevated reading, additional fieldwork, including a soil boring and sediment sampling will be collected and screened for radiation in the outfall area near Outfall 2 as described in Section 3.2.12 AOC-L: Lower River Terrace – Discharge Pipes.

2.6.5 Final Report for the Closure of the Legacy Thorium Slurry Pits at the Bausch & Lomb Glass Plant Report August 18, 2008

Additional radiological surveying and remedial activities were conducted at the Site between 2007 and 2008 to evaluate the extent of possible thorium contamination remaining above naturally occurring levels in the excavated areas of the former thorium slurry pits. The site work was performed in accordance with the NYSDEC approved work plan dated April 9, 2008. Subsurface soils were excavated from a legacy thorium slurry operation to measure and test the soils for the presence of residual Th-232. The results of the survey showed that the excavated soils and the samples were indistinguishable from area background concentrations. The report concluded that the excavated soils pose no health risk to workers or to the public and were returned to the excavation, with NYSDEC approval, as part of the final step of this remedial effort. The report was reviewed and found to be acceptable by NYSDEC (email September 10, 2008).

2.6.6 Phase II Environmental Site Characterization Report (August 2011)

S_2C_2 Inc. (S2C2) conducted a field investigation and prepared a Phase II Site Characterization Report (SCR) for the Site between 2009 and 2011. The initial Technical Approach was based on the Technical Approach – Phase

II Site Investigation memorandum dated October 2009. This technical approach identified four primary Areas of Environmental Concern (AOCs) based on the RECs in the Phase I which include the following:

- Historic Fill associated with the initial development of the Genesee River flats area prior to construction of the Glass Plant in 1910.
- Former Raceways – filled prior to construction of the Glass Plant
- Operation areas associated with the Former Glass Plant
- Former Sand Blast Room/Dust Collectors
- Former Laboratory
- Former Septic Tank
- Former Discharge Pipes to Genesee River
- Off-site sources including the coal gas production that occurred at the adjacent RG&E property.

During the Phase II field investigation, the technical approach was modified based on new information collected in the field and the knowledge that RG&E was planning to investigate MGP impacts on the southern portion of the Former Glass Plant Site. Additional borings were added to investigate process areas of the former Glass Plant and to investigate the Lower Terrace and pipe discharge areas. The technical approach to investigate the area with MPG impacts was scaled back (removal of 4 borings), due to the anticipated RG&E work in these locations.

Following the completion of the Phase II field investigation, the AOCs were refined based on historical photos and a newly identified, detailed floor of the Former Glass Plan which included piping diagrams and room layouts. These AOCs were identified as follows:

- AOC-A: Former Raceways
- AOC-B: Bio-Cell
- AOC-C: Compressor Rooms
- AOC-D: Batch Room
- AOC-E: Homo Furnace
- AOC-F: Lehr/Tank Furnace
- AOC-G: Transformers/Electrical Platforms and Rooms
- AOC-H: Historic Fill
- AOC-I: Septic Tank
- AOC-J: Pit Area
- AOC-K: Upper Terrace
- AOC-L: Lower River Terrace – Discharge Pipes
- AOC-M: Offsite Coal Gasification Plant
- AOC-N: Former Buildings
- AOC-O: Prangborn Dust Collector
- AOC-P: Underground Piping

A description of each AOC is presented in **Section 3.2** with a summary of the findings and conclusions and recommendations for each AOC.

2.6.7 RG&E Remedial Investigation Off-Site

There were various off-site investigations as found in the Remedial Investigation Report RG&E East Station Former MGP Site that involve the Bausch & Lomb Property. The off-site overburden investigation involves 3 investigations that include off-site test pit excavations, off-site TarGOST, and off-site soil borings and monitoring wells. The RG&E Remedial Investigation also included sediment sampling within the Genesee River adjacent to the Former Glass Plant Site. The data collected from these investigations have been included in **Appendix A**, the findings, and conclusions regarding the MGP impacts are also discussed in the text and references to the work completed can be found in the RG&E Record of Decision (ROD) in **Appendix B**

2.6.8 RG&E Pre-Design Investigation and RG&E Remedial Actions

As discussed above, due to the presence of MGP-related impacts at the Former Glass Plant Site and the New York state-owned property, both properties will be included in the RG&E pre-design investigation (PDI), remedial design, and remedial action along with the RG&E East Station MGP property and adjacent river sediments. A series of investigations have been conducted to determine the nature and extent of contamination at the RG&E Site. Contaminants of concern identified in soil, sediment, and groundwater include volatile organic compounds (VOCs), specifically benzene, toluene, ethylbenzene, and xylenes, referred to collectively as benzene, toluene, ethylbenzene, xylene (BTEX); semivolatile organic compounds (SVOCs), specifically polycyclic aromatic hydrocarbons (PAHs); metals, specifically arsenic, lead, and mercury; cyanide; and coal tar.

The selected remedy for the RG&E Site outlined in the June 2022 ROD includes excavation of impacted soil at the RG&E Site, the Former Glass Plant Site, and the New York state-owned parcel; excavation of impacted sediment adjacent to all properties; installation and operation of non-aqueous phase liquid (NAPL) recovery systems; monitored natural attenuation (MNA) in groundwater; installation of a cover system consisting of clean soil; institutional controls in the form of environmental easements for the Site; and development of a Site Management Plan (SMP). The PDI for the RG&E Site was performed from Fall 2023 to early Winter 2024. A total of 28 soil borings were installed to bedrock at the RG&E Site, a total of 17 soil borings were installed at the Former Glass Plant Site, and a total of 26 sediment cores or Ponar dredge samples were collected in Genesee River sediments (**Figure 4A, Appendix A**). The green areas on **Figure 4A** presents the preliminary excavation areas of the proposed remedial actions planned to address MGP and petroleum-impacted soil on the B+L Site. PDI soil borings will be used to supplement information on subsurface materials and analytical parameters obtained during the B+L RI work.

3.0 PRELIMINARY CONCEPTUAL SITE MODEL

A preliminary conceptual site model (CSM) has been developed for the B+L Site to illustrate potential pathways through which impacts can be transmitted and the potential receptors of those impacts. Due to the nature of the property, the complexity of impacts from multiple historical operations from the two adjoining properties, and the long historical industrial developmental use of the area, the conceptual model is simplified but helpful to address data gaps from previous investigations. The conceptual site model may be revised following a review of the data collected during this RI.

3.1 Contaminants of Potential Concern

A preliminary set of Contaminants of Potential Concern (COPCs) have been identified for the Site based on historical industrial operations on both parcels and past sampling and laboratory analyses of soil, sediment and groundwater samples on the Site, the contaminants of Concern (COCs) adjacent RG&E Site, and areas in the River. These COPCs include the following:

- Metals, particularly, arsenic, barium, cadmium, copper, lead, mercury, and zinc `
- SVOCs, particularly polynuclear aromatic hydrocarbons (PAHs) associated with past MGP operations.
- One detection of polychlorinated biphenyls (PCBs) in soil identified in a former transformer area.
- Low levels of VOCs, particularly benzene, ethylbenzene, and trichloroethene in groundwater only.

3.2 Areas of Concern

As described in previous sections, 16 AOCs were identified based on extensive historical document review, direct field information collected during the Phase II Site Characterization and historical design documents provided by B+L showing the layout of the Former Glass Plant operations and utilities. The details provided below were summarized from the Phase II Environmental Site Characterization Report (S2C2, August 2011).

3.2.1 AOC-A: Former Raceways

Based on historical photos, two raceways from the Genesee River were present at the Site from at least 1851 to 1869. These raceways were filled sometime between 1869 and 1875. Another single raceway was present on the Site from at least 1881. This raceway was filled prior to 1900. The fill contents in the former raceways may present an environmental concern to the property and as such the raceways were indicated as an AOC.

During the investigation, multiple techniques were used to evaluate the location of these former raceways including desktop mapping using GIS overlays with historical maps and landmarks, geophysical field investigations using terrain conductivity, EM31 geophysical surveying, and electrical conductivity (EC) surveying methods (EC borings). Based on the results of this investigation, the report concluded that former raceways channels could not be distinguished from surrounding fill and soil, and recommended that no further action is warranted for AOC-A.

3.2.2 AOC-B: Bio-Cell

The Bio-Cell is located within the upper terrace at the Site on the former Bausch & Lomb parking lot for the Glass Plant facility. The Bio-Cell contains VOC impacted soil removed as part of an interim remedial measure for an adjacent NYSDEC Brownfield Site (NYSDEC Site No C828159 - 690 St. Paul Street). During the Phase II, one soil boring completed west of the Bio-Cell (SB-19) to evaluate the potential impacts of the soils in the Bio-Cell on the soil quality adjacent to the Bio-Cell. Field screening using a photoionization detector (PID) and analytical result and from the boring showed no VOC impacts. A single soil sample was submitted for analysis of PCBs, Base/Neutrals and Acids (BNAs) and metals for the Phase II SC. Soil sample SB-19 (0.5-1) indicated the presence of a number of PAHs and metals with a concentration of benzo(a)pyrene (2.0 mg/kg) slightly over the Industrial SCO.

In addition to the SC work conducted by B+L, RG&E completed additional borings in the Bio-Cell area as part of their off-Site work in 2013 and 2014. Multiple borings were completed in the area and the data from these borings is provided in **Appendix A**.

Based on the results of the SC investigation and the 2013/2014 RG&E Off-Site investigation it does not appear that the imported VOC impacted soils from the adjacent BCP Site within the Bio-Cell have caused VOC impacts on the Former Glass Plant Site soil underneath or adjacent to the Bio-Cell. Since there are no documented historical uses for this area other than parking and the Bio-Cell, and the analytical data results show no VOC impacts to surrounding soil, no additional samples are recommended.

3.2.3 AOC-C: Compressor Rooms

Two compressor rooms were identified in the 1966 Bausch & Lomb Glass Plant drawing in the northwest corner of the main facility building. Soil boring SB-22 was advanced adjacent to the former compressor rooms. The soil boring was advanced to four feet depth below ground surface and one soil sample was collected at the near surface, below the concrete slab. The soil core collected at this location was described as concrete, silt, brick, and black coal clinker. Soil sample SB-22 (0.5-1) indicated the presence of a number of PAHs, PCBs, and metals with concentrations of benzo(a)pyrene (7.3 J mg/kg), arsenic (405 mg/kg), and lead (6,340 EJ mg/kg) over Restricted Residential SCOs.

During the 1993 Asbestos/metals survey a wipe sample was collected from the main compressor room and analyzed for metals. This sample showed arsenic and lead concentrations of 22.1 and 135.9 ug/wipe, respectively. Based on the results of the Phase II investigation, the SC report concluded that it is likely that the deeper soil impacts observed at this location were not the result of activities associated with the compressor rooms and are more appropriately classified with AOC-H (Historic Fill), AOC-G (Transformers/Electrical Rooms), and/or AOC-F (Lehr/Tank Furnace Area). Shallow soil will likely require additional sampling to evaluate nature and extent of impacts in AOC-C.

3.2.4 AOC-D: Batch Room

The batch room was used to mix/create raw materials for manufacturing glass lenses. Soil boring SB-26 was advanced to twelve feet below ground surface at the suspected location of this former room. A single soil sample was collected directly beneath the concrete slab (SB-26 0.5-1) to verify soil quality in this area. Soil sample SB-26 (0.5-1) indicated the presence of several PAHs and metals with concentrations detected slightly above Restricted Residential SCOs.

During the 1993 Asbestos/Metals Survey three wipe samples were collected within this room and analyzed for metals. These wipe samples indicated the presence of arsenic (1,330 - 4,600 ug/wipe), barium (1,234 - 5,703 ug/wipe), cadmium (20.3 – 175 ug/wipe), chromium (8.4 - 134.1 ug/wipe), lead (629.6 – 7,140 ug/wipe), nickel (1,185 – 2,210 ug/wipe), and selenium (36.8 – 116 ug/wipe). These results are elevated compared to samples collected in non-operation areas. Although former operations in this room included the use of a number of different metals, it does not appear that former operations in the batch room have significantly impacted soil quality directly beneath the concrete slab.

During the RG&E Off-Site investigation work, one boring was advanced in this location (TG-14-06C) and soil samples were collected from 11 - 12 and 19 – 20.5 ft bgs and were analyzed for VOCs, SVOCs and metals. No metals or VOCs were detected in concentrations exceeding Restricted Residential SCOs and one SVOC was detected slightly above Restricted Residential SCOs at this location.

Bases on the conclusions in the SC Report and the results from the RG&E boring, it is unlikely likely that activities associated with the compressor rooms have impacted the area and additional investigation is not recommended within the suspected former compressor rooms.

3.2.5 AOC-E: Homo Furnace

The former homo furnace is located south of the Batch Room adjacent to the Pit Area. The homo furnace was powered by an electrical connection and was likely used to process small batches of glass. No soil borings were advanced at this AOC during the SC Investigation. Soil sampling was recommended to evaluate the soil for potential historical impacts.

3.2.6 AOC-F: Lehr/Tank Furnace

The Lehr/Tank Furnace AOC was located in the northwest corner of the main facility building. The tank furnace was used to melt the batch and was powered by natural gas possibly with an electric assist. The tank furnaces are typically heated to temperatures of 1,100 to 1,500°C. Molten glass was removed from the furnace and cooled. The Lehrs were used as a further stage in the cooling process as a temporary reheating step to remove stress points. The Lehrs was likely powered by electric or natural gas power source. Soil borings SB-08, and SB-22 were located adjacent to the Lehrs/Tank Furnace AOC. Soil sample SB-22, discussed above, indicated the presence of benzo(a)pyrene, arsenic, and lead over the Restricted Residential SCOs. Soil sample SB-08 (0.5-1) indicated the presence of a number of PAHs and metals with only a benzo(a)pyrene (1.9 mg/kg) concentration exceeding the Industrial SCO.

During the 1993 Asbestos/Metals Survey four wipe samples were collected within this AOC and analyzed for metals. These wipe samples indicated the presence of arsenic (207 – 4,050 ug/wipe), barium (406 – 4,580 ug/wipe), cadmium (8.6 – 63.6 ug/wipe), chromium (5.1 – 45.0 ug/wipe), lead (880.4 – 9,083 ug/wipe), nickel (21.0 – 394 ug/wipe), and selenium (2.0 -135 ug/wipe). A wipe sample collected from the floor, located adjacent to the former lehrs unit indicated the highest results for all metals from this area. Former operation in this room included the use of a number of different metals, which may have impacted soil quality as shown in soil results from borings SB-22. Lead concentrations in soil collected at SB-22 (405 mg/kg), were elevated compared to background lead concentrations and could be associated with a localized metals hot-spot in this area.

Further investigation of lead impacts at this AOC is recommended to determine the horizontal and vertical extent of metal impacts adjacent to soil boring SB-22.

3.2.7 AOC-G: Transformers/Electrical Platforms and Rooms

Former transformer pads, electrical platforms and rooms were identified from the 1966 site plan. Soil borings SB-11, SB-22, and SB-23 were located adjacent to former electrical transformer pads or electrical rooms. Soil samples collected from soil borings at these locations were analyzed for PCBs as well as BNAs and metals. While there were other metals and SVOC results exceeding Restricted Residential SCOs that were typical of what are observed in other locations on the Site, the SC Report only discussed PCB results to evaluate the potential for

PCB impacts from the former transformers. PCBs were only detected in one soil sample collected from SB-11 (0.5-1). A total PCB concentration of 0.22 J mg/kg, which is below the Restricted Residential SCO of 1 mg/kg was reported in this location. Based on these sampling results, it does not appear that former electrical transformers/rooms have impacted soil quality. Arsenic and Lead were also detected in concentrations exceeding Restricted Residential SCOs in these locations and barium was detected in concentrations exceeding Restricted Residential SCOs in SB-23, These observations are consistent with other soil exceedances on the Site. Of the identified electrical areas, soil borings were collocated adjacent to all but one of these areas, an electrical shop located within the main facility building. Therefore, an additional boring will be advanced and surface soil samples will be collected in this area to evaluate the extent of impacts.

3.2.8 AOC-H: Historic Fill

As presented in **Section 2.2 Site History** and **Section 2.5.2 Site Geology**, the Site has had a long history of filling dating back to at least the mid-1800s. These filling episodes included, initial filling to allow for development along the Genesee River flats, filling of former Raceways, filling of the land prior to the construction of the former Glass Plant Facility, and lastly filling that occurred subsequent to demolition of the former Glass Plant Facility in 1994. As specified in NYDEC DER-10 a total of four borings/test pits are required per acre to characterize/delineate historic fill material (HFM). Based on the size of the Former Glass Plant Site(7.8 acres) a total of approximately 32 borings would be required to satisfy the NYDEC HFM requirements.

A total of 21 electrical conductivity borings and three (3) soil borings were advanced through the HFM at the site. Based on field observations the following types of fill were identified in this investigation:

- Non-historic fill (NHFM) – recent dumped debris
- Non-historic fill – recent demolition debris
- Non-historic fill – glass plant operations debris
- Historic Fill Material – reworked soil with indications of demolition debris (i.e., brick)
- Historic Fill Material - Coal ash/cinder
- Historic Fill Material – emplaced soil

The NHFM includes recent dumped debris, demolition debris and glass plant operations debris. NHFM dumped debris was observed primarily within the upper terrace and is likely the result of illegal dumping. NHFM recent demolition debris is primarily located in the northwest corner of the facility adjacent to the former 3-story operation plant building location and is likely material moved to this area during building demolition activities. NHFM demolition debris related to Glass Plant Operations is primarily located along the retaining wall between the main terrace and Lower River Terrace and includes municipal trash (primarily glass bottles) and glass blanks produced by the former plant.

HFM identified on the site includes coal ash/cinder related to the burning of coal, reworked soil with indications of demolition debris, and emplaced soil. As described in the geology section, land surfaces at the site were predominantly created by importing fill. As a result, most of the overburden at the site is HFM. The reworked HRM material consists of what appears to be alluvial deposits (fine sand with silt and some gravel but also contains abundant brick debris) and the emplaced HFM consists of primarily sand silts and gravels that resemble till like material likely brought in from nearby locations above the gorge.

In general, soil samples collected within the HFM indicate the presence of primarily PAHs and metals with a limited presence of PCBs with analytical results exceeding the Restricted Residential SCOs for a number of PAHs and metals. Site specific impacts are overprinted on general HFM quality as discussed in AOC specific sections.

3.2.9 AOC-I: Septic Tank

The Phase I Environmental Site Assessment (Leader 2002) identified a former septic tank system as an AOC. The estimated location of this system was identified in the Technical Approach Memo (S2C2, 2009) and is shown on Figure 2-6 in the SCR. Boring CON-14/SB-14 was located adjacent to the suspected location of the former Septic Tank. Subsequent GIS processing of a Bausch & Lomb piping diagram from the 1993 Asbestos/Metals Survey (Paradigm) indicates an extensive piping system for water, steam, gas, air, and drains. Based on mapping in the Phase II SC Report the report concluded that interior drain lines with what appeared to be settling tanks are located adjacent to the cafeteria and locker rooms and are likely sanitary sewer lines. The Phase II concluded that a septic tank may be located west of the main plant near the transformer platform and high voltage area.

Soil boring SB-23 was advanced adjacent to the interpreted location of this possible septic tank. A total of three soil samples were collected from this boring and analyzed for BNAs, PCBs, and metals. Soil samples indicated the presence of PAHs and metals with benzo(a)pyrene (7.6 mg/kg), dibenz(a,h)anthracene (1.4 J mg/kg) and arsenic (55 mg/kg) over the Industrial SCOs. Based on these results, it appears that the samples collected are more representative of historic fill conditions than AOC specific impacts associated with a former septic tank. Additional borings are not required in this location.

3.2.10 AOC-J: Pit Area

The Pit Area, located in the southwest corner of the facility is described in the SCR as a sunken concrete structure with an unknown use. The Pit Area is also described in other documents as the R&D Area, was screened and sampled for radiation as part of the decontamination and final release survey of the Bausch + Lomb Glass Plant Batch Room in 1994. These results are documented in the Final Project Report for the Decontamination and Release of the Bausch + Lomb Batch Room (January 1995) (The Final Decontamination Report), The Final Decontamination Report described the R&D Area as an Unaffected Area and released it with unrestricted use following screening and sampling. A sketch included in the report shows the layout of the R&D Area including the locations of equipment, fume hoods, tables and shelves, furnaces, and shows a center square feature with steps accessing this feature. This is presumably the “sunken concrete structure” noted in the SCR.

While no soil samples were collected from the Pit Area specifically, SB-12-02, was advanced in the southeast corner of the R&D Area and SB-14-03, was advanced in the northwest portion of the R&D Area. The results of these two borings noted exceedances of arsenic only, but petroleum impacts (sheen) were reported in the boring logs. The RIWP includes these results in **Appendix A** Historical Data. An additional boring in this location is required to evaluate impact from past use.

3.2.11 AOC-K: Upper Terrace

The Upper Terrace is located in the eastern portion of the site and extends to the cliff face which defines the eastern most boundary of the Site. This area was formerly used as a parking area for the former Glass Plant and currently contains the Bio-Cell (AOC-B). One soil boring was advanced within the upper Terrace, SB-19, as during the SC investigation. A single soil sample was submitted for analysis of PCBs, BNs and metals. Soil sample SB-19 (0.5-1) indicated the presence of a number of PAHs and metals with a concentration of benzo(a)pyrene (2.0 mg/kg) slightly over the Restricted Residential and Industrial SCO.

RG&E completed additional borings on the southern half of the upper terrace and soil samples reflected similar results of SVOCs. Additional borings are planned as part of the RG&E PDI. Additionally, remedial actions to excavate MGP impacted soil is also planned for this area (**Figure 4A**)

3.2.12 AOC-L: Lower River Terrace – Discharge Pipes

The Lower River Terrace consists of an 0.84 acre strip of land located directly adjacent to the Genesee River at an elevation of approximately 390 ft (canal datum). Six soil samples (denoted as SED-X in the figures in Appendix A) were collected within this AOC during the Phase II SC and were targeted at identified discharge pipes. Results of these soil samples were compared to both the Industrial SCO standards and the NYS PER standards due to the proximity of the Lower River Terrace to the Genesee River. Exceedances of both the Industrial SCO criteria and the SCO PER criteria for SVOCs, PCBs and metals were identified. An additional six soil samples were collected by RG&E and analytical results show similar exceedances of Restricted Residential SCOs. Based on the results of this investigation, it appears that soil quality within the Lower Terrace has been impacted by site activities. Two additional borings are proposed in this area (**Figure 4A**). The analytical data collected from these cores and the existing data from previous investigations will be evaluated in the RI to assess the nature and extent of the impacts.

3.2.13 AOC-M: Offsite Coal Gasification Plant

AOC-M - Offsite Coal Gasification Plant is the adjacent RGE Former MGP. This AOC is not included as part of this Remedial Investigation. However, the data collected on the Former Glass Plant Site and in the Genesee River adjacent to the B+L property are included in the data set compiled for evaluating data gaps at the B+L Site.

It should also be noted that media, including soil, groundwater, and sediments impacted by the adjacent MGP Site are also under continued investigation with Remedial Actions planned to address the MGP impacts on the B+L Site and in the Genesee River adjacent to the Site.

Based on known site conditions at the adjacent RG&E property, impacts associated with former Coal Gasification operations at the neighboring property were suspected on the Site. Olfactory indications of coal tar impacts were noted on boring logs for a number of soil borings including SB-03, SB-06, SB-14, SB-20, and SB-26. In addition, free-phase coal tar was observed in soil cores collected at boring SB-20. Free-phase coal tar was identified from 13 to 18.5 feet bgs in unconsolidated overburden below the observed water table. Soil samples collected from this interval were submitted for analysis of VOCs and PAHs and indicated the presence of benzene, ethylbenzene, naphthalene, acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, dibenz(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, phenanthrene, and pyrene. Concentrations of benzo(a)pyrene (24 mg/kg) and benzo(a)anthracene (23 mg/kg) exceed the Industrial SCOs. PAH concentrations observed in this soil sample were the highest concentrations reported for any sample collected at the Site. Based on these results, it is clear that coal gasification operations at the adjacent RG&E property have impacted soil quality on the B+L Site.

3.2.14 AOC-N: Former Buildings

A total of four additional former B+L Glass Plant Buildings were identified during the Phase II SC investigation based on site plans presented in the Asbestos and Metals Report. According to the report, two of the four buildings were located on the adjacent RG&E property and were not investigate. The remaining two buildings (Buildings 11 and 17) were located east of the main operations building.

Soil Boring SB-03 and SB-20 were both located near or within the suspected location of these two buildings. Soil boring SB-03 was completed to a depth of 8 bgs in former Building 11 and SB-20 was completed to a depth of 8 and 18.5 feet bgs in former Building 17. Two soil samples were collected at SB-03 and three soil samples were collected at SB-20 to verify soil quality at these locations. Soil samples at both locations indicated the presence of a number of PAHs and metals. Concentrations of benzo(a)pyrene (6.3 mg/kg at 0-0.5 ft bgs) and arsenic (26.4 mg/kg and 835 mg/kg at 0-0.5 and 4.5-5 ft bgs) at boring SB-03 exceeded the Industrial SCOs. Additional metals and SVOCs exceeded Restricted Residential SCOs at these sample depths, consistent with other locations. Concentrations of benzo(a)anthracene (25 mg/kg), benzo(a)pyrene (25 mg/kg), benzo(b)fluoranthene (37 mg/kg), dibenz(a,h)anthracene (11 mg/kg), arsenic (41.9 mg/kg), and lead (5,930 mg/kg) in soil sample SB-20 (0.5-1) also exceeded the Industrial SCOs. Similar to SB-03, additional metals and SVOCs exceeded Restricted Residential SCOs at these sample depths, consistent with other locations. Based on these results, it appears that operations at these former buildings or filling adjacent to these buildings prior to or following demolition may have impacted soil quality.

RG&E also completed additional borings on the southern half of the former location of Building 11, similar to the investigation area completed in the upper terrace. Soil samples reflected similar results of SVOCs. And additional borings are planned as part of the RG&E PDI. Additionally, remedial actions to excavate MGP impacted soil is also planned for this area (**Figure 4B**). Additional investigation will also be completed to delineate the horizontal and vertical extent in the former location of Building 17.

3.2.15 AOC-O: Prangborn Dust Collector

The Pragborn Dust Collector was used to collect dust resulting from mixing of raw materials for manufacturing glass lenses. Soil boring SB-12 was advanced to four (4) feet below ground surface adjacent to the suspected location of this unit. Two soil samples were collected (SB-12 0-0.5 and SB-12 3.5-4) to verify soil quality in this area. Both soil samples indicated the presence of a number of PAHs and metals with concentrations of arsenic (321 mg/kg) and lead (106,000 mg/kg) detected above Industrial SCOs in sample SB-12 (3.5-4). Barium (8,090 mg/kg) and mercury (0.815) were also detected above Restricted Residential SCOs. The soil description at this soil borings consisted of crushed glass and a powder like substance at 3.5-4 feet bgs. Based on these results, it appears that soil quality adjacent to the former Prangborn Dust Collector has been impacted by site activities. A soil boring will be added to this area to evaluate the nature and extend of the contamination,

3.2.16 AOC-P: Underground Piping

Underground piping at the former Glass Plant facility is illustrated in Figure 2-7 in the SCR. The following types of piping were identified:

Natural Gas Lines

- Sluice Ways and Drains
- Steam Lines
- Sewer Lines
- Water Lines

Soil samples collected within the Lower-River Terrace areas were targeted to observed discharge pipe locations with the purpose of evaluating soil conditions adjacent to these discharge areas. In addition, two soil samples (SB-09 and SB-23) were located adjacent to underground piping as identified (following sampling activities) from the rectified site diagram. Results of soil samples collected at these locations indicate the presence of a number of PAHs and metals with concentrations of benzo(a)pyrene, dibenz(a,h)anthracene, and arsenic detected above industrial SCO's. However, these results are consistent with general historic fill conditions. At this time, it is unknown if underground piping has impacted soil conditions at the Site. Additional borings will not target these locations due to the inability to locate the infrastructure through geophysical means or mapping.

3.2.17 Non-AOC Areas

There are several areas that have not been identified as AOCs, but the soil quality underneath the slab will need to be evaluated for potential historical impacts. These locations are as follows:

- Loading Dock
- Glass "81" Secured Storage
- Building 10
- Building 9

Additional borings will be advanced in these areas.

3.3 Summary of Environmental Assessment

The Site is currently zoned for Industrial Use. The area was gated with limited access to the public, until the City of Rochester accessed the property, without an access agreement, and installed a gravel roadway to access the railroad trestle for maintenance purposes. The property has been accessible by the public since this maintenance road was installed, resulting in several instances of illegal dumping. The City of Rochester was notified on 27 July 2023 regarding this matter for resolution. A majority of the Site (approximately 6 of the 7.8 acres) is covered by impervious surfaces or cover soils (Bio-Cell) limiting human contact to impacted soil.

Overburden groundwater impacts are limited with the exception of the MGP impacted area on the south side of the Site and offsite transportation of impacted overburden groundwater does not appear to be significant. According to the RG&E ROD, the impacts to bedrock groundwater appears to be from historical MGP operations, and MGP related COCs are migrating in groundwater with the secondary porosity of the bedrock (i.e., cracks, bedding planes, fissures, etc.).

Based on the investigations conducted to date, the primary COPCs are anticipated to be VOCs, SVOCs, and metals. COPCs will be refined based on the RIR results. A more detailed description of each media is provided in the following sections.

3.3.1 Soil

As discussed in the Phase II ESA, fill at the Site is a complex mixture of demolition debris, imported excavation materials, coal cinder and ash, reworked fill/alluvial deposits. Ranging between 8 to 47 feet below grade which is underlain by weathered bedrock at the site with a bedrock surface that slopes from the exposed cliff surface to the river (east to west). While COPCs are discussed in relation to each specific AOC within the historical operational context, the following is a brief overall summary of COPC impacts.

Generally, soil exceedances for metals, including cadmium, lead, and barium, are inconsistently distributed in extent and type of metal on the in soil borings completed under the former B+L manufacturing plant floor slab. These impacts appear to be localized according to the specific historical operational use. However, it appears that soil quality within the Lower Terrace has been impacted by site activities, with respect to soil exceedances of metals.

According to the RG&E ROD, petroleum-like odor and sheen are present at depths typically at and below the water table in the central portion of the Former Glass Plant Site. These apparent petroleum impacts appear to be unrelated to the MGP residual material observed in the southeast portion of the property. These were analyzed and identified as diesel/petroleum-related impacts from other possible sources at the Former Glass Plant Site and their operations. Minor apparent petroleum-related impacts, such as petroleum-like odor or minor sheen, were observed in borings completed to the east of the former plant floor slab and in two borings completed along the Genesee River west of the retaining wall. The ROD also notes that a targeted PDI and remedial action are planned to investigate the extent of these impacts and address the contamination while mobilized to implement MGP remedial efforts.

Additionally, soil exceedances for PAHs are distributed throughout the fill material in the southern portion of the Former Glass Plant Site and in soil along the Genesee River. The origin of the fill material placed at the Site prior to the construction of the B+L Former Glass Plant is unknown. Residuals from the 1915 fire that destroyed a portion of the former B+L manufacturing facility may also contribute to PAHs in overburden on the Former Glass Plant Site.

MGP-related impacts appear to be limited to the southeast portion of the property located north of the former purifier area at the former MGP site. In the southeast portion of the Former Glass Plant Site, apparent MGP residual material, including sheen, and/or NAPL blebs were observed in overburden soil at depths typically greater than 10 ft bgs. The apparent MGP residual material was typically observed in the overburden soil directly above and within weathered bedrock. NAPL migration from the former purifier area to the southeast portion of the Former Glass Plant Site along the overburden and bedrock interface is a possible transport mechanism from the former MGP site to the Former Glass Plant Site. As noted above, the RG&E ROD will address this area with a PDI and remedial action are to investigate the extent of these impacts and address the contamination.

3.3.2 Surface Soil

While analytical data show some limited impacts to surface soil at the Site from historical operations, a large majority of the Site is covered by impermeable surfaces including the former building foundation, paved parking areas and the Bio-Cell. COPC impacts are concentrated on areas to the west of the existing foundation and to the surface soil of the lower terrace. As described in section 3.2.12 for AOC-L Lower River Terrace – Discharge Pipes, discharge pipes observed along the retaining wall likely discharged directly to the river during times of high-water levels. These pipes likely transported COPCs including multiple metals (antimony, arsenic, copper, lead, silver, and zinc), SVOCs (primarily PAHs), and limited PCBs.

3.3.3 Groundwater

Overburden groundwater quality was evaluated at four monitoring well locations, one temporary groundwater grab sample location and at Pipe G (flowing pipe). Dissolved VOC concentrations in groundwater are associated with offsite coal tar impacts associated with the neighboring RG&E operations and possible from an unknown regional or upgradient source for dissolved chlorinated volatile organic compounds (CVOCs) impacts. Dissolved SVOC compounds recorded over the NYS GWS are likely associated with the documented coal tar associated with the neighboring RG&E site and from general historic fill groundwater conditions. Dissolved metal concentrations in overburden groundwater over the NYS GWS is likely the result of historic fill conditions with the exception of metal concentrations observed at MW-04. At this location, is suspected that site activities associated with the former Glass Plant has impacted the geochemistry of groundwater in this vicinity (low pH) which provides an ideal environment for solubilizing metals in groundwater.

Based on the results of this investigation, additional investigation is recommended to delineate the low pH conditions and elevated metal concentrations in the vicinity of MW-04, which is located within AOC-D Batch Room. Additional investigation may be required to determine background groundwater conditions associated with historic fill as specified in NYDEC DER-10. Additional investigation of TCE impacted groundwater may also be required as specified in NYDEC DER-10; however, it is believed that CVOCs are not a compound of concern at this site.

3.3.4 Soil Vapor

Due to the very low levels of VOCs detected in soil and groundwater, and the absence of structures on the Site, soil vapor is not considered a concern at this time.

3.3.5 Sediment

As discussed in the RG&E ROD, NAPL impacts to sediment within the Genesee River related to former MGP operations appear to be limited to an area along the southern portion of the former MGP site adjacent to the former light oil plant. A discrete area of NAPL blebs were observed adjacent to the Former Glass Plant Site located approximately 210 ft north (downstream) of the northern RG&E and Former Glass Plant Site boundary. The extent of these impacts is currently being investigated by RGE. Additionally due to the limited nature of the sediments (i.e., thin sediment layer over bedrock), the selected remedy discussed in the RG&E ROD included only remediating sediments with visual NAPL impacts. The following description for investigation and remediation is included in the East Station Record of Decision:

"Following a pre-design investigation, sediment which contains MGP NAPL impacts and is above sediment PAH Class C SGV, will be removed from the Genesee River. This is currently predicted to be excavation and off-site disposal/thermal treatment of approximately 2,500 cubic yards (cy) of impacted sediment.

A restoration plan for the Genesee Riverbed and banks will be completed with the goal of restoring the stream bed, banks, and floodplain in-kind to the extent possible using natural stream restoration/bioengineering design principles and with the goal of re-establishing habitat function. The design will include a monitoring plan for areas disturbed by the remedy and all activities will be consistent with the requirements of 6 NYCRR Part 608"

3.3.6 Surface Water

Surface Water will not be evaluated as part of this Remedial Investigation Work Plan. The Genesee River is the only surface water body in proximity to the Site. Also as discussed in the Qualitative Assessment Section 6.3 of the RGE RI "The mean daily discharge rate of the Genesee River recorded at the Ford Street Bridge Gauging Station#04231600, located approximately 2 miles upstream of the Former MGP Site, is 6,670 cfs. Given this flow rate, concentrations of COPC in groundwater entering the river would be significantly diluted to concentrations that are very low to non-detect. Therefore, exposure to COPC in surface water would be insignificant and therefore, was not considered to be a complete exposure pathway."

4.0 INVESTIGATION TASKS

The elements of the RI presented in this section are based on the data gap assessment and preliminary CSM presented in Section 3.

The approach to the remedial investigation is described in the following sections. The remedial investigation will consist of a geophysical investigation, site survey, surface soil investigation, a soil investigation, a sediment sample, and a groundwater investigation. Each portion of the investigation work will follow NYSDEC guidelines outlined in Division of Environmental Remediation (DER) DER-10.

Field activities will be conducted in accordance with the Subsurface Soil Disturbance Protocol (**Appendix C**) Field Sampling Plan (FSP) (**Appendix D)**, Quality Assurance Project Plan (QAPP) (**Appendix E)** A Site-specific CAMP (**Appendix F**) and the Health and Safety Plan (HASP) (**Appendix G)**. Site-specific elements and specific job safety analyses for soil borings will be added to the Health and Safety Plan. All samples will be analyzed at an ELAP-accredited laboratory.

Investigation-derived waste (IDW), including excess soils, decontamination rinsates, well development water, purge water, and personal protective equipment, will be placed in Department of Transportation-approved 55-gallon 17-H type drums. The IDW will be evaluated as hazardous or non-hazardous based on characterization results and will be disposed of in accordance with DEC Program Policy DER-10 and all local, State, and Federal regulations and applicable permits. Waste characterization sampling is described in more detail in **Section 4.6**. It is assumed that all IDW will be nonhazardous. It is anticipated that IDW will be stored on-site within the perimeter of the Site fence to maintain site security until disposal.

The Community Air Monitoring Plan (CAMP) (**Appendix F**) will be implemented for real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area during invasive activities on-site.

4.1 Geophysical/Utility Clearance and Initial Site Survey

A geophysical investigation will be conducted to identify buried utilities and other structures that may be impacted by installing soil borings. The geophysical survey will be conducted over areas where soil borings will be installed plus an additional 10 feet extending outward from proposed boring locations. Any detected utilities will be marked out.

Prior to initiation of Site activities, Call 811 (Dig Safely NY) will be contacted to locate utility lines that enter and/or cross the property. The geophysical survey will be conducted to detect buried structures and subsurface utilities within the specified locations, and/or to trace a particular utility line or system. The geophysical surveyor will apply the appropriate surface geophysical method(s) to search for utilities and/or buried obstructions. Geophysical technologies may include, but not be limited to, ground-penetrating radar (GPR), radio frequency (RF), and electromagnetic induction (EM). These techniques will be used to locate subsurface utility lines or subsurface features within a 10-foot radius of each proposed intrusive activity. Specific features may include subsurface utilities, subsurface anomalies, large voids, former subsurface structures, abandoned utilities, and former utility trenches. Paint and flagging shall be used for marking of lines, showing any underground site utilities or obstructions.

Additionally, a focused effort will be completed to identify potential subsurface features in AOC:J Pit Area. This area will be scanned using the best applied method to identify potential subsurface anomalies, large voids or vaults in the area described as the “sunken concrete structure”.

Prior to intrusive work, Parsons will follow their *Subsurface Soil Disturbance Protocol* (**Appendix C**).

Following the geophysical investigation and mark out of investigation sampling locations, a site topographical survey will be completed for the approximately 7.8-acre investigation area by a subcontracted surveyor. The site survey will include geophysical mark-outs of former structures, utilities, and obstructions.

In addition, site survey tasks will include collecting the as-built sample coordinates and elevation information, as well as the as-built monitoring well elevations. Horizontal survey data will be based on the North American Datum (NAD) 83 New York State Plane (Western Zone) coordinate system (in feet). Elevations will be based on the North American Vertical Datum (NAVD) 88.

4.2 Surface Soil Sampling and Soil Borings

4.2.1 Surface Soil and Existing Cover Sampling

Up to 20 surface soil samples will be collected at the Site (**Table 1**). Fourteen proposed locations are included on **Figure 4A** and up to six additional surface soil samples may be collected depending on the surface area not covered with impervious material. Surface soil will be collected from the 0–2-inch interval below any vegetative cover using a hand auger. These samples will be collected for chemical analysis to evaluate the potential for Site related impacts to surface soil at the Site and to evaluate for human exposure from incidental soil ingestion, inhalation of soil or dermal contact. SOPs for collecting surface soil samples and other field work are included in the Field Sampling Plan (**Appendix D**).

4.2.1.1 Surface Soil Analytical Sampling

Surface soil samples will be analyzed for the following parameters:

- TAL metals by USEPA SW-846 Method 6010
- TCL VOCs by UESPA SW-846 Method 8260 +10 Tentatively identified compounds (TICs)
- TCL SVOCs by USEPA SW-846 Method 8270+20 Tentatively identified compounds (TICs)
- Mercury by USEPA SW846 Method 7471
- Chromium (trivalent and hexavalent) by USEPA SW846 Method 7196
- Cyanide by USEPA SW-846 Method 9014
- PCBs by USEPA SW-846 Method 8082
- Pesticides by USEPA SW-846 Method 8081
- Herbicides by USEPA SW-846 Method 8151
- PFAS by USEPA Method 1633
- 1,4-dioxane by USEPA SW-846 Method 8270 SIM

Pesticides, herbicides, PFAS, and 1,4-dioxane samples will be collected at all locations, with samples from 20% of the surface sampling locations analyzed immediately after collection. Samples from other locations will be held at the lab pending receipt of analytical results from the initial 20% of sample locations. If results from the initial 20% of sample locations exceed Restricted Residential Use SCOs for pesticides, herbicides, 1,4-dioxane and/or exceed the most recent applicable guidance values for Restricted Residential Use SCOs for PFAS, additional on hold samples will be analyzed for these selected parameters in consultation with NYSDEC. PFAS samples will be collected in a manner consistent with protocols outlined in the Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) under NYSDEC's Part 375 Remedial Programs (NYSDEC 2023). Results from soil cover analytical samples will be compared to Restricted Residential use guidance values for perfluorooctanoic acid (PFOA) and perfluorooctane sulfonic acid (PFOS) (NYSDEC 2023). Additional details on the analytical program are included in the QAPP (**Appendix E**).

4.2.2 Existing Cover Soil Sampling

A total of 14 existing cover soil samples will be collected at the Site (**Figure 4A, Table 1**). Cover soil will be collected by installing shallow soil borings. These samples will be collected from the 0-6 inch interval below any vegetative cover and the 12-24 inch interval for chemical analysis to evaluate the potential for Site related impacts to existing cover soils at the Site and for assessing ecological resource exposure to soil. SOPs for collecting soil samples, installing soil borings, and other field work are included in the Field Sampling Plan (**Appendix D**).

4.2.2.1 Existing Cover Soil Analytical Sampling

Existing cover soil samples will be analyzed for the following parameters:

- TAL metals by USEPA SW-846 Method 6010
- TCL VOCs by UESPA SW-846 Method 8260
- TCL SVOCs by USEPA SW-846 Method 8270
- Mercury by USEPA SW846 Method 7471
- Chromium (trivalent and hexavalent) by USEPA SW846 Method 7196
- Cyanide by USEPA SW-846 Method 9014
- PCBs by USEPA SW-846 Method 8082
- Pesticides by USEPA SW-846 Method 8081
- Herbicides by USEPA SW-846 Method 8151
- PFAS by USEPA Method 1633
- 1,4-dioxane by USEPA SW-846 Method 8270 SIM

Pesticides, herbicides, PFAS, and 1,4-dioxane samples will be collected at all locations, with samples from 20% of the existing cover soil sampling locations analyzed immediately after collection. Samples from other locations will be held at the lab pending receipt of analytical results from the initial 20% of sample locations. If results from the initial 20% of sample locations exceed Restricted Residential Use SCOs for pesticides, herbicides, 1,4-dioxane and/or exceed the most recent applicable guidance values for Residential Use SCOs for PFAS additional on hold samples will be analyzed for these selected parameters in consultation with NYSDEC. PFAS samples will be collected in a manner consistent with protocols outlined in the Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) under NYSDEC's Part 375 Remedial Programs (NYSDEC 2023). Results from soil cover analytical samples will be compared to residential use guidance values for PFOA and PFOS (NYSDEC 2023). Additional details on the analytical program are included in the QAPP (**Appendix E**).

4.2.3 Soil Borings

A total of 16 soil borings will be installed to bedrock at the Site (**Table 1**). Proposed locations for the 16 borings (**Figures4A and 4B**) were selected to address data gaps identified following a thorough review of the 2011 Site Characterization conducted by B+L, and the 2012 and 2014 Remedial Investigation work conducted on the

Former Glass Plant Site. Soil borings will be installed to sample subsurface soil for analytical parameters to provide a further level of understanding of the nature and extent of contamination at the Site. Standard Operating Procedures (SOPs) for installing soil borings and other field work are included in the Field Sampling Plan (**Appendix D**).

4.2.3.1 Soil Boring Installation

Soil borings will be advanced using hollow-stem augers, and soils will be continuously recovered via split-spoon. Standard penetration testing (SPT) shall be conducted continuously at all soil borings in accordance with American Society for Testing and Materials (ASTM) D1586. Split-spoon samples shall be obtained using a standard spoon (2-inch outer diameter [OD] and 1.375-inch inner diameter [ID]), driven with a 140-pound hammer dropped from 30 inches. The number of hammer blows required to advance the spoon 24 inches will be measured in 6-inch increments and recorded. Split-spoon sampling will continue until the target depth for each boring is achieved, or refusal is encountered. Refusal shall be defined as 100 hammer blows required to penetrate 12 inches of material or less.

Soils will be visually classified using the Burmister soil classification system (1970) and Unified Soil Classification System (USCS) (ASTM International 2018). Soil descriptions will be recorded in the field notes or soil boring log forms. Any non-native material present in the soil core will be noted and described (type, color, texture, moisture content, etc.) in the field logs. Each soil core will also be photographed and screened for the presence of VOCs with a photoionization detector (PID) and a radiological detector. PID and radiological readings will be recorded on the boring log and/or field book.

Once all sampling needs are met, each borehole will be grouted from total depth to surface. After grouting is complete, the surface and surrounding area will be restored to conditions prior to intrusive activities. Track mats may be used to access the boring locations and minimize ground disturbances.

Sampling equipment will be decontaminated between pushes and soil boring locations by washing equipment using a phosphate-free cleaning solution (e.g., Alconox) along with a distilled water rinse. All “down hole” drilling equipment will be decontaminated inside the decontamination pad, using a high-pressure steam wash.

Drill cuttings and decontamination rinsate will be containerized in roll-off containers lined with polyethylene, or other approved container, and transported to a central waste staging area for further characterization and disposal.

4.2.3.2 Soil Analytical Sampling

Up to four soil samples from each proposed boring will be collected and submitted for laboratory analysis based on the following criteria:

For VOCs and SVOCs:

- A depth at which visual or olfactory evidence of non-aqueous phase liquid (NAPL) contamination or elevated PID readings is encountered, if any.
- The interval immediately above the shallowest depth at which visual or olfactory evidence of NAPL contamination is encountered, if any.
- The interval directly above the water table, if encountered.
- The bottom of the boring.

For all metals:

- At a depth where visual staining or color change occurs indicating a potential zone of metal oxidation or reduction and potential dissolved metal precipitation.
- At an approximate depth that coincides with historical basement or foundation slab elevation.
- At a depth that corresponds with a metals exceedance collected from an adjacent boring where additional delineation is recommended.

All soil samples will be analyzed for the following parameters:

- Target analyte list (TAL) metals by U.S. Environmental Protection Agency (USEPA) SW-846 Method 6010
- Target compound list (TCL) VOCs +10 TICs by UESPA SW-846 Method 8260
- TCL SVOCs +20 TICs by USEPA SW-846 Method 8270
- Mercury by USEPA SW846 Method 7471
- Chromium (trivalent and hexavalent) by USEPA SW846 Method 7196
- Cyanide by USEPA SW-846 Method 9014
- Polychlorinated biphenyls (PCBs) by USEPA SW-846 Method 8082

Additionally. soil samples from each of the 16 proposed borings will be collected and submitted to the laboratory for the following parameters:

- Pesticides by USEPA SW-846 Method 8081
- Herbicides by USEPA SW-846 Method 8151
- PFAS by USEPA Method 1633
- 1,4-dioxane by USEPA SW-846 Method 8270 SIM

Samples from four of the sixteen proposed borings will be analyzed immediately for pesticides, herbicides, PFAS, and 1,4-dioxane following collection. Samples from the remaining twelve borings will be held at the lab pending receipt of analytical results. If results from the initial 20% of sample locations exceed Restricted Residential Use SCOs for pesticides, herbicides, 1,4-dioxane and/or exceed the most recent applicable guidance values for Residential Use SCOs for PFAS additional on hold samples will be analyzed for these selected parameters in consultation with NYSDEC. PFAS samples will be collected in a manner consistent with protocols outlined in the Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) under NYSDEC's Part 375 Remedial Programs (NYSDEC 2023). Results from soil cover analytical samples will be compared to residential use guidance values for PFOA and PFOS (NYSDEC 2023). Additional details on the analytical program are included in the Quality Assurance Project Plan (QAPP) (**Appendix E**).

4.3 Groundwater Sampling

As described above in Section 2 – Previous Investigations, groundwater samples have been collected from multiple overburden and bedrock monitoring wells since 2010 (**Appendix A**). A total of three groundwater sampling events have been conducted as part of the B+L Site Characterization Phase II Investigation in August 2010, and as part of the RG&E off-site investigations conducted as part of the East Station Remedial Investigation and the Supplemental Investigation in December of 2013 and August 2014. As summarized above, the reports concluded that site groundwater contains elevated levels of petroleum type analytes associated with MGP impacted media in the overburden in the southeastern and southern central portion of the property. MGP associated impacts are also observed in bedrock groundwater in several wells at the Site. As noted elsewhere RG&E will be completing a Remedial Action (RA) to address the MGP impacted areas on the Former Glass Plant Site following the completion of a PDI in 2023 to evaluate the extent of the MGP impacts in the southeastern and south-central portion of the Former Glass Plant Site.

In addition to the RA, the Record of Decision for GR&E East Station Site determined that Monitored Natural Attenuation as an acceptable remedy for off-site groundwater (on the Former Glass Plant Site) following the completion of the RAs. Furthermore, the multiple rounds of groundwater samples collected at the Site to date by both B+L and RG&E meet the groundwater sampling requirements for remedial investigations set forth in DER-10. However, one additional round of samples will be collected as part of this RI and compared to previously collected groundwater data to evaluate the current conditions of groundwater to the historical sampling.

A round of groundwater sampling will be conducted by sampling the monitoring wells shown on **Figure 4A**. Wells that will be sampled (6 wells in total, **Table 1**), include 5 existing overburden wells and one newly installed overburden well.

Groundwater samples will be analyzed for the following parameters:

- Metals by USEPA SW-846 Method 6010
- VOCs by USEPA SW-846 Method 8260
- SVOCs by USEPA SW-846 Method 8270
- Mercury by USEPA SW846 Method 7471
- Chromium (trivalent and hexavalent) by USEPA SW846 Method 7196
- Cyanide by USEPA SW-846 Method 9014

- PCBs by USEPA SW-846 Method 8082

Additionally, since PFAS in groundwater has not been evaluated at the Site, one round of groundwater samples will be collected from three overburden monitoring wells including one existing upgradient overburden monitoring well (MW-03) and two existing downgradient overburden monitoring wells (MW-02 and MW-01) to screen for the presence of PFAS and 1,4-dioxane and analyzed for the following parameters:

- Pesticides by USEPA SW-846 Method 8081
- Herbicides by USEPA SW-846 Method 8151
- PFAS by USEPA Method 1633
- 1,4-dioxane by USEPA SW-846 Method 8270 SIM

Each monitoring well will be redeveloped a minimum of 24 hours prior to undergoing sampling as described in the FSP (**Appendix D**). Some sampling locations may differ from those shown on **Figure 4** due to conditions of the wells at the time of sampling.

Additional details on the analytical program are included in the QAPP (**Appendix E**).

4.4 Surface Water and Sediment Sampling

4.4.1 Surface Water Sampling

A qualitative assessment for surface water will be included in the RI report but analytical samples of surface water will not be collected and evaluated as part of this Remedial Investigation Work Plan. The Genesee River is the only surface water body in proximity to the Site. Also as discussed in the Qualitative Assessment Section 6.3 of the RGE RI "The mean daily discharge rate of the Genesee River recorded at the Ford Street Bridge Gauging Station #04231600, located approximately 2 miles upstream of the Former MGP Site, is 6,670 cfs. Given this flow rate, concentrations of COPC in groundwater entering the river would be significantly diluted to concentrations that are very low to non-detect. Therefore, exposure to COPC in surface water would be insignificant and therefore, was not considered to be a complete exposure pathway."

4.4.2 Sediment Sampling

Up to six samples will be collected from three sediment sampling locations within the Genesee River adjacent to the Site (**Figure 4A, Table 1**). One sample location (PAR-SED-01) is located slightly downstream of Outfall 2 and the proposed sediment excavation areas included as part of the adjacent East Station Former MGP Site remediation, one sample location (PAR-SED-02) is located within the proposed RGE sediment excavation area, and one sample location (PAR-SED-03) is located on the northern and downstream extent of the B+L property line. Sediment sampling methodology will be selected at the time of sampling based on current River conditions and estimated sediment thickness at the sample locations. Sampling methodology may include sediment coring using a vibracore or grab sampling using a Ponar dredge.

Upon retrieval, the sediment samples will be logged and classified in the field using the USCS, documented in their entirety via photographs, and screened with a PID.

Up to two sediment sample intervals from each sampled location will be collected and submitted for laboratory analysis for the following parameters:

- TAL metals by USEPA SW-846 Method 6010
- TCL VOCs +10 TICs by UESPA SW-846 Method 8260
- TCL SVOCs +20 TICs by USEPA SW-846 Method 8270
- Mercury by USEPA SW846 Method 7471
- Chromium (trivalent and hexavalent) by USEPA SW846 Method 7196
- Cyanide by USEPA SW-846 Method 9014
- PCBs by USEPA SW-846 Method 8082

Up to two samples will be collected for PFAS (by USEPA Method 1633) and 1,4-dioxane (by USEPA SW-846 Method 8270 SIM) from each sediment sampling location and held at the lab pending receipt of analytical results from soil samples. If results from soil samples exceed Restricted Residential Use SCOs for 1,4-dioxane and/or exceed the most recent applicable guidance values for Restricted Residential Use SCOs for PFAS, then the on hold sediment samples will be analyzed for those parameters. PFAS samples will be collected in a manner consistent with protocols outlined in the Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) under NYSDEC's Part 375 Remedial Programs (NYSDEC 2023).

4.5 Radiological Screening

Soil boring and sediment cores collected from locations that present a potential for radiological contamination will be field screened by Ameriphysics prior to sampling. Ameriphysics is specifically licensed by the U.S. Nuclear Regulatory Commission (NRC) to act as a radiological services provider, and the screening will be conducted by a health-physics technician that is qualified according to the requirements of Ameriphysics' radiological control program. Ameriphysics NRC license and credentials for Tom Hansen, Jr., PhD, CHP, RRPT are provided in **Appendix H.**

4.5.1 Radiological Screening Approach

Radiological screening will consist of gamma scans with a Ludlum Model 44-10 2-inch x 2-inch Sodium Iodide (NaI) scintillation detector. According to NUREG-1507, this detector is capable of a detection sensitivity of 1.8 picoCuries per gram (pCi/g) of Th-232 when the Th-232 is in equilibrium with progeny in the decay series. A 2006 *Report of Suntru Street Radiological Survey Performed for Bausch and Lomb* by Andrew Karam made comparisons against a screening value of 2.8 pCi/g of Th-232 that was deemed to correspond to a total effective dose equivalent of 10 millirem per year (mrem/yr). Thus, the Ludlum Model 44-10 is sufficiently sensitive for the required scanning in that its detection sensitivity is nominally 64 percent of the prior action level that was used.

The gamma scanning will be accomplished by passing the detector over the length of the core. The detector will be kept close to the core (i.e., at a distance of a few centimeters or less), and a scan speed of one-detector length or less per second will be maintained (i.e., no more than two inches per second). The health-physics technician will listen to the audible output of the instrument to which the Ludlum Model 44-10 detector is configured (e.g., Ludlum Model 2221 or equivalent) and will investigate any increased counts that are noticed by stopping the detector and allowing the output to stabilize before continuing the scan.

4.5.2 Radiological Field Screening Action Level

The Ludlum Model 44-10 gives results in units of counts per minute. The following procedures will be followed in the field during core screening:

- An action level of twice the local background counts (2 x BKG) will be used as an action level for determining if additional screening is necessary.
  - Gamma scan returns with a result less than or equal to the action level, a result of "≤ 2 x BKG" will be made in the boring log, and no additional screening is required.
  - Gamma scan returns with a result a result exceeds the action level, the observed count rate will be recorded in the boring log, and the entire core and any persons or equipment that contact the core will be handled as potentially contaminated until proven otherwise as described in the following paragraphs.

4.5.3 Radiological Screening for Potentially Contaminated Materials and Personnel

Personnel and equipment that contact cores exceeding the action level are subject to additional screening. Personnel will be scanned with a Ludlum Model 43-93 alpha-beta scintillation detector that is coupled to Ludlum Model 2360 survey instrument. The action level is that any sustained noticeable increase in the instrument's audible output will require decontamination (or in the case of clothing, disposal). Potentially contaminated equipment will be subject to unrestricted release surveys that are performed according to the implementing procedures upon which Ameriphysics' licensed radiological control program is based. The following surface contamination screening levels in units of disintegrations per minute per one hundred square centimeters ($dpm/100cm^2$) will be used, and any equipment that cannot be decontaminated will be disposed of as radioactive material.

Table 2: Acceptable Surface Contamination Radiological Screening Levels

Radiation Type	Total Surface Contamination (dpm/100cm²)	Removable Surface Contamination (dpm/100cm²)	
	Average (over 1 square meter)	Maximum	
Beta	1,000	3,000	100
Alpha	100	300	20

A Ludlum Model 43-93 will be used to demonstrate compliance with the average and maximum total surface contamination screening levels. Removable surface contamination is measured by wiping an area of 100 square centimeters with a paper or cloth sampling media (i.e., a "wipe sample") and then analyzing the wipe sample on a Ludlum Model 3030 or 2929 alpha-beta sample counter.

The Ludlum Model 44-10 is not effective for decision making at the action level (e.g., discriminating 2.7 pCi/g from 2.9 pCi/g in a field sample). Consequently, cores that exhibit sustained count rates above the action level will have their radioactivity determined with samples that are analyzed via gamma spectroscopy. The analysis will happen offsite at a National Environmental Laboratory Accreditation Program certified radiochemical laboratory, GEL Laboratories. The analysis method will demonstrate a Th-232 detection sensitivity of less than 2.8 pCi/g via Actinium-228 (Ac-228).

4.5.4 Radiological Screening Equipment Checks and Calibration

Any radiological survey equipment that is used for the screening will be calibrated at 12-month intervals or following repair, whichever comes sooner. Calibration will be performed with National Institute of Standards and Technology (NIST) traceable sources. Only instruments with a current calibration label will be used for conducting the screening. Instruments suspected of providing incorrect measurements will be removed from service and tagged pending a satisfactory response check.

The following functional checks will be performed before use each day:

- Battery;
- Physical integrity;
- Background; and
- Response to known source

For "Background" and "Response to known source" items, a control chart will be developed for each instrument using the instrument's response to background and an appropriate check source using a specified source-detector alignment that can be easily repeated. These checks will be performed before each day's use and the results immediately plotted on the control chart to determine if the instrument performs properly. A properly functioning instrument must be able to demonstrate daily background and net source counts that fall within 20 percent of initially derived values. Any instrument found to respond improperly will be taken out of service until repaired and recalibrated, if necessary. Additionally, should an instrument exhibit erratic behavior, such as high battery consumption or other anomalous symptoms, it will be subjected to a thorough inspection and recalibration by a calibration and repair facility.

4.6 Waste Characterization Sampling

4.6.1 Soil IDW

Up to three composite soil samples will be collected for evaluating potential disposal options for IDW. The specific parameters to be analyzed will be determined in consultation with a disposal facility but are likely to include the following parameters:

- Reactivity
- Corrosivity
- Ignitability
- Toxicity Characteristic Leaching Procedure (TCLP) VOCs (these samples will be collected as discrete samples rather than as composites)
- TCLP SVOCs
- TCLP metals
- Total cyanide
- Reactive cyanide
- PCBs
- Pesticides/herbicides

4.6.2 Groundwater IDW

One sample will be collected from each drum containing groundwater IDW for evaluating potential disposal. The specific parameters to be analyzed will be determined in consultation with a disposal facility but are likely to include the following parameters:

- Reactivity
- Corrosivity
- Ignitability
- Toxicity Characteristic Leaching Procedure (TCLP) VOCs (these samples will be collected as discrete samples rather than as composites)
- TCLP SVOCs
- TCLP metals
- Total cyanide
- Reactive cyanide
- PCBs
- Pesticides/herbicides

4.6.3 Personal Protective and Disposable Sampling Equipment

PPE, disposal sampling equipment (ex., bailers and rope),and general trash that may come in contact with potentially impact soils/water generated during completion of the work will be containerized in U.S. Department of Transportation (DOT)-compliant 55-gallon open top steel drums and stored in the IDW Storage Area. These materials will be secured and labeled as non-hazardous waste and disposed of accordingly.

4.6.4 IDW Staging and Disposal

An IDW Storage area will be established on-Site within the perimeter of the fence at the start of field work. The IDW Storage Area will consist of 10 mil. minimum plastic sheeting with a wood plank perimeter to prevent potential rainwater runoff. IDW generated during waste characterization sampling will be placed in DOT-approved 55-gallon 17-H type drums and stored at the IDW Storage Area until analytical results have been received. Runoff generated at the IDW Storage Area will be pumped into 55-gallon drums and treated as IDW as needed. IDW will be disposed of in accordance with DER-10 as well as applicable local, State, and Federal regulations.

Intrusive work that could result in the generation of large quantities of material requiring offsite transportation is not expected to occur. If transportation of material offsite is necessary, all transport of materials will be performed by licensed haulers in accordance with appropriate local, State, and Federal regulations, including 6 NYCRR part 364. Haulers will be appropriately licensed and trucks properly placarded. Materials transported by trucks exiting the Site will be secured with either tight-fitting opaque covers that are secured on the sides and/or back, or opaque covers that are locked on all sides. Loose-fitting canvas-type truck covers will be prohibited. If loads contain wet materials capable of producing free liquid, truck liners will be used.

4.7 Qualitative Human Health Exposure Assessment (QHHEA)

A Qualitative Human Health Exposure Assessment (QHHEA) will be developed in accordance with NYSDEC's DER-10 Technical Guidance for Site Investigation and Remediation and DER's Brownfield Cleanup Program Guide. The overall objective of the QHHEA is to evaluate the linkages between the contaminant source(s) and potentially exposed human receptor populations. To satisfy this objective, the QHHEA will document and describe the contaminant source(s) and constituents of potential concern (COPCs), the current and reasonably anticipated future land use at the Site, potential exposure pathways, and potentially exposed human receptor populations.

The results of the 2010 Phase II Site Characterization as well as the numerous investigations and report completed by RG&E on the Former Glass Plant Site indicate that soil and groundwater has been impacted by metals, SVOCs and VOCs. While RG+E investigations were limited to MGP related impacts, the documented presence of metals in Site soil and warrants further investigation of these media. Groundwater may also be impacted via leaching from overlying soils and will be investigated as part of the proposed RI sampling program.

While a QHHEA has already been completed for MGP related impacts on the Site, potential human exposure routes include incidental ingestion of soil, dermal contact with soil/groundwater, inhalation of soil dust will be prepared to supplement the Human Health Exposure Assessment as documented in the ROD for the adjacent RG&E Site. A thorough evaluation of current and reasonably anticipated future land use will guide the identification of potentially exposed human receptor populations and the determination of complete or incomplete exposure pathways at the Site.

Assumptions

- • The current land use at the Site will include Industrial Use and Restricted Residential Use scenarios.
- • Assumes groundwater is not used for potable purposes.
- • The QHHEA will focus on the Site and not on adjacent parcel(s).

4.8 Fish and Wildlife Resources Impact Analysis

A Fish & Wildlife Resources Impact Analysis (FWRIA) Part 1: Resource Characterization in accordance with NYSDEC's DER-10 Section 3.10.1(c) will be conducted to evaluate impacts to fish and wildlife from the potential migration of Site-related COPCs toward the Genesee River. The purpose of the FWRIA is to identify the fish and wildlife species and habitats found on and in the vicinity of the site, evaluate the potential effects on these natural resources, and identify steps that can be taken to reasonably minimize potentially significant adverse impacts.

4.9 Green Remediation

Green remediation concepts and techniques in accordance with DER-31 Green Remediation (August 2010) will be considered during all stages of the remedial program, including during implementation of the RI. The major green remediation concepts as detailed in DER-31 are:

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long term when choosing a site remedy;
- Reducing direct and indirect GHG and other emissions;
- Increasing energy efficiency and minimizing use of non-renewable energy;
- Conserving and efficiently managing resources and materials;
- Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;
- Maximizing habitat value and creating habitat when possible;
- Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals; and
- Integrating the remedy with the end use where possible and encouraging green and sustainable re-development.

Green and sustainable best management practices (BMPs) will be performed during the RI as appropriate. These BMPs may include, but not be limited to, minimizing vehicle idling; utilizing local staff, suppliers, and subcontractors where possible; and sending IDW and other waste to local disposal facilities rather than trucking the waste to facilities located more distantly.

4.10 Data Management and Validation

Analytical services for sediment, water, and other types of samples to be collected as part of this work effort will be provided by laboratories accredited under the NYSDOH Environmental Laboratory Accreditation Program or equivalent. Data validation will be provided for data collected as a result of this work plan. Data validation is the review and evaluation of analytical environmental sample data in accordance with USEPA and NYSDEC protocols and is to determine data usability and defensibility. As described in Section 9.0 of the QAPP (**Appendix E**), a USEPA Level IV data validation (i.e., full data validation) will be conducted on 10 percent of the chemical samples, and a USEPA Level III data validation (i.e., sample plus quality control summary data only, no raw data review) will be conducted on the remaining 90 percent of the samples. The validated results will be incorporated into a NYSDEC-compatible database (such as Equis) following validation.

Once the data validation has been completed, a data usability and summary report that presents the results of data validation and data usability assessment will be prepared and submitted to NYSDEC as part of the RFI report.

4.11 Technical Plans for Remedial Investigation

Various plans will be implemented during the remedial investigation to control the management of materials generated during Site remediation.

4.11.1 Dust, Odor, and Vapor Control Plan

A Dust, Odor, and Vapor Control Plan will be developed for remedial construction work activity to meet CAMP requirements and OSHA standards for construction (29 CFR 1926) after selection of the final remedy and will specifically address work practices to minimize dust, odors, and vapors during remedial construction activities and/or other invasive work.

Specific work practices to minimize dust, odors, and vapors during remedial construction activities and/or other invasive work will be identified in the remedial design.

4.11.2 Decontamination Plan

Equipment (e.g., drill rigs, sampling equipment, etc.) will be decontaminated as necessary prior to exiting the Site. Decontamination will consist of physically removing residual contaminated soil from the equipment using steam cleaning/pressure washing methods. A temporary decontamination pad will be constructed in accordance with standard remedial investigation practices (e.g., poly lined work area). Decontamination fluids will be collected, sampled and disposed accordingly of as IDW.

4.11.3 Citizen Participation Plan

This RIWP, along with a Fact Sheet approved by NYSDEC that describes the upcoming remedial action, will be placed in the document repository for the Site. The Fact Sheet will also be mailed to the entities provided on the Site Contact List presented in the Citizen Participation Plan prior to the start of the remedial action at the Site.

5.0 REPORT PREPARATION

5.1 Remedial Investigation Report

Data obtained during the field investigations identified in this scope of work will be compiled, evaluated, and summarized. A Remedial Investigation Report will then be prepared following completion of the remedial investigation and receipt of analytical data. This report will document remedial investigation activities specified in this work plan, as well as the nature and extent of the contamination identified at the Site during remedial investigation activities. Groundwater flow direction will be documented from water level measurements. Chemical analytical results for soil and groundwater will be compared to 6 NYCRR Part 375 guidelines for various potential future land uses and State of New York Class GA water quality standards respectively. A brief summary of relevant results from prior site investigations will also be included.

5.2 Feasibility Study Report

Pending results of the remedial investigation, the feasibility study will address the areas of the site where concentrations in the impacted media are elevated due to past site activities. Soil and groundwater cleanup objectives are contaminant-specific remedial action objectives for soil based on a site's current, intended, or reasonably anticipated future use as defined in 6 NYCRR Subpart 375-6 ranging from unrestricted use to commercial use.

The feasibility study will address the areas of the site where CPOIs in soil and groundwater exceed the applicable statewide standards, criteria and guidance. The feasibility study will also include an evaluation of the pre-release conditions, contaminants identified from the remedial investigation and their potential for vapor intrusion into future buildings.

Feasibility study documentation will be prepared in accordance with DER-10 focusing on table summaries of engineering analyses. Remedial alternatives to be assessed are anticipated to include no action, source area excavation, and cap and cover. Potential future land uses to be assessed for excavation will range from commercial to unrestricted use. The Feasibility Study report will include cost estimates with a level of detail appropriate for a feasibility study (not construction contractor cost estimates). Recommendations for follow-up work prior to remediation, if any, will also be included.

6.0 SCHEDULE

Work will begin following the approval of the Scope of Work by NYSDEC and completing of access agreements and additional preparatory tasks. The schedule for the work described herein is estimated below assuming no significant delays due to uncontrollable circumstances. Each consecutive task will begin after completion of the preceding.

Item	Estimated Completion
Drilling and Sampling Field Work Planning and Implementation	7 weeks
Lab Analyses of RI Samples	6 weeks after completion of all field investigation activities
Engineer Evaluation and Validation of RI Data	6 weeks after completion and delivery of laboratory data
Draft RI Report	12 weeks of completion of data evaluation and validation
Draft FS Report	1 year from RI Report completion

7.0 REFERENCES

NES, Inc. Final Project for the Decontamination and Release of the Bausch & Lomb Batch Room, Bausch & Lomb, Rochester, New York. 23 pp. January 1995.

Report of Suntru Street Radiological Survey Performed for Bausch and Lomb December 11 and 12, 2006

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NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation (May 2010).

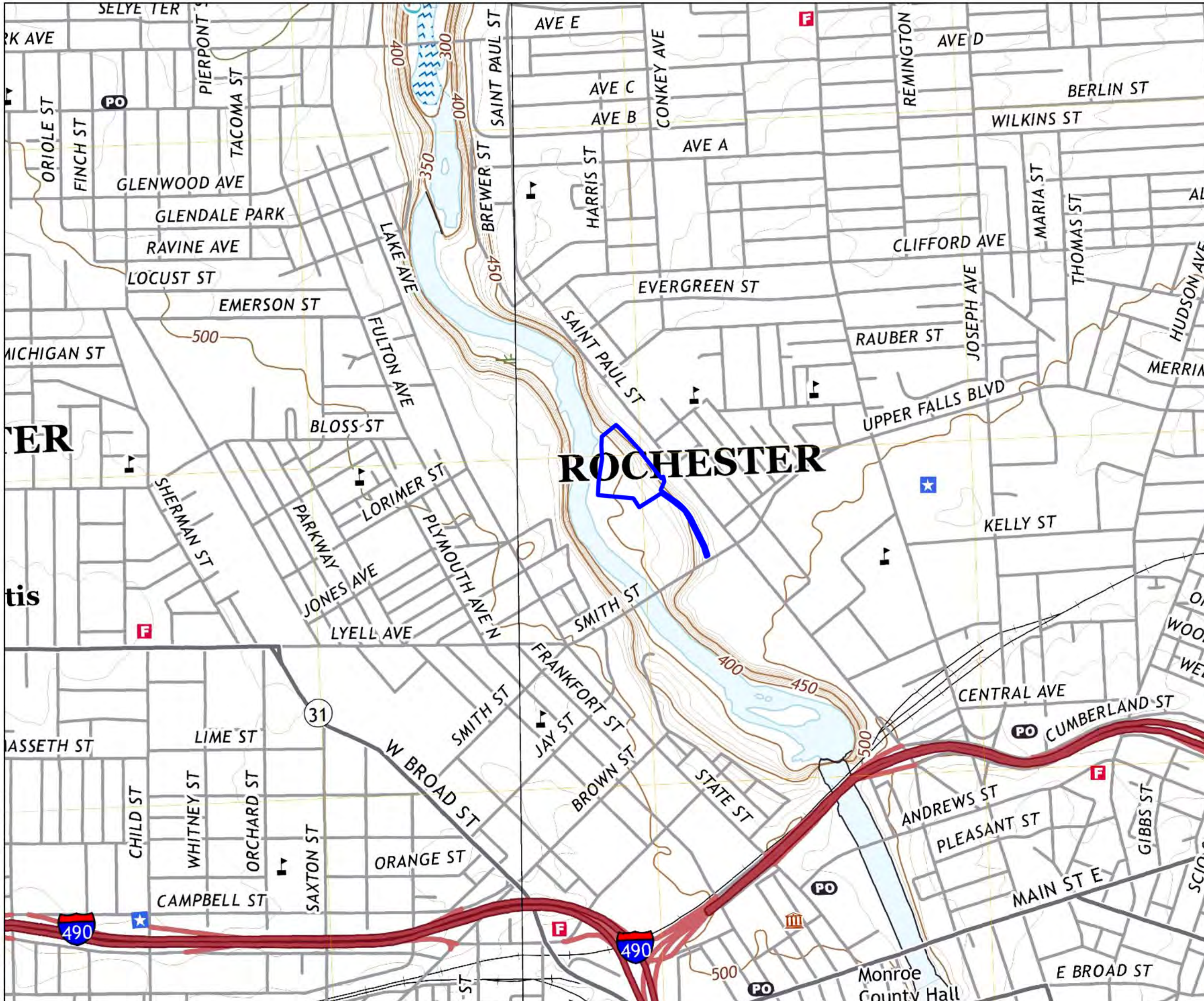
NYSDEC DER-31 Green Remediation. (August 2010).

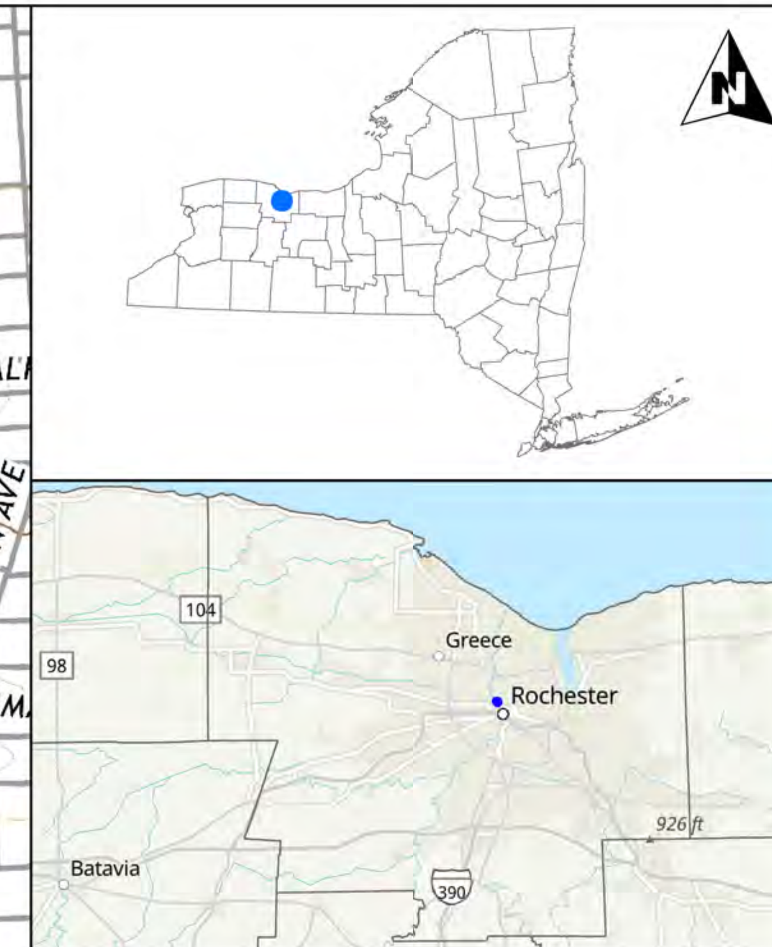
NYSDEC Record of Decision, RG&E – East Station, State Superfund Project, Rochester, Monroe County, Site No. 828204 (June 2022)

NYSDEC. 2023. Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs. April.

S2C2. 2011. Phase II Site Characterization Report. August.

FIGURES





Property Boundary

Notes:
USGS Quadrangle: Rochester East, NY (2019), Rochester West, NY (2019).

0 1,000 2,000 Feet

Figure 1

Bausch + Lomb
Former Glass Plant - Suntru Street Site
NYSDEC Site No. C828225
Rochester, NY

USGS Quad Map
with Site Boundary

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 * 315-451-9560

Plotted By:
Plot Date: 9/9/2024

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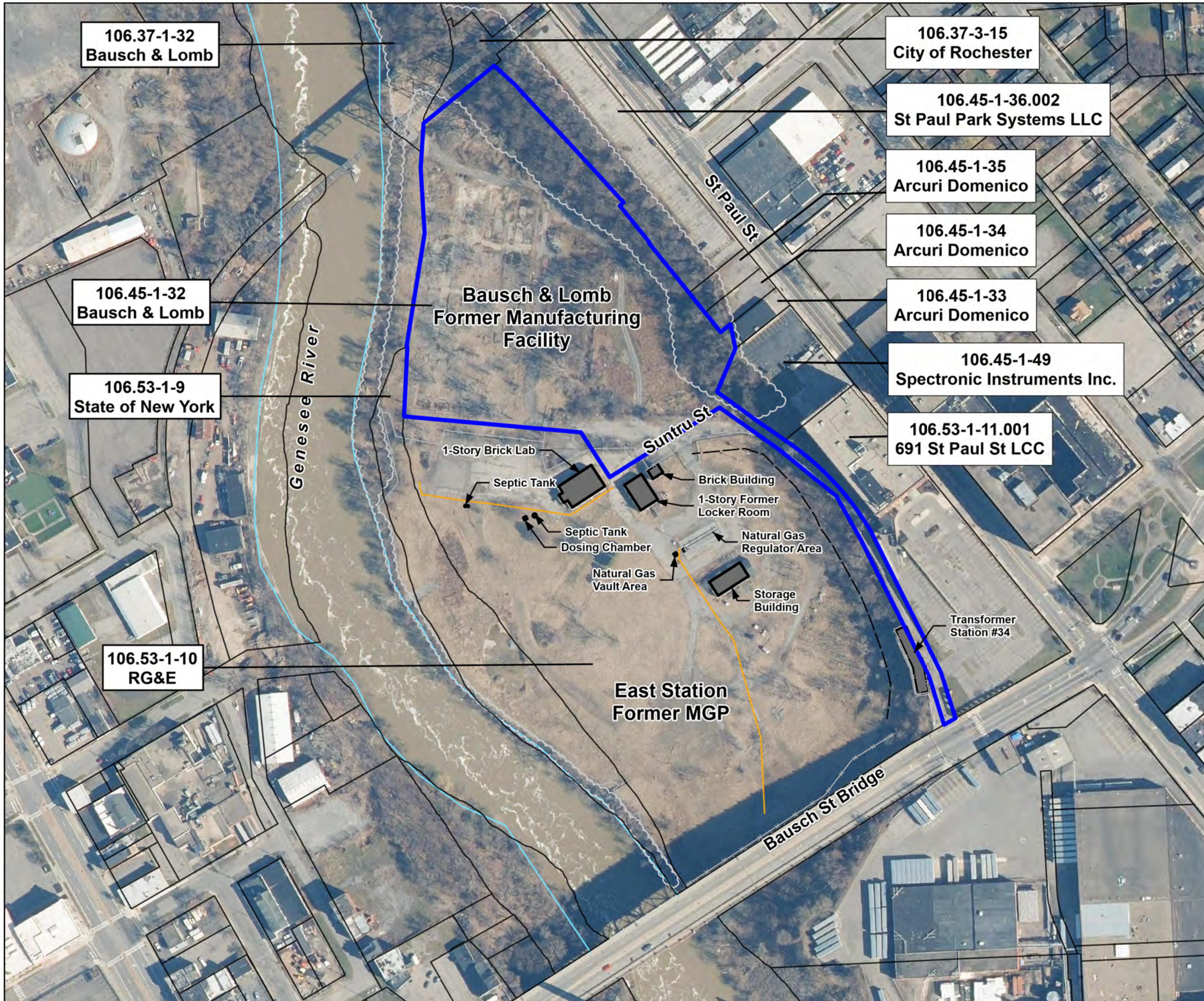

River Bank
Existing Fence
Existing Tree Line
Existing Gas Line
Toe of Slope
Existing Building
Property Boundary
Tax ID
Owner
Tax Parcel Boundary

Notes:
1) Parcel Boundaries and Ownership Information obtained from City of Rochester Tax Parcel Records.

0 200 400 600 Feet

Figure 2

Bausch + Lomb
Former Glass Plant - Suntru Street Site
NYSDEC Site No. C828225
Rochester, NY

Site Boundary and
Neighboring Properties

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 * 315-451-9560

Plot Date: 9/9/2024 Plotted By:

Document Path: \nysyr04fs01\Projects\Bausch and Lomb\GIS\BL Suntru St.aprx

Notes:

1) Parcel Boundaries obtained from City of Rochester Tax Parcel Records.
2) All information shown was collected using the NYSDEC Environmental Resource Mapper and NHD Linear Hydrography.
3) Genesee River is a Class (B) stream.
4) No New York State Regulated Wetlands, Adjacent Areas, or Checkzones are located within the plan view.

Figure 3

Bausch + Lomb
Former Glass Plant - Suntru Street Site
NYSDEC Site No. C828225
Rochester, NY

NYSDEC Environmental Resources Map

PARSONS

301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 * 315-451-9560

Plotted By:

Plot Date: 9/9/2024

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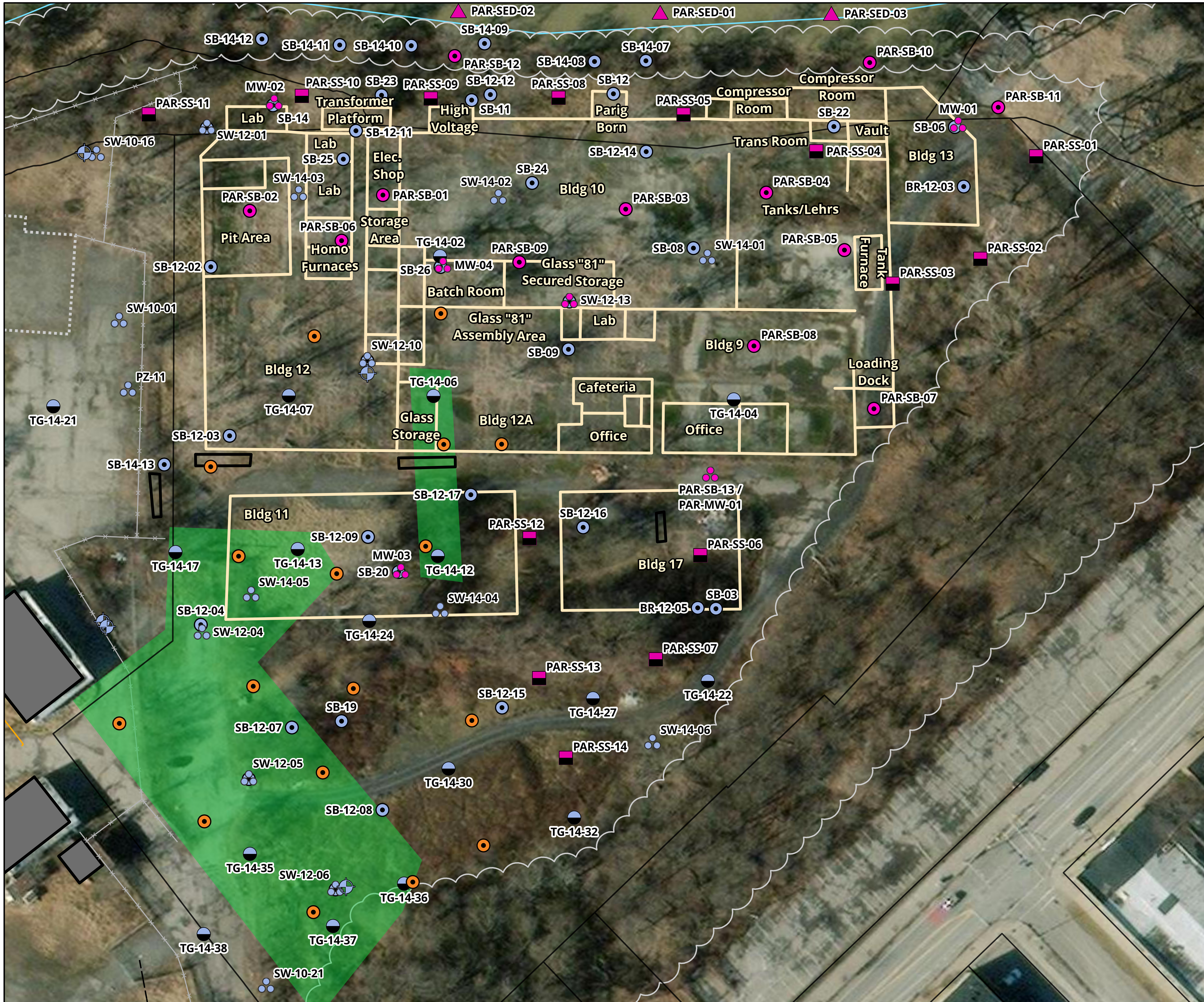
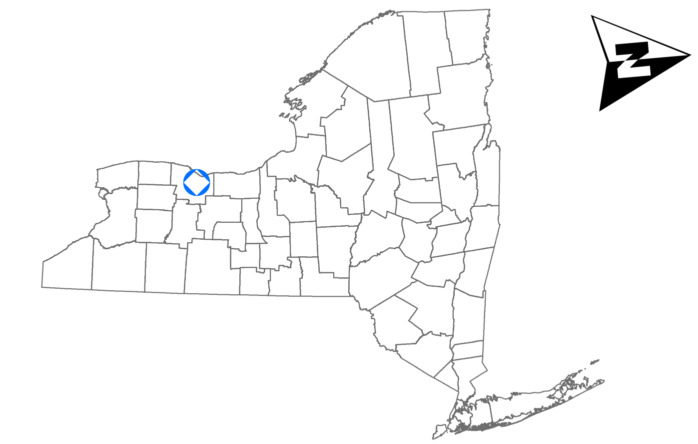




River Bank
Toe of Slope
Existing Tree Line
Existing Fence
Property Boundary
Building Layout
Off-Site Excavation (Note 2)
Proposed Co-Located RGE/B+L Soil Boring Location
Proposed B+L Soil Boring Location
Proposed B+L Surface Soil / Existing Cover Soil Location
Proposed Overburden Well Location
Proposed Sediment Location

Historical Sample Location

Bedrock Monitoring Well Location
Overburden Well Location
TargOST Location
Soil Boring Location
Test Pit Location

Notes:
1) Parcel Boundaries obtained from City of Rochester Tax Parcel Records.
2) Limits of Excavation shown are those proposed in the Record of Decision.

0 50 100 150 200 Feet

Figure 4A

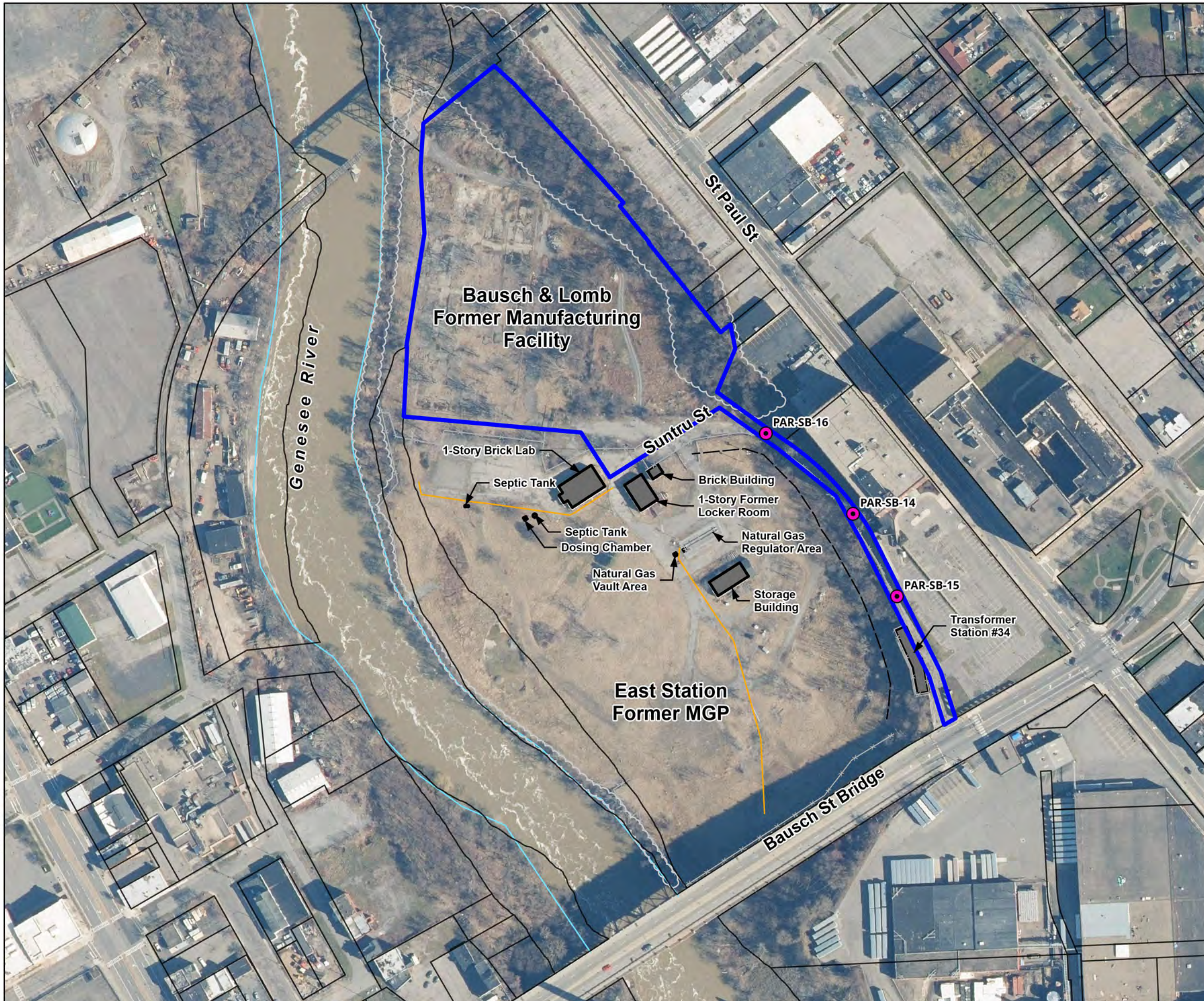
Bausch + Lomb
Former Glass Plant - Suntru Street Site
NYSDEC Site No. C828225
Rochester, NY

Historical and Proposed Sampling Locations - Main Site

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 * 315-451-9560

Plot Date: 11/18/2024
Plotted By:

Document Path: \nysyr04fs01\Projects\Bausch and Lomb\GIS\BL Suntru St.aprx



River Bank
Existing Tree Line
Toe of Slope
Existing Fence
Existing Gas Line
Existing Building
Property Boundary
Proposed B+L Soil Boring Location

Notes:
1) Parcel Boundaries obtained from City of Rochester.

0 200 400 600 Feet

Figure 4B

Bausch + Lomb
Former Glass Plant - Suntru Street Site
NYSDEC Site No. C828225
Rochester, NY

Proposed Sampling Locations -Suntru Street

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 * 315-451-9560

Plotted By:
Plot Date: 9/10/2024

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TABLES

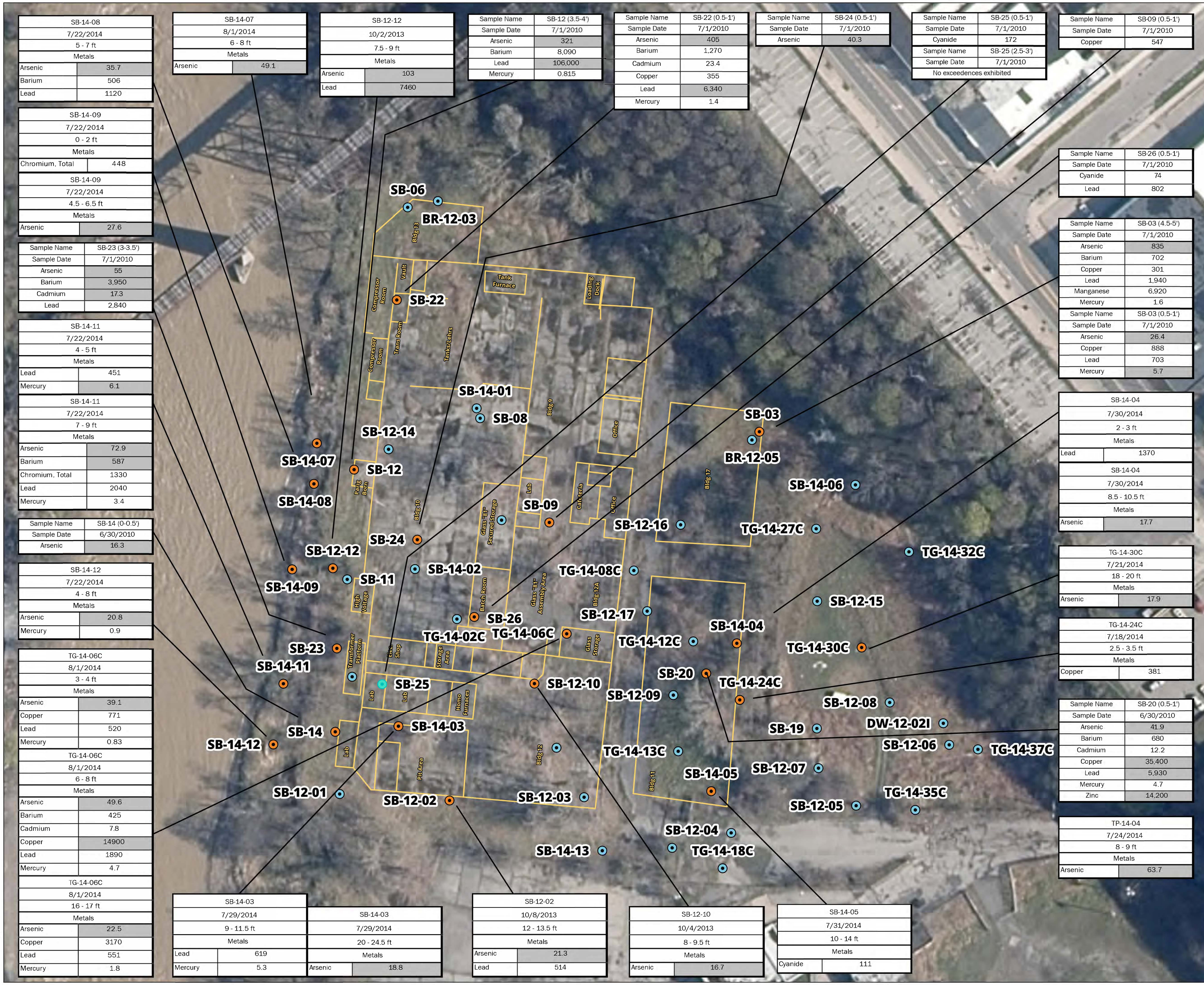
Table 1
Remedial Investigation Sample Summary
Former Glass Plant - Suntru Street Site

Location or Sample ID	Total Depth (ft)	Latitude	Longitude	Analytical Sample Depth (ft)- from workplan	Matrix	TAL Metals (6010/7471)	TCL SVOCs/ TICs (8270D)	1,4 Dioxane (8270D)	Cyanide (9014)	TCL VOCs/ TICs (8260C)	Chromium (Tri and Hex) (7196)	Mercury (7471)	PFAS (1633)	PCBs - 8082	Pesticides (8081)	Herbicides (8151)
PAR-SS-01	24"	43.170235	-77.621999	0.0-2.0	Soil	x	x		x	x	x	x		x		
PAR-SS-02	24"	43.170109	-77.621747	0.0-2.0	Soil	x	x	x	x	x	x	x	x	x	x	x
PAR-SS-03	24"	43.169937	-77.621704	0.0-2.0	Soil	x	x		x	x	x	x		x		
PAR-SS-04	24"	43.169817	-77.622069	0.0-2.0	Soil	x	x		x	x	x	x		x		
PAR-SS-05	24"	43.169571	-77.622199	0.0-2.0	Soil	x	x		x	x	x	x		x		
PAR-SS-06	24"	43.16952	-77.621046	0.0-2.0	Soil	x	x	x	x	x	x	x	x	x	x	x
PAR-SS-07	24"	43.169415	-77.620787	0.0-2.0	Soil	x	x		x	x	x	x		x		
PAR-SS-08	24"	43.169335	-77.622274	0.0-2.0	Soil	x	x		x	x	x	x		x		
PAR-SS-09	24"	43.169092	-77.622305	0.0-2.0	Soil	x	x		x	x	x	x		x		
PAR-SS-10	24"	43.168847	-77.622345	0.0-2.0	Soil	x	x		x	x	x	x		x		
PAR-SS-11	24"	43.168551	-77.622336	0.0-2.0	Soil	x	x		x	x	x	x		x		
PAR-SS-12	24"	43.169197	-77.621135	0.0-2.0	Soil	x	x		x	x	x	x		x		
PAR-SS-13	24"	43.169189	-77.620768	0.0-2.0	Soil	x	x	x	x	x	x	x	x	x	x	x
PAR-SS-14	24"	43.169225	-77.620553	0.0-2.0	Soil	x	x		x	x	x	x		x		
PAR-SED-01	TBD	43.169545	-77.622471	TBD	Soil	x	x		x	x	x	x		x		
PAR-SED-02	TBD	43.169161	-77.622527	TBD	Soil	x	x		x	x	x	x		x		
PAR-SED-03	TBD	43.169871	-77.622424	TBD	Soil	x	x		x	x	x	x		x		
PAR-SB-01	To Bedrock	43.169045	-77.621790	TBD	Soil	x	x		x	x	x	x		x		
PAR-SB-02	To Bedrock	43.168788	-77.621783	TBD	Soil	x	x		x	x	x	x		x		
PAR-SB-03	To Bedrock	43.169505	-77.621691	TBD	Soil	x	x	x	x	x	x	x	x	x	x	x
PAR-SB-04	To Bedrock	43.169776	-77.621698	TBD	Soil	x	x		x	x	x	x		x		
PAR-SB-05	To Bedrock	43.169914	-77.621528	TBD	Soil	x	x		x	x	x	x		x		
PAR-SB-06	To Bedrock	43.168957	-77.621682	TBD	Soil	x	x		x	x	x	x		x		
PAR-SB-07	To Bedrock	43.16994	-77.621107	TBD	Soil	x	x	x	x	x	x	x	x	x	x	x
PAR-SB-08	To Bedrock	43.169723	-77.62130	TBD	Soil	x	x		x	x	x	x		x		
PAR-SB-09	To Bedrock	43.169292	-77.621580	TBD	Soil	x	x		x	x	x	x		x		
PAR-SB-10	To Bedrock	43.169997	-77.622010	TBD	Soil	x	x		x	x	x	x		x		
PAR-SB-11	To Bedrock	43.170234	-77.621860	TBD	Soil	x	x	x	x	x	x	x	x	x	x	x
PAR-SB-12	To Bedrock	43.169208	-77.622133	TBD	Soil	x	x		x	x	x	x		x		
PAR-SB-13	To Bedrock	43.169554	-77.621252	TBD	Soil	x	x		x	x	x	x		x		
PAR-SB-14	To Bedrock	43.168101	-77.618666	TBD	Soil	x	x		x	x	x	x		x		
PAR-SB-15	To Bedrock	43.167648	-77.618346	TBD	Soil	x	x	x	x	x	x	x	x	x	x	x
PAR-SB-16	To Bedrock	43.168544	-77.619307	TBD	Soil	x	x		x	x	x	x		x		
MW-01	-	43.170092	-77.622099	-	GW	x	x	x	x	x	x	x	x	x	x	x
MW-02	-	43.168792	-77.622333	-	GW	x	x	x	x	x	x	x	x	x	x	x
MW-03	-	43.168946	-77.621079	-	GW	x	x	x	x	x	x	x	x	x	x	x
MW-04	-	43.169084	-77.621865	-	GW	x	x		x	x	x	x		x		
SW-12-13	-	43.169318	-77.621741	-	GW	x	x		x	x	x	x		x		
PAR-MW-01	-	43.169554	-77.621252	-	GW	x	x		x	x	x	x		x		

Note: Based on field conditions, up to 4 samples will be collected from each proposed Soil Boring location.

Notes: 1.) An additional 6 surface soil samples may be collected to fill data gaps pending what is encountered in the field. If additional samples are collected, a portion of these additional samples will be sent for 1,4 Dioxane, PFAS, Pesticides and Herbicide analysis to reach the 20% requirement.

APPENDIX A HISTORICAL SAMPLING DATA – SUMMARY EXCEEDANCES



SB-14-08	
7/22/2014	
5 - 7 ft	
Metals	
Arsenic	35.7
Barium	506
Lead	1120

SB-14-09	
7/22/2014	
0 - 2 ft	
Metals	
Chromium, Total	448

SB-14-09	
7/22/2014	
4.5 - 6.5 ft	
Metals	
Arsenic	27.6

Sample Name	SB-23 (3-3.5')
Sample Date	7/1/2010
Arsenic	55
Barium	3,950
Cadmium	17.3
Lead	2,840

SB-14-11	
7/22/2014	
4 - 5 ft	
Metals	
Lead	451
Mercury	6.1

SB-14-11	
7/22/2014	
7 - 9 ft	
Metals	
Arsenic	72.9
Barium	587
Chromium, Total	1330
Lead	2040
Mercury	3.4

Sample Name	SB-14 (0-0.5')
Sample Date	6/30/2010
Arsenic	16.3

SB-14-12	
7/22/2014	
4 - 8 ft	
Metals	
Arsenic	20.8
Mercury	0.9

TG-14-06C	
8/1/2014	
3 - 4 ft	
Metals	
Arsenic	39.1
Copper	771
Lead	520
Mercury	0.83

TG-14-06C	
8/1/2014	
6 - 8 ft	
Metals	
Arsenic	49.6
Barium	425
Cadmium	7.8
Copper	14900
Lead	1890
Mercury	4.7

TG-14-06C	
8/1/2014	
16 - 17 ft	
Metals	
Arsenic	22.5
Copper	3170
Lead	551
Mercury	1.8

SB-14-07	
8/1/2014	
6 - 8 ft	
Metals	
Arsenic	49.1

SB-12-12	
10/2/2013	
7.5 - 9 ft	
Metals	
Arsenic	103
Lead	7460

Sample Name	SB-12 (3.5-4')
Sample Date	7/1/2010
Arsenic	321
Barium	8,090
Lead	106,000
Mercury	0.815

Sample Name	SB-22 (0.5-1')
Sample Date	7/1/2010
Arsenic	405
Barium	1,270
Cadmium	23.4
Copper	355
Lead	6,340
Mercury	1.4

Sample Name	SB-24 (0.5-1')
Sample Date	7/1/2010
Arsenic	40.3

Sample Name	SB-25 (0.5-1')
Sample Date	7/1/2010
Cyanide	172
Sample Name	SB-25 (2.5-3')
Sample Date	7/1/2010
No exceedences exhibited	

Sample Name	SB-09 (0.5-1')
Sample Date	7/1/2010
Copper	547

Sample Name	SB-26 (0.5-1')
Sample Date	7/1/2010
Cyanide	74
Lead	802

Sample Name	SB-03 (4.5-5')
Sample Date	7/1/2010
Arsenic	835
Barium	702
Copper	301
Lead	1,940
Manganese	6,920
Mercury	1.6
Sample Name	SB-03 (0.5-1')
Sample Date	7/1/2010
Arsenic	26.4
Copper	888
Lead	703
Mercury	5.7

SB-14-04	
7/30/2014	
2 - 3 ft	
Metals	
Lead	1370

SB-14-04	
7/30/2014	
8.5 - 10.5 ft	
Metals	
Arsenic	17.7

TG-14-30C	
7/21/2014	
18 - 20 ft	
Metals	
Arsenic	17.9

TG-14-24C	
7/18/2014	
2.5 - 3.5 ft	
Metals	
Copper	381

Sample Name	SB-20 (0.5-1')
Sample Date	6/30/2010
Arsenic	41.9
Barium	680
Cadmium	12.2
Copper	35,400
Lead	5,930
Mercury	4.7
Zinc	14,200

TP-14-04	
7/24/2014	
8 - 9 ft	
Metals	
Arsenic	63.7

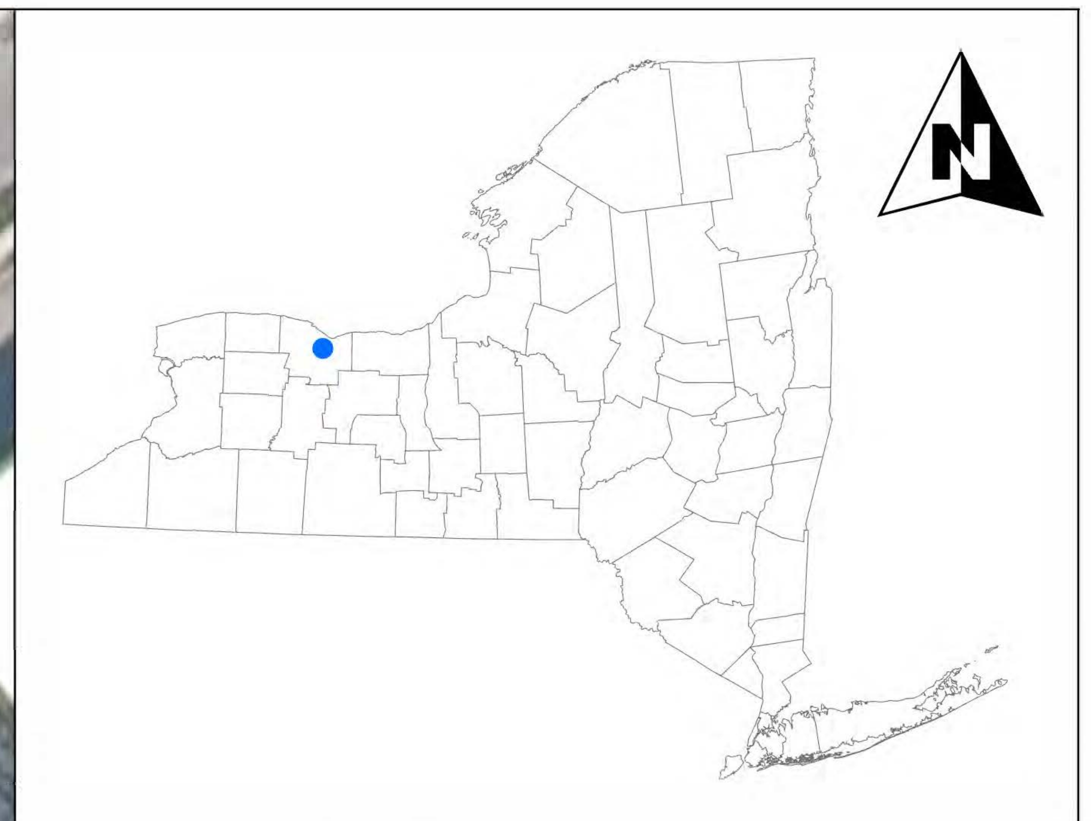
SB-14-03	
7/29/2014	
9 - 11.5 ft	
Metals	
Lead	619
Mercury	5.3

SB-14-03	
7/29/2014	
20 - 24.5 ft	
Metals	
Arsenic	18.8

SB-12-02	
10/8/2013	
12 - 13.5 ft	
Metals	
Arsenic	21.3
Lead	514

SB-12-10	
10/4/2013	
8 - 9.5 ft	
Metals	
Arsenic	16.7

SB-14-05	
7/31/2014	
10 - 14 ft	
Metals	
Cyanide	111



Soil Boring Location

Soil Boring Location with No Metal Exceedances Exhibited

Chemical Name	NYSDEC PART 375 INDUSTRIAL SCOs	NYSDEC PART 375 RESTRICTED RESIDENTIAL SCOs
Metals/Inorganics (mg/kg)		
Arsenic	16	16
Barium	10000	400
Cadmium	60	4.3
Chromium, Total	6800	180
Copper	10000	270
Cyanide	10000	27
Lead	3900	400
Manganese	10000	2000
Mercury	5.7	0.81
Zinc	10000	10000

Notes:
1) All concentrations are shown in milligrams per kilogram (mg/kg)
2) Only results exceeding restricted residential and/or industrial soil cleanup objectives (SCOs) as defined by 6 NYCRR Part 375 (NYSDEC 2006) are presented on this figure. Results exceeding industrial SCOs are shaded gray.

0 100 200 Feet

Figure A-1

Bausch + Lomb
Former Glass Plant - Suntru Street Site
NYSDEC No. 828225
Rochester, NY

Historical Soil Sample Data - Metals / Inorganics

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 * 315-451-9560

Plotted By:

Plot Date: 8/9/2023

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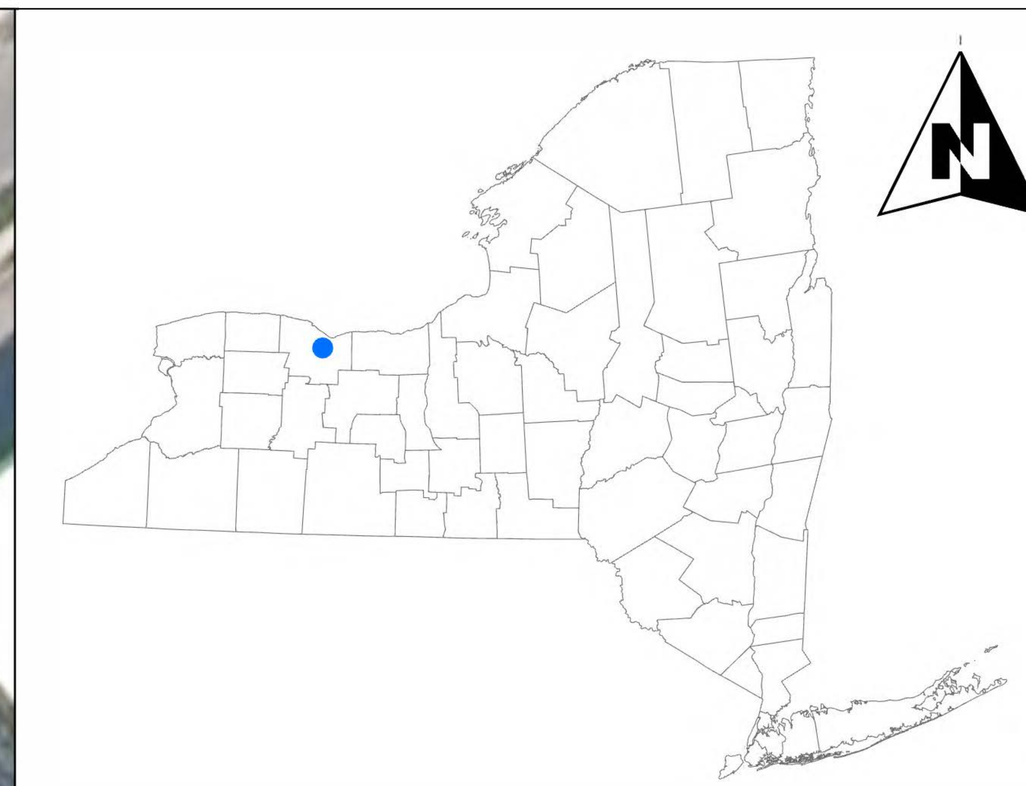
Sample Name Sample Date	SB-19 (0.5-1') 7/1/2010
Polychlorinated Biphenyls	
Aroclor 1260	1.6
Total PCBs	1.6



Soil Boring Locations

Soil Boring Locations with No PCB Exceedances Exhibited

Chemical Name	NYSDEC PART 375 INDUSTRIAL SCOs	NYSDEC PART 375 RESTRICTED RESIDENTIAL SCOs
Polychlorinated Biphenyls (mg/kg)		
Total PCBs	25	1

Notes:
1) All concentrations are shown in milligrams per kilogram (mg/kg)
2) Only results exceeding restricted residential and/or industrial soil cleanup objectives (SCOs) as defined by 6 NYCRR Part 375 (NYSDEC 2006) are presented on this figure. Results exceeding industrial SCOs are shaded gray.

0 100 200 Feet

Figure A-2

Bausch + Lomb
Former **G**lass **P**lant - **S**untru **S**treet **S**ite
NY**SDEC** No. **828225**
Rochester, NY

Historical Soil Sample Data - Polychlorinated Biphenyls

PARSONS

301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 * 315-451-9560

P lotted By :

P lot Da te: 8/7/2023

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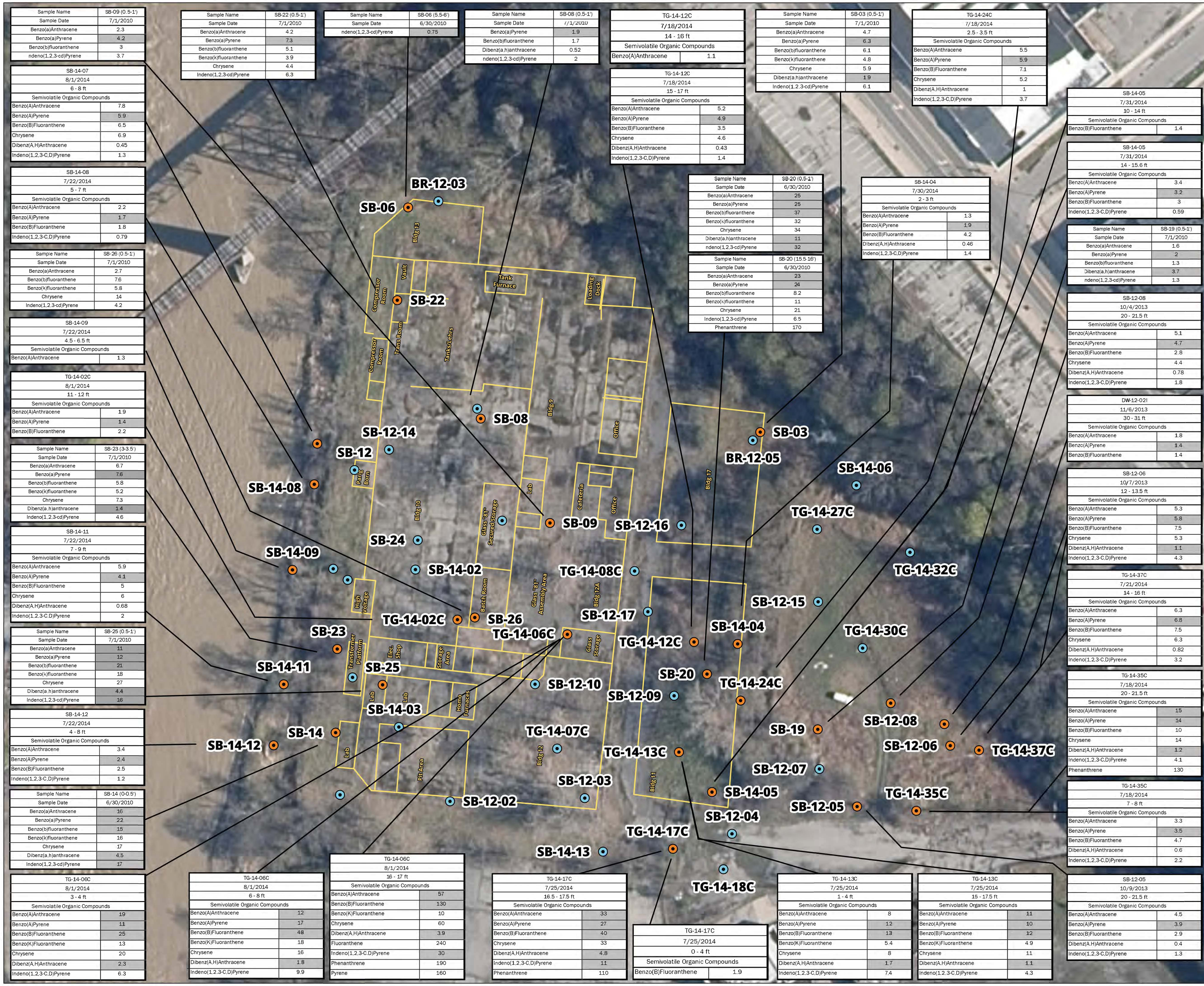


Sample Name	SB-09 (0.5-1')
Sample Date	7/1/2010
Benzo(a)Anthracene	2.3
Benzo(a)Pyrene	4.2
Benzo(b)fluoranthene	3
ndeno(1,2,3-cd)Pyrene	3.7

SB-14-07	
8/1/2014	
6 - 8 ft	
Semivolatile Organic Compounds	
Benzo(A)Anthracene	7.8
Benzo(A)Pyrene	5.9
Benzo(B)Fluoranthene	6.5
Chrysene	6.9
Dibenz(A,H)Anthracene	0.45
Indeno(1,2,3-C,D)Pyrene	1.3

SB-14-08	
7/22/2014	
5 - 7 ft	
Semivolatile Organic Compounds	
Benzo(A)Anthracene	2.2
Benzo(A)Pyrene	1.7
Benzo(B)Fluoranthene	1.8
Indeno(1,2,3-C,D)Pyrene	0.79

Sample Name	SB-26 (0.5-1')
Sample Date	7/1/2010
Benzo(a)Anthracene	2.7
Benzo(b)fluoranthene	7.6
Benzo(k)fluoranthene	5.8
Chrysene	14
Indeno(1,2,3-cd)Pyrene	4.2

SB-14-09	
7/22/2014	
4.5 - 6.5 ft	
Semivolatile Organic Compounds	
Benzo(A)Anthracene	1.3

TG-14-02C	
8/1/2014	
11 - 12 ft	
Semivolatile Organic Compounds	
Benzo(A)Anthracene	1.9
Benzo(A)Pyrene	1.4
Benzo(B)Fluoranthene	2.2

Sample Name	SB-23 (3-3.5')
Sample Date	7/1/2010
Benzo(a)Anthracene	6.7
Benzo(a)Pyrene	7.6
Benzo(b)fluoranthene	5.8
Benzo(k)fluoranthene	5.2
Chrysene	7.3
Dibenz(a,h)anthracene	1.4
Indeno(1,2,3-cd)Pyrene	4.6

SB-14-11	
7/22/2014	
7 - 9 ft	
Semivolatile Organic Compounds	
Benzo(A)Anthracene	5.9
Benzo(A)Pyrene	4.1
Benzo(B)Fluoranthene	5
Chrysene	6
Dibenz(A,H)Anthracene	0.68
Indeno(1,2,3-C,D)Pyrene	2

Sample Name	SB-25 (0.5-1')
Sample Date	7/1/2010
Benzo(a)Anthracene	11
Benzo(a)Pyrene	12
Benzo(b)fluoranthene	21
Benzo(k)fluoranthene	18
Chrysene	27
Dibenz(a,h)anthracene	4.4
Indeno(1,2,3-cd)Pyrene	16

SB-14-12	
7/22/2014	
4 - 8 ft	
Semivolatile Organic Compounds	
Benzo(A)Anthracene	3.4
Benzo(A)Pyrene	2.4
Benzo(B)Fluoranthene	2.5
Indeno(1,2,3-C,D)Pyrene	1.2

Sample Name	SB-14 (0-0.5')
Sample Date	6/30/2010
Benzo(a)Anthracene	16
Benzo(a)Pyrene	22
Benzo(b)fluoranthene	15
Benzo(k)fluoranthene	16
Chrysene	17
Dibenz(a,h)anthracene	4.5
Indeno(1,2,3-cd)Pyrene	17

TG-14-06C	
8/1/2014	
3 - 4 ft	
Semivolatile Organic Compounds	
Benzo(A)Anthracene	19
Benzo(A)Pyrene	11
Benzo(B)Fluoranthene	25
Benzo(K)Fluoranthene	13
Chrysene	20
Dibenz(A,H)Anthracene	2.3
Indeno(1,2,3-C,D)Pyrene	6.3

Sample Name	SB-22 (0.5-1')
Sample Date	7/1/2010
Benzo(a)Anthracene	4.2
Benzo(a)Pyrene	7.3
Benzo(b)fluoranthene	5.1
Benzo(k)fluoranthene	3.9
Chrysene	4.4
Indeno(1,2,3-cd)Pyrene	6.3

Sample Name	SB-06 (5.5-6')
Sample Date	6/30/2010
ndeno(1,2,3-cd)Pyrene	0.75

Sample Name	SB-08 (0.5-1')
Sample Date	7/1/2010
Benzo(a)Pyrene	1.9
Benzo(b)fluoranthene	1.7
Dibenz(a,h)anthracene	0.52
ndeno(1,2,3-cd)Pyrene	2

TG-14-12C	
7/18/2014	
14 - 16 ft	
Semivolatile Organic Compounds	
Benzo(A)Anthracene	1.1

TG-14-12C	
7/18/2014	
15 - 17 ft	
Semivolatile Organic Compounds	
Benzo(A)Anthracene	5.2
Benzo(A)Pyrene	4.9
Benzo(B)Fluoranthene	3.5
Chrysene	4.6
Dibenz(A,H)Anthracene	0.43
Indeno(1,2,3-C,D)Pyrene	1.4

Sample Name	SB-03 (0.5-1')
Sample Date	7/1/2010
Benzo(a)Anthracene	4.7
Benzo(a)Pyrene	6.3
Benzo(b)fluoranthene	6.1
Benzo(k)fluoranthene	4.8
Chrysene	5.9
Dibenz(a,h)anthracene	1.9
Indeno(1,2,3-cd)Pyrene	6.1

TG-14-24C	
7/18/2014	
2.5 - 3.5 ft	
Semivolatile Organic Compounds	
Benzo(A)Anthracene	5.5
Benzo(A)Pyrene	5.9
Benzo(B)Fluoranthene	7.1
Chrysene	5.2
Dibenz(A,H)Anthracene	1
Indeno(1,2,3-C,D)Pyrene	3.7

Sample Name	SB-20 (0.5-1')
Sample Date	6/30/2010
Benzo(a)Anthracene	25
Benzo(a)Pyrene	25
Benzo(b)fluoranthene	37
Benzo(k)fluoranthene	32
Chrysene	34
Dibenz(a,h)anthracene	11
ndeno(1,2,3-cd)Pyrene	32

Sample Name	SB-20 (15.5-16')
Sample Date	6/30/2010
Benzo(a)Anthracene	23
Benzo(a)Pyrene	24
Benzo(b)fluoranthene	8.2
Benzo(k)fluoranthene	11
Chrysene	21
Indeno(1,2,3-cd)Pyrene	6.5
Phenanthrene	170

SB-14-04	
7/30/2014	
2 - 3 ft	
Semivolatile Organic Compounds	
Benzo(A)Anthracene	1.3
Benzo(A)Pyrene	1.9
Benzo(B)Fluoranthene	4.2
Dibenz(A,H)Anthracene	0.46
Indeno(1,2,3-C,D)Pyrene	1.4

SB-14-05	
7/31/2014	
10 - 14 ft	
Semivolatile Organic Compounds	
Benzo(B)Fluoranthene	1.4

SB-14-05	
7/31/2014	
14 - 15.6 ft	
Semivolatile Organic Compounds	
Benzo(A)Anthracene	3.4
Benzo(A)Pyrene	3.2
Benzo(B)Fluoranthene	3
Indeno(1,2,3-C,D)Pyrene	0.59

Sample Name	SB-19 (0.5-1')
Sample Date	7/1/2010
Benzo(a)Anthracene	1.6
Benzo(a)Pyrene	2
Benzo(b)fluoranthene	1.3
Dibenz(a,h)anthracene	3.7
ndeno(1,2,3-cd)Pyrene	1.3

SB-12-08	
10/4/2013	
20 - 21.5 ft	
Semivolatile Organic Compounds	
Benzo(A)Anthracene	5.1
Benzo(A)Pyrene	4.7
Benzo(B)Fluoranthene	2.8
Chrysene	4.4
Dibenz(A,H)Anthracene	0.78
Indeno(1,2,3-C,D)Pyrene	1.8

DW-12-02I	
11/6/2013	
30 - 31 ft	
Semivolatile Organic Compounds	
Benzo(A)Anthracene	1.8
Benzo(A)Pyrene	1.4
Benzo(B)Fluoranthene	1.4

SB-12-06	
10/7/2013	
12 - 13.5 ft	
Semivolatile Organic Compounds	
Benzo(A)Anthracene	5.3
Benzo(A)Pyrene	5.8
Benzo(B)Fluoranthene	7.5
Chrysene	5.3
Dibenz(A,H)Anthracene	1.1
Indeno(1,2,3-C,D)Pyrene	4.3

TG-14-37C	
7/21/2014	
14 - 16 ft	
Semivolatile Organic Compounds	
Benzo(A)Anthracene	6.3
Benzo(A)Pyrene	6.8
Benzo(B)Fluoranthene	7.5
Chrysene	6.3
Dibenz(A,H)Anthracene	0.82
Indeno(1,2,3-C,D)Pyrene	3.2

TG-14-35C	
7/18/2014	
20 - 21.5 ft	
Semivolatile Organic Compounds	
Benzo(A)Anthracene	15
Benzo(A)Pyrene	14
Benzo(B)Fluoranthene	10
Chrysene	14
Dibenz(A,H)Anthracene	1.2
Indeno(1,2,3-C,D)Pyrene	4.1
Phenanthrene	130

TG-14-35C	
7/18/2014	
7 - 8 ft	
Semivolatile Organic Compounds	
Benzo(A)Anthracene	3.3
Benzo(A)Pyrene	3.5
Benzo(B)Fluoranthene	4.7
Dibenz(A,H)Anthracene	0.6
Indeno(1,2,3-C,D)Pyrene	2.2

SB-12-05	
10/9/2013	
20 - 21.5 ft	
Semivolatile Organic Compounds	
Benzo(A)Anthracene	4.5
Benzo(A)Pyrene	3.9
Benzo(B)Fluoranthene	2.9
Dibenz(A,H)Anthracene	0.4
Indeno(1,2,3-C,D)Pyrene	1.3

TG-14-06C	
8/1/2014	
6 - 8 ft	
Semivolatile Organic Compounds	
Benzo(A)Anthracene	12
Benzo(A)Pyrene	17
Benzo(B)Fluoranthene	48
Benzo(K)Fluoranthene	18
Chrysene	16
Dibenz(A,H)Anthracene	1.8
Indeno(1,2,3-C,D)Pyrene	9.9

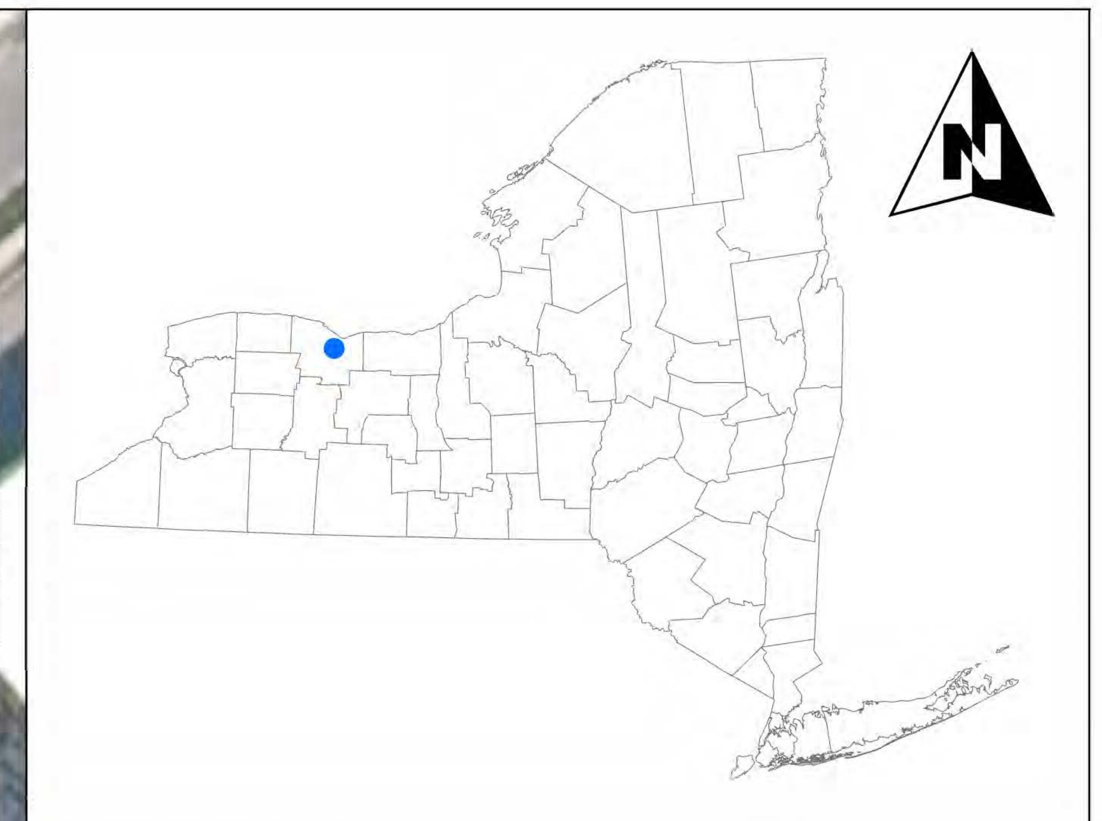
TG-14-06C	
8/1/2014	
16 - 17 ft	
Semivolatile Organic Compounds	
Benzo(A)Anthracene	57
Benzo(B)Fluoranthene	130
Benzo(K)Fluoranthene	10
Chrysene	60
Dibenz(A,H)Anthracene	3.9
Fluoranthene	240
Indeno(1,2,3-C,D)Pyrene	30
Phenanthrene	190
Pyrene	160

TG-14-17C	
7/25/2014	
16.5 - 17.5 ft	
Semivolatile Organic Compounds	
Benzo(A)Anthracene	33
Benzo(A)Pyrene	27
Benzo(B)Fluoranthene	40
Chrysene	33
Dibenz(A,H)Anthracene	4.8
Indeno(1,2,3-C,D)Pyrene	11
Phenanthrene	110

TG-14-17C	
7/25/2014	
0 - 4 ft	
Semivolatile Organic Compounds	
Benzo(B)Fluoranthene	1.9

TG-14-13C	
7/25/2014	
1 - 4 ft	
Semivolatile Organic Compounds	
Benzo(A)Anthracene	8
Benzo(A)Pyrene	12
Benzo(B)Fluoranthene	13
Benzo(K)Fluoranthene	5.4
Chrysene	8
Dibenz(A,H)Anthracene	1.7
Indeno(1,2,3-C,D)Pyrene	7.4

TG-14-13C	
7/25/2014	
15 - 17.5 ft	
Semivolatile Organic Compounds	
Benzo(A)Anthracene	11
Benzo(A)Pyrene	10
Benzo(B)Fluoranthene	12
Benzo(K)Fluoranthene	4.9
Chrysene	11
Dibenz(A,H)Anthracene	1.1
Indeno(1,2,3-C,D)Pyrene	4.3



Soil Boring Location

Soil Boring Location with No SVOC Exceedances Exhibited

Chemical Name	NYSDEC PART 375 INDUSTRIAL SCOs	NYSDEC PART 375 RESTRICTED RESIDENTIAL SCOs
Semivolatile Organic Compounds (mg/kg)		
2-Methylphenol (O-Cresol)	1000	100
4-Methylphenol (P-Cresol)	1000	100
Acenaphthene	1000	100
Acenaphthylene	1000	100
Anthracene	1000	100
Benzo(A)Anthracene	11	1
Benzo(A)Pyrene	1.1	1
Benzo(B)Fluoranthene	11	1
Benzo(G,H,I)Perylene	1000	100
Benzo(K)Fluoranthene	110	3.9
Chrysene	110	3.9
Dibenz(A,H)Anthracene	1.1	0.33
Dibenzofuran	1000	59
Fluoranthene	1000	100
Fluorene	1000	100
Indeno(1,2,3-C,D)Pyrene	11	0.5
Naphthalene	1000	100
Phenanthrene	1000	100
Phenol	1000	100
Pyrene	1000	100

Notes:

1) All concentrations are shown in milligrams per kilogram (mg/kg)

2) Only results exceeding restricted residential and/or industrial soil cleanup objectives (SCOs) as defined by 6 NYCRR Part 375 (NYSDEC 2006) are presented on this figure. Results exceeding industrial SCOs are shaded gray.

0 100 200 Feet

Figure A-3

Bausch + Lomb
Former Glass Plant - Suntru Street Site
NYSDEC No. 828225
Rochester, NY

Historical Soil Sample Data - Semivolatile Organic Compounds

PARSONS

301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 * 315-451-9560

Plotted By:

Plot Date: 8/10/2023

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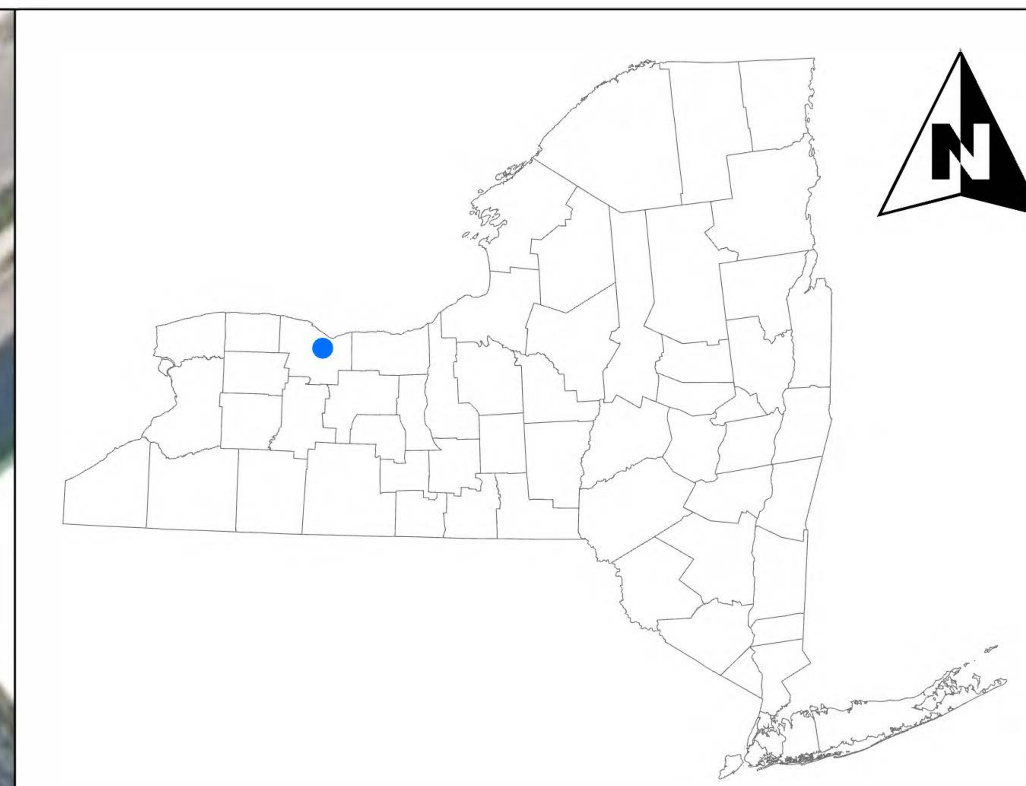

Soil Boring Location with No VOC Exceedances Exhibited

Chemical Name	NYSDEC PART 375 INDUSTRIAL SCOs	NYSDEC PART 375 RESTRICTED RESIDENTIAL SCOs
Volatile Organic Compounds (mg/kg)		
1,2,4-Trimethylbenzene	380	52
Benzene	89	4.8
Ethylbenzene	780	41
O-Xylene (1,2-Dimethylbenzene)	1	0.1
Toluene	1000	100
Xylenes	1000	100

Notes:
1) All concentrations are shown in milligrams per kilogram (mg/kg)
2) Only results exceeding restricted residential and/or industrial soil cleanup objectives (SCOs) as defined by 6 NYCRR Part 375 (NYSDEC 2006) are presented on this figure. Results exceeding industrial SCOs are shaded gray.

0 100 200 Feet

Figure A-4

Bausch + Lomb
Former Glass Plant - Suntru Street Site
NYSDEC No. 828225
Rochester, NY

Historical Soil Sample Data - Volatile Organic Compounds

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 * 315-451-9560

Plot Date: 8/7/2023 Plotted By:

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Sample Name	SED-AB
Sample Date	8/24/2010
Semi-Volatile Organic Compounds	
Benzo(a)Anthracene	13
Benzo(a)Pyrene	15
Benzo(b)fluoranthene	14
Benzo(k)fluoranthene	12
Chrysene	16
Dibenz(a,h)anthracene	3.3
Indeno(1,2,3-cd)Pyrene	11
Metals	
Arsenic	103
Cadmium	5.9
Lead	984

Sample Name	SED-C
Sample Date	8/24/2010
Semi-Volatile Organic Compounds	
Benzo(a)Anthracene	15
Benzo(a)Pyrene	15
Benzo(b)fluoranthene	12
Benzo(k)fluoranthene	11
Chrysene	16
Dibenz(a,h)anthracene	3.1
Indeno(1,2,3-cd)Pyrene	8.6

Sample Name	SED-E*
Sample Date	8/24/2010
Semi-Volatile Organic Compounds	
Benzo(a)Pyrene	9.4
Benzo(k)fluoranthene	6.3
Chrysene	11
Dibenz(a,h)anthracene	1.8
Hexachlorobenzene	2.4
Indeno(1,2,3-cd)Pyrene	5.4
Polychlorinated Biphenyls	
Aroclor-1248	1.8
Aroclor-1254	1.4
Total PCBs	3.2
Metals	
Arsenic	105
Barium	432
Cadmium	10.7
Chromium (Total)	1,150
Copper	471
Lead	573

Sample Name	SED-F
Sample Date	8/24/2010
Semi-Volatile Organic Compounds	
Benzo(a)Pyrene	1.6
Indeno(1,2,3-cd)Pyrene	1.3
Metals	
Arsenic	56.4
Barium	1,500
Copper	558
Lead	2,150
Silver	461

Sample Name	SED-I*
Sample Date	8/24/2010
Metals	
Arsenic	58
Cadmium	63.3
Copper	1,490
Lead	654

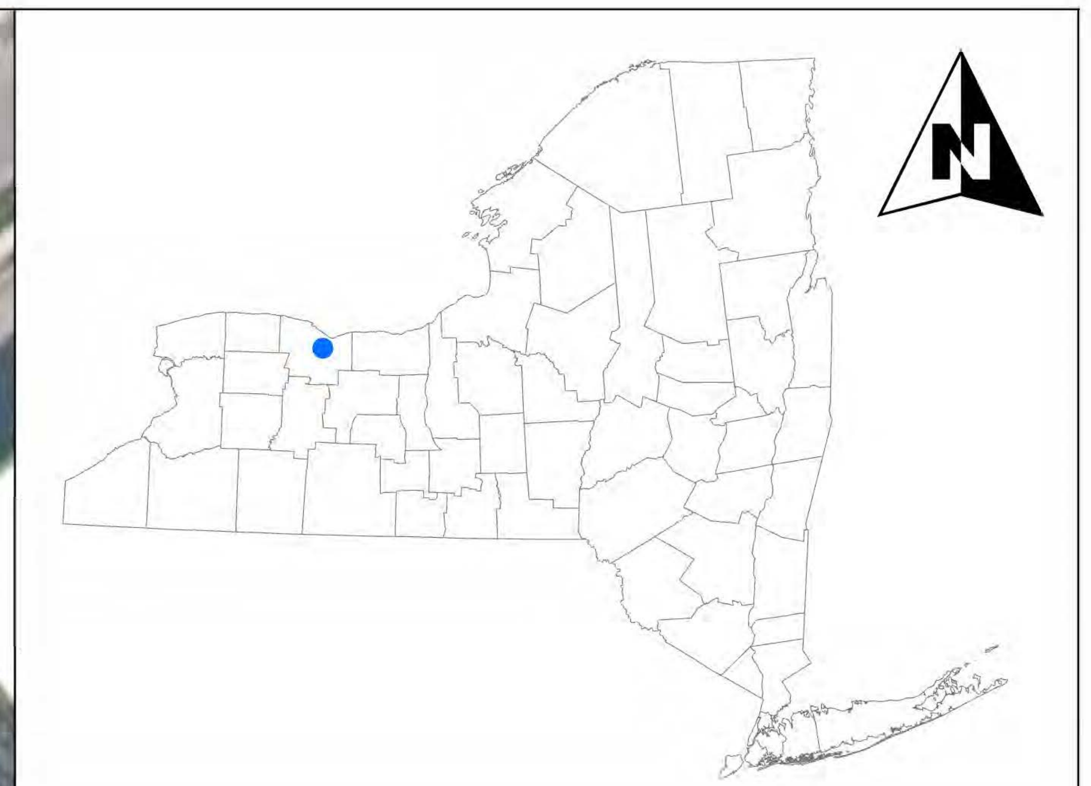
Sample Name	SED-L
Sample Date	8/24/2010
Semi-Volatile Organic Compounds	
Benzo(a)Anthracene	2.6
Benzo(a)Pyrene	3.4
Benzo(b)fluoranthene	2.8
Dibenz(a,h)anthracene	0.77
Indeno(1,2,3-cd)Pyrene	2.4
Metals	
Arsenic	20.2
Lead	529

Chemical Name	NYSDEC PART 375 INDUSTRIAL SCOs	NYSDEC PART 375 RESTRICTED RESIDENTIAL SCOs
Metals/Inorganics (mg/kg)		
Arsenic	16	16
Barium	10000	400
Cadmium	60	4.3
Chromium, Total	6800	180
Copper	10000	270
Cyanide	10000	27
Lead	3900	400
Manganese	10000	2000
Mercury	5.7	0.81
Zinc	10000	10000

Chemical Name	NYSDEC PART 375 INDUSTRIAL SCOs	NYSDEC PART 375 RESTRICTED RESIDENTIAL SCOs
Polychlorinated Biphenyls (mg/kg)		
Total PCBs	25	1

Chemical Name	NYSDEC PART 375 INDUSTRIAL SCOs	NYSDEC PART 375 RESTRICTED RESIDENTIAL SCOs
Semivolatile Organic Compounds (mg/kg)		
2-Methylphenol (O-Cresol)	1000	100
4-Methylphenol (P-Cresol)	1000	100
Acenaphthene	1000	100
Acenaphthylene	1000	100
Anthracene	1000	100
Benzo(A)Anthracene	11	1
Benzo(A)Pyrene	1.1	1
Benzo(B)Fluoranthene	11	1
Benzo(G,H,I)Perylene	1000	100
Benzo(K)Fluoranthene	110	3.9
Chrysene	110	3.9
Dibenz(A,H)Anthracene	1.1	0.33
Dibenzofuran	1000	59
Fluoranthene	1000	100
Fluorene	1000	100
Indeno(1,2,3-C,D)Pyrene	11	0.5
Naphthalene	1000	100
Phenanthrene	1000	100
Phenol	1000	100
Pyrene	1000	100

Chemical Name	NYSDEC PART 375 INDUSTRIAL SCOs	NYSDEC PART 375 RESTRICTED RESIDENTIAL SCOs
Volatile Organic Compounds (mg/kg)		
1,2,4-Trimethylbenzene	380	52
Benzene	89	4.8
Ethylbenzene	780	41
O-Xylene (1,2-Dimethylbenzene)	1	0.1
Toluene	1000	100
Xylenes	1000	100



Soil Boring Location

Notes:
1) All concentrations are shown in milligrams per kilogram (mg/kg)
2) Only results exceeding restricted residential and/or industrial soil cleanup objectives (SCOs) as defined by 6 NYCRR Part 375 (NYSDEC 2006) are presented on this figure. Results exceeding industrial SCOs are shaded gray.

0 100 200 Feet

Figure A-5

Bausch + Lomb
Former Glass Plant - Suntru Street Site
NYSDEC No. 828225
Rochester, NY

Historical Soil Terrace Sample Data

PARSONS

301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 * 315-451-9560

Plot Date: 8/7/2023 Plotted By:

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APPENDIX B RG&E EAST STATION ROD

RECORD OF DECISION

RGE - East Station
State Superfund Project
Rochester, Monroe County
Site No. 828204
June 2022

Prepared by
Division of Environmental Remediation
New York State Department of Environmental Conservation

DECLARATION STATEMENT - RECORD OF DECISION

RGE - East Station
State Superfund Project
Rochester, Monroe County
Site No. 828204
June 2022

Statement of Purpose and Basis

This document presents the remedy for the RGE - East Station site a Class A site. The remedial program was chosen in accordance with the New York State Environmental Conservation Law and Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York (6 NYCRR) Part 375 and, is not inconsistent with the National Oil and Hazardous Substances Pollution Contingency Plan of March 8, 1990 (40CFR300), as amended.

This decision is based on the Administrative Record of the New York State Department of Environmental Conservation (the Department) for the RGE - East Station site and the public's input to the proposed remedy presented by the Department. A listing of the documents included as a part of the Administrative Record is included in Appendix B of the ROD.

Description of Selected Remedy

The elements of the selected remedy are as follows:

1. Remedial Design

A remedial design program will be implemented to provide the details necessary for the construction, operation, optimization, maintenance, and monitoring of the remedial program. Green remediation principles and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per DER-31. The major green remediation components are as follows:

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
- Reducing direct and indirect greenhouse gases and other emissions;
- Increasing energy efficiency and minimizing use of non-renewable energy;
- Conserving and efficiently managing resources and materials;
- Reducing waste, increasing recycling, and increasing reuse of materials which will otherwise be considered a waste;
- Maximizing habitat value and creating habitat when possible;
- Fostering green and healthy communities and working landscapes which balance ecological, economic, and social goals;
- Integrating the remedy with the end use where possible and encouraging green and sustainable re-development; and

- Additionally, to incorporate green remediation principles and techniques to the extent feasible in the future development at this site, any future on-site buildings will include, at a minimum, a 20-mil vapor barrier/waterproofing membrane on the foundation to improve energy efficiency as an element of construction.

2. Excavation

Excavation and off-site disposal of contaminant source areas, including:

- grossly contaminated soil, as defined in 6 NYCRR Part 375-1.2(u);
- soil exceeding the 6 NYCRR Part 371 hazardous criteria for lead;
- concentrated solid or semi-solid hazardous substances per 6 NYCRR Part 375-1.2(au)(1)
- soil with visual waste material or non-aqueous phase liquid;
- soil containing total SVOCs exceeding 500 ppm;
- soils which exceed the protection of groundwater soil cleanup objectives (PGWSCOs), as defined by 6 NYCRR Part 375-6.8 for those contaminants found in site groundwater above standards; and
- soils that create a nuisance condition, as defined in Commissioner Policy CP-51 Section G.

Excavations will be conducted to various depths of up to approximately 30 feet below ground surface (bgs) or to competent bedrock, as feasible at the former MGP site, and up to 24 feet bgs at the B&L property adjacent to and north of the site or to competent bedrock, as feasible. The excavation will remove the former purifier waste area, the former light oil plant, a former gas holder, other underground structures, residual MGP wastes and near-river soil (soil between the ISS wall and the sediment). Lateral earth support and excavation dewatering will be required at the former MGP site and B&L property off-site to the north of the site. A pre-design investigation will be conducted to confirm the footprint of NAPL and other MGP impacts in the near-river soil and sediment areas.

Approximately 33,400 cu yd of off-site MGP-impacted soil and 299,500 cu yd of on-site MGP-impacted soil will be excavated. The upper 10 ft of surface and subsurface soil from the former MGP site (approximately 251,600 cu yd) will be stockpiled on-site for potential reuse. Prior to reuse on-site, stockpiled soil will be analyzed to confirm compliance with 6 NYCRR 375-6.7 (d), Commissioner Policy-51 (CP-51), DER-10 Section 5.4(e) and with Department concurrence. On- and off-site soil deemed unacceptable for reuse will be transported off-site for disposal or may be evaluated in the remedial design for on-site thermal treatment. The site will be re-graded to accommodate installation of a cover system as described in remedy element 5 outside of the near-river soils footprint.

For the near-river soils, the pre-design investigation will confirm the presence of MGP contamination (including NAPL) and confirm continued impact on the river prior to remediation. Removals will be conducted only where MGP contamination (including NAPL) is present and influencing the river with the goal of preserving the bank topography and vegetation where possible.

On-site soil which does not exceed the protection of groundwater SCOs (PGWSCOs) may be used below the cover system described in remedy element 5 to backfill the excavation.

Clean fill meeting lower of RRSCOs and PGWSCOs per 6 NYCRR Part 375-6.7(d) will be brought in on-site to replace the excavated soil or complete the backfilling of the excavation and establish the designed grades on-site. Clean fill meeting UUSCOs will be brought in to replace excavated soil on the B&L off-site property.

Following a pre-design investigation, sediment which contains MGP NAPL impacts and is above sediment PAH Class C SGV, will be removed from the Genesee River. This is currently predicted to be excavation and off-site disposal/thermal treatment of approximately 2,500 cubic yards (cy) of impacted sediment.

A restoration plan for the Genesee Riverbed and banks will be completed with the goal of restoring the stream bed, banks, and floodplain in-kind to the extent possible using natural stream restoration/bioengineering design principles and with the goal of re-establishing habitat function. The design will include a monitoring plan for areas disturbed by the remedy and all activities will be consistent with the requirements of 6 NYCRR Part 608.

3. NAPL Recovery

Installation and operation of NAPL, petroleum or coal tar recovery wells to remove potentially mobile petroleum or coal tar from the subsurface. The number, depth, type and spacing of the recovery wells will be determined during the design phase of the remedy. Petroleum or coal tar will be collected periodically from each well; however, if wells are determined by the Department to accumulate large quantities of NAPL, petroleum or coal tar over extended time periods, they can be converted to automated collection system.

4. Monitored Natural Attenuation

Groundwater contamination (remaining after active remediation) will be addressed with monitored natural attenuation (MNA). Groundwater will be monitored for site related contamination and also for MNA indicators which will provide an understanding of the (biological activity) breaking down the remaining contamination. It is anticipated that contaminant concentrations will decrease steadily over a reasonable period of time. Reports of the attenuation will be provided periodically in accordance with the monitoring and reporting requirements in the site management plan, and additional active remediation will be evaluated if it appears that natural processes alone will not address the remaining groundwater contamination. The contingency remedial action will depend on the information collected, but it is currently anticipated that oxygen injection will be the expected contingency remedial action.

5. Cover System

An on-site cover will be required to allow for restricted residential use of the site, which includes anticipated active recreation, where the upper two feet of exposed surface soil exceed the restricted residential use SCOs. Where a soil cover is to be used it will be a minimum of two feet of soil placed over a demarcation layer, with the upper six inches of soil of sufficient quality to maintain a vegetative layer. In near-river soils, the upper 2 ft will be sufficient quality to maintain a vegetative layer and the demarcation layer will not include any fabric. Soil cover material, including any fill material brought to the site, will meet the SCOs for cover material for the use of the site as set forth in 6 NYCRR Part 375-6.7(d). Substitution of other materials and components may be allowed where such components already exist or are a component of the tangible property to be placed as part of site redevelopment. Such components may include, but are not necessarily limited to pavement, concrete, paved surface parking areas, sidewalks, building foundations and building slabs. Off-site, a soil cover will not be required since the backfill shall meet unrestricted use SCOs.

Where the soil cover is required over the ISS treatment area, it will consist of a minimum of four feet of soil with the top two feet meeting the SCOs for restricted residential (active recreational) use. For areas where solidified material underlies the cover, the solidified material itself will serve as the demarcation layer due to the nature of the material. A cover system will not be used on the banks or within the floodplain of the Genesee River because ecological SCOs will be met through excavation and backfill.

6. Institutional Control

Imposition of an institutional control in the form of an environmental easement for the controlled property which will:

- require the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3);
- allow the use and development of the controlled property for restricted residential, uses as defined by Part 375-1.8(g), although land use is subject to local zoning laws;
- restrict the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDOH or County; and
- require compliance with the Department-approved Site Management Plan.

7. Site Management Plan

An SMP is required, which includes the following:

a. An Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary to ensure the following institutional and/or engineering controls remain in place and effective:

Institutional Controls:

- The Environmental Easement discussed in Element 6 above.

Engineering Controls:

- The soil cover noted in Element 5 above.
- The IRMs discussed in Section 6.2, above, including the ISS barrier wall, slurry wall, NAPL collection trench; and NAPL monitoring/recovery wells in Element 3.

This plan includes, but may not be limited to:

- an Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination on the former MGP site;
- descriptions of the provisions of the environmental easement including any land use, and groundwater use restrictions;
- a provision should redevelopment occur to ensure no soil exceeding protection of groundwater concentrations will remain below storm water retention basin or infiltration structures;
- a provision for evaluation of the potential for soil vapor intrusion for any buildings developed on site, and in off-site areas with site-related contamination, including provision for implementing actions recommended to address exposures related to soil vapor intrusion;
- a provision that should a building foundation or building slab on the former MGP site be removed in the future, a cover system consistent with that described in Remedial Element 5 above will be placed in any areas where the upper two feet of exposed surface soil exceed the applicable soil cleanup objectives (SCOs);
- provisions for the management and inspection of the identified engineering controls;
- maintaining site access controls and Department notification; and
- the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.

b. A Monitoring and Maintenance Plan to assess the performance and effectiveness of the remedy. The plan includes, but may not be limited to:

- monitoring of groundwater to assess the performance and effectiveness of the remedy;
- periodic NAPL monitoring and recovery, and recovery well maintenance, as appropriate;
- monitoring and maintenance of the cover system to assess the performance and effectiveness of the remedy, erosion, settlement, or other disturbances;
- monitoring of the riverbank to assess for NAPL seeps into sediment or the river, with contingencies to address this condition, as appropriate;
- a contingent technology if MNA is not proven effective in the long-term;
- a schedule of monitoring, maintenance, and frequency of submittals to the Department;
- monitoring for vapor intrusion for any buildings developed on the site, and in off-site areas with site-related contamination, as may be required by the Institutional and Engineering Control Plan discussed above; and
- monitoring of remedial restoration success and repair actions, as needed.

New York State Department of Health Acceptance

The New York State Department of Health (NYSDOH) concurs that the remedy for this site is protective of human health.

Declaration

The selected remedy is protective of human health and the environment, complies with State and Federal requirements that are legally applicable or relevant and appropriate to the remedial action to the extent practicable, and is cost effective. This remedy utilizes permanent solutions and alternative treatment or resource recovery technologies, to the maximum extent practicable, and satisfies the preference for remedies that reduce toxicity, mobility, or volume as a principal element.

June 1, 2022
Date

Andrew Guglielmi
Andrew Guglielmi, Division Director
Division of Environmental Remediation

RECORD OF DECISION

RGE - East Station
Rochester, Monroe County
Site No. 828204
May 2022

SECTION 1: SUMMARY AND PURPOSE

The New York State Department of Environmental Conservation (the Department), in consultation with the New York State Department of Health (NYSDOH), has selected a remedy for the above referenced site. The disposal of hazardous wastes associated with the former manufactured gas plant operations (MGP wastes) at the site has resulted in threats to public health and the environment that will be addressed by the remedy. The disposal or release of hazardous wastes at this site, as more fully described in this document, has contaminated various environmental media. Contaminants include hazardous waste.

The New York State Inactive Hazardous Waste Disposal Site Remedial Program (also known as the State Superfund Program) is an enforcement program, the mission of which is to identify and characterize suspected inactive hazardous waste disposal sites and to investigate and remediate those sites found to pose a significant threat to public health and environment.

The Department has issued this document in accordance with the requirements of New York State Environmental Conservation Law and 6 NYCRR Part 375. This document is a summary of the information that can be found in the site-related reports and documents.

SECTION 2: CITIZEN PARTICIPATION

The Department seeks input from the community on all remedies. A public comment period was held, from March 30, 2022 to April 28, 2022, during which the public was encouraged to submit comments on the proposed remedy. All comments on the remedy received during the comment period were considered by the Department in selecting a remedy for the site. Site-related reports and documents were made available for review by the public at the following document repositories:

DECInfo Locator - Web Application
https://www.dec.ny.gov/data/DecDocs/828204/

Central Library of Rochester and Monroe County
115 South Avenue
Rochester, New York 14604
585-428-7300

A virtual public meeting was also conducted on April 13, 2022. At the meeting, the findings of the remedial investigation (RI) and the feasibility study (FS) were presented along with a summary of the proposed remedy. After the presentation, a question-and-answer period was held, during which verbal or written comments were accepted on the proposed remedy.

Comments on the remedy received during the comment period are summarized and addressed in the responsiveness summary section of the ROD.

Receive Site Citizen Participation Information By Email

Please note that the Department's Division of Environmental Remediation (DER) is "going paperless" relative to citizen participation information. The ultimate goal is to distribute citizen participation information about contaminated sites electronically by way of county email listservs. Information will be distributed for all sites that are being investigated and cleaned up in a particular county under the State Superfund Program, Environmental Restoration Program, Brownfield Cleanup Program and Resource Conservation and Recovery Act Program. We encourage the public to sign up for one or more county listservs at http://www.dec.ny.gov/chemical/61092.html

SECTION 3: SITE DESCRIPTION AND HISTORY

Location: The Rochester Gas and Electric (RG&E) East Station former manufactured gas plant (MGP) site is located in the City of Rochester, Monroe County in an industrial/commercial area. The site is on the eastern bank of the Genesee River, at the foot of Suntru Street, north of the Inner Loop Highway.

Site Features: The site is located within the Genesee River Gorge. The site is relatively flat with the gorge wall rising to the east and the river to the west. The majority of the former MGP site is open space with four RG&E buildings located in the northern portion of the parcel. These buildings are no longer occupied. A high-pressure gas main is located in the central portion of the former MGP site and a natural gas regulator station is located in the northeastern quadrant. The site is approximately 13.4 acres and is bounded to the north by property owned by Bausch & Lomb (B&L), to the west by a 2.25-acre parcel owned by New York State along the Genesee River, to the east by Suntru Street and the gorge wall, and to the south by the Bausch Street Bridge. A beverage brewing facility operates south of the Bausch Street Bridge on the eastern side of the Genesee River. Further east and west lie commercial and industrial properties beyond which are residential properties.

Current Zoning and Land Use: According to the City of Rochester, both the former MGP site and B&L property are zoned M-1 Industrial and the site is vacant except for a natural gas regulating station.

Past Use of the Site: A coal carbonization plant was constructed at the former MGP site in 1872 by Citizen's Gas Works. Coal gas manufacturing at the former MGP site ceased around 1952. A catalytic reforming process was used at the former MGP site from around 1951 until 1976.

Manufactured gas operations ceased at the Former MGP site in 1976. The former MGP had several gas holders and gas manufacturing plant buildings which have since been demolished and the foundations filled in. However, four (4) buildings remain on-site but are neither used nor occupied.

Prior to April 2018 the site was tracked under the Voluntary Cleanup Program as site number V00358.

Site Geology and Hydrogeology: The site is underlain by approximately 10 to 20 feet (ft) of unconsolidated deposits consisting of urban fill materials and the remains of the former MGP, over a discontinuous layer of alluvial deposits. The alluvial deposits beneath the fill material and former MGP structures range in thickness from 1 to 10 ft, where present. Alluvial deposits tend to be thicker along the eastern property boundary and generally become thinner or pinch out in the western portion of the former MGP site.

Overburden soil on the B&L property to the north, is similar. The fill thickness ranges from approximately 20.5 ft in the southeast corner of this property to not present along the Genesee River, where alluvial deposits were observed at the ground surface. The alluvial deposits range in thickness from 32 ft in the southeast corner of the B&L property to 8.5 ft along the Genesee River.

The top of weathered bedrock surface generally slopes gently to the north and west toward the Genesee River. Weathered bedrock consists of rock fragments and gravel with silt and sand approximately 1 to 3 ft in thickness. Weathered bedrock was observed across the upland portions of the former MGP site. Weathered bedrock encountered directly beneath overburden soil consists of the Rochester Shale below the majority of the former MGP site and Irondequoit Limestone below the northwest portion of the former MGP site and the majority of the B&L Property. In total, nine bedrock formations are present beneath the former MGP site and/or B&L property as detailed in the feasibility study (FS).

Overburden groundwater is typically encountered 6 to 20 ft beneath ground surface at the former MGP site. Groundwater elevation contours indicate that the groundwater flow direction is to the west toward the Genesee River. The Genesee River, a Class B waterway, flows south to north past the former MGP site and B&L property, eventually discharging to Lake Ontario to the north.

A site location map is attached as Figure 1, and a map of existing site conditions is attached as Figure 2.

SECTION 4: LAND USE AND PHYSICAL SETTING

The Department may consider the current, intended, and reasonably anticipated future land use of the site and its surroundings when evaluating a remedy for remediation. For this site, alternatives that restrict(s) the use of the site to restricted-residential use which will allow for active recreation use and an alternative which will allow for unrestricted use of the site and any off-site areas subject to remediation.

A comparison of the results of the RI to the appropriate standards, criteria, and guidance values (SCGs) for the identified land use and the unrestricted use SCGs for the site contaminants is included in the Tables for the media being evaluated in Exhibit A.

SECTION 5: ENFORCEMENT STATUS

Potentially Responsible Parties (PRPs) are those who may be legally liable for contamination at a site. This may include past or present owners and operators, waste generators, and haulers.

The PRPs for the site, documented to date, include:

Rochester Gas and Electric Corporation (RG&E)

RGE was subject to a Multi-site Voluntary Cleanup Agreement (VCA) that was executed on April 10, 2003 and subsequently amended and restated on December 23, 2014, Index No. B8-0535-98-07, pertaining to the MGP Sites listed in Table A of Paragraph I (together with appendices and any other modifications and prior agreements or orders related to the listed Sites, and the original Multi-Site VCA).

Due to circumstances unrelated to RGE's performance under the Original 2003 Multi-Site VCA, the Department’s Voluntary Cleanup Program was terminated, necessitating the completion of investigation and remediation pursuant to another legally controlling commitment document that replaces the Original Multi-Site VCA.

RG&E at the request of the Department proposed to further modify, amend and restate the Original Multi-Site VCA as this multi-site order on consent Index Number; CO 8-20180517-48 (together with appendices, and the RG&E Multi-Site Order).

SECTION 6: SITE CONTAMINATION

6.1: Summary of the Remedial Investigation (RI)

A (RI) has been conducted. The purpose of the RI was to define the nature and extent of any contamination resulting from previous activities at the site. The field activities and findings of the investigation are described in the RI Report.

The following general activities are conducted during an RI:

- Research of historical information,
- Geophysical survey to determine the lateral extent of wastes,
- Test pits, soil borings, and monitoring well installations,
- Sampling of waste, surface and subsurface soils, groundwater, and soil vapor,
- Sampling of surface water and sediment,
- Ecological and Human Health Exposure Assessments.

The analytical data collected on this site includes data for:

- groundwater
- soil
- sediment

6.1.1: Standards, Criteria, and Guidance (SCGs)

The remedy must conform to promulgated standards and criteria that are directly applicable or that are relevant and appropriate. The selection of a remedy must also take into consideration guidance, as appropriate. Standards, Criteria and Guidance are hereafter called SCGs.

To determine whether the contaminants identified in various media are present at levels of concern, the data from the RI were compared to media specific SCGs. The Department has developed SCGs for groundwater, surface water, sediments, and soil. The NYSDOH has developed SCGs for drinking water and soil vapor intrusion. The tables found in Exhibit A list the applicable SCGs in the footnotes. For a full listing of all SCGs see: http://www.dec.ny.gov/regulations/61794.html

6.1.2: RI Results

The data have identified contaminants of concern. A "contaminant of concern" is a hazardous waste that is sufficiently present in frequency and concentration in the environment to require evaluation for remedial action. Not all contaminants identified on the property are contaminants of concern. The nature and extent of contamination and environmental media requiring action are summarized in Exhibit A. Additionally, the RI Report contains a full discussion of the data. The contaminant(s) of concern identified at this site are:

arsenic	cyanide
lead	mercury
benzo(a)pyrene	benzo(b)fluoranthene
benzo(g,h,i)perylene	benzo(k)fluoranthene
benzo(a)anthracene	dibenzo(a, h)anthracene
indeno(1,2,3-cd)pyrene	coal tar
benzene, toluene, ethylbenzene, and xylenes (BTEX)	naphthalene
polycyclic aromatic hydrocarbons (PAHs), total	

As illustrated in Exhibit A, the contaminant(s) of concern exceed the applicable SCGs for:

- groundwater
- sediment
- soil

6.2: Interim Remedial Measures

An interim remedial measure (IRM) is conducted at a site when a source of contamination or exposure pathway can be effectively addressed before issuance of the Record of Decision.

The following IRMs have been completed at this site based on conditions observed during the RI.

Tar Well Removal IRM (2004 and 2005):

An IRM to address coal-tar impacts in the Former Tar Well area was performed between 2004 and 2005. The IRM included the removal of approximately 20,000 tons of impacted soil/fill material and the removal of the Former Tar Well structure in the southeastern quadrant of the former MGP site. IRM activities also included the construction of a circular perimeter slurry wall surrounding the tar well, soil excavation immediately outside the tar well to the inside of the slurry wall, and excavation dewatering and off-site disposal of approximately 978,000 gallons of groundwater. IRM activities are described in the "Final Engineering Report for IRM" by URS, Inc. in 2006.

In-Situ Solidification (ISS) IRM with Barrier Wall and Non-Aqueous Phase Liquid (NAPL) Collection System to Mitigate NAPL Seeps (2007 and 2008):

An IRM to mitigate seeps along the Genesee Riverbank was completed in 2007 and 2008 and included ISS of approximately 18,000 cubic yards (cu yd) of soil to immobilize MGP residuals (including NAPL) in the overburden material near the riverbank and the installation of a barrier wall consisting of a slurry wall and NAPL collection trench with 22 NAPL recovery/monitoring wells east of the ISS area. Approximately 27,000 tons of overburden soil containing purifier waste was also removed and transported to an off-site disposal facility. Construction details are described in the "Phase IV Interim Remedial Measure Implementation Report" (Ish, Inc., 2009).

Following completion of the ISS IRM, NAPL and water quality in the ISS recovery wells and bedrock groundwater monitoring wells beneath the ISS columns has been monitored annually. Measurable NAPL thicknesses were found for the first time during the May 2010 monitoring event in recovery well RW-5 (1.35 ft thick dense NAPL [DNAPL] and 0.07 ft thick light NAPL [LNAPL], and in shallow bedrock monitoring wells DW-3R (0.33 ft thick DNAPL) and MW-5R (0.21 ft thick DNAPL) near the former light oil plant area. Recent NAPL measurements completed in October 2020 indicated that DNAPL was present in DW-3R and RW-5 and measurable NAPL was not present in well MW-5R.

6.3: Summary of Environmental Assessment

This section summarizes the assessment of existing and potential future environmental impacts presented by the site. Environmental impacts may include existing and potential future exposure pathways to fish and wildlife receptors, wetlands, groundwater resources, and surface water.

Based upon the resources and pathways identified and the toxicity of the contaminants of ecological concern at this site, a Fish and Wildlife Resources Impact Analysis (FWRIA) was deemed not necessary.

Soil, including soil between the barrier wall and the sediment (near-river soil), groundwater and sediments were analyzed for volatile organic compounds (VOCs), semi-VOCs, metals, polychlorinated biphenyls (PCBs), pesticides and cyanide. No PCBs or pesticides were detected in any media. Based on the investigations conducted to date, the primary contaminants of concern include SVOCs and metals in shallow soils; VOCs, SVOCs and metals in subsurface soils, groundwater, and VOCs and SVOCs in river sediment. Groundwater in several select monitoring wells was additionally analyzed for the emerging contaminants per- and polyfluoroalkyl substances (PFAS) and 1,4-dioxane.

Nature and Extent of Contamination:

<u>On-Site Shallow Soil (0-0.8 feet, below ground surface [bgs]</u>): Several semi-VOCs, including but not limited to polycyclic aromatic hydrocarbons (PAHs), such as benzo(a)pyrene (BAP) (0.44-7.2 parts per million [ppm]) and dibenz(a,h)anthracene (0.42-1.3 ppm) exceeded their respective unrestricted use soil cleanup objectives (UUSCO) and restricted residential soil cleanup objectives (RRSCOs) of 1.0 ppm and 0.33 ppm, respectively. Inorganic analytes (metals) had limited impact on the on-site surface soil, however arsenic notably ranged from 5.4- 169 ppm, exceeding the UUSCO and RRSCO of 13 and 16 ppm, respectively, in three surface soil samples.

<u>On-site Subsurface Soil (below top 0.8 feet, bgs):</u> VOCs, SVOCs and metals, including MGP impacts (NAPL, sheen and staining) were found in on-site subsurface soils. While minor staining was observed in fill material throughout the former MGP site, NAPL and sheen observations were limited to certain areas of the parcel, typically as blebs and stringers within the lower portion of the fill material, alluvial deposits, and/or weathered bedrock. NAPL was typically found in these areas:

- The northeast quadrant of the former MGP site in the vicinity of the former purifier area;
- The southeast quadrant of the former MGP site in the vicinity of the former oil tanks, former tar well; and
- The southwest quadrant and southern portion of the northwest quadrant of the former MGP site in the vicinity of the former light oil plant and along the riverbank west of the ISS area.

Remaining former MGP structures investigated during the RI do not appear to be significant sources of contaminants. Negligible quantities of NAPL were observed, if present at all, in the structures.

On-site subsurface soil samples were collected up to approximately 32 feet bgs. VOCs, such as benzene (non-detect to 370 ppm), toluene (90 ppm - 600 ppm) and xylene (non-detect to 1,100 ppm) exceeded their respective UUSCOs of 0.06 ppm, 0.7 ppm and 0.6 ppm. SVOCs mainly consisting of PAHs such as benzo(a)anthracene (0.011 ppm - 780 ppm), benzo(a) pyrene (0.0048 ppm - 530 ppm) and benzo(b)fluoranthene (0.0093 ppm - 460 ppm) exceeded their respective UUSCOs of 1.0 ppm, 1.0 ppm, and 0.8 ppm respectively, as well as their respective RRSCOs of 1.0ppm, 1.0 ppm and 3.9 ppm. Metals, including arsenic (1.4 ppm - 1,940 ppm) and total cyanide (0.57 ppm - 401 ppm) exceeded their respective UUSCOs of 13 ppm and 27 ppm, and their respective RRSCOs of 16 ppm and 27 ppm. However, soil with higher metals concentrations were generally limited to fill found less than 7 to 25 ft bgs, dependent on location, and do not typically exceed SCOs in the natural alluvial soil. Higher concentrations of total cyanide were typically located in the vicinity of the Former Purifier Area, west of the existing ISS Area adjacent to the Genesee riverbank and along the southern property boundary near the former Light Oil Plant.

Off-site Soil: On the B&L property to the north, MGP-related impacts appear to be limited to the southeast portion of the property, north of the former purifier area at the former MGP site. In the southeast portion of the B&L property, MGP impacts such as sheen and/or NAPL blebs, were observed in overburden soil at depths typically greater than 10 ft bgs. The MGP impacts were typically observed in the overburden soil directly above and within weathered bedrock, as noted below.

In the central portion of the B&L property, petroleum-like odor and sheen are present at and below the water table. These impacts were analyzed and identified as diesel/petroleum-related impacts that appear to be from other sources at the B&L property and their operations. Petroleum-like odor and/or minor sheens were observed in borings completed to the east of the former plant floor slab and in two borings completed along the Genesee River west of the retaining wall. There were also limited exceedances of the 12 ppm UUSCO for naphthalene, with concentrations ranging from 0.025 - 50 ppm.

Similar to the former MGP site, the samples that exceed UUSCOs for SVOCs consist mainly of PAHs including benzo(a)anthracene (0.02 ppm - 57 ppm vs. UUSCO of 1 ppm); benzo(a)pyrene (0.0061 ppm - 27 ppm vs UUSCO of 1 ppm); benzo(b)fluoranthene (0.0065 ppm - 18 ppm vs UUSCO of 0.8 ppm) and chrysene (0.0054 ppm - 60 ppm vs. UUSCO of 1ppm). These PAHs are distributed throughout the fill material in the southern portion of the B&L property and in soil along the Genesee River. The origin of the fill material used at the former B&L property, including fill material observed beneath the floor slab, is unknown and does not appear to be impacted by the former MGP. The use of coal as a fuel source at the former B&L plant, as indicated on Sanborn Maps, may explain ash-like material (ALM) observed in the fill. Residuals from the 1915 fire that destroyed a portion of the former B&L manufacturing facility may also contribute to PAHs in overburden on the B&L property.

Soil exceedances for metals above UUSCOs include arsenic (1.1 ppm - 103 ppm vs. UUSCO of 13 ppm); cadmium 0.035 ppm - 38.3 ppm vs. UUSCO of 2.5 ppm); lead (1.3 ppm - 7,460ppm vs. UUSCO of 63 ppm); barium (10.3 ppm - 8,330 ppm vs. UUSCO of 350 ppm) and mercury (0.0099 ppm - 6.1 ppm vs. UUSCO of 0.18 ppm) are most prevalent in soil borings completed west of the former B&L property plant floor slab. The presence of these metals in soil does not appear to be related to the former MGP operations or MGP waste material. PAHs and metals were also detected in one location completed beneath the B&L property plant floor slab. Additional completed test pits in the vicinity of gas conveyance subsurface pipes on the eastern side of the former plant floor slab found no evidence of past or ongoing release of MGP residuals.

<u>On-site and Off-site Bedrock</u>: MGP-related impacts, including sheens and NAPL, are present in competent bedrock at several discrete depths. NAPL, when present, was typically encountered as blebs and was observed in deep bedrock at five locations as follows:

- BR-10-08 (Reynales Limestone from 68 to 76 ft bgs) and BR-10-07 (Reynales Limestone at 94 ft bgs and Maplewood Shale from 96 to 101 ft bgs) in the southern portion of the Former MGP site;
- BR-10-02 (Maplewood Shale from 86 to 89 ft bgs) on the Former MGP site along the RG&E and B&L Property boundary; and
- BR-12-01 (Reynales Limestone from 63 to 67 ft bgs) and BR-12-02 (Irondequoit Limestone at 37 and 40 ft bgs) in the southern portion of the B&L Property.

A depression in the bedrock surface observed in the southwest corner of the former MGP site did not appear to be collecting and retaining DNAPL, though sheen and trace DNAPL were observed in drilling fluid. Sheen was observed at several locations at discrete depth intervals.

NAPL and sheen were not observed at the Grimsby Sandstone and Queenston Shale interface, or at the top of the Queenston Shale (150 feet to 200 feet bgs), which defines the lower vertical extent of visual/olfactory impacts. The vertical extent of NAPL and sheen appears to be limited to the transmissive features observed in the Grimsby Sandstone and overlying bedrock formations ranging from approximately 72 to 143 feet bgs.

In the vicinity of the three areas of the former MGP site and B&L property where MGP-related NAPL is present in overburden soil, NAPL or sheen is typically observed in shallow bedrock similar to the impacts to the Irondequoit Limestone at BR-10-01 and BR-12-02 (approximately 26 feet, bgs) near the former purifier area. This information suggests that NAPL impacts in the overburden likely migrated downward into bedrock through bedrock fracture and joint features, cross-cutting bedding plane partings, and migrated horizontally along the bedding plane partings.

<u>Overburden Groundwater</u>: Overburden groundwater across the former MGP site exceeds Class GA Water Quality Standards (GWQS) for VOCs (typically benzene, toluene, ethylbenzene, and xylenes [BTEX]), PAHs and several metals including arsenic and total cyanide. Benzene ranged from 0.44 parts per billion (ppb) to 15,000 ppb vs. GWQS of 1 ppb; ethylbenzene ranged from

non-detect to 1,300 ppb vs. GWQS of 5 ppb; toluene ranged from 0.52 ppb to 7,500 ppb vs. GWQS of 5 ppb; and xylenes ranged from 1.5 ppb to 1,400 ppb vs. GWQS of 5 ppb. PAHs such as benzo(a)pyrene ranged from 0.62 ppb to 5.1 ppb vs. GWQS of non-detect. Arsenic ranged from 9.2 ppb to 5,600 ppb vs. GWQS of 25 ppb. Cyanide ranged from 11 ppb to 197,000 ppb vs. GWQS of 200 ppb. Phenol ranged from 11 ppb - 580 ppb vs. GWQS of 1 ppb. VOC and PAH concentrations in groundwater are typically lowest in the northwestern portion of the former MGP site, which generally coincides with the distribution of MGP impacts observed in overburden soil. The presence of NAPL in the subsurface likely contributes to impacts to the overburden groundwater aquifer. Perfluorooctanesulfonic acid (PFOS) was detected in two downgradient wells at 18 and 32 parts per trillion (ppt) exceeding the drinking water maximum contaminant level (MCL) of 10 ppt. Several other PFAS compounds were detected for which there are no guidance values or standards.

NAPL has been measured in overburden monitoring wells in the southwestern portion of the former MGP site in the vicinity of the former light oil plant. However, NAPL has not been detected in passive recovery wells installed in the gravel collection trench west (upgradient) of the ISS area. The absence of NAPL in these recovery wells suggests that NAPL present in overburden soil and highly weathered bedrock is not mobile, or its mobility is severely limited. NAPL volume and mobility were decreased by removing the former tar well contents, which removed the primary NAPL source and the primary source of dissolved phase impacts in the onsite overburden groundwater.

<u>Bedrock Groundwater</u>: MGP-related dissolved-phase constituents in bedrock exceed GWQS for VOCs (typically BTEX and total cyanide in several bedrock monitoring well locations and at varying depth intervals. Benzene ranged from 0.56 ppb to 39,000 ppb vs. GWQS of 1 ppb; toluene ranged from 6.2 ppb to 14,000 ppb vs. GWQS of 5 ppb; ethylbenzene ranged from 1.3 ppb to 4,000 ppb vs. GWQS of 5 ppb and xylenes ranged from 300 ppb to 1,700 ppb vs. (GWQS of 5 ppb). SVOCs such as 2,4-dimethylphenol ranged from 3ppb to 200ppb relative to a GWQS of 1ppb. Cyanide ranged from 8.2 ppb to 2,900 ppb vs. GWQS of 200 ppb. The presence of NAPL and sheen in bedrock is likely the source of dissolved-phase impacts to shallow and deeper bedrock groundwater.

<u>Sediment</u>: NAPL impacts in Genesee River sediment related to former MGP operations appear to be limited to an area along the southern portion of the former MGP site adjacent to the former light oil plant. A discrete area of NAPL blebs was also observed adjacent to the B&L property located approximately 210 ft north (downstream) of the RG&E and B&L property boundary and consisted of VOCs, such as benzene (1.1 ppm - 14 ppm vs. Class A freshwater sediment guidance value (SGV) of 0.53 ppm); ethylbenzene (non-detect to 0.43 ppm vs. SGV of 0.43 ppm; o-xylene (non-detect to 22 ppm vs. SGV of 0.82 ppm; and total xylenes (non-detect to 31 ppm vs. SGV of 0.59 ppm and SVOCs consisting of total PAHs (0.3242 ppm - 859.2 ppm vs. SGV of 4 ppm).

Sediment cores collected during the investigation indicated that sediment thickness was limited in the vicinity of the former light oil plant, with soft sediment thickness ranging from 1 to 3.5 ft in the area where NAPL was observed. Since no apparent immediately upland source of the small area of NAPL observed in sediment adjacent to the B&L property was identified during the RI, the NAPL may have been mobilized and deposited from an upstream source. The NAPL was observed near the top of a 4.5-ft core sample, immediately below a 0.8-ft-thick layer of sandy fluvial deposits. Analytical testing indicated that sediment with the highest PAH concentrations which exceeded the SGV of 4 ppm were co-located with areas of visual and olfactory impacts.

Soil Vapor: A soil vapor investigation was not conducted at the site due to unoccupied buildings.

Special Resources Impacted/Threatened: The site is located adjacent to the Genesee River. In this section the Genesee River is Class B surface water body. Much of the bank is vegetated with trees around the former MGP-related structures. Ecological species potentially affected by the remedy include fish, freshwater mussels, and local birds.

6.4: **Summary of Human Exposure Pathways**

This human exposure assessment identifies ways in which people may be exposed to site-related contaminants. Chemicals can enter the body through three major pathways (breathing, touching or swallowing). This is referred to as *exposure.*

Access to the site is restricted by fencing. For people entering the site, contact with contaminated soil or groundwater is unlikely unless they dig below the ground surface. People entering the river adjacent to the site have the potential to come into contact with contaminated river sediments. People are not drinking the contaminated groundwater because the area is served by a public water supply that is not affected by this contamination. Volatile organic compounds in the groundwater may move into the soil vapor (air spaces within the soil), which in turn may move into overlying buildings and affect the indoor air quality. This process, which is similar to the movement of radon gas from the subsurface into the indoor air of buildings, is referred to as soil vapor intrusion. Because the site is vacant, the inhalation of site-related contaminants due to soil vapor intrusion does not represent a current concern. Sampling indicates soil vapor intrusion is not a concern for off-site structures.

6.5: **Summary of the Remediation Objectives**

The objectives for the remedial program have been established through the remedy selection process stated in 6 NYCRR Part 375. The goal for the remedial program is to restore the site to pre-disposal conditions to the extent feasible. At a minimum, the remedy shall eliminate or mitigate all significant threats to public health and the environment presented by the contamination identified at the site through the proper application of scientific and engineering principles.

The remedial action objectives for this site are:

<u>Groundwater</u>

RAOs for Public Health Protection

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.
- Prevent contact with, or inhalation of volatiles, from contaminated groundwater.

RAOs for Environmental Protection

- Restore ground water aquifer to pre-disposal/pre-release conditions, to the extent practicable.
- Prevent the discharge of contaminants to surface water.
- Remove the source of ground or surface water contamination.

<u>Soil</u>

RAOs for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation of or exposure from contaminants volatilizing from contaminants in soil.

RAOs for Environmental Protection

- Prevent migration of contaminants that will result in groundwater or surface water contamination.
- Prevent impacts to biota from ingestion/direct contact with soil causing toxicity or impacts from bioaccumulation through the terrestrial food chain.

<u>Sediment</u>

RAOs for Public Health Protection

- Prevent direct contact with contaminated sediments.

RAOs for Environmental Protection

- Prevent releases of contaminant(s) from sediments that will result in surface water levels in excess of (ambient water quality criteria).
- Restore sediments to pre-release/background conditions to the extent feasible.

Soil Vapor
RAOs for Public Health Protection

- Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into buildings at a site.

SECTION 7: SUMMARY OF THE SELECTED REMEDY

To be selected the remedy must be protective of human health and the environment, be cost-effective, comply with other statutory requirements, and utilize permanent solutions, alternative technologies, or resource recovery technologies to the maximum extent practicable. The remedy must also attain the remedial action objectives identified for the site, which are presented in Section 6.5. Potential remedial alternatives for the Site were identified, screened and evaluated in the feasibility study (FS) report.

A summary of the remedial alternatives that were considered for this site is presented in Exhibit B. Cost information is presented in the form of present worth, which represents the amount of money invested in the current year that will be sufficient to cover all present and future costs associated with the alternative. This enables the costs of remedial alternatives to be compared on a common basis. As a convention, a time frame of 30 years is used to evaluate present worth costs for alternatives with an indefinite duration. This does not imply that operation, maintenance, or monitoring will cease after 30 years if remediation goals are not achieved. A summary of the Remedial Alternatives Costs is included as Exhibit C.

The basis for the Department's remedy is set forth at Exhibit D.

The selected remedy is referred to as the Partial Excavation of On-Site Soil, Full Excavation of Off-Site MGP-Impacted Soil and Sediment, Groundwater MNA, Continued Site Management of the NAPL Recovery Wells and Long-term Monitoring.

The estimated present worth cost to implement the remedy is $47,747,000. The cost to construct the remedy is estimated to be $46,623,600 and the estimated average annual cost is $90,600.

The elements of the selected remedy are as follows:

1. Remedial Design

A remedial design program will be implemented to provide the details necessary for the construction, operation, optimization, maintenance, and monitoring of the remedial program. Green remediation principles and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per DER-31. The major green remediation components are as follows:

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
- Reducing direct and indirect greenhouse gases and other emissions;
- Increasing energy efficiency and minimizing use of non-renewable energy;
- Conserving and efficiently managing resources and materials;
- Reducing waste, increasing recycling, and increasing reuse of materials which would otherwise be considered a waste;
- Maximizing habitat value and creating habitat when possible;
- Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals;
- Integrating the remedy with the end use where possible and encouraging green and sustainable re-development; and
- Additionally, to incorporate green remediation principles and techniques to the extent feasible in the future development at this site, any future on-site buildings will include, at a minimum, a 20-mil vapor barrier/waterproofing membrane on the foundation to improve energy efficiency as an element of construction.

2. Excavation

Excavation and off-site disposal of contaminant source areas, including:
- grossly contaminated soil, as defined in 6 NYCRR Part 375-1.2(u);
- soil exceeding the 6 NYCRR Part 371 hazardous criteria for lead;
- concentrated solid or semi-solid hazardous substances per 6 NYCRR Part 375-1.2(au)(1)
- soil with visual waste material or non-aqueous phase liquid;
- soil containing total SVOCs exceeding 500 ppm;
- soils which exceed the protection of groundwater soil cleanup objectives (PGWSCOs), as defined by 6 NYCRR Part 375-6.8 for those contaminants found in site groundwater above standards; and
- soils that create a nuisance condition, as defined in Commissioner Policy CP-51 Section G.

Excavations will be conducted to various depths of up to approximately 30 feet below ground surface (bgs) or to competent bedrock, as feasible at the former MGP site, and up to 24 feet bgs at the B&L property adjacent to and north of the site or to competent bedrock, as feasible. The excavation will remove the former purifier waste area, the former light oil plant, a former gas holder, other underground structures, residual MGP wastes and near-river soil (soil between the ISS wall and the sediment). Lateral earth support and excavation dewatering will be required at the former MGP site and B&L property off-site to the north of the site. A pre-design investigation will be conducted to confirm the footprint of NAPL and other MGP impacts in the near-river soil and sediment areas.

Approximately 33,400 cu yd of off-site MGP-impacted soil and 299,500 cu yd of on-site MGP-impacted soil will be excavated. The upper 10 ft of surface and subsurface soil from the former

MGP site (approximately 251,600 cu yd) will be stockpiled on-site for potential reuse. Prior to reuse on-site, stockpiled soil will be analyzed to confirm compliance with 6 NYCRR 375-6.7 (d), Commissioner Policy-51 (CP-51), DER-10 Section 5.4(e) and with Department concurrence. On- and off-site soil deemed unacceptable for reuse will be transported off-site for disposal or may be evaluated in the remedial design for on-site thermal treatment. The site will be re-graded to accommodate installation of a cover system as described in remedy element 5 outside of the near-river soils footprint.

For the near-river soils, the pre-design investigation will confirm the presence of MGP contamination (including NAPL) and confirm continued impact on the river prior to remediation. Removals will be conducted only where MGP contamination (including NAPL) is present and influencing the river with the goal of preserving the bank topography and vegetation where possible.

On-site soil which does not exceed the protection of groundwater SCOs (PGWSCOs) may be used below the cover system described in remedy element 5 to backfill the excavation.

Clean fill meeting lower of RRSCOs and PGWSCOs per 6 NYCRR Part 375-6.7(d) will be brought in on-site to replace the excavated soil or complete the backfilling of the excavation and establish the designed grades on-site. Clean fill meeting UUSCOs will be brought in to replace excavated soil on the B&L off-site property.

Following a pre-design investigation, sediment which contains MGP NAPL impacts and is above sediment PAH Class C SGV, will be removed from the Genesee River. This is currently predicted to be excavation and off-site disposal/thermal treatment of approximately 2,500 cubic yards (cy) of impacted sediment.

A restoration plan for the Genesee Riverbed and banks will be completed with the goal of restoring the stream bed, banks, and floodplain in-kind to the extent possible using natural stream restoration/bioengineering design principles and with the goal of re-establishing habitat function. The design will include a monitoring plan for areas disturbed by the remedy and all activities will be consistent with the requirements of 6 NYCRR Part 608.

3. NAPL Recovery

Installation and operation of NAPL, petroleum or coal tar recovery wells to remove potentially mobile petroleum or coal tar from the subsurface. The number, depth, type and spacing of the recovery wells will be determined during the design phase of the remedy. Petroleum or coal tar will be collected periodically from each well; however, if wells are determined by the Department to accumulate large quantities of NAPL, petroleum or coal tar over extended time periods, they can be converted to automated collection.

4. Monitored Natural Attenuation

Groundwater contamination (remaining after active remediation) will be addressed with monitored natural attenuation (MNA). Groundwater will be monitored for site related contamination and also for MNA indicators which will provide an understanding of the (biological activity) breaking down the remaining contamination. It is anticipated that contaminant concentrations will decrease steadily over a reasonable period of time. Reports of the attenuation will be provided periodically in accordance with the monitoring and reporting requirements in the site management plan, and additional active remediation will be evaluated if it appears that natural processes alone will not address the remaining groundwater contamination. The contingency remedial action will depend on the information collected, but it is currently anticipated that oxygen injection would be the expected contingency remedial action.

5. Cover System

An on-site cover will be required to allow for restricted residential use of the site, which includes anticipated active recreation, where the upper two feet of exposed surface soil exceed the restricted residential use SCOs. Where a soil cover is to be used it will be a minimum of two feet of soil placed over a demarcation layer, with the upper six inches of soil of sufficient quality to maintain a vegetative layer. In near-river soils, the upper 2 ft will be sufficient quality to maintain a vegetative layer and the demarcation layer will not include any fabric. Soil cover material, including any fill material brought to the site, will meet the SCOs for cover material for the use of the site as set forth in 6 NYCRR Part 375-6.7(d). Substitution of other materials and components may be allowed where such components already exist or are a component of the tangible property to be placed as part of site redevelopment. Such components may include, but are not necessarily limited to pavement, concrete, paved surface parking areas, sidewalks, building foundations and building slabs. Off-site, a soil cover will not be required since the backfill shall meet unrestricted use SCOs.

Where the soil cover is required over the ISS treatment area, it will consist of a minimum of four feet of soil with the top two feet meeting the SCOs for restricted residential (active recreational) use. For areas where solidified material underlies the cover, the solidified material itself will serve as the demarcation layer due to the nature of the material. A cover system will not be used on the banks or within the floodplain of the Genesee River because ecological SCOs will be met through excavation and backfill.

6. Institutional Control

Imposition of an institutional control in the form of an environmental easement for the controlled property which will:

- require the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3);
- allow the use and development of the controlled property for restricted residential, uses as defined by Part 375-1.8(g), although land use is subject to local zoning laws;
- restrict the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDOH or County; and
- require compliance with the Department-approved Site Management Plan.

7. Site Management Plan

An SMP is required, which includes the following:

a. An Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary to ensure the following institutional and/or engineering controls remain in place and effective:

Institutional Controls:

- The Environmental Easement discussed in Element 6 above.

Engineering Controls:

- The soil cover noted discussed in Element 5 above.
- The IRMs discussed in Section 6.2, above, including the ISS barrier wall, slurry wall, NAPL collection trench; and NAPL monitoring/recovery wells in Element 3.

This plan includes, but may not be limited to:

- an Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination on the former MGP site;
- descriptions of the provisions of the environmental easement including any land use, and groundwater use restrictions;
- a provision should redevelopment occur to ensure no soil exceeding protection of groundwater concentrations will remain below storm water retention basin or infiltration structures;

- a provision for evaluation of the potential for soil vapor intrusion for any buildings developed on site, and in off-site areas with site-related contamination, including provision for implementing actions recommended to address exposures related to soil vapor intrusion;
- a provision that should a building foundation or building slab on the former MGP site be removed in the future, a cover system consistent with that described in Remedial Element 5 above will be placed in any areas where the upper two feet of exposed surface soil exceed the applicable soil cleanup objectives (SCOs);
- provisions for the management and inspection of the identified engineering controls;
- maintaining site access controls and Department notification; and
- the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.

b. A Monitoring and Maintenance Plan to assess the performance and effectiveness of the remedy. The plan includes, but may not be limited to:

- monitoring of groundwater to assess the performance and effectiveness of the remedy;
- periodic NAPL monitoring and recovery, and recovery well maintenance, as appropriate;
- monitoring and maintenance of the cover system to assess the performance and effectiveness of the remedy, erosion, settlement, or other disturbances;
- monitoring of the riverbank to assess for NAPL seeps into sediment or the river, with contingencies to address this condition, as appropriate;
- a contingent technology if MNA is not proven effective in the long-term;
- a schedule of monitoring, maintenance and frequency of submittals to the Department;
- monitoring for vapor intrusion for any buildings developed on the site, and in off-site areas with site-related contamination, as may be required by the Institutional and Engineering Control Plan discussed above; and
- monitoring of remedial restoration success and repair actions, as needed.

Exhibit A

<u>Nature and Extent of Contamination</u>

This section describes the findings of the Remedial Investigation for all environmental media that were evaluated. As described in Section 6.1, samples were collected from various environmental media to characterize the nature and extent of contamination.

For each medium for which contamination was identified, a table summarizes the findings of the investigation. The tables present the range of contamination found at the site in the media and compares the data with the applicable SCGs for the site. The contaminants are arranged into three categories; volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs) and inorganics (metals and cyanide).

For comparison purposes, the SCGs are provided for each medium that allows for unrestricted use. For soil, if applicable, the Restricted Use SCGs identified in Section 4 and Section 6.1.1 are also presented.

This section describes the distribution of MGP-related impacts in overburden soil, overburden groundwater, bedrock, bedrock groundwater and sediment, taking into consideration historical operations, observations during subsurface investigations, and laboratory analytical results. Refer to Figures 3 and 4 (attached) for observations of MGP-related impacts. Pesticides and polychlorinated biphenyls (PCBs) were sampled at the site from 1993-2000 but were not found to be Contaminants of Concern (COCs) at the site and thus were not carried over to the RI and FS.

The following media and source locations were identified to require remedial actions based on the conclusions presented in the RIR and the presence of MGP-related impacts. The media and locations requiring remedial actions are shown on Figure 5.

- Surface Soil: Completed pathways for potential current and future exposure to MGP-related impacts to surface soil were identified during the RI in the following locations:
  - Former MGP site.
- Subsurface Soil: Completed pathways for potential current and future exposure to MGP-related impacts to subsurface soil were identified in the RI in the following locations:
  - Former MGP site, including:
    - The Former Purifier Area in the northeast quadrant;
    - The vicinity of the Former Oil Tanks, Former Tar Well, and Former MGP Plant in the southeast quadrant; and
    - The Former Light Oil Plant in the southwest quadrant, including an area north of the Former Light Oil Plant west of the ISS area.
  - The southeastern portion of the B&L Property adjacent to and north of the site. These MGP impacts appear to be contiguous with NAPL observed in the northeast quadrant of the former MGP site associated with the former purifier area.
- Overburden Groundwater: Completed pathways for potential current and future exposure to MGP-related impacts to overburden groundwater were identified in the RI in the following locations:
  - Former MGP site; and
  - The southern portion of the B&L property adjacent to and north of the site.
- Bedrock Groundwater: Completed pathways for potential current and future exposure to MGP-related impacts to bedrock groundwater in the following locations were identified in the RI:
  - Former MGP site; and
  - The southern and northern portions of the B&L property adjacent to and north of the site.

- Sediment: Completed pathways for potential current and future exposure to MGP-related impacts to sediment were identified in the RI in the following locations:
  - Along the southern portion of the former MGP site adjacent to the former light oil plant; this area is adjacent to an upland portion of the former MGP site where NAPL has been observed in the overburden at a similar elevation; and a small area north of the RG&E and B&L property boundary. adjacent to the B&L property.

Waste/Source Areas

As described in the RI report, waste/source materials were identified at the site and are impacting groundwater, soil, and sediment.

Wastes are defined in 6 NYCRR Part 375-1.2 (aw) and include solid, industrial and/or hazardous wastes. Source Areas are defined in 6 NYCRR Part 375 (au). Source areas are areas of concern at a site where substantial quantities of contaminants are found which can migrate and release significant levels of contaminants to another environmental medium. Wastes and Source areas were identified at the site include areas of coal tar NAPL.

Two waste source areas were identified and addressed during the site investigation of the former MGP site through two IRMs. One area was the tar well area and the other was along the Genesee River. These areas were addressed by excavation/ISS of source material including NAPL, VOCs, SVOCs and cyanide and installation of a collection trench for NAPL extraction and monitoring. The IRMs were effective in addressing this source material and NAPL that were entering the bedrock and the adjacent Genesee River. These waste/source areas identified at the site were addressed by the IRM(s) described in Section 6.2.

NAPL (LNAPL and DNAPL) has been measured in overburden wells in the southwestern portion of the Former MGP site in the vicinity of the Former Light Oil Plant. Accumulating NAPL has not been detected in passive recovery wells installed in the gravel collection trench east of the ISS area. The absence of accumulating NAPL in the recovery wells suggests that NAPL present in overburden soil and highly weathered bedrock is not mobile or its mobility is severely limited. NAPL volume and mobility were decreased by removing the Former Tar Well contents, which removed the primary NAPL source.

Physical properties tests were completed to better understand potential DNAPL mobility in bedrock and provide parameters for future remedial alternative evaluation. LNAPL is limited to the location of the former Light Oil Plant area.

MGP residuals, including NAPL, sheen, and staining are encountered in Former MGP site overburden soil. While minor staining was observed in fill material throughout the Former MGP site, NAPL and sheen observations were limited to certain areas of the parcel, typically as blebs and stringers within the lower portion of the fill material, alluvial deposits, and/or weathered bedrock. NAPL was typically found in the following three areas:

- The northeast quadrant of the former MGP site in the vicinity of the former Purifier Area;
- The southeast quadrant of the former MGP site in the vicinity of the former Oil Tanks, former Tar Well, and former MGP; and
- The southwest quadrant and southern portion of the northwest quadrant of the Former MGP site in the vicinity of the former Light Oil Plant and along the riverbank west of the ISS area.

Former MGP structures assessed during the RI do not appear to be significant sources of contaminants. Negligible quantities of NAPL were observed, if present at all in the structures.

In the off-site overburden, NAPL blebs were observed in the southeast portion of the B&L property north of the site in overburden soil at depths typically greater than 10 ft bgs.

In the on-site and off-site bedrock, NAPL was typically encountered as blebs and found in the deep bedrock in the following areas:

- The southern portion of the former MGP site;
- The former MGP site along the RG&E and B&L boundary; and,
- The southern portion of the B&L property.

In the sediment, visible NAPL was limited to an area along the southern portion of the former MGP site adjacent to the former light oil plant. A discrete area of NAPL blebs was also observed adjacent to the B&L property located approximately 210 ft north (downstream) of the RG&E/B&L property boundary. These areas are shown on Figures 3 and 4.

On-site and Off-site Bedrock

In the vicinity of the three areas of the Former MGP site and B&L Property where MGP-related NAPL is present in overburden soil, NAPL or sheen are typically observed in shallow bedrock similar to the impacts to the Irondequoit Limestone at BR-10-01 and BR-12-02 near the Former Purifier Area. This information suggests that NAPL impacts in the overburden likely migrated downward into bedrock through bedrock fracture and joint features, cross-cutting bedding plane partings, and migrated horizontally along the bedding plane partings.

MGP-related impacts, including sheens and NAPL, are present in competent bedrock at several discrete depths, typically limited in vertical and horizontal extent to the transmissive features.

NAPL, when present, was typically encountered as blebs and was observed in deep bedrock at five locations:

- BR-10-08 (Reynales Limestone from 68 to 76 ft bgs) and BR-10-07 (Reynales Limestone at 94 ft bgs and Maplewood Shale from 96 to 101 ft bgs) in the southern portion of the former MGP site;
- BR-10-02 (Maplewood Shale from 86 to 89 ft bgs) on the former MGP site along the RG&E and B&L boundary; and
- BR-12-01 (Reynales Limestone from 63 to 67 ft bgs) and BR-12-02 (Irondequoit Limestone at 37 and 40 ft bgs) in the southern portion of the B&L Property.

A depression in the bedrock surface observed at BR-10-07, in the southwest corner of the Former MGP site, did not appear to be collecting and retaining DNAPL, though sheen and trace DNAPL were observed in drilling fluid. Sheen was observed at several locations at discrete depth intervals. NAPL and sheen were not observed at the Grimsby Sandstone and Queenston Shale interface, or at the top of the Queenston Shale, which defines the lower vertical extent of visual/olfactory impacts. The vertical extent of NAPL and sheen appears to be limited to the transmissive features observed in the Grimsby Sandstone and overlying bedrock formations.

Groundwater

Groundwater samples were collected from overburden and bedrock monitoring wells. The presence of NAPL in the subsurface likely contributes to impacts to groundwater. Contamination in the on-site and off-site overburden and bedrock groundwater exceeds the SCGs for inorganic compounds, SVOCs including PAHs, and VOCs.

Overburden groundwater across the former MGP site exceeds Class GA Water Quality Standards for VOCs (typically benzene, toluene, ethylbenzene, and xylenes [BTEX]), PAHs, several metals, and total cyanide. VOC and PAH concentrations in groundwater are typically lowest in the northwestern portion of the former MGP site, which generally agrees with the distribution of MGP residuals observed in overburden soil.

On-site bedrock groundwater contains MGP-related dissolved-phase constituents. Bedrock groundwater exceeds Class GA Water Quality Standards for VOCs (typically BTEX), SVOCs including PAHs and naphthalene, metals, and total cyanide at several monitoring well locations and at several depth intervals. Wells that had no exceedance of MGP-related dissolved-phase constituents included DW-5 in the southeast quadrant of the former MGP site near the southern property boundary, and MW-6D, DW-10-01M, and DW-10-01R, located in the northeast quadrant of the former MGP site east of the Former Purifier Area. The presence of NAPL and sheen in bedrock is likely the source of dissolved-phase impacts to bedrock groundwater.

Table #1 - On-site Overburden Groundwater

Detected Constituents	Concentration Range Detected (ppb)[a]	TOGS 1.1.1, Class GA Water Quality SCG[b] (ppb)[a]	Frequency Exceeding SCG
VOCs			
1,2-Dibromo-3-chloropropane (DBCP)	0.55 – 40	0.04	8 of 25
Benzene	0.67 – 15000	1	19 of 25
Carbon disulfide	5.9 – 520	60	2 of 25
Chlorobenzene	1 – 1	5	0 of 25
cis-1,2-Dichloroethene	1.2 – 1.2	5	0 of 25
Ethylbenzene	0.88 – 1300	5	16 of 25
Isopropylbenzene (Cumene)	0.87 – 92	5	13 of 25
o-Xylene	1.5 – 1400	5	9 of 15
Styrene	27 – 360	5	3 of 25
Tetrachloroethene	0.91 – 0.91	5	0 of 25
Toluene	0.52 – 7500	5	10 of 25
Trichloroethene	1.4 – 1.4	5	0 of 25
SVOCs			
2,4-Dimethylphenol	4.7 - 1400	1	8 of 25
2-Nitroaniline	73 - 73	5	1 of 25
Benzo(a)pyrene[e]	0.52 - 5	0	5 of 25
Biphenyl	1.6 - 95	5	12 of 25
bis(2-Ethylhexyl)phthalate	21 - 21	5	1 of 25
Di-n-butylphthalate	0.38 - 0.65	50	0 of 25
Phenol	11 - 580	1	6 of 25
Inorganics			
Antimony, Total	6.8 - 180	3	2 of 25
Arsenic, Total	9.3 - 5600	25	13 of 25
Barium, Total	29 - 1400	1000	1 of 25
Cadmium, Total	0.34 - 2.4	5	0 of 25
Chromium, Total	0.91 - 32	50	0 of 25
Copper, Total	1.5 - 41	200	0 of 25
Cyanide	11 - 197000	200	19 of 25
Iron, Total	660 - 94000	300	25 of 25
Lead, Total	3.3 - 10	25	0 of 25
Manganese, Total	4.5 - 1300	300	12 of 25
Mercury, Total	0.12 - 27	0.7	2 of 25

Detected Constituents	Concentration Range Detected (ppb)[a]	TOGS 1.1.1, Class GA Water Quality SCG[b] (ppb)[a]	Frequency Exceeding SCG
Nickel, Total	1.5 - 68	100	0 of 25
Selenium, Total	9.7 - 92	10	2 of 25
Silver, Total	1.7 - 4.9	50	0 of 25
Sodium, Total	123000 - 2230000	20000	25 of 25

a - ppb: parts per billion, which is equivalent to micrograms per liter, ug/L, in water.
b - SCG: Standard Criteria or Guidance - Ambient Water Quality Standards and Guidance Values (TOGs 1.1.1, May 2020).
c - Only detected parameters with an action level are summarized.
d - Detected concentrations were screened against applicable SCGs. Sample counts are representative of all samples analyzed within each grouping.
e - For benzo(a)pyrene, the standard is 0 µg/L. Only detected concentrations are considered to exceed the standard.

Table #2 On-site Bedrock Groundwater

Detected Constituents	Concentration Range Detected (ppb)[a]	TOGS 1.1.1, Class GA Water Quality SCG[b] (ppb)[a]	Frequency Exceeding SCG
VOCs			
1,2-Dibromo-3-chloropropane (DBCP)	18 - 18	0.04	1 of 30
Benzene	0.56 - 39000	1	29 of 34
Carbon disulfide	0.57 - 22	60	0 of 30
Chlorobenzene	4.3 - 4.3	5	0 of 30
Chloroform (Trichloromethane)	0.97 - 10	7	5 of 30
Chloromethane (Methyl Chloride)	22 - 22	5	1 of 30
Ethylbenzene	1.3 - 4000	5	24 of 34
Isopropylbenzene (Cumene)	0.96 - 100	5	5 of 30
o-Xylene	300 - 1700	5	4 of 5
Styrene	2.3 - 1400	5	11 of 30
Tetrachloroethene	0.7 - 0.7	5	0 of 30
Toluene	6.2 - 12000	5	27 of 34
SVOCs			
2,4-Dimethylphenol	3 - 200	1	8 of 30
2-Nitroaniline	1.5 - 1.5	5	0 of 30
Benzo(a)pyrene[e]	5.1 - 5.1	0	1 of 34
Biphenyl	0.64 - 46	5	2 of 30
bis(2-Chloroethoxy)methane	0.71 - 0.71	5	0 of 30
bis(2-Ethylhexyl)phthalate	24 - 24	5	1 of 30
Phenol	36 - 55	1	3 of 30

Table #2 On-site Bedrock Groundwater (Continued)

Detected Constituents	Concentration Range Detected (ppb)[a]	TOGS 1.1.1, Class GA Water Quality SCG[b] (ppb)[a]	Frequency Exceeding SCG
Inorganics			
Arsenic, Total	5.9 - 36	25	3 of 30
Barium, Total	13 - 17500	1000	17 of 30
Cadmium, Total	0.42 - 8.8	5	5 of 30
Chromium, Total	0.93 - 1800	50	1 of 30
Copper, Total	1.7 - 140	200	0 of 30
Cyanide	8.8 - 2900	200	10 of 34
Iron, Total	480 - 95000	300	30 of 30
Lead, Total	3.8 - 150	25	3 of 30
Manganese, Total	15 - 28800	300	16 of 30
Nickel, Total	1.5 - 500	100	1 of 30
Sodium, Total	259000 - 81300000	20000	30 of 30

a - ppb: parts per billion, which is equivalent to micrograms per liter, ug/L, in water.
b - SCG: Standard Criteria or Guidance - Ambient Water Quality Standards and Guidance Values (TOGs 1.1.1, May 2020).
c - Only detected parameters with an action level are summarized.
d - Detected concentrations were screened against applicable SCGs. Sample counts are representative of all samples analyzed within each grouping.
e - For benzo(a)pyrene, the standard is 0 µg/L. Only detected concentrations are considered to exceed the standard.

Table #3 Off-site Overburden Groundwater

Detected Constituents	Concentration Range Detected (ppb)[a]	TOGS 1.1.1, Class GA Water Quality SCG[b] (ppb)[a]	Frequency Exceeding SCG
VOCs			
Benzene	0.44 - 840	1	6 of 12
cis-1,2-Dichloroethene	0.9 - 1	5	0 of 12
Ethylbenzene	0.85 - 470	5	3 of 12
Isopropylbenzene (Cumene)	0.83 - 34	5	2 of 12

Detected Constituents	Concentration Range Detected (ppb)[a]	TOGS 1.1.1, Class GA Water Quality SCG[b] (ppb)[a]	Frequency Exceeding SCG
Toluene	1.2 - 1.2	5	0 of 12
Trichloroethene	1.6 - 1.6	5	0 of 12
SVOCs			
Benzo(a)pyrene[e]	0.62 - 1.6	0	4 of 12
Biphenyl	0.95 - 2	5	0 of 12
bis(2-Ethylhexyl)phthalate	1.4 - 12	5	1 of 12
Di-n-butylphthalate	0.33 - 0.77	50	0 of 12
Phenol	19 - 19	1	1 of 12

Table #3 Off-site Overburden Groundwater (Continued)

Detected Constituents	Concentration Range Detected (ppb)[a]	TOGS 1.1.1, Class GA Water Quality SCG[b] (ppb)[a]	Frequency Exceeding SCG
Inorganics			
Arsenic, Total	9.2 - 270	25	5 of 12
Barium, Total	93 - 470	1000	0 of 12
Cadmium, Total	0.56 - 1.9	5	0 of 12
Chromium, Total	1.3 - 57	50	1 of 12
Copper, Total	2.1 - 200	200	0 of 12
Cyanide	24 - 3800	200	9 of 12
Iron, Total	51 - 75500	300	11 of 12
Lead, Total	4.6 - 890	25	4 of 12
Manganese, Total	340 - 3700	300	12 of 12
Mercury, Total	0.16 - 2.6	0.7	2 of 12
Nickel, Total	1.6 - 70	100	0 of 12
Selenium, Total	9 - 43	10	1 of 12
Sodium, Total	27100 - 1020000	20000	12 of 12

a - ppb: parts per billion, which is equivalent to micrograms per liter, ug/L, in water.
b - SCG: Standard Criteria or Guidance - Ambient Water Quality Standards and Guidance Values (TOGs 1.1.1, May 2020).
c - Only detected parameters with an action level are summarized.
d - Detected concentrations were screened against applicable SCGs. Sample counts are representative of all samples analyzed within each grouping.
e - For benzo(a)pyrene, the standard is 0 µg/L. Only detected concentrations are considered to exceed the standard.

Table #4 Off-site Bedrock Groundwater

Detected Constituents	Concentration Range Detected (ppb)[a]	TOGS 1.1.1, Class GA Water Quality SCG[b] (ppb)[a]	Frequency Exceeding SCG
VOCs			
Benzene	680 - 31000	1	7 of 7
Carbon disulfide	6.9 - 6.9	60	0 of 7
Chloroform (Trichloromethane)	1.4 - 17	7	1 of 7
Ethylbenzene	8.1 - 2400	5	7 of 7
Isopropylbenzene (Cumene)	28 - 50	5	2 of 7
Styrene	37 - 3400	5	5 of 7

Detected Constituents	Concentration Range Detected (ppb)[a]	TOGS 1.1.1, Class GA Water Quality SCG[b] (ppb)[a]	Frequency Exceeding SCG
Toluene	210 - 14000	5	7 of 7

Table #4 Off-site Bedrock Groundwater (Continued)

Detected Constituents	Concentration Range Detected (ppb)[a]	TOGS 1.1.1, Class GA Water Quality SCG[b] (ppb)[a]	Frequency Exceeding SCG
SVOCs			
2,4-Dimethylphenol	4.9 - 110	1	4 of 7
Benzo(a)pyrene[e]	0.83 - 0.83	0	1 of 7
Biphenyl	2.4 - 13	5	1 of 7
bis(2-Ethylhexyl)phthalate	3.7 - 3.7	5	0 of 7
Di-n-butylphthalate	0.35 - 0.41	50	0 of 7
Phenol	2 - 21	1	3 of 7
Inorganics			
Arsenic, Total	7.3 - 170	25	2 of 7
Barium, Total	230 - 5100	1000	4 of 7
Cadmium, Total	0.83 - 4.7	5	0 of 7
Chromium, Total	1.7 - 290	50	1 of 7
Copper, Total	6.6 - 29	200	0 of 7
Cyanide	5.5 - 1900	200	3 of 7
Iron, Total	650 - 76000	300	7 of 7
Lead, Total	3.3 - 4.9	25	0 of 7
Manganese, Total	17 - 18800	300	3 of 7
Nickel, Total	1.3 - 10	100	0 of 7
Selenium, Total	21 - 150	10	2 of 7
Sodium, Total	318000 - 66500000	20000	7 of 7

a - ppb: parts per billion, which is equivalent to micrograms per liter, ug/L, in water.
b - SCG: Standard Criteria or Guidance - Ambient Water Quality Standards and Guidance Values (TOGs 1.1.1, May 2020).
c - Only detected parameters with an action level are summarized.
d - Detected concentrations were screened against applicable SCGs. Sample counts are representative of all samples analyzed within each grouping.
e - For benzo(a)pyrene, the standard is 0 µg/L. Only detected concentrations are considered to exceed the standard.

Based on the findings of the RI, the presence of NAPL has resulted in the contamination of groundwater. The site contaminants that are considered to be the primary contaminants which will drive the remediation of groundwater to be addressed by the remedy selection process are: NAPL, inorganic compounds (arsenic, barium, cyanide, lead, mercury), SVOCs including PAHs, and VOCs.

Soil

Soil samples from across the former MGP site collected at a variety of depths exceed restricted residential SCOs for PAHs, metals and total cyanide. Soil with metals at concentrations greater than restricted residential SCOs are generally limited to fill soil and do not typically exceed restricted commercial SCOs in the natural alluvial soil. The PAH concentrations in soil exceed restricted residential SCOs in both fill and alluvial materials. VOC detections exceeding restricted residential SCOs were limited to fill material sampled at two soil boring locations in the vicinity of the former light oil plant and along the riverbank west of the ISS area.

Surface and subsurface soil samples were collected from the site and B&L property during the RI as shown on Figure 3. Shallow soil samples were collected from a depth of 0 to up to 0.8 ft to assess direct human exposure. Subsurface soil samples were collected from a depth of 1 to 64 ft to assess soil contamination impacts to groundwater. The results indicate that soils at the site exceed the restricted residential SCOs for inorganic compounds, PAHs, and VOCs. The results indicate that soils at the B&L Property (off-site property to the north of the site) exceed the unrestricted SCOs for inorganic compounds, PAHs, and VOCs. MGP residuals, including NAPL, sheen, and staining are encountered in overburden soil and competent bedrock.

Table #5 – On-site Shallow Soil

Detected Constituents	Concentration Range Detected (ppm)[a]	Unrestricted Use Soil Cleanup Objective (SCG)[b] (ppm)[a]	Frequency Exceeding Unrestricted SCG[b]	Restricted Use Soil Cleanup Objective for Restricted Residential (SCG)[c] (ppm)[a]	Frequency Exceeding Restricted Residential SCG[c]	Protection of Ground-water SCG (ppm)	Frequency Exceeding SCG
SVOCs							
Acenaphthene	0.11 - 0.18	20	0 of 9	100	0 of 9	98	0 of 9
Acenaphthylene	0.24 - 2	100	0 of 9	100	0 of 9	107	0 of 9
Anthracene	0.26 - 1	100	0 of 9	100	0 of 9	1000	0 of 9
Benzo(a)anthracene	0.23 - 5.7	1	8 of 9	1	8 of 9	1	8 of 9
Benzo(a)pyrene	0.44 - 7.2	1	8 of 9	1	8 of 9	22	0 of 9
Benzo(b)fluoranthene	0.42 - 6.6	1	8 of 9	1	8 of 9	1.7	8 of 9
Benzo(g,h,i)perylene	0.9 - 5.1	100	0 of 9	100	0 of 9	1000	0 of 9
Benzo(k)fluoranthene	0.18 - 2.7	0.8	8 of 9	3.9	0 of 9	1.7	4 of 9
Chrysene	0.18 - 6	1	8 of 9	3.9	5 of 9	1.0	8 of 9
Dibenz(a,h)anthracene	0.42 - 1.3	0.33	8 of 9	.033	8 of 9	1000	0 of 9

Detected Constituents	Concentration Range Detected (ppm)[a]	Unrestricted Use Soil Cleanup Objective (SCG)[b] (ppm)[a]	Frequency Exceeding Unrestricted SCG[b]	Restricted Use Soil Cleanup Objective for Restricted Residential (SCG)[c] (ppm)[a]	Frequency Exceeding Restricted Residential SCG[c]	Protection of Ground-water SCG (ppm)	Frequency Exceeding SCG
Dibenzofuran	0.099 - 0.17	7	0 of 9	59	0 of 9	210	0 of 9
Fluoranthene	0.19 - 7.3	100	0 of 9	100	0 of 9	1000	0 of 9
Fluorene	0.19 - 0.33	30	0 of 9	100	0 of 9	386	0 of 9
Indeno(1,2,3- cd) pyrene	0.43 - 4	0.5	8 of 9	0.5	8 of 9	8.2	0 of 9
Naphthalene	0.16 - 0.28	12	0 of 9	100	0 of 9	12.0	0 of 9
Phenanthrene	0.8 - 3.5	100	0 of 9	100	0 of 9	1000	0 of 9
Pyrene	0.23 - 12	100	0 of 9	100	0 of 9	1000	0 of 9
Total PAHs	3.44 - 56.86	-	-			-	-
Inorganics							
Arsenic	5.4 - 169	13	5 of 9	16	3 of 9	16	3 of 9
Barium	35.4 - 92.1	350	0 of 9	400	0 of 9	820	0 of 9
Beryllium	0.22 - 0.45	7.2	0 of 9	72	0 of 9	47	0 of 9
Cadmium	0.25 - 1.4	2.5	0 of 9	4.3	0 of 9	7.5	0 of 9
Copper	17.6 - 669	50	4 of 9	270	1 of 9	1720	0 of 9
Cyanide	1.7 - 13.7	27	0 of 9	27	0 of 9	40	0 of 9
Lead	34.6 - 1170	63	5 of 9	400	3 of 9	450	1 of 9
Manganese	319 - 730	1600	0 of 9	2000	0 of 9	2000	0 of 9
Mercury	0.11 - 15	0.18	6 of 9	0.81	3 of 9	0.73	3 of 9
Nickel	9.3 - 20.7	30	0 of 9	310	0 of 9	130	0 of 9
Silver	0.3 - 1.7	2	0 of 9	180	0 of 9	8.3	0 of 9
Zinc	48.8 - 221	109	2 of 9	10000	0 of 9	2480	0 of 9

a - ppm: parts per million, which is equivalent to milligrams per kilogram, mg/kg, in soil.
b - SCG: Part 375-6.8(a), Unrestricted Soil Cleanup Objectives (March 2020).
c - SCG: Part 375-6.8(b), Restricted Use Soil Cleanup Objectives for the Protection of Public Health for Restricted Residential Use
d - Only detected parameters with an action level are summarized.
e - Detected concentrations were screened against applicable SCGs. Sample counts are representative of all samples analyzed within each grouping.
f - Total PAHs are screened per CP-51.

Table #6 – On-site Soil (Subsurface)

Detected Constituents	Concentration Range Detected (ppm)[a]	Unrestricted Use Soil Cleanup Objective (SCG)[b] (ppm)[a]	Frequency Exceeding Unrestricted SCG[b]	Restricted Use Soil Cleanup Objective for Restricted Residential (SCG)[c] (ppm)[a]	Frequency Exceeding Restricted Residential SCG[c]	Protection of Groundwater SCG (ppm)	Frequency of Exceeding SCG
VOCs							
1,3-Dichlorobenzene	0.0093 - 0.19	2.4	0 of 207	49	0 of 207	2.4	0 of 207
1,4-Dichlorobenzene	0.022 - 0.67	1.8	0 of 207	13	0 of 207	1.8	0 of 207
2-Butanone (Methyl Ethyl Ketone)	0.0022 - 0.16	0.12	1 of 207	100	0 of 207	0.12	1 of 207
Acetone	0.0048 - 0.62	0.05	48 of 207	100	0 of 207	0 .05	48 of 207
Benzene	0.00049 - 370	0.06	39 of 207	4.8	5 of 207	0.06	39 of 207
Chlorobenzene	0.0024 - 0.07	1.1	0 of 207	100	0 of 2017	1.1	0 of 207
Chloroform (Trichloromethane)	0.00069 - 0.0037	0.37	0 of 207	49	0 of 207	0.37	0 of 207
Ethylbenzene	0.00049 - 170	1	35 of 207	41	11 of 207	1.0	35 of 207
Methylene chloride	0.0025 - 1.2	0.05	27 of 207	100	0 of 207	0.05	27 of 207
Naphthalene	0.13 - 160	12	1 of 4	100	15 of 207	12.0	1 of 4
Tetrachloroethene	0.00099 - 0.034	1.3	0 of 207	19	0 of 207	1.3	0 of 207
Toluene	0.00047 - 600	0.7	9 of 207	100	1 of 207	0.7	9 of 207
Trichloroethene	0.012 - 0.012	0.47	0 of 207	21	0 of 207	0.47	0 of 207
Xylene (total)	0.0011 - 1100	0.26	39 of 207	100	8 of 207	1.6	23 of 207
SVOCs							
2-Methylphenol (o-Cresol)	0.3 - 2.3	0.33	2 of 207	100	0 of 207	0.33	2 of 207
4-Methylphenol	0.016 - 33	0.33	7 of 207	100	0 of 207	0.33	7 of 207
Acenaphthene	0.0037 - 290	20	20 of 207	100	6 of 207	98	7 of 207
Acenaphthylene	0.0065 - 1300	100	5 of 207	100	5 of 207	107	4 of 207
Anthracene	0.0068 - 1500	100	6 of 207	100	6 of 207	1000	0 of 207
Benzo(a)anthracene	0.011 - 780	1	115 of 207	1	115 of 207	1.0	115 of 207
Benzo(a)pyrene	0.0048 - 530	1	121 of 207	1	121 of 207	22	24 of 207
Benzo(b)fluoranthene	0.0093 - 460	1	114 of 207	1	114 of 207	1.7	100 of 207
Benzo(g,h,i)perylene	0.007 - 370	100	4 of 207	100	4 of 207	1000	0 of 207
Benzo(k)fluoranthene	0.0028 - 260	0.8	84 of 207	3.9	50 of 207	1.7	66 of 207

Table #6 – On-site Soil (Subsurface) (Continued)

Detected Constituents	Concentration Range Detected (ppm)[a]	Unrestricted Use Soil Cleanup Objective (SCG)[b] (ppm)[a]	Frequency Exceeding Unrestricted SCG[b]	Restricted Use Soil Cleanup Objective for Restricted Residential (SCG)[c] (ppm)[a]	Frequency Exceeding Restricted Residential SCG[c]	Protection of Groundwater SCG (ppm)	Frequency of Exceeding SCG
SVOCs							
Chrysene	0.0066 - 700	1	115 of 207	3.9	76 of 207	1.0	115 of 207
Dibenz(a,h)anthracene	0.0097 - 78	0.33	55 of 207	0.33	55 of 207	1000	0 of 207
Dibenzofuran	0.0044 - 320	7	15 of 207	59	4 of 207	210	2 of 207
Fluoranthene	0.01 - 1500	100	9 of 207	100	9 of 207	1000	2 of 207
Fluorene	0.0069 - 1700	30	17 of 207	100	8 of 207	386	3 of 207
Indeno(1,2,3-cd)pyrene	0.0085 - 310	0.5	118 of 207	0.5	118 of 207	8.2	14 of 207
Naphthalene	0.0066 - 18000	12	35 of 207	100	15 of 207	12.0	35 of 207
Phenanthrene	0.0076 - 4900	100	15 of 207	100	15 of 207	1000	0 of 207
Phenol	0.29 - 0.29	0.33	0 of 207	100	0 of 207	0.33	0 of 207
Pyrene	0.012 - 2200	100	9 of 207	100	9 of 207	1000	0 of 207
Total PAHs	0.012 - 39726	-	-			-	-
Inorganics							
Arsenic	1.4 - 1940	13	68 of 207	16	59 of 207	16	59 of 207
Barium	3.3 - 1190	350	2 of 207	400	1 of 207	820	1 of 207
Beryllium	0.091 - 4.2	7.2	0 of 207	72	0 of 207	47	0 of 207
Cadmium	0.043 - 9.9	2.5	3 of 207	4.3	2 of 207	7.5	2 of 207
Copper	2 - 1360	50	28 of 207	270	7 of 207	1720	0 of 207
Cyanide	0.57 - 401	27	27 of 207	27	27 of 207	40	20 of 207
Lead	1.7 - 2630	63	73 of 207	400	11 of 207	450	7 of 207
Manganese	49.6 - 1560	1600	0 of 207	2000	0 of 207	2000	0 of 207
Mercury	0.0093 - 33.3	0.18	64 of 207	0.81	32 of 207	0.73	29 of 207
Nickel	1 - 135	30	14 of 207	310	0 of 207	130	1 of 207
Selenium	0.58 - 15.6	3.9	3 of 207	180	0 of 207	4.0	3 of 207
Silver	0.4 - 1.3	2	0 of 207	180	0 of 207	8.3	0 of 207
Zinc	7.8 - 2430	109	34 of 207	10000	0 of 207	2480	0 of 207

a - ppm: parts per million, which is equivalent to milligrams per kilogram, mg/kg, in soil.
b - SCG: Part 375-6.8(a), Unrestricted Soil Cleanup Objectives (March 2020).
c - SCG: Part 375-6.8(b), Restricted Use Soil Cleanup Objectives for the Protection of Public Health for Restricted Residential Use.
d - Only detected parameters with an action level are summarized.
e - Detected concentrations were screened against applicable SCGs. Sample counts are representative of all samples analyzed within each grouping.
f - Total PAHs are screened per CP-51.

Off-site Soil

On the B&L Property (off-site property to the north of and adjacent to the site), MGP-related impacts appear to be limited to the southeast portion of the property located north of the former purifier area at the former MGP site. In the southeast portion of the B&L property, apparent MGP residual material, including sheen, and/or NAPL blebs was observed in overburden soil at depths typically greater than 10 ft bgs. The apparent MGP residual material was typically observed in the overburden soil directly above and within weathered bedrock. NAPL migration from the former purifier area to the southeast portion of the B&L property along the overburden and bedrock interface is a possible transport mechanism from the former MGP site to the B&L property.

In the central portion of the B&L property, petroleum-like odor and sheen are present at depths typically at and below the water table. The apparent petroleum impacts appear to be unrelated to the MGP residual material observed in the southeast portion of the property. These were analyzed and identified as diesel/petroleum-related impacts from other possible sources at the B&L property and their operations. Minor apparent petroleum-related impacts, such as petroleum-like odor or minor sheen, were observed in borings completed to the east of the former plant floor slab and in two borings completed along the Genesee River west of the retaining wall.

Similar to the former MGP site, the samples that exceed SCOs for PAHs are distributed throughout the fill material in the southern portion of the B&L property and in soil along the Genesee River. The origin of the fill material used at the Former B&L property, including fill material observed beneath the floor slab, is unknown. Glass, presumably related to former B&L manufacturing operations, was found in fill material on the B&L property. The use of coal as a fuel source in the former B&L plant buildings, as indicated on Sanborn Maps, may explain ALM observed in the fill. Residuals from the 1915 fire that destroyed a portion of the former B&L manufacturing facility may also contribute to PAHs in overburden on the B&L property.

Soil exceedances for metals, including cadmium, lead, and barium, are most prevalent in soil borings completed west of the former B&L manufacturing plant floor slab. The presence of these metals in soil does not appear to be related to the former MGP operations or MGP waste material.

PAHs and metals were also detected in one location completed beneath the B&L plant floor slab, TG-14-06C, where a possible void was noted below a layer of fill material with ALM while advancing the direct-push boring. This boring was completed in an area where historical drawings indicate gas conveyance pipes from the MGP entered the former B&L manufacturing plant. However, test pits completed in the vicinity of the subsurface pipes on the eastern side of the former plant floor slab found no evidence of past or ongoing release of MGP residuals.

Table #7 – Off-site Soil

Detected Constituents	Concentration Range Detected (ppm)[a]	Unrestricted Use Soil Cleanup Objective (SCG)[b] (ppm)[a]	Frequency Exceeding SCG[b]
VOCs			
1,2-Dichlorobenzene	0.00035 - 0.00035	1.1	0 of 89
2-Butanone (Methyl Ethyl Ketone)	0.0032 - 0.019	0.12	0 of 89
Acetone	0.0033 - 0.44	0.05	11 of 89
Benzene	0.00042 - 4.5	0.06	10 of 89
Chloroform (Trichloromethane)	0.0004 - 0.58	0.37	1 of 89
cis-1,2-Dichloroethene	0.00076 - 0.0054	0.25	0 of 89
Ethylbenzene	0.00044 - 16	1	4 of 89
Methylene chloride	0.0016 - 0.087	0.05	1 of 89
Tetrachloroethene	0.00073 - 0.0016	1.3	0 of 89
Toluene	0.00033 - 0.21	0.7	0 of 89
Trichloroethene	0.0019 - 0.079	0.47	0 of 89
Xylene (total)	0.00072 - 4.7	0.26	6 of 89
SVOCs			
2-Methylphenol (o-Cresol)	0.38 - 0.38	0.33	1 of 91
4-Methylphenol	0.05 - 0.05	0.33	0 of 54
Acenaphthene	0.0057 - 67	20	2 of 91
Acenaphthylene	0.0042 - 5.5	100	0 of 91
Anthracene	0.0054 - 41	100	0 of 91
Benzo(a)anthracene	0.02 - 57	1	24 of 91
Benzo(a)pyrene	0.0061 - 27	1	20 of 91
Benzo(b)fluoranthene	0.0089 - 130	1	24 of 91
Benzo(g,h,i)perylene	0.008 - 38	100	0 of 91
Benzo(k)fluoranthene	0.0065 - 18	0.8	19 of 91
Chrysene	0.0054 - 60	1	23 of 91
Dibenz(a,h)anthracene	0.012 - 4.8	0.33	16 of 91
Dibenzofuran	0.0078 - 20	7	2 of 91
Fluoranthene	0.0092 - 240	100	1 of 91
Fluorene	0.015 - 49	30	2 of 91
Indeno(1,2,3-cd)pyrene	0.006 - 30	0.5	20 of 91
Naphthalene	0.025 - 50	12	1 of 91
Pentachlorophenol	0.12 - 0.12	0.8	0 of 91
Phenanthrene	0.0087 - 190	100	3 of 91

Detected Constituents	Concentration Range Detected (ppm)[a]	Unrestricted Use Soil Cleanup Objective (SCG)[b] (ppm)[a]	Frequency Exceeding SCG[b]
Phenol	0.14 - 1.3	0.33	2 of 91
Pyrene	0.0086 - 160	100	1 of 91

Table #7 – Off-site Soil - (Continued)

Detected Constituents	Concentration Range Detected (ppm)[a]	Unrestricted Use Soil Cleanup Objective (SCG)[b] (ppm)[a]	Frequency Exceeding SCG[b]
Inorganics			
Arsenic	1.1 - 103	13	21 of 88
Barium	10.3 - 8330	350	4 of 88
Beryllium	0.055 - 2.9	7.2	0 of 88
Cadmium	0.035 - 38.3	2.5	4 of 88
Copper	3.5 - 14900	50	13 of 88
Cyanide	0.55 - 111	27	1 of 88
Lead	1.3 - 7460	63	28 of 88
Manganese	12.6 - 1110	1600	0 of 88
Mercury	0.0099 - 6.1	0.18	22 of 88
Nickel	2.9 - 97.5	30	2 of 88
Selenium	0.42 - 2.2	3.9	0 of 88
Silver	0.27 - 27.7	2	9 of 88
Zinc	9.7 - 6300	109	20 of 88

a - ppm: parts per million, which is equivalent to milligrams per kilogram, mg/kg, in soil.
b - SCG: Part 375-6.8(a), Unrestricted Soil Cleanup Objectives (March 2020).
c - SCG: Part 375-6.8(b), Restricted Use Soil Cleanup Objectives for the Protection of Public Health for Commercial Use (March 2020).
d - Only detected parameters with an action level are summarized.
e - Detected concentrations were screened against applicable SCGs. Sample counts are representative of all samples analyzed within each grouping.

Based on the findings of the RI, the presence of MGP residuals has resulted in the contamination of soil. The site contaminants identified in off-site surface soil which are considered to be primary COCs, to be addressed by the remedy selection process, are inorganic compounds (arsenic, copper, cyanide, lead, and mercury), PAHs, and VOCs. The site contaminants identified in off-site subsurface soil which are considered to be primary contaminants, to be addressed by the remedy selection process, are NAPL, inorganic compounds (arsenic, barium, cadmium, copper, cyanide, lead, and mercury), PAHs, and VOCs.

Sediment

Sediment samples were collected from locations adjacent to, and downstream of, the former MGP site in the Genesee River as shown on Figure 4. The samples were collected to assess the potential impacts to the river sediments from the site. The results indicate that the sediment exceeds SCGs for sediments for total PAHs and VOCs.

NAPL impacts to sediment related to former MGP operations appear to be limited to an area along the southern portion of the former MGP site adjacent to the former light oil plant. A discrete area of NAPL blebs was observed adjacent to the B&L property located approximately 210 ft north (downstream) of the northern RG&E and B&L property boundary.

The NAPL observed in sediment adjacent to the former light oil plant correlates with upland impacts to overburden along the overburden and bedrock interface. Previous NAPL migration from the overburden likely contributed to the current impacts observed in sediment in the vicinity of the former light oil plant. Alternatively, erosion of the eastern riverbank may have exposed NAPL that was already present in the overburden. Sediment cores collected during the investigation indicated that sediment thickness was limited in the vicinity of the former light oil plant, with soft sediment thickness ranging from one to 3.5 ft in the area where NAPL was observed. Where observed, NAPL was present in sediment consisting of sand or sand and gravel at the top of bedrock at elevations similar to adjacent upland soil borings. Since no apparent upland source of the small area of NAPL observed in sediment adjacent to the B&L property was identified during the RI, the NAPL may have been mobilized and deposited from an upstream source. The NAPL was observed near the top of the 4.5-ft core sample, immediately below a 0.8-ft-thick layer of sandy fluvial deposits. The NAPL bleb was co-located with glass, wood, and shells. Analytical testing indicated that sediment with the highest PAH concentrations were co-located with areas of visual and olfactory impacts.

Table #8 – Sediment (Genesee River)

Detected Constituents	Concentration Range Detected (ppm)[a]	Freshwater Sediment Class A (SCG)[b] (ppm)[a]	Frequency Exceeding SCG
VOCs			
1,2,4-Trimethylbenzene	0.00044 - 54	3.4	3 of 21
Benzene	1.1 - 14	0.53	5 of 21
Ethylbenzene	0.000097 - 59	0.43	5 of 21
Isopropyl benzene (Cumene)	0.00047 - 7.5	0.21	5 of 21
o-Xylene	0.00013 - 22	0.82	4 of 21
Toluene	0.69 - 9.4	0.93	1 of 21
Xylene (total)	0.00012 - 31	0.59	6 of 21
SVOCs			
Total PAHs	0.3242 - 859.2	4	11 of 21

a - ppm: parts per million, which is equivalent to milligrams per kilogram, mg/kg, in sediment.
b - SCG: Freshwater Sediment Class A, New York State Department of Environmental Conservation Division of Fish, Wildlife and Marine Resources Bureau of Habitat (24 June 2014).
c - Only detected parameters with an action level are summarized.
d - Detected concentrations were screened against applicable SCGs. Sample counts are representative of all samples analyzed within each grouping.

Based on the findings of the RI, the presence of NAPL and MGP residual(s) has resulted in the contamination of sediment. The site contaminants that are considered to be the primary contaminants of concern which will drive the remediation of sediment to be addressed by the remedy selection process are NAPL and PAHs.

Soil Vapor

A soil vapor investigation was not conducted at the site. The two laboratory buildings located in the northern portion of the former MGP site, the only buildings at the site, were previously the only occupied buildings at the former MGP site. The laboratory buildings are currently not used or occupied and may be demolished in the future. As a result, vapor intrusion into the two formerly occupied structures is not considered a complete exposure pathway.

Exhibit B

Description of Remedial Alternatives

The following alternatives were considered based on the remedial action objectives (see Section 6.5) to address the contaminated media identified at the site as described in Exhibit A.

Alternative 1: No Further Action

The No Further Action Alternative recognizes the remediation of the site completed by the IRM(s) described in Section 6.2. This alternative leaves the site in its present condition and does not provide any additional protection of the environment. This No Further Action Alternative generally consists of institutional controls to establish monitoring requirements for fences and to protect from potential future exposure to soil and groundwater; monitoring of existing IRMs at the site; engineering controls (i.e., fencing, signage) to restrict access to the river and natural gas infrastructure; long-term overburden and bedrock groundwater monitoring; and passive NAPL recovery at the former MGP site.

Present Worth:..........*$1,006,000*
Capital Cost:..........*$333,600*
Annual Costs:..........*$54,300*

Alternative 2: Soil Capping, Near-River Soil Excavation, Full Sediment Excavation, and Hydraulic Containment (Slurry Wall)

This alternative generally consists of surface soil excavation and asphalt-capping of surface soil at the former MGP site and B&L property adjacent to and north of the site, excavating subsurface near-river soil to competent bedrock, excavating sediment and installing a slurry wall at the former MGP site to mitigate groundwater flow off-site. Engineering controls will include existing fencing which restricts site access. Institutional controls will be implemented to establish monitoring and maintenance requirements for caps and fences and to protect from potential future exposure to subsurface soil and groundwater via an environmental easement. Long-term overburden and bedrock groundwater monitoring and passive NAPL recovery will also be conducted.

Present Worth:..........*$29,363,000*
Capital Cost:..........*$28,584,000*
Annual Costs:..........*$62,800*

Alternative 3: Full Excavation of On-site and Off-site Soil, Near-River Soil Excavation, and Full Sediment Excavation

This alternative generally consists of excavating surface, subsurface and near-river and upland soil at the former MGP site and the MGP-impacted area of the B&L property adjacent to and north of the site to competent bedrock. The upper 10 ft of soil will be stockpiled for sampling to confirm compliance with 6 NYCRR 375-6.7 (d) and CP-51 in accordance with DER-10 Section 5.4(e) and will receive the concurrence of NYSDEC prior to reuse at the former MGP site; impacted soil will be treated or disposed off-site. Site sediment will be excavated for off-site disposal/thermal treatment. MNA of groundwater, or a contingent technology outlined in the remedial design if MNA is not effective, and passive recovery of NAPL.

Present Worth:..*$89,873,000*
Capital Cost:..*$88,791,500*
Annual Costs:..*$87,200*

Alternative 4: Partial Excavation of On-site Soil, Full Excavation of Off-site Soil, Near-River Soil Excavation, and Full Sediment Excavation

This alternative generally consists of excavating former MGP site surface soil, fully excavating near-river soil (i.e., between the ISS wall and the river) to competent bedrock, partially excavating soil at upland source areas at the former MGP site and the MGP-impacted area of the B&L property adjacent to and north of the site to competent bedrock and backfilling with material allowing for unrestricted use, and constructing a vegetated two-foot clean soil cover with a demarcation layer on the former MGP site. The upper 10 ft of soil will be stockpiled for sampling to confirm compliance with 6 NYCRR 375-6.7 (d) and CP-51 in accordance with DER-10 Section 5.4(e) and will receive the concurrence of NYSDEC prior to reuse at the former MGP site; impacted soil will be treated or disposed off-site. Sediment containing MGP residuals and PAHs and VOCs above sediment criteria will be excavated for off-site treatment/disposal. Engineering controls will include a vegetated two-foot clean soil cover meeting restricted residential SCOs with a demarcation layer. Institutional controls will be implemented to document the presence of covered areas, to establish maintenance and monitoring requirements for the soil cover, and to protect from potential future exposure to subsurface soil and groundwater via an environmental easement. MNA of groundwater, or a contingent technology outlined in the remedial design if MNA is not effective, and passive NAPL recovery will also be conducted. This alternative is depicted on Figures 6, 7, and 8.

Present Worth:..*$47,747,000*
Capital Cost:..*$46,623,600*
Annual Costs:..*$90,600*

Alternative 5: Partial On-site Excavation (Upper 10 feet), Partial On-site ISS, Off-site ISS, Near-River Soil Excavation, and Full Sediment Excavation

This alternative generally consists of excavating former MGP site surface soil and excavating the upper 10 ft of soil at the former MGP site upland source areas and the MGP-impacted area of the B&L Property adjacent to and north of the site. Near-river soil at the former MGP site will be excavated to competent bedrock. The soil will be stockpiled for sampling to confirm compliance with 6 NYCRR 375-6.7 (d) and CP-51 in accordance with DER-10 Section 5.4(e) and will receive the concurrence of the Department prior to reuse at the former MGP site; impacted soil will be treated or disposed off-site. Source area subsurface soil below 10 ft will be treated by ISS. Sediment containing MGP residuals and PAHs and VOCs above sediment criteria will be excavated for off-site treatment/disposal. Institutional controls will be implemented to record the presence of covered areas, to establish OM&M requirements for soil covers, and to protect from potential future exposure to subsurface soil and groundwater via an environmental easement. Engineering controls will include a vegetated two-foot clean soil cover meeting restricted residential SCOs with a demarcation layer. MNA of groundwater, or a contingent technology outlined in the remedial design if MNA is not effective, and passive NAPL recovery will also be conducted.

Present Worth:..........*$48,454,000*
Capital Cost:..........*$47,353,000*
Annual Costs:..........*$88,700*

Alternative 6: Partial On-site Excavation (Upper 10 feet), Partial On-site ISS, Off-site Excavation, Near-River Soil Excavation, and Full Sediment Excavation

This alternative generally consists of excavating former MGP site surface soil and the upper 10 ft of soil at the former MGP site upland source areas. Near-river soil at the former MGP site and the MGP-impacted area of the B&L property adjacent to and north of the site will be excavated to competent bedrock. The soil will be stockpiled for sampling to confirm compliance with 6 NYCRR 375-6.7 (d) and CP-51 in accordance with DER-10 Section 5.4(e) and will receive the concurrence of the Department prior to reuse at the former MGP site; impacted soil will be treated or disposed of off-site. Former MGP site source area subsurface soil below 10 ft will be treated by ISS. Sediment containing MGP residuals and PAHs and VOCs above sediment criteria will be excavated for off-site treatment/disposal. Engineering controls will include a vegetated two-foot clean soil cover with a demarcation layer. Institutional controls will be implemented to document the presence of covered areas, to establish monitoring and maintenance requirements for the soil cover meeting restricted residential SCOs, and to protect from potential future exposure to subsurface soil and groundwater via an environmental easement. MNA of groundwater, or a contingent technology outlined in the remedial design if MNA is not effective, and passive NAPL recovery will also be conducted.

Present Worth:..........*$53,362,000*
Capital Cost:..........*$52,261,000*
Annual Costs:..........*$88,700*

Exhibit C

Remedial Alternative Costs

Remedial Alternative	**Capital Cost ($)**	**Annual Costs ($)**	**Total Present Worth ($)**
1: No Further Action	$333,600	$54,300	$1,006,000
2: Soil Capping, Near-River Soil Excavation, Full Sediment Excavation, and Hydraulic Containment (Slurry Wall)	$28,584,000	$62,800	$29,363,000
3: Full Excavation of On-site and Off-site Soil, Near-River Soil Excavation, and Full Sediment Excavation	$88,791,500	$87,200	$89,873,000
4: Partial Excavation of On-site Soil, Full Excavation of Off-site Soil, Near-River Soil Excavation, and Full Sediment Excavation	$46,623,600	$90,600	$47,747,000
5: Partial On-site Excavation (Upper 10 feet), Partial On-site ISS, Off-site ISS, Near-River Soil Excavation, and Full Sediment Excavation	$47,353,000	$88,700	$48,454,000
6: Partial On-site Excavation (upper 10 feet), Partial On-site ISS, Off-site Excavation, Near-River Soil Excavation, Full Sediment Excavation	$52,261,000	$88,700	$53,362,000

Exhibit D

SUMMARY OF THE REMEDY

The Department is selecting Alternative 4, Partial Excavation of On-site Soil, Full Excavation of Off-site Soil, Near-River Soil Excavation, and Full Sediment Excavation, as the remedy for this site. Alternative 4 will achieve the remediation goals for the site by removing contaminated soil on the former MGP site and off-site B&L property, removing contaminants near-the river and contaminated sediments in the river. The elements of this remedy are described in Section 7. The selected remedy is depicted in Figures 6, 7, and 8.

Basis for Selection

The selected remedy is based on the results of the RI and the evaluation of alternatives. The criteria to which potential remedial alternatives are compared are defined in 6 NYCRR Part 375. A detailed discussion of the evaluation criteria and comparative analysis is included in the approved FS report.

The first two evaluation criteria are termed "threshold criteria" and must be satisfied in order for an alternative to be considered for selection.

1. **Protection of Human Health and the Environment.** This criterion is an overall evaluation of each alternative's ability to protect public health and the environment.

The selected remedy (Alternative 4) will satisfy this criterion by removing impacted soil from the former MGP site source areas including the source of groundwater impacts; removing MGP-impacted soil at the B&L property adjacent to and north of the site; removing contaminated sediment; and constructing a soil cover at the former MGP site. Implementing MNA and NAPL recovery will restore overburden and bedrock groundwater quality and may attain Class GA Water Quality Standards over time. In addition, a contingent technology will be outlined in the remedial design if MNA is not proven effective in the long term.

The No Further Action alternative (Alternative 1) is least protective of human health and the environment. Alternative 2 includes institutional controls that are protective of potential future exposure to subsurface soil and uses containment technologies to restrict additional impacts from migrating off-site. This Alternative will result in some improvement in groundwater quality, though Class GA Water Quality Standards will not be attained within 30 years.

Alternatives 3, 4, 5, and 6 are protective, but to different degrees. Alternative 3 is the most protective of the alternatives with respect to MGP-impacted soil and NAPL source areas and will restore the former MGP site to conditions suitable for unrestricted future use within the applicable zoning designation. As noted above for Alternative 4, Alternatives 5 and 6 will also require implementing MNA and NAPL recovery or a contingent technology if MNA is not proven effective in the long term.

Alternatives 2 through 6 are equally protective with respect to sediment and riverbank soil.

2. <u>Compliance with New York State Standards, Criteria, and Guidance (SCGs).</u> Compliance with SCGs addresses whether a remedy will meet environmental laws, regulations, and other standards and criteria. In addition, this criterion includes the consideration of guidance which the Department has determined to be applicable on a case-specific basis.
-
Alternatives 3, 4, 5, and 6 comply with SCGs to the extent practicable. Alternative 1 is the least compliant with SCGs related to remediating impacted soil, groundwater, and sediment. Alternative 2 will partially comply with SCGs related to direct exposures to surface soil and containment of impacts on-site but will not comply with Class GA Water Quality Standards or address impacts to subsurface soil. Alternative 3 meets and exceeds the restricted residential use SCGs and will also meet unrestricted SCGs related to each of the impacted media. Alternatives 4, 5, and 6 will result in substantial compliance with SCGs but will rely on a vegetated two-foot clean soil cover with a demarcation layer and an environmental easement to preclude contact with limited remaining impacted soil at the former MGP site. Alternatives 2, 3, 4, 5, and 6 will include MNA, or a contingent technology outlined in the remedial design if MNA is not effective, and NAPL recovery to improve groundwater quality to meet regulatory standards over time. Alternatives 4, 5, and 6 satisfy the restricted residential use SCGs. Each Alternative will include engineering and institutional controls.

The next six "primary balancing criteria" are used to compare the positive and negative aspects of each of the remedial strategies.

3. <u>Long-term Effectiveness and Permanence.</u> This criterion evaluates the long-term effectiveness of the remedial alternatives after implementation. If wastes or treated residuals remain on-site after the selected remedy has been implemented, the following items are evaluated: 1) the magnitude of the remaining risks, 2) the adequacy of the engineering and/or institutional controls intended to limit the risk, and 3) the reliability of these controls.

Long-term effectiveness is best accomplished by Alternatives 3 through 6 which address long-term impacts to the environment resulting from NAPL in subsurface soil through removal of NAPL, soil and sediment contaminants and natural attenuation of groundwater contaminants. Alternatives 1 and 2 do not include measures for addressing these impacts. These alternatives are therefore not likely permanent solutions. Given their reliance on engineering and institutional controls, alternatives 1 and 2 will have limited effectiveness over the long term as compared to other Alternatives.

Alternative 3 addresses current and future potential human exposure to soil and sediment and potential long-term risks to the environment via removal of remaining soil contaminants outside of existing treated areas (i.e., ISS wall) to achieve pre-release conditions. NAPL present in bedrock groundwater will be reduced through passive NAPL recovery and managed through a groundwater use prohibition. Groundwater contamination will be reduced through natural attenuation.

Alternatives 4, 5, and 6 are equally effective and permanent over the long term. These alternatives address potential current and future exposures to surface soil contaminants, subsurface soil containing contaminants including NAPL and total PAHs greater than 500 parts per million (ppm), and sediment contaminants. COC-impacted subsurface soil including total PAHs less than 500 ppm will remain on-site. These alternatives will rely on engineering controls and institutional controls to monitor the soil cover installed at the former MGP site. Alternatives 5 and 6 will also rely on engineering and institutional controls to document the presence and locations of solidified soil and manage solidified soil if excavated in the future. Under Alternative 6, controls related to solidified soil will not be required at the B&L Property, as it includes excavation for off-site areas. Source removal and stabilization along with MNA or a contingent technology outlined in the remedial design if MNA is not effective and NAPL recovery will support the potential restoration of overburden and bedrock groundwater quality to Class GA Water Quality Standards over a long period of time.

4. Reduction of Toxicity, Mobility or Volume. Preference is given to alternatives that permanently and significantly reduce the toxicity, mobility, or volume of the wastes at the site.

The highest degree of mobility and volume reduction is offered by alternatives that permanently remove contamination from the site. Thus, the full excavation called for under Alternative 3 ranks highest for this criterion and is the most effective with respect to reducing toxicity, mobility, or volume. Alternatives 1 and 2 will not reduce the volume or toxicity of on-site impacted soil. Alternative 1 will not reduce the mobility of impacted media. Through capping and sediment excavation, Alternative 2 will reduce the mobility of impacted soil via erosion and the potential transport of impacted sediment. Alternatives 4, 5, and 6 are slightly less effective than Alternative 3 because some COC-impacted subsurface soil will remain at the former MGP site; however, these alternatives meet the SCGs for the site. The volume of subsurface soil contamination remaining at depth will be minimal and have a minimal potential human health exposure.

Alternatives 2, 3, 4, 5, and 6 will further reduce contaminant mass in overburden and bedrock groundwater over time via MNA or a contingent technology outlined in the remedial design if MNA is not effective, and NAPL recovery.

5. Short-term Impacts and Effectiveness. The potential short-term adverse impacts of the remedial action upon the community, the workers, and the environment during the construction and/or implementation are evaluated. The length of time needed to achieve the remedial objectives is also estimated and compared against the other alternatives.

Alternative 1 will have the lowest level of potential short-term impact to the public and on-site workers because no active remediation will occur on the site.

Alternatives 2 through 6 involve the use of standard construction machinery, which will produce some degree of short-term construction impacts. Varying levels of truck traffic, dust, noise generation, and potential odor impacts will be generated, though dust and odor control are required as part of the remedial design plans. Alternative 3 will have the greatest short-term impacts to the public and site workers given the large soil volume requiring excavation. Much lower levels of traffic will be produced under Alternatives 4, 5, and 6 because less material will be transported off-site. Some inbound traffic associated with delivery of materials for the cap or ISS will be required under Alternatives 2, 5, and 6.

The potential for odors is lower for Alternatives 2, 4, 5, and 6; however, controls will be needed to mitigate odors and dust generated during bentonite slurry wall construction for Alternative 2 and when mixing and handling the cement/ground granulated blast-furnace slag (GGBFS) or other ISS agents for Alternatives 5 and 6 and during excavation of contaminated soil. The length of time required to complete remediation will be the greatest under Alternative 3 (4 to 5 years), with lesser and broadly similar lengths of time required for Alternatives 2 (1 to 1.5 years) and 4, 5, and 6 (3 to 4 years).

6. Implementability. The technical and administrative feasibility of implementing each alternative are evaluated. Technical feasibility includes the difficulties associated with the construction of the remedy and the ability to monitor its effectiveness. For administrative feasibility, the availability of the necessary personnel and materials is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, institutional controls, and so forth.

All of the retained alternatives employ readily available technologies and have been used at other sites. Alternative 2 will have some challenges associated with working around active utilities when installing the bentonite slurry wall. Alternative 3 will be implementable but technically and logistically challenging. Alternative 5 will also have some challenges associated with incorporating buried structures and debris into the ISS mixture at the former MGP site and B&L property, though this has been completed similarly elsewhere. Bench-scale testing will be required to establish an effective mix design and field-testing during construction will be necessary to conform with the ISS mix design for Alternative 5. Implementability concerns related to sediment excavation (a presumptive remedy) are the same for Alternatives 2 through 6. Excavating sediment is a common practice although there can be difficulties associated with obtaining permits, sediment resuspension and turbidity, and managing water and flows. The remedial design will address in-water challenges.

7. Cost-Effectiveness. Capital costs and annual operation, maintenance and monitoring costs are estimated for each alternative and compared on a present worth basis. Although cost-effectiveness is the last balancing criterion evaluated, where two or more alternatives have met the requirements of the other criteria, it can be used as the basis for the final decision.

The costs of the alternatives vary significantly. Alternative 1 has the lowest cost at approximately $1 million and Alternative 3 has the highest cost at approximately $89.87 million with its large volume of soil to be handled due to excavation and off-site disposal/thermal treatment or on-site treatment/potential soil reuse. The costs of Alternatives 4, 5, and 6 are similar to each other. Alternative 2 is much less expensive than Alternatives 3, 4, 5, and 6, but it does not address the volume of wastes existing in the former MGP site upland area and the B&L property overburden, which is a continuing source of impacts to groundwater quality.

8. <u>Land Use.</u> When cleanup to pre-disposal conditions is determined to be infeasible, the Department may consider the current, intended, and reasonably anticipated future land use of the site and its surroundings in the selection of the soil remedy.

The reasonably anticipated future use of the site is active recreation (restricted residential), and Alternatives 1 and 2 will impose the greatest restrictions on land use; however, continued commercial or industrial use of the former MGP site is possible under each of the remedies.

Alternative 3 will allow for essentially unrestricted future use of the former MGP site (except for the previously implemented ISS area) and continued commercial use of the B&L property adjacent to and north of the site in accordance with local zoning and ordinances.

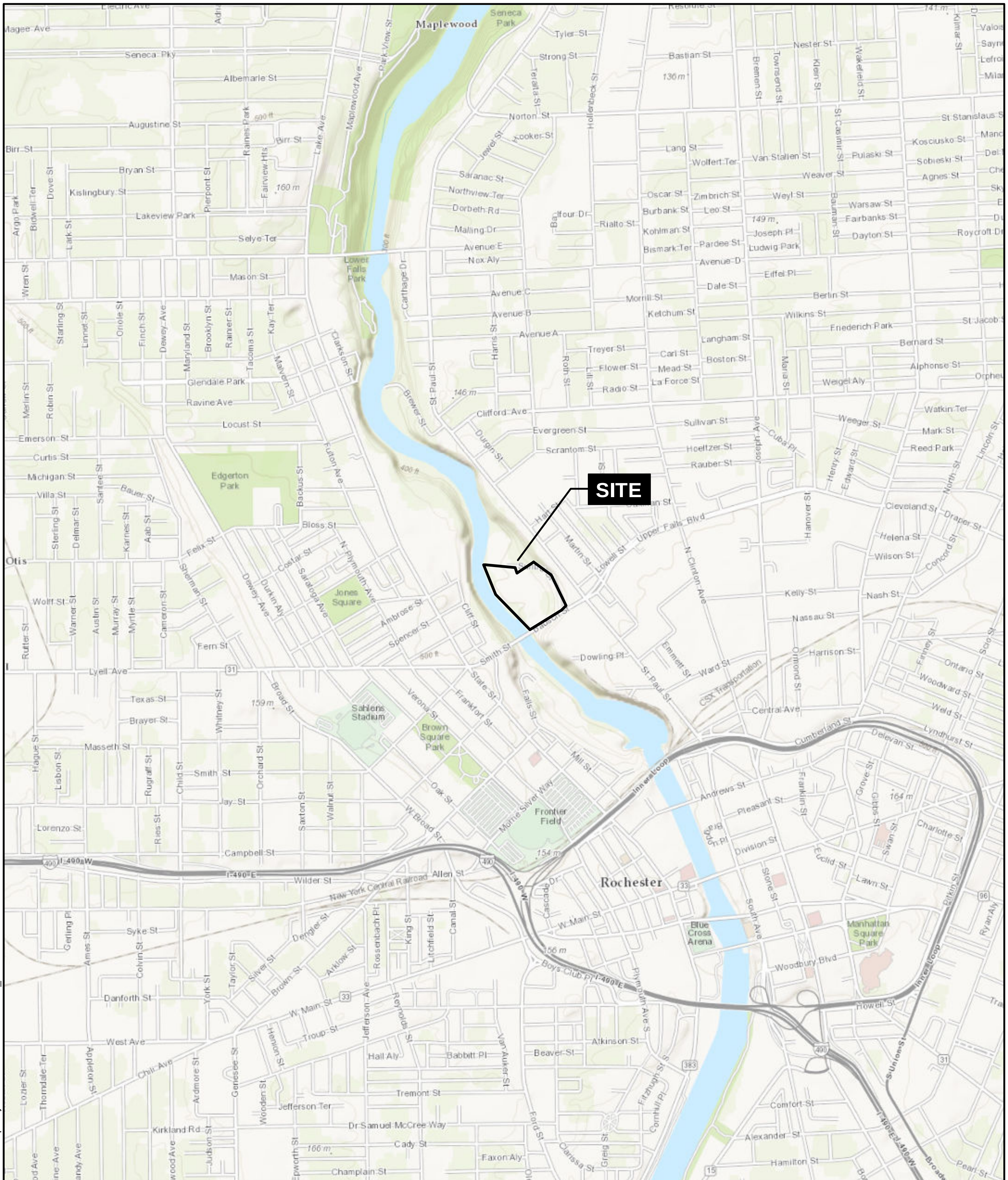
Alternatives 4 and 5 will include limited use restrictions and active recreation (restricted residential) use of the MGP. The area of soil remediation at the B&L property will not require restrictions. In addition, Alternative 5 will include limited institutional controls placed on both properties, and Alternative 6 will include limited institutional controls placed on the Former MGP site only (i.e., documenting the presence/potential future management of solidified soil).

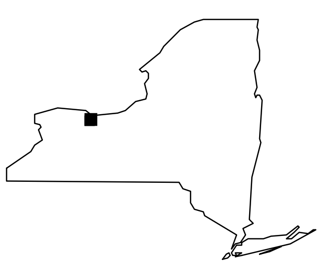
Alternatives 1 through 6 rely on institutional controls (e.g., an environmental easement) for the site.

The final criterion, Community Acceptance, is considered a "modifying criterion" and is taken into account after evaluating those above. It is evaluated after public comments on the Proposed Remedial Action Plan have been received.

9. <u>Community Acceptance.</u> Concerns of the community regarding the investigation, the evaluation of alternatives, and the PRAP were evaluated, and a Record of Decision (ROD) has been prepared. Also, a responsiveness summary has been prepared that describes the public comments received during the comment period and the manner in which the Department has addressed the concerns raised. The selected remedy does not differ from the proposed remedy. A Fact Sheet will be prepared to announce the execution and availability of the ROD to the public.

<u>Alternative 4</u> has been selected as the final remedy for the RG&E East Station Site because as described above, it satisfies the threshold criteria and provides the best balance of the balancing criterion for this site.





MAP SOURCE: ESRI

HALEY ALDRICH

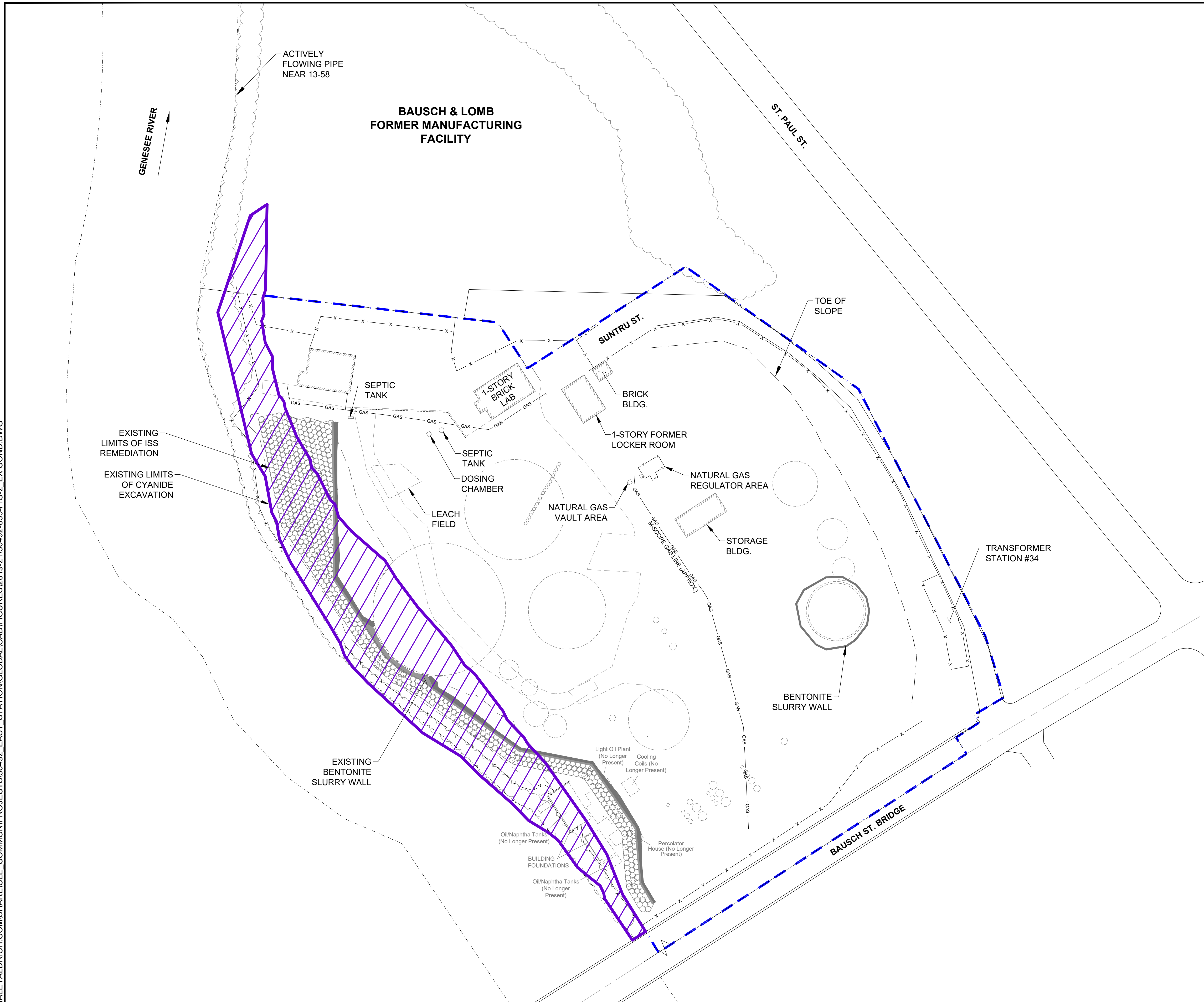
RG&E EAST STATION FORMER MGP SITE
ROCHESTER, NEW YORK

PROJECT LOCUS

APPROXIMATE SCALE: 1 IN = 2,000 FT
OCTOBER 2021

FIGURE 1

GIS FILE PATH: G:\36492_East_Station\Global\GIS\MapProjects\36492-042-001-SITE_LOCUS.mxd ? USER: hmarch ? LAST SAVED: 3/26/2015 2:20:15 PM



LEGEND

- PROPERTY BOUNDARY
- RIVER BANK
- TOE OF SLOPE
- EXISTING FENCE
- EXISTING GAS LINE
- EXISTING BUILDING
- FORMER STRUCTURES/FEATURES
- EXISTING TREE LINE
- EXISTING ISS COLUMNS
- EXISTING SLURRY WALL
- APPROXIMATE BOUNDARY OF NEW YORK STATE-OWNED PARCEL
- APPROXIMATE BOUNDARY OF RG&E-OWNED PARCEL

NOTES

1. SITE FEATURES FROM SURVEYSITEMAP.DWG AND DIGITISED FROM GOOGLE EARTH PRO IMAGE.
2. ALL LOCATIONS ARE APPROXIMATE.
3. APPROXIMATE BOUNDARY OF NEW YORK STATE-OWNED PARCEL FROM CITY OF ROCHESTER, NY PROPERTY INFORMATION GIS TOOL.

N

0 150 300
SCALE IN FEET

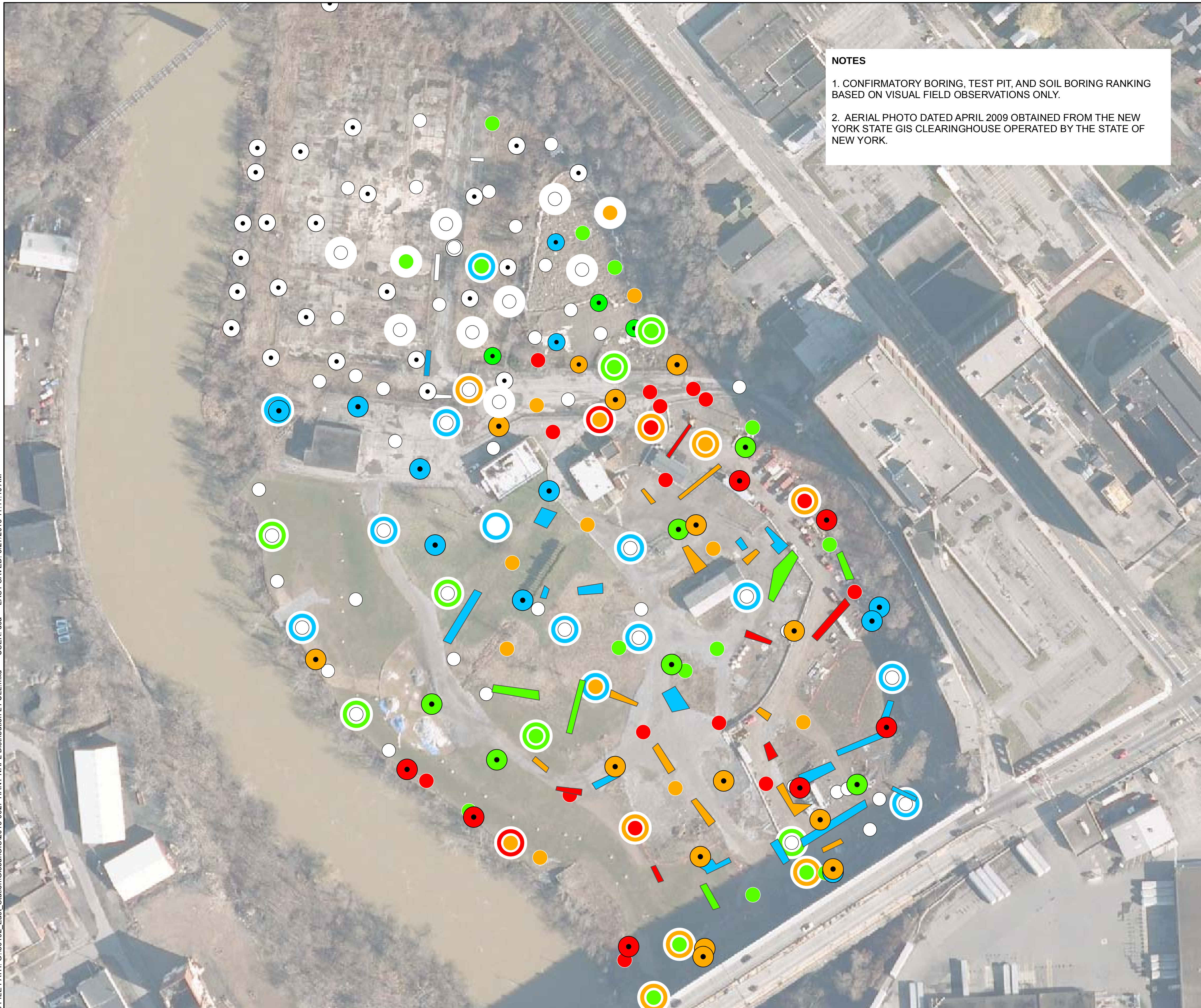
HALEY ALDRICH

RG&E EAST STATION FORMER MGP SITE
ROCHESTER, NEW YORK

EXISTING RG&E EAST STATION SITE CONDITIONS

SCALE: AS SHOWN
MAY 2021

FIGURE 2



NOTES

1. CONFIRMATORY BORING, TEST PIT, AND SOIL BORING RANKING BASED ON VISUAL FIELD OBSERVATIONS ONLY.

2. AERIAL PHOTO DATED APRIL 2009 OBTAINED FROM THE NEW YORK STATE GIS CLEARINGHOUSE OPERATED BY THE STATE OF NEW YORK.

SOIL BORING OBSERVATIONS

- MINOR MGP IMPACTS OBSERVED
- SHEEN OBSERVED
- MINOR TLM/OLM OBSERVED
- TLM/OLM OBSERVED

TEST PIT OBSERVATIONS

- MINOR MGP IMPACTS OBSERVED
- SHEEN OBSERVED
- MINOR TLM/OLM OBSERVED
- TLM/OLM OBSERVED

MAXIMUM TarGOST RESPONSE

- BACKGROUND (LESS THAN 20%)
- 20% TO 50%
- 50% TO 100%
- GREATER THAN 100%

TarGOST CONFIRMATORY BORING OBSERVATIONS

- MINOR MGP IMPACTS OBSERVED
- SHEEN OBSERVED
- MINOR TLM/OLM OBSERVED
- TLM/OLM OBSERVED

N

0 150 300

SCALE IN FEET

HALEY ALDRICH

RG&E EAST STATION FORMER MGP SITE
ROCHESTER, NEW YORK

TARGOST, SOIL BORING, AND TEST PIT OBSERVATIONS

OCTOBER 2021

FIGURE 3

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NOTE:
1. SEDIMENT OBSERVATIONS WERE COMPLETED IN 2013 BY HALEY & ALDRICH OF NEW YORK.
2. AERIAL PHOTO DATED APRIL 2009 OBTAINED FROM THE NEW YORK STATE GIS CLEARINGHOUSE.

0 150 300
SCALE IN FEET

HALEY ALDRICH

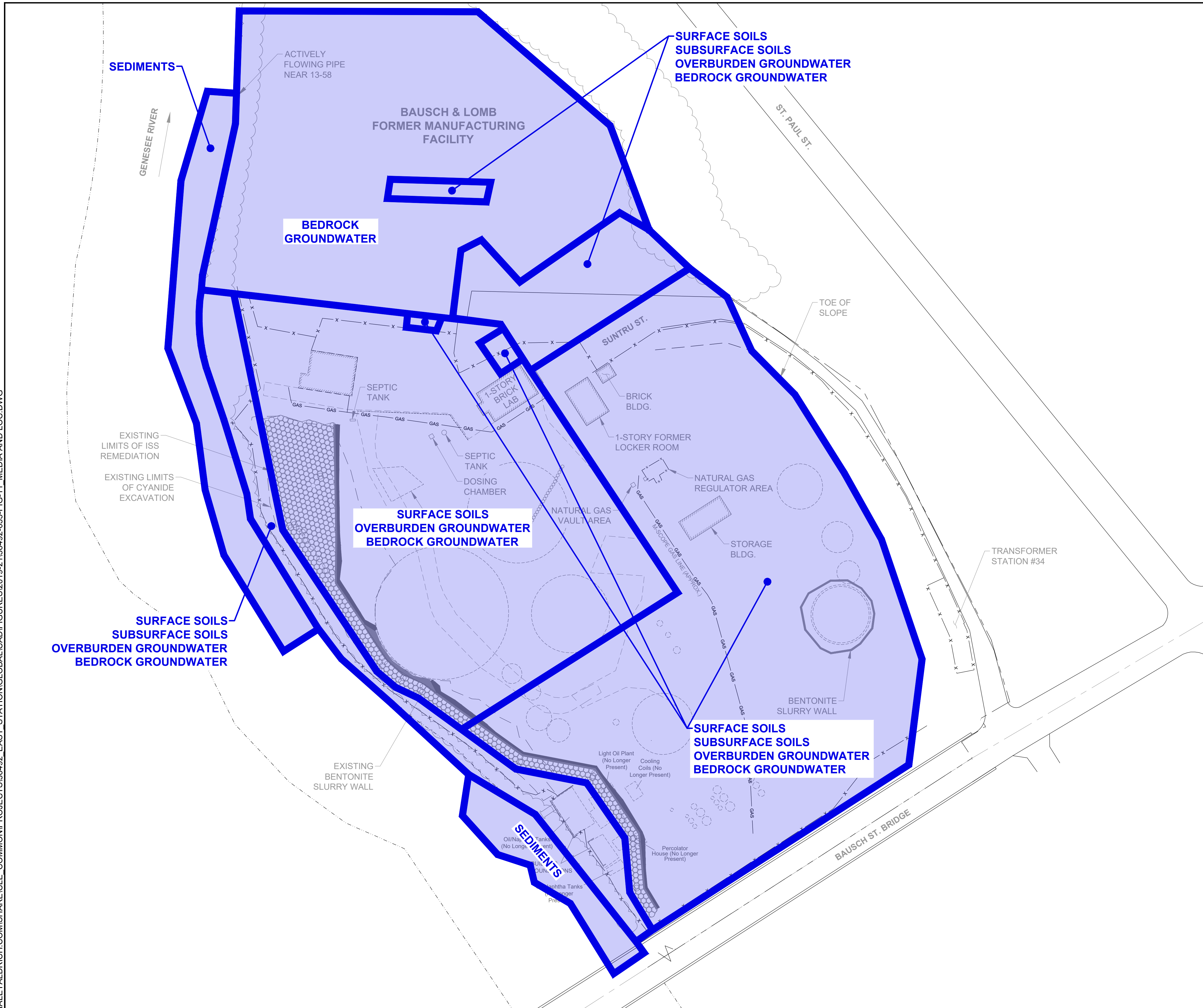
RG&E EAST STATION FORMER MGP SITE
ROCHESTER, NEW YORK

SEDIMENT NAPL/SHEEN OBSERVATIONS - 2013

OCTOBER 2021

FIGURE 4

GIS FILE PATH: G:\36492_East_Station\Global\GIS\2015-0324-HANY-Sediment Observations 2013-F.mxd — USER: dca — LAST SAVED: 3/24/2015 2:52:59 PM



LEGEND

- PROPERTY BOUNDARY
- RIVER BANK
- TOE OF SLOPE
- EXISTING FENCE
- EXISTING GAS LINE
- EXISTING BUILDING
- FORMER STRUCTURES/FEATURES
- EXISTING TREE LINE
- EXISTING ISS COLUMNS
- EXISTING SLURRY WALL
- RESPONSE ACTIONS AREA

NOTES

1. SITE FEATURES FROM SURVEYSITEMAP.DWG AND DIGITISED FROM GOOGLE EARTH PRO IMAGE.
2. ALL LOCATIONS ARE APPROXIMATE.

N

0 150 300
SCALE IN FEET

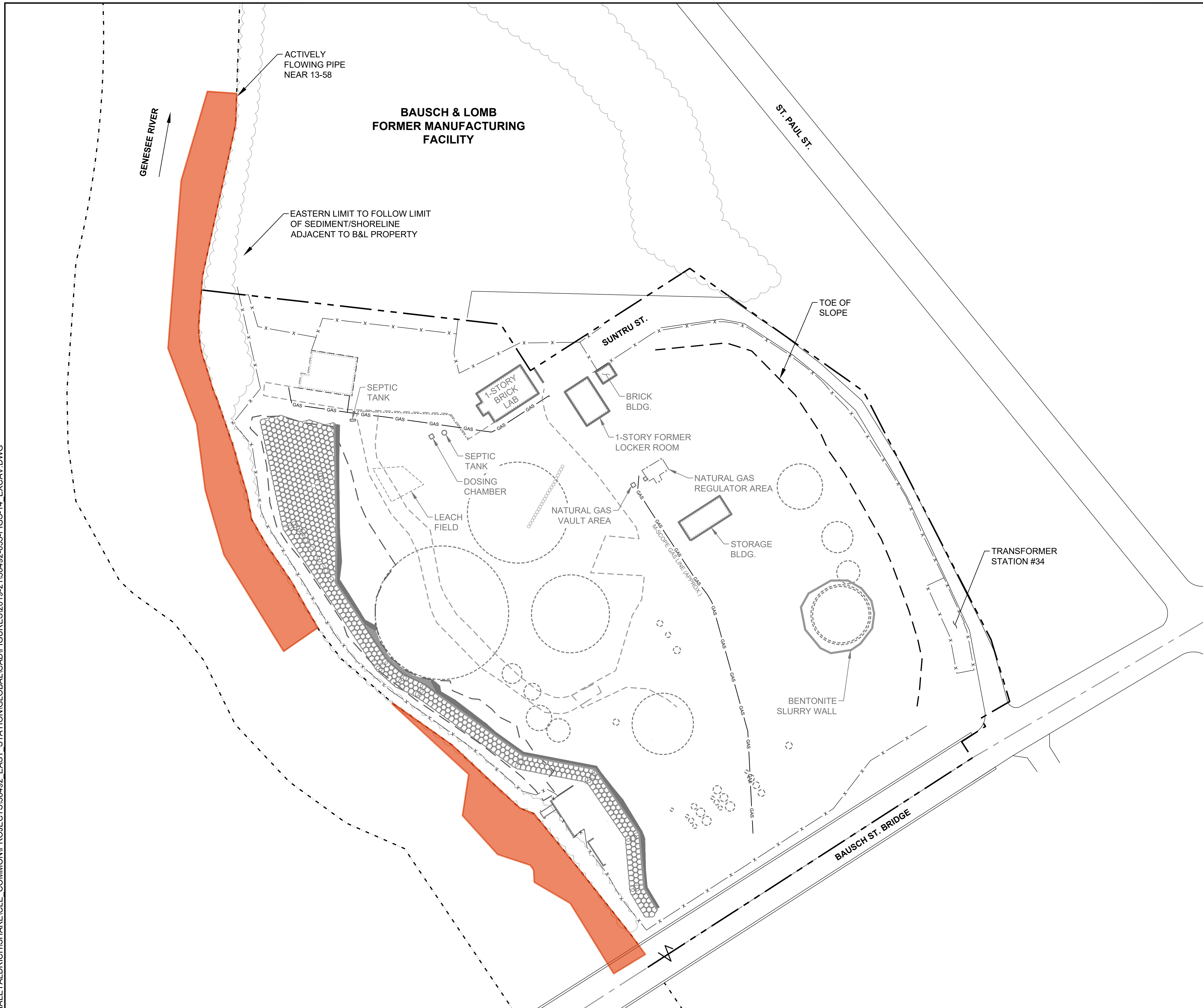
HALEY ALDRICH

RG&E EAST STATION FORMER MGP SITE
ROCHESTER, NEW YORK

MEDIA AND LOCATIONS REQUIRING REMEDIAL ACTIONS

SCALE: AS SHOWN
MAY 2021

FIGURE 5



LEGEND

- PROPERTY BOUNDARY
- RIVER BANK
- TOE OF SLOPE
- EXISTING FENCE
- EXISTING GAS LINE
- EXISTING BUILDING
- FORMER STRUCTURES/FEATURES
- EXISTING TREE LINE
- EXISTING ISS COLUMNS
- EXISTING SLURRY WALL
- EXCAVATE TO BEDROCK

NOTES

1. SITE FEATURES FROM SURVEYSITEMAP.DWG AND DIGITISED FROM GOOGLE EARTH PRO IMAGE.
2. ALL LOCATIONS ARE APPROXIMATE.

N

0 150 300
SCALE IN FEET

HALEY ALDRICH

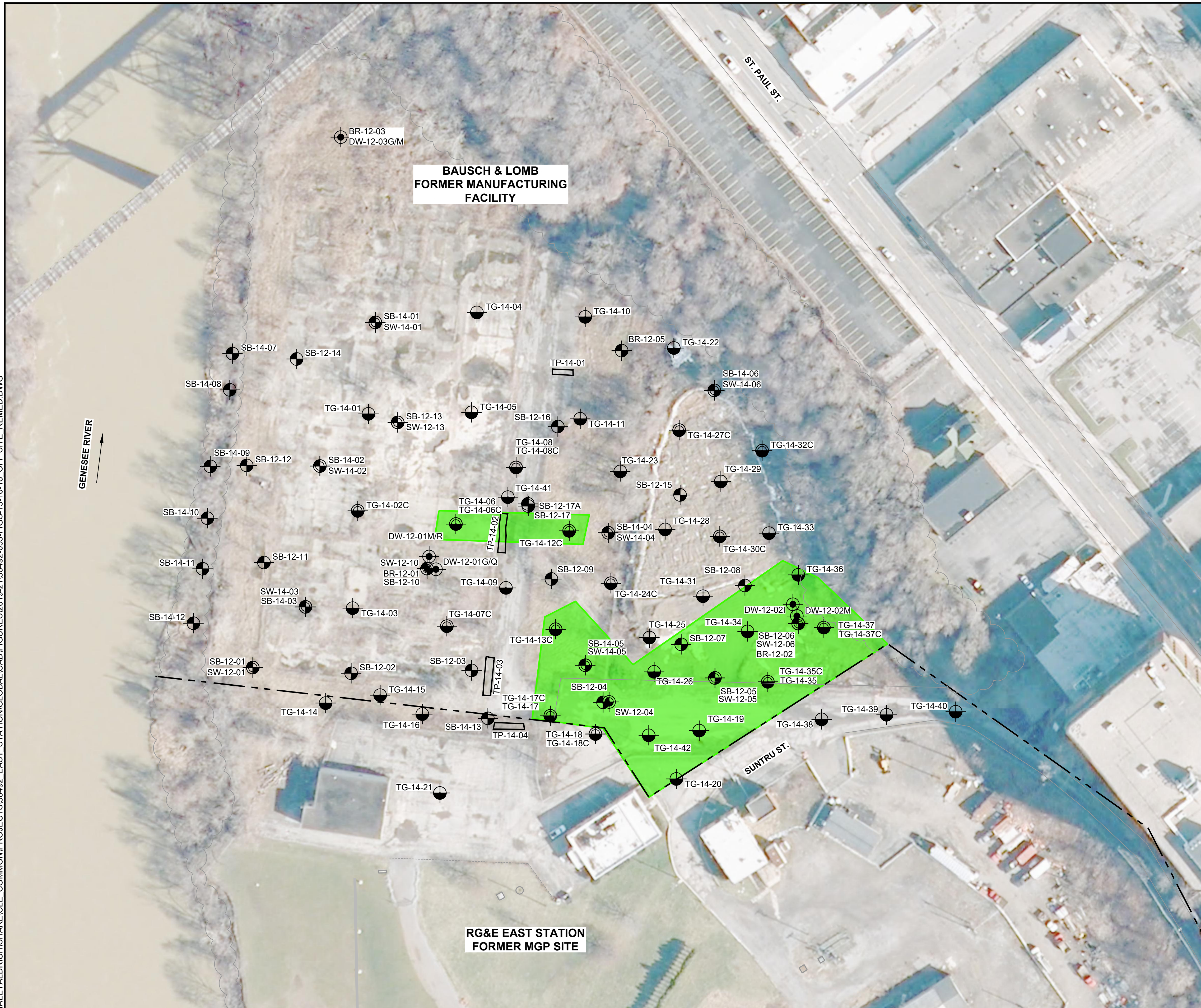
RG&E EAST STATION FORMER MGP SITE
ROCHESTER, NEW YORK

SEDIMENT REMEDY
FULL EXCAVATION
(ALL ALTERNATIVES)

SCALE: AS SHOWN
OCTOBER 2021

FIGURE 6

VARI, KATALIN Printed: 4/26/2021 12:38 PM Layout: FIGURE 14
\\HALEYALDRICH\SHARE\CLE_COMMON\PROJECTS\36492_EAST_STATION\GLOBAL\CAD\FIGURES\2019-21\36492-035-FIGS-14_EXCAV.DWG



LEGEND

- PROPERTY BOUNDARY
- SOIL BORING LOCATION
  SB = SOIL BORING
- SOIL BORING/OVERBURDEN MONITORING WELL LOCATION
  SW = SHALLOW (OVERBURDEN) WELL
- BEDROCK MONITORING WELL LOCATION
  BR = BEDROCK CORING, DW = DEEP (BEDROCK) WELL
- TARGOST LOCATION
  TG = TARGOST
- TARGOST WITH CONFIRMATION SOIL BORING
  TG-14-XXC
- TEST PIT
- OFF-SITE EXCAVATION

NOTES

1. AERIAL PHOTO DATED APRIL 2009 OBTAINED FROM THE NEW YORK STATE GIS CLEARINGHOUSE OPERATED BY THE STATE OF NEW YORK.
2. SOIL BORINGS, MONITORING WELLS, TEST PITS, AND TARGOST LOCATIONS ON BAUSCH & LOMB PROPERTY WERE SURVEYED BY HOFFMAN LAND SURVEYING & GEOMATICS ON 25 NOVEMBER 2013 AND 7 AUGUST 2014.

N

0 100 200
SCALE IN FEET

HALEY ALDRICH

RG&E EAST STATION FORMER MGP SITE
ROCHESTER, NEW YORK

OFF-SITE SELECTED REMEDY EXCAVATION (ALTERNATIVES 3, 4 & 6)

SCALE: AS SHOWN
OCTOBER 2021

FIGURE 7

VARI, KATALIN Printed: 4/26/2021 12:39 PM Layout: FIGURE 16
\\HALEYALDRICH\SHARE\CLE_COMMON\PROJECTS\36492_EAST_STATION\GLOBAL\CAD\FIGURES\2019-2\136492-035-FIGS-13-16-18_OFF SITE_REMED.DWG

NOTES

1. SITE FEATURES FROM SURVEYSITEMAP.DWG AND DIGITISED FROM GOOGLE EARTH PRO IMAGE.
2. ALL LOCATIONS ARE APPROXIMATE.
3. REMEDY TO EXTEND TO TOE OF SLOPE AT WESTERN PROPERTY BOUNDARY.

HALEY ALDRICH

RG&E EAST STATION FORMER MGP SITE
ROCHESTER, NEW YORK

ON-SITE REMEDY
PARTIAL EXCAVATION
(ALTERNATIVE 4)

SCALE: AS SHOWN
MAY 2021

FIGURE 8

VARI, KATALIN   Printed: 3/22/2022 3:27 PM   Layout: FIGURE 8
\\HALEYALDRICH.COM\SHARE\CLE_COMMON\PROJECTS\36492_EAST_STATION\GLOBAL\CAD\FIGURES\2019-21\36492-035-FIGS-8_NOT PART OF SET.DWG

APPENDIX A

Responsiveness Summary

RESPONSIVENESS SUMMARY

RGE-East Station
State Superfund Project
Rochester, Monroe County New York
Site No. 828204

The Proposed Remedial Action Plan (PRAP) for the RGE East Station site was prepared by the New York State Department of Environmental Conservation (the Department) in consultation with the New York State Department of Health (NYSDOH) and was issued to the document repositories on March 30, 2022. The PRAP outlined the remedial measure proposed for the contaminated soil, sediment, and groundwater at the RGE East Station site.

The release of the PRAP was announced by sending a notice to the public contact list, informing the public of the opportunity to comment on the proposed remedy.

A public meeting was held on April 13, 2022, which included a presentation of the remedial investigation/feasibility study (RI/FS) for the RGE East Station site as well as a discussion of the proposed remedy. The meeting provided an opportunity for citizens to discuss their concerns, ask questions and comment on the proposed remedy. These comments have become part of the Administrative Record for this site. The public comment period for the PRAP ended on April 28, 2022.

This responsiveness summary responds to all questions and comments raised during the public comment period. The following are the comments received, with the Department's responses:

COMMENT 1: Kevin M. Corradino, Vice President of Business Development, Forgen Companies, New Jersey asked if this presentation was being recorded and where it can be accessed. Also, he asked who the consultant was representing RG&E.

RESPONSE 1: The presentation was recorded and is available for public viewing through the DECInfoLocator at this link https://www.dec.ny.gov/data/DecDocs/828204/. The consultant for RG&E is Haley and Aldrich of New York.

COMMENT 2: Lisa Baron**,** Executive Board Chair, Friends of the Garden Aerial (dba Greentopia) of Rochester NY asked if RG&E is in favor of the Alternative 4 remedy as well as Bausch and Lomb for the off-site portion of Alternative 4.

RESPONSE 2: RG&E supports the Alternative 4 remedy. The Department has not received comments from Bausch &Lomb. **Note: (As of the date of the close of the Comment Period no comments were received from Bausch and Lomb.)**

COMMENT 3: Lisa Baron**,** Executive Board Chair, Friends of the Garden Aerial (dba Greentopia) of Rochester NY asked if the RG&E East Station cleanup be conducted in concert with the RG&E West Station Cleanup, slated for 2027.

RESPONSE 3: The RG&E West Station remediation is now being procured for construction bids and will be started prior to the RGE East Station MGP remediation and should not impact the RGE East Station MGP remediation process.

Kevin Hylton, Private Citizen, from Rochester NY submitted a letter by e-mail (dated April 19, 2022) which included the following comments:

COMMENT 4: The NYSDEC has either failed to weigh or has not been transparent about the environmental and societal externalities of this project and should not proceed until those externalities are evaluated, disclosed, and weighed against the benefits of performing the remedy.

RESPONSE 4: The Department has considered the environmental and societal externalities in the development of the proposed remedy. Examples of the externalities considered thus far include reducing short-term impacts to the public and environment through minimizing the volume of soil to be transported and disposed off-site thereby reducing vehicle emissions, noise, vibration and wear and tear on community infrastructure in the neighborhoods surrounding the site and along transportation routes. Further the proposed remedy does not contemplate complete excavation to bedrock of all contaminated soils on the site, further reducing the potential short-term impacts while still resulting in a remedy protective of human health and the environment. Additionally, the Department's regulations require consideration of multiple land use factors in evaluation of remedial alternatives. These include: zoning; environmental justice concerns; local restrictions, local master or comprehensive plans and the anticipated future use of the site. Further, the Department has policy on "Green Remediation" (DER-31) which requires extensive consideration of the environmental footprint of the remedy. Minimization of the environmental footprint of the remedy is evaluated in greater detail during the Remedial Design, which has yet to begin. A significant design effort is expected for this remedy. Thus, the issues identified are considered at multiple points in the remedial process. Qualitative and quantitative assessments of these issues were made as the remedial alternatives were developed (e.g., greater, or lesser excavation and associated costs). Additional evaluation will occur during the design phase (e.g., refinement of excavation volumes, transportation options (e.g., can rail transport minimize truck emissions). Regarding disclosure, the Department has communicated with the public at key milestones during the project as required by its Citizen Participation policies. Further, the above was explained during the public meeting for the proposed remedy on April 13, 2022. All key documents were also made available to the public in both a physical repository in the community and an electronic repository available to anyone with internet access.

COMMENT 5: The environmental and social impacts of this remedial plan are likely be worse than the residual impacts caused by the site if it were simply left alone, thus the stunningly high financial cost to RG&E ratepayers may actually impair public health and safety rather than improve it. Alternatively, the installation of a cap and removal of impacted shoreline soils and sediments may provide nearly as much environmental benefit as the proposed remedy; avoid the vast majority of the environmental damage the proposed remedy will cause; and dramatically reduce the cost of the project to ratepayers.

RESPONSE 5: The Department is required to select a remedy which meets the threshold goals of protecting human health and the environment and compliance with standards criteria and guidance while best meeting the additional balancing criteria of long-term effectiveness and permanence; reduction of toxicity, mobility, or volume; short-term impact and effectiveness; implementability, cost effectiveness, land use and community acceptance. The overarching goal of the remedial program is to restore the site to pre-disposal conditions to the extent feasible. Due to the size of the site, the nature of the contamination and the media impacted, all of the alternatives that meet the threshold criteria are costly. However, the Department did not select the most expensive remedial alternative. A simple capping remedy is not consistent with the Department's requirement to address sources of contamination. Additionally, this remedy is consistent with what has been documented to be a necessary and technically appropriate remedy at MGP sites around the state over many years. At this site much of the source material (coal tar) is located at the interface of the bedrock surface and overburden soil. Failure to remove the coal tar in this zone would allow continued migration of the coal tar and continued impacts to groundwater, thus not complying with Department guidance and regulations. As a baseline consideration, remedial parties must address sources of contamination. As source material, primarily coal tar, still exists at the site, it must be addressed in accordance with the Department's hierarchy for sources. In order to address the majority of the source material, the overburden soil must be excavated. Further, a simple capping remedy does not make whole the off-site property, which was impacted by the Site, and as indicated by the commenter, sediment excavation would still be required. The holistic approach for any cleanup and remedy is to bring the site to a state of protectiveness and accommodate future use. Capping and removing sediments alone does not resolve the remaining underlying contamination of the site and also is contrary to the Department's mission of returning sites to as close as pre-disposal conditions as possible and future productive use. Furthermore, removal of MGP-impacted soils in the subsurface is an integral part of the overall remedy for not recontaminating the sediment and for monitored natural attenuation of groundwater, both of which require source removal.

COMMENT 6: The need for this level of remediation has not been shown. Previous IRMs at the Site have eliminated seeps and releases to the Genesee River (other than from impacted sediments and the south shoreline area on B&L property). Water quality data have not been presented demonstrating surface water qualityproblems in the river attributable to the upland portion of the Site nor has it been demonstrated that theenvironmental problems at and emanating from the Site pose a threat that warrants the approach to remediation currently under consideration. While the river is impaired by nutrients and turbidity from erosion upstream of the Site, water quality downstream of the Site is impaired by heavy metals (silver, cadmium, and chromium) and by chlorinated hydrocarbons from Kodak's historic operations, not by MGP constituents.

RESPONSE 6: Based upon the extensive remedial investigations spanning over at least a decade, the Department believes that this site has been fully characterized to support this proposed remedy. The completion of interim remedial measures (IRMs) have reduced the impact from the contamination at the site but did not address the remainder of MGP wastes, coal tar and other contaminants that must be addressed in order to form a complete and protective remedy. Sources of contamination at the site present an ongoing threat to groundwater, sediment, surface water and potentially soil vapor. While not measured in the river, contaminated groundwater and coal tar are discharging to the river. The proposed remedy addresses actual and potential impacts and best meets the remedy selection criteria.

COMMENT 7: NYSDEC's DER-31 major green remediation concepts urge the agency to take into account "Reducing direct and indirect greenhouse gases and other emissions", and "Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals". It is insufficient to merely state that NYSDEC has a policy document called "DER-31". It must make decisions in a way that manifests these concepts.

RESPONSE 7: As noted above, not only were green remediation concepts considered in the development of the remedial alternatives (e.g. reuse of site soil to the extent possible which reduces transportation impacts) the detailed assessment of how to minimize the environmental footprint of the remedy will take place in the detailed remedial design which is the next phase of the remedial program. Many additional techniques to reduce the impact of the remedy can be evaluated for incorporation into the remedy. Examples of these include: sourcing backfill from as close to the site as possible; using equipment with the least emissions; using sustainably derived biodiesel fuel; using equipment meeting the most current emission standards; utilizing rail transport for disposal; utilizing the nearest disposal facility; recycling waste materials, crushing concrete for reuse on-site, carbon off-sets, etc. The Department along with RG&E are committed to reducing greenhouse and other emissions to accomplish the implementation of this remedy. As one of the first states in the country to adopt a green remediation policy, the Department clearly takes this seriously for all remedies implemented in New York State.

DER-31 is implemented to the maximum extent possible while still accomplishing the remedial goals of the Superfund Cleanup Program.

COMMENT 8: NYSDEC ignores the fact that the world is facing an existential threat from greenhouse gas emissions yetis proposing a remedy that will exacerbate the threat rather than reduce it.

RESPONSE 8: As stated above, the Department considers this for all remedies implemented in New York State and implements DER-31 to the maximum extent possible while still accomplishing the remedial goals established for the site.

COMMENT 9: The NYSDEC's March 2022 Fact Sheet for RG&E's East Station Manufactured Gas Plant Site (Site #828204) (the "Site") and related documents have described a proposed remedy to achieve NYSDEC's established soil cleanup objectives ("numeric goals") pursuant to RG&E's desire to achieve restricted residential status. The remedy involves excavating more than a half million tons of soil and sediment and the need to stockpile, load, transport to offsite treatment and disposal facilities, thermally treat, landfill, mine and transport borrow fill, backfill, dredgeand process sediments, etc. all of which are entirely dependent on the combustion of fossil fuel (thousands of gallons of diesel fuel for transportation and on-Site work and No. 2 fuel oil, No. 4 fuel oil, non-residual Waste Oil A, natural gas, or liquefied petroleum gas for thermal treatment activities).

RESPONSE 9: As discussed above, the Department is and has been well aware of the potential environmental impacts of selected remedies and developed policy years ago to incorporate minimization of the environmental footprint of remedies to make remedies more sustainable while achieving cleanups that are protective of human health and the environment. Protecting the environment today considers climate change mitigation (reducing greenhouse gas emissions) and adaptation (creating remedies that are resilient in the face of anticipated climate change (e.g., able to withstand storm surges).

COMMENT 10: The selected remedy will result in greater harm to public health and the environment than alternatives that rely on less excavation, transportation, and thermal treatment, all of which will result in massive emissions of greenhouse gasses (plus particulates and ozone) at a time when the greatest non-wartime existential threat thathas ever faced mankind comes from precisely these emissions. The NYSDEC's position that numeric cleanup goals must be achieved at this Site (which may not be possible in all Site media in any event) will result in an increase in environmental, public health and safety impacts rather than a decrease. Since this is not the agency's intent, it must acknowledge that there exist circumstances in environmental work inwhich tradeoffs can and should be made. If other acceptable approaches result in lower costs to RG&E and if NYSDEC and/or the public so demand(s), there is precedent in New York for a responsible party to fund additionalprojects in the public interest that have a geographic or social nexus to the Site in question.

RESPONSE 10: Noted. However, the Department must comply with guidance and regulations such as addressing sources of contamination and making the site protective. As noted above, the nature of the contamination at this site requires more than simple capping for on-site contamination. Methods to mitigate the greenhouse gas emissions will be evaluated during the Remedial Design which has yet to begin.

COMMENT 11: There is no argument that RG&E has an obligation to address the Site in a manner that protects public health and the environment; however available documents make clear that NYSDEC's numeric cleanup goals will force an inefficient approach to reducing the risks to public health at and near the Site as well as across the state (should thermal treatment be performed at Clean Earth Corporation's Fort Edward, NY location, which is typically used byRG&E for such work.)

RESPONSE 11: It has not yet been determined if thermal treatment of soil will be part of the soil disposal.

COMMENT 12: The final remedy selected for this Site must contemplate such a tradeoff: 1) Allow some impacted materials to remain (at depth) at this Site or 2) Significantly increase environmental justice inequities, greenhouse gas and other emissions and traffic safety risk. It is a fool's errand to expend so many financial resources and so negatively impact the environment and public safety in order to remove all accessible MGP-related materials, which have an immeasurably small chance of negatively affecting public health, when that same investment could have a tangible, positive effect on both public health and safety if applied elsewhere. Both NYSDEC and RG&E would be lauded for making the choice that improves rather than harms the environment and public healthand safety.

RESPONSE 12: Again, the Department requires that environmental footprint and environmental justice be considered not only in remedy selection and remedial design, but throughout the remedial process per Department green remediation, climate and environmental justice policy. Additionally, please see Section 7.0, Summary of the Proposed Remedy and Exhibit D of the Proposed Remedial Action Plan (PRAP) dated March 2022 for more specific detail on this discussion and how the proposed remedy will be implemented, and engineering and construction mitigation techniques employed.

COMMENT 13: In the Site's upland areas, MGP residuals are located at depths greater than ten feet below ground surface (BGS). Excavations are described in the PRAP as potentially extending to 30 feet BGS (or top of bedrock). At that point, documents show that MGP residuals, primarily coal tar, have entered the fractured bedrock. Once the tar enters the competent bedrock, feasible options for recovery or treatment do not exist. As the fractures narrow and the viscosity of the tar increases, natural attenuation predominates, and stasis is reached. In a previous IRM, RG&E removed a tar well that served as the source of much of the tar residuals at the site and this fact is acknowledged in the PRAP.

W i t h the source removed, no more is available to add to the current soil and bedrock burden. Additionally, a series of IRMs (ISS wall, slurry wall and collection trench) directed at stopping the movement ofmobile MGP residuals from the upland areas were previously installed and to date, appear to have been effective. Finally, it must be noted that there is no consumptive use of groundwater at or near the Site; therefore,drinking water is not affected even if MGP constituents make their way into the local aquifer.

RESPONSE 13: The IRMs, including the tar well excavation and ISS implementation including the NAPL collection wells, and slurry wall installation were an effective partial remedy to prevent more MGP wastes and NAPL from entering the Genesee River and reducing more significant groundwater contamination at the site. They also minimized site-wide impacts and allowed the extraction of NAPL from those affected areas to the extent practicable. While the IRMs conducted were considered an integral part of this remedy, remaining on-site source contamination must be addressed in order for the remainder of the site to meet all cleanup requirements as part of the New York State Superfund Program including the remedial hierarchy of addressing sources. Removal of MGP-impacted source soil in the upland areas is an integral part of the overall remedy, which relies on source removal to prevent recontamination of sediment and for monitored natural attenuation of groundwater. Please refer to the detailed discussion in Section 7.0 and Exhibit D of the PRAP for the details that will be incorporated to make this an effective and holistic remedy.

APPENDIX B

Administrative Record

Administrative Record

RGE East Station MGP
State Superfund Project
Rochester, Monroe County, New York
Site No. 828204

1. PRAP Comment Letter from Kevin Hylton, 59 Harwick Rd. Rochester, NY. dated April 19, 2022.

2. Proposed Remedial Action Plan, RG&E East Station MGP, Virtual Public Meeting, conducted on April 13, 2022.

3. Proposed Remedial Action Plan, RG&E East Station MGP Fact Sheet, dated April 4, 2022.

4. Proposed Remedial Action Plan (PRAP) for the RGE East Station MGP site*,* dated March 2022, prepared by the Department with NYSDOH concurrence on March 23, 2022.

5. NAPL and Groundwater Gauging Report for Performance Monitoring of ISS IRM, RG&E East Station Former MGP Site, Rochester, New York, prepared by Haley & Aldrich of New York, dated February 2022.

6. Feasibility Study (FS) of the RG&E East Station MGP Site No.828204, prepared by Haley and Aldrich of New York, dated May 4, 2021, and approved on May 12, 2021 by NYSDEC.

7. NAPL and Groundwater Gauging Report for Performance Monitoring of ISS IRM, RG&E East Station Former MGP Site, Rochester, New York, prepared by Haley & Aldrich of New York, dated December 2020.

8. NYSDEC Comment Letter "RE: RG&E East Station Former MGP Site # 828204, Feasibility Study (FS) dated July 2019, prepared by Haley and Aldrich (H&A) for RG&E revised 8/13/20" dated 12 November 2020.

9. Emergent Contaminant Groundwater Sampling Results, prepared by Parsons Corporation, dated March 2020.

10. NAPL and Groundwater Gauging Report for Performance Monitoring of ISS IRM, RG&E East Station Former MGP Site, Rochester, New York, prepared by Haley & Aldrich of New York, dated December 2019.

11. NAPL and Groundwater Gauging Report for Performance Monitoring of ISS IRM, RG&E East Station Former MGP Site, Rochester, New York, prepared by Haley & Aldrich of New York, dated December 2018.

12. Remedial Investigation Report Comment Response, prepared by Haley & Aldrich of New York, 27 August 2018.

13. NYSDEC Approval Letter 'RE: Remedial Investigation Report, RGE – East Station, Site ID No. 828204, City of Rochester, Monroe County", dated 9 August 2018.

14. Order on Consent, Index No. CO-82018057-48, Voluntary Cleanup Agreement Transition Order from Site No. V00358 to State Superfund Program, Site No. 828204 between the New York State Department of Environmental Conservation and RG&E, dated June 26, 2018.

15. NAPL and Groundwater Gauging Report for Performance Monitoring of ISS IRM, RG&E East Station Former MGP Site, Rochester, New York, prepared by Haley & Aldrich of New York, dated December 2017.

16. NAPL and Groundwater Gauging Report for Performance Monitoring of ISS IRM, RG&E East Station Former MGP Site, Rochester, New York, prepared by Haley & Aldrich of New York, dated January 2017.

17. NAPL and Groundwater Gauging Report for Performance Monitoring of ISS IRM, RG&E East Station Former MGP Site, Rochester, New York, prepared by Haley & Aldrich of New York, dated November 2017.

18. Remedial Investigation Report (RIR), prepared by Haley and Aldrich for RG&E submitted to NYSDEC, dated June 30, 2015.

19. NAPL and Groundwater Gauging Report for Performance Monitoring of ISS IRM, RG&E East Station Former MGP Site, Rochester, New York, prepared by Haley & Aldrich of New York, dated December 2014.

20. Off-Site Supplemental Remedial Investigation Work Plan Addendum, prepared by Haley & Aldrich of New York, dated June 2014.

21. NYSDEC Division of Fish, Wildlife and Marine Resources, Bureau of Habitat, "Screening and Assessment of Contaminated Sediment" dated June 24, 2014.

22. Off-Site Supplemental Remedial Investigation Summary, prepared by Haley & Aldrich of New York, dated February 2014.

23. Remedial Investigation for Sediments Data Summary, prepared by Haley & Aldrich of New York, dated January 2014.

24. NAPL and Groundwater Gauging Report for Performance Monitoring of ISS IRM, RG&E East Station Former MGP Site, Rochester, New York, prepared by Haley & Aldrich of New York, dated December 2013.

25. Addendum Remedial Investigation for Sediments, prepared by Haley & Aldrich of New York, dated May 2013.

26. NYSDEC Approval Letter "RE: Addendum Remedial Investigation Work Scope for Sediments. RG&E East Station Plant, MGP Site # V00358-8, Rochester, Monroe County", dated 21 May 2013.

27. On-Site Supplemental Remedial Investigation Data Summary Package, prepared by Haley & Aldrich of New York, dated March 2013.

28. Regulator Station Upgrade Summary, prepared by Haley & Aldrich of New York, dated March 2013.

29. NYSDEC Approval Letter "RE: Supplemental Remedial Investigation Work Plan. RG&E East Station Plant, MGP Site # V00358-8, Rochester, Monroe County" dated 24 July 2012.

30. NYSDEC Approval Letter "RE: Off-Site Supplemental Remedial Investigation Work Plan. RG&E East Station Plant, MGP Site # V00358-8, Rochester, Monroe County" dated 24 July 2012.

31. NYSDEC Approval Letter "RE: Soil & Groundwater Management Plan for Natural Gas Regulator Station Modifications. RG&E East Station Plant, MGP Site # V00358-8, Rochester, Monroe County" dated 24 July 2012.

32. Work Plan for Soil & Ground Water Management for Natural Gas Regulator Station Upgrade, prepared by RG&E, dated July 2012.

33. Supplemental Remedial Investigation Work Plan, prepared by Haley & Aldrich of New York, dated June 2012.

34. Off-Site Supplemental Remedial Investigation Work Plan, prepared by Haley & Aldrich of New York, dated June 2012.

35. Data Summary Package, prepared by Haley & Aldrich of New York, dated December 2011.

36. NYSDEC "Citizen Participation Plan" (CPP), dated July 11, 20011, approved on August 7, 2011.

37. Bedrock Well Screen Placement Memorandum, prepared by Haley & Aldrich of New York, dated July 2011.

38. Site Status Update Memorandum, prepared by Haley & Aldrich of New York, dated March 2011.

39. NYSDEC Approval Letter "RE: RG&E Former MGP East Station, Site # V00358-8, Remedial Investigation Work Plan, dated July 19, 2010 prepared by Haley & Aldrich of New York." Dated 10 November 2010.

40. Health & Safety Plan for Remedial Investigation, prepared by Haley & Aldrich of New York, dated August 2010.

41. Remedial Investigation Work Plan, prepared by Haley & Aldrich of New York, dated July 2010.
42. NYSDEC, 2010. "DER-10 Technical Guidance Site Investigation and Remediation" dated May 2010.
43. Phase 2 Data Summary Package Assessment of MGP-Related NAPL Residuals in Sediments in the Genesee River Project Area, prepared by GEI Consultants, Inc., dated March 2010.
44. NAPL and Groundwater Monitoring Report for Performance Monitoring of ISS IRM – October 2008 through August 2009 Monitoring Events, prepared by Ish, Inc., dated November 2009.
45. NYSDEC Approval Letter "RE: RG&E East Station Site #V00358-8, Phase IV IRM Completion Report dated April 1, 2009 prepared by Ish, Inc." dated 25 September 2009.
46. Phase IV Interim Remedial Measure Implementation Report, prepared by Ish, Inc., dated March 31, 2009.
47. IRM Work Plan for ISS Technology, Phase III & IV Report, prepared by Ish, Inc., dated October 2007, approved on November 9, 2007.
48. Draft Report for Remedial Design Investigations for Designing Phase III ISS Application of the Draft IRM Work Plan for In-Situ Stabilization/Solidification to Control NPL Seeps, prepared by Ish, Inc., and Meta Environmental, Inc., dated October 2007.
49. NYSDEC "6NYCRR Part 375, Environmental Remediation Programs", dated December 14, 2006.
50. Report Phase II (Treatability Testing) of the IRM Work Plan for In-Situ Stabilization/Solidification to Control NAPL Seeps, prepared by Ish, Inc., dated November 11, 2006.
51. Report for the Supplemental Testing in Phase II (Treatability Testing) of the Draft IRM Work Plan for In-Situ Stabilization/Solidification to Control NAPL Seeps, prepared by Ish, Inc., dated November 2006.
52. NYSDEC Approval Letter "Re: RG&E MGP Site, East Station Site # V00358-8, Rochester, New York Draft Report of Supplemental Treatability Testing for Draft IRM Work Plan for In- Situ Stabilization/Solidification (ISS) prepared by Ish Inc, dated May 20, 2006." Dated 29 September 2006.
53. IRM Final Engineering Report for the Tar Well Removal, prepared by URS, Inc., dated March 17, 2006.

54. Draft Report on Pre-Remediation Characterization of Tar Well/Gas Holder Area, prepared by Ish, Inc. and Meta Environmental, Inc., dated December 2004.

55. Ish, Inc., Phase I Remedial Design Investigation to Mitigate NAPL Seeps at the RG&E East Station Site dated June 31, 2004.

56. Ish, Inc., 2004. "Interim Remedial Measure Phase I Remedial Design Investigation to Mitigate NAPL Seeps" dated January 2004.

57. Order on Consent, Multi-Site Voluntary Cleanup Agreement, Index No. B8 0535-98-07 between the New York State Department of Environmental Conservation and Rochester Gas and Electric, executed on April 10, 2003.

58. Addendum to the Focused Remedial Investigation, prepared by Ish, Inc. and Meta Environmental, Inc., dated April 2000.

59. Focused Remedial Investigation Report, prepared by Ish, Inc. and Meta Environmental, Inc., dated April 2000.

60. NYSDEC Division of Water, "Technical and Operational Guidance Series (TOGs 1.1.1) Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations", revised June 1998.

61. Site Investigation Report, prepared by Atlantic Environmental Services & Remediation Technology, Inc., dated June 1993.

62. Expanded Phase I Investigation – Genesee River Gorge (Lower Falls), prepared by Recra Environmental, Inc., dated January 1988.

63. Preliminary Site Review – NYS Superfund Site No. 828044, prepared by Morrison-Knudsen Engineers, Inc., dated June 1986.

APPENDIX C SUBSURFACE SOIL DISTURBANCE PROTOCOL

PARSONS ENVIRONMENT & INFRASTRUCTURE GROUP MANDATORY SUBSURFACE SOIL DISTURBANCE PROTOCOL

1. INTRODUCTION

Intrusive investigation or excavation of the subsurface in areas developed for commercial, industrial or residential use exposes Parsons to the risk of causing damage to underground utilities and structures on a daily basis.

The potential consequences of causing damage to an underground utility or structure include, but are not limited to the following:

- Injury or loss of life
- Financial responsibility for repair, lost time, and/or loss of service
- Loss of client
- Federal investigation of job site work practices
- Litigation (third party lawsuits)

The mandatory protocol and checklists provided herein are intended as tools to aid in the management of risk, and ensure that a responsible standard is consistently applied at project sites where intrusion of the subsurface will occur.

2. PURPOSE

The purpose of this mandatory protocol is the prevention of potential injury and/or loss of life; and damage to subsurface utilities and structures. Parsons' staff will identify and evaluate the hazards associated with underground utilities and other structures prior to conducting any intrusive subsurface operation including but not limited to drilling/boring, test pitting, excavation and other subsurface intrusive activities.

3. SCOPE

Parsons' staff will employ sound investigative and work practices, and will use appropriate measures to avoid damage to subsurface utilities and structures. Furthermore, Parsons requires that these procedures be implemented by all of Parsons' employees and subcontractors, as appropriate. Subcontractors will have a copy of the procedures set forth in Section 6 of this document as an appendix to their contracts.

4. POLICY

Parsons' policy requires that the project manager follow all local, state, and federal laws applying to intrusive subsurface work (i.e. obtain permits, inform agencies, obtain utility clearances, etc). The project manager shall review, as available, all current and historical site drawings and plans from the client, facility owner or tenant, utility providers, municipal government offices (i.e. city engineer or building department) and third parties as appropriate.

The Pre-Drilling/Subsurface Checklist for Intrusive Fieldwork **(Attachment A)** shall be completed prior to initiating fieldwork. <u>Note:</u> *The checklist includes a site visit as a requisite to meet with knowledgeable staff as appropriate (current or former site/owner personnel, utility representatives, municipal representatives, etc.), and review site conditions and features relative to the proposed locations for intrusive work. The checklist should be turned in to the Parsons Project Manager and a copy placed in the project file.*

The procedure described under Section 6 of this document is mandatory at all sites where any intrusive subsurface activities will take place, including but not limited to drilling, augering, boring, excavating, test pitting, trenching or direct push (Geoprobe) technology.

Variance from the Subsurface Soil Disturbance Protocol is allowed only with the written approval from the appropriate Parsons' Program Manager or Sector Leader and the completion of the Utility Clearance Variance Request Form (Attachment B). GBU, Division or Project Safety personnel should be consulted as needed. Failure to obtain a variance in writing is grounds for disciplinary action. Copies of all variances will be maintained in the project files.

The Project Manager is encouraged to find locations that are acceptable to the project team to perform intrusive subsurface work that are not within right-of-ways, streets, highways, or near municipal or third party-owned utility corridors. When it is necessary to conduct work within these areas, the Project Manager should obtain approval from either the Program Manager or Sector Leader and submit the existing work plan to the GBU or Division Safety Manager for review.

5. RESPONSIBILITY

It is the responsibility of the Project Manager to ensure that the Pre-Drilling/Subsurface Checklist for Intrusive Fieldwork and Utility Clearance Variance Request form are followed. If a variance is sought, it is the responsibility of the Project manager to gain written approval of the appropriate Parsons' Program Manager or Sector Leader.

6. PROCEDURE: SUBSURFACE SOIL DISTURBANCE PROTOCOL

The Parsons' Project Manager will be responsible for fulfilling the objectives of this protocol by ensuring that the procedures are carried out by Parsons' employees, subcontractors, and any other person acting on behalf of Parsons. The Parsons' Project Manager will ensure that all individuals working on drilling and other subsurface exploration projects are adequately trained and supervised. Parsons will practice sound investigation and work practices and employ all necessary measures to avoid damage to subsurface systems and structures. The Parsons' Program Manager or Sector Leader will be contacted and advised in advance of beginning field work in the event that a variance to this protocol is requested by the Parsons' Project Manager or designee. The following tasks/subtasks will be completed at every site and documented on the checklist.

6.1 PRE-INVESTIGATION TASKS

The objective of these tasks is to gather all relevant information about the site to assist in identifying exploration locations and obtaining necessary permits. Please note that in some instances the following information will be obtained or gathered by a subcontractor, which meets this objective.

6.1.1 Obtain Site Plans

Obtain as-built drawings and/or existing site plans as available. NOTE: As-built drawings may not accurately depict the locations of improvements and subsurface features and should therefore not be solely relied upon to determine acceptable locations for intrusive subsurface activities.

6.1.2 Obtain Permits

The project staff will observe all local, state, and federal laws, obtain all necessary permits and utility clearances, and secure site access permission. NOTE: Some permits/clearances require this step to be completed after the exploration locations have been identified and marked in the field. If this is required, proceed with Items 6.2 and 6.3 prior to obtaining permits.

6.1.3 Utility Mark-outs

Parsons' project staff will request a utility mark-out through the local utility locating one-call system for the work site, and document a reasonable degree of effort to locate all main electrical, gas, telephone and all other subsurface utilities. The Parsons' Project Manager must be notified of the status of locating underground utilities before field work progresses. If locating utilities becomes problematic, the Parsons' Project Manager should update the client and discuss potential alternative methods for locating or reducing risk of damage to underground utilities/structures for consideration (i.e. subcontract a private locating service, re-evaluate risk/reward of specific locations or utilize intrusive non-destructive methods as described in Section 6.5.6). Site plans will be updated as appropriate to include utility mark-out information. On third party sites, close coordination with the site owner's representatives for mark-outs, review of as-builts, and other information reviews should be conducted prior to work. NOTE: Some utilities require the exploration locations to be identified and marked in the field prior to performing mark-outs. If this is required proceed with Items 6.2 and 6.3 prior to obtaining permits.

6.2 SITE VISIT

A site visit is required to compare the site plan to actual conditions, document all findings, and update the site plan. Parsons will obtain information needed to prepare a vicinity map of the area that may include significant neighboring addresses, land use, surface water bodies, and other natural as well as manmade features of note, as appropriate. The site visit should be scheduled concurrent with, or soon after the utility mark-out. The inspection should include the following activities at a minimum.

6.2.1 Utilities

Note the location of all utility mark-outs and aboveground utilities:

- Area lights
- Phones
- Drain lines
- Overhead lines
- Fire hydrants
- Fiber optic cable signage
- Catch basins
- Manholes
- Junction boxes
- Natural gas
- Other utilities
- Observe paving scars such as areas of new pavement or saw cuts

6.2.2 Plant/Property Systems

If possible, speak with someone having historical site knowledge to gain information about the site (locations of former tanks, lines, etc.). For UST systems:

- Inspect for the presence of a dispenser pan and, if possible, determine whether product piping is rigid or flexible.
- Visually inspect the location of the tank field, observation wells (if present), dispensers and vent stack(s).

- Note the orientation, arrangement, location, sizes, etc. of the tanks and manholes. Estimate the burial depth of the tank field.

- Observe paving scars (i.e. fresh asphalt/concrete patches, scored asphalt/concrete). Note that this may not indicate location of product piping.

6.2.3 Existing Remediation Systems

Visually inspect the location of aboveground components. Note the locations of well manholes, sparge points, etc.

6.2.4 Safety

For UST systems, note the location of the emergency shut off switch and become familiar with its use.

6.3 SELECTION OF DRILLING/TEST PIT LOCATIONS

6.3.1 Critical Zones

Establish pre-drilling critical zones appropriate to the project site. These are zones where no drilling (if possible and if client concurs) will be conducted. As an example, the following critical zones could be applied at a UST site:

- 10ft (3m) distance from the furthest edge of any operating tank

- 10ft (3m) distance surrounding operating dispenser islands

- At active service station sites, the entire area between the tank field and the dispenser islands.

- The zone between 0 and 5-feet of utility markings

6.3.2 Select Drilling Locations

The information collected to this point will be utilized in combination with regulatory requirements and investigation objectives to select drilling locations. It is recommended that alternate drilling locations be selected in case additional explorations are required or obstructions are encountered. The effort to investigate a specific proposed drilling location should be to clear a minimum five-foot radius circle around the location.

6.3.3 Review Selected Locations with the Client

At a minimum, offer to review the selected and alternate drilling locations with the client's project manager or designated representative. When completing Geoprobe^{tm} (or similar) investigations in which some boring locations are not selected in advance, but partially determined in the field based on field screening results, the client should approve the areas in which work will be performed. Do not proceed with the investigation until the plan has been discussed with the client, and approval to proceed has been granted. If relocation of a boring outside approved limits is necessary at any time and for any reason, contact the client prior to proceeding. CLIENT APPROVAL MUST BE DOCUMENTED. Verbal approval is acceptable if followed with written approval. Documentation may include a notation in the field book, email or written correspondence.

6.4. REQUIRED NOTIFICATIONS

Affected parties must be notified at least 48-hours (longer if possible) in advance of planned intrusive fieldwork. An exception would be in the event of an emergency response situation. Parsons' staff will avoid scheduling conflicts with facility activities at the site. The Parsons' Project Manager or designee will notify the following persons as applicable:

- The oversight regulatory agency (includes local fire, police and municipal contacts as appropriate).
- Property owner for private properties. This should include neighboring third party property owners if a potential exists for causing inconvenience as a result of the scheduled fieldwork.
- Client specific notifications as appropriate (i.e. facility maintenance, retail and/or real estate managers as appropriate)

6.5. ON-SITE SUBSURFACE ACTIVITIES

6.5.1 Safety

A Project Safety, Health and Environmental Plan (PSHEP) must be available on site at all times and all Parsons' staff, contractors and subcontractors must be familiar with it. Parsons' employees are to acknowledge their review of the PSHEP by signing the signature form contained within the PSHEP. The Parsons' field team leader is tasked with conducting a tailgate meeting at the start of each day to review project specific health and safety items with staff and subcontractors. Subcontractors, however, are responsible for their own health and safety. All work areas shall be secured with safety cones, safety tape, construction fence, barricades, or signs as appropriate.

A copy of this entire subsurface activity protocol and completed checklist must be appended to the health and safety plan.

6.5.2 Supervision

A Parsons' on-site representative will be responsible for overseeing subsurface activities. This representative will ensure that the work is performed with due caution and will be alert for warning signs that could indicate the presence of underground tanks, lines, or other subsurface structures.

6.5.3 Warning Signs

The following warning signs may indicate the presence of a subsurface structure such as tanks or lines:

- Pea Gravel/Sand/Non-indigenous Material.
- The absence of soil recovery in the hand auger. This could indicate pea gravel that has spilled out of the auger.
- Any unexpected departure from the native soil or groundwater conditions as established in other on-site digging.
- Obstructions encountered

If any of the above warning signs or a suspicious condition is encountered, intrusive subsurface activities in this area should immediately cease and the Parsons' Project Manager shall be contacted.

6.5.4 Drill Boring Sequence

If possible, the boring sequence should be planned such that the boring furthest from any suspected underground improvements is carried out first. This is done to determine the natural subsurface conditions and to allow the field geologist/scientist to recognize native versus fill conditions. Also, least impacted locations should be done first if possible to prevent possible cross contamination.

6.5.5 Surface Removal for Paved Areas

Sufficient paving or surface improvement should be removed to allow clear visibility of the subsurface conditions during hand augering/digging, and allow excavation with hand tools. Drilling in an area of high risk may warrant a larger pavement opening.

- Monitoring Well Installations: 2-ft x 2-ft (60cm x 60cm) minimum removal is suggested (assumes for example: 6.25-inch hollow stem auger (HSA) or smaller).
- Soil Borings: 8-inch (20cm) diameter minimum removal is suggested (assumes for example: 3.25-inch HAS or smaller).
- Direct Push Samplers: 4 to 6 inch (10 to 15 cm) diameter minimum removal is suggested (assumes for example: 2-inch diameter sample tube).

The technique used should not pose a threat to subsurface structures. Final completion for holes in pavement shall be neatly saw-cut or cored unless otherwise directed by the client.

6.5.6 Clearing the Subsurface for Utilities and Other Structures

Parsons' staff must ensure that no subsurface utilities, structures, or improvements exist where intrusive subsurface activities will occur. Locations will be cleared using results of historical data research and with geophysical methods (see below for details) at a zone 5 feet in radius around the proposed location. Staff (or personnel supervised by Parsons) will also utilize intrusive, non-destructive procedures such as hand digging to a depth of 5 feet and a diameter or width equivalent to the outside dimensions of the auger to investigate the boring location.

The method used to delineate the subsurface should be compatible with the inherent risk associated with the type of facility/property and the location of the drilling. Proactive investigative methods to clear specific drilling locations will include the following non-invasive and invasive non-destructive methods:

Non-Invasive Geophysical Remote Sensing: Multiple appropriate instruments (ground penetrating radar, electromagnetic detector, magnetometer, metal detector) can be used for this work. Survey an area around the location to a distance of 5 feet using geophysical methods to identify potential subsurface utilities or facilities. Move the borehole location, if necessary, within the cleared circle to avoid an object identified by the geophysical instrument. Examples of geophysical methods are provided below:

- Electromagnetic and radio frequency;
- Ferrous metal or magnetic locators;
- Ground probing radar (GPR).

Important note: A combination of two or more non-invasive instruments may be required to properly clear a subsurface area. For example, a ferrous metal detector may not detect metals pipes embedded in concrete duct banks, PVC pipes, FRP pipes, or other non-ferrous materials.

Intrusive Non-Destructive Procedures: Delineate the subsurface at the borehole location by probing or digging. Several acceptable methods are discussed below. In some cases, these intrusive procedures may not be practical due to the subsurface conditions or requirements of the explorations.

- Vacuum/Air Knife Digging: Vacuum digging has proven to be a very effective and safe means of digging and is recommended instead of probing and digging with hand tools.
- Probing: The probe should have a blunt or rounded tip and should be advanced by hand in a triangular pattern around the bore location without excessive force.
- Hand Digging: Should be performed with a small hand garden spade.

- Hand Augering: The auger is to be turned slowly and not forced through the soil. It is recommended that an auger without sharp points (some augers have rounded edges) be used.

- Post Hole Digging: Can be used for soil removal only in soil that has been probed and cannot be used to advance the hole beyond the depth or width of probing.

The area to be cleared for underground utilities or structures for augering shall exceed the diameter of the largest tool (hand auger, drill auger, sampling tube, etc.) to be advanced and sufficiently large to allow for visual inspection of any obstructions encountered. The first 1 - 2ft (0.3 - 0.6m) can be cleared by hand digging to remove the soil. Slowly and carefully probe (i.e. triangular pattern), vacuum, or hand auger throughout the area to be cleared to ensure that no obstructions exist anywhere near the potential path of the drill auger or push type sampler. The soil in the area to be cleared shall be fully removed during this step. If probing is utilized, then alternate probing with soil removal as necessary, until the first 5-ft (1.5m) has been delineated.

6.5.7 Refusal

Where natural subsurface conditions (e.g. cobbles/rocks, fill material, and/or bedrock) may prevent adequate probing and augering, a practical and sensible evaluation by the Parsons' Project Manager will be the basis for determining if continuation of probing and augering is feasible. In all cases Parsons must employ all means necessary to prevent damaging subsurface utilities, product lines, tanks, or other structures. **When conventional means of probing and augering cannot be utilized, the Parsons' field representative believes that additional probing/augering is not feasible, or if the probing/augering poses additional hazard to personnel because of the physical demands of performing the task, work in that specific area will cease**. The Parsons' Project Manager will contact the client's project manager or designee to discuss alternatives. If Parsons' staff suspects, based on past information or boring logs, that hand augering is infeasible, then alternatives such as vacuum clearing or non-invasive procedures should be evaluated in advance.

6.5.8 Event Notification

If any portion of a tank, pipe, utility or other subsurface structure is encountered, or if there is any doubt it has been encountered, the work is to cease in that area and the Parsons' Project Manager notified immediately. If there is reason to believe that the structure has been damaged, if applicable, the emergency shut-off switch should be activated (if applicable) and the appropriate municipality and client notified immediately. The Parsons' Project Manager and/or client will decide if additional uncovering by hand is required. If it is confirmed that a UST system has been encountered, a tightness test(s) should be considered. Under no circumstances is the area to be backfilled without notifying the Parsons' Project Manager, unless risk of personal injury or damage warrants a temporary backfilling.

In case of refusal or if an unknown subsurface object is encountered during intrusive subsurface activities, then the following specified resolution process must take place.

- Additional and deliberately careful excavation by hand will be conducted in an attempt to define the cause of refusal or identify the subsurface object.

    a. If the cause CAN be readily and correctly defined as not destructive or hazardous, the field task manager should call the PM to discuss the situation.

    b. If the cause CAN be readily and correctly defined as potentially destructive or hazardous, the field task manager should call the PM to discuss the situation. The specific location must be re-evaluated.

    c. If the cause CANNOT be readily and correctly defined, the field task manager should call the PM to discuss the situation. The specific location must be re-evaluated.

- In case “a,” drilling may proceed ONLY after consultation with the PM.

- In cases “b” and “c,” drilling MUST STOP so that location re-evaluation can take place. The client, the utility owner (if applicable) and if required, the appropriate regulatory agency, must be advised of the situation and consulted to determine if (1) the location is necessary, which may require additional effort to clear a new location, or (2) the location is not necessary, and can be deleted from the program.

6.5.9 Scheduling

Since clearing locations for augering, drilling, excavation and similar intrusive field work can be time consuming, it may be appropriate to perform the surface removal subsurface delineation prior to the arrival of subcontractors and their equipment on site. If these activities are conducted prior to the actual day of intrusive field work, then the cleared locations must be adequately covered with plates and/or backfilled, or barricaded to protect pedestrians and other surface traffic. Care must be taken to prevent settlement of the material used to cover the holes.

ATTACHMENT A

PRE-DRILLING/SUBSURFACE CHECKLIST
FOR INTRUSIVE FIELD WORK

PREDRILLING/SUBSURFACE CHECKLIST FOR INTRUSIVE FIELDWORK

Site Name: ______________________ **Job Number:** __________

Site Phone Number: ______________________

Site Address: ______________________ **County:** __________

Client Proj. Mgr.: ______________________ **Phone:** __________

Site Manager Contacted Date: ______________________ **By:** __________

Site Drawings (yes / no / NA) ________ (please attach) **Historical Drawings (yes / no / NA)** ________

Third Party Construction/Redevelopment Plans (Yes/No/NA)

***ATTACH SITE FIGURE WITH PROPOSED BORING LOCATIONS

Subcontractor's (drillers, concrete, etc…) **Company** ______________________

Subcontractor's Contact Person ______________________ **Phone** __________

Meeting / Start Date ______________________ **Time** __________

1) **Health and Safety Signoff Form Completed? (Yes/No)** **Date** __________

2) **Utility Protection Services (Minimum 48 Hrs. Advance Notice, State Specific Notification Period Supercedes)**

Called: Date __________ Time __________ Initials __________

Reference # ______________________

Proposed Drilling Locations Premarked for Locating Service. Y / N

3) **Private or In-House Utility Locating Service Performed?** Y / N __________

Called: Date __________ Time __________ Initials __________

Name of Locating Service: ______________________

Telephone #/ contact: ______________________

Name of Supplier Locating Technician: ______________________

Type of sensing equipment used: ______________________

Proposed Drilling Locations Premarked Y / N

4) **Other Potential Underground Structures**

Name of City Engineer/Utility Representative: ______________________

Telephone #: ______________________

Date Notified ______________________ Maps: Y / N

Cleared: Y / N

5) **COMPLETED SITE WALKOVER W/ SITE MANAGER/DESIGNEE OR OWNER/TENANT REP.** Y / N

Name of Site Manager: ______________________

Name of Property Owner/Tenant Representative: ______________________

Cleared: Yes / No

Building Utility Service Line Connections Identified: Y / N

(Hand sketch on site map w/proposed boring locations and most likely utility trench locations)

6) **Utility Inventory:** Y / N

Utility	Name	Depth (ft) (If Available)	Phone	Notified - Date		Marked
Above Ground Services						
Electric		NA		Y / N		Y / N
Telephone		NA		Y / N		Y / N
Cable		NA		Y / N		Y / N
Overhead Supports		NA		Y / N		Y / N
Traffic light cables		NA		Y / N		Y / N

PREDRILLING/SUBSURFACE CHECKLIST FOR INTRUSIVE FIELDWORK

6) Utility Inventory Continued:

Below Ground Services:

Electric				Y / N		Y / N
Telephone				Y / N		Y / N
Cable				Y / N		Y / N
Gas				Y / N		Y / N
Water				Y / N		Y / N
UST System				Y / N		Y / N
Storm				Y / N		Y / N
Sanitary				Y / N		Y / N
Steam				Y / N		Y / N
Pipeline Companies				Y / N		Y / N

Other:

				Y / N		Y / N
				Y / N		Y / N
				Y / N		Y / N

7) **Site-Specific Emergency Contingency Plan Incorporated in Health & Safety Plan** Y / N

8) **Drilling Locations Approved by Client Project Manager Named Above?** Y / N

9) **Signature of Parsons' Project Mgr. (required to begin fieldwork):**

Name of Project Manager	Signature of Project Manager
Name of Parsons Field Personnel	Signature of Field Personnel

(This document to be included with the site H&S Plan and should be available upon request.)

ADDITIONAL COMMENTS / NOTES:

ATTACHMENT B

UTILITY CLEARANCE VARIANCE REQUEST FORM

PARSONS

UTILITY CLEARANCE VARIANCE REQUEST

To: Enter Parsons Manager (Program, Sector or Operations)

From:

Client Company Name:

Site/Project Name:

Date of Request:

Work Start Date:

The purpose of this document is to request a variance from one or more of the PE&I Mandatory Subsurface Soil Disturbance Protocol requirements. The purpose of the mandatory protocol is to prevent potential injury and/or loss of life; and damage to subsurface utilities and structures during any soil disturbance. Any waiver of these requirements should be carefully evaluated.

Variance from the Subsurface Soil Disturbance Protocol is allowed only with the written approval of the appropriate Parsons' Program/Sector/Operations Manager. GBU/Divisional/Program safety resources should be consulted as needed. Failure to obtain a variance in writing is grounds for disciplinary action.

Brief Project Description

Insert a brief background and description of the intrusive activities, which are the reason(s) for requesting a variance.

Utility Clearance Requirements

Step No.	Requirement	Step Completed[1]
Prep-1	Obtain as-built drawings and/or existing site plans if available and review for on-site utilities.	☐ Yes ☐ No

[1]Any "No" response must include the rationale for not completing the step at the end of the Variance Request form.

Step No.	Requirement	Step Completed[1]
Prep-2	Utility mark-out requested through the nationwide utility locating one-call system (www.call811.com) for the work site.	☐ Yes ☐ No
Prep-3	Review the Subsurface Soil Disturbance protocol with all PE&I technical staff that will potentially be involved in projects that include subsurface investigation.	☐ Yes ☐ No
Pre Mob-1	Notify affected parties at least 48-hours (longer if possible) in advance of planned intrusive fieldwork.	☐ Yes ☐ No
Pre Mob-2	Prepare a Project Safety, Health and Environmental Plan (PSHEP) that includes a copy of the Subsurface Soil Disturbance protocol.	☐ Yes ☐ No
Pre Mob-3	Select a competent Parsons' on-site representative to oversee all surface removal, hand augering/digging, drilling, and test pitting.	☐ Yes ☐ No
Site [2] Visit-1	Perform a site visit and identify indications of underground utilities. Indications could include [3]: ➢ Area lights ➢ Phones ➢ Drain lines ➢ Overhead lines ➢ Fire hydrants ➢ Fiber optic cable signage ➢ Catch basins ➢ Manholes ➢ Junction boxes ➢ Natural gas	☐ Yes ☐ No

[1] Any "No" response must include the rationale for not completing the step at the end of the Variance Request form.

[2] Site visit activities must be included with mobilization activities if a Site visit is not performed prior to mobilization for the field work.

[3] Note that list is not all inclusive.

Step No.	Requirement	Step Completed[1]
	➢ Observe paving scars such as areas of new pavement or saw cuts	
Site Visit-2	Prepare a vicinity map of the proposed work area to include significant features and utilities. The site visit should be scheduled concurrent with, or soon after the utility mark-out.	☐ Yes ☐ No
Site Visit-3	Interview someone having historical site knowledge to gain information about the site (locations of former tanks, lines, etc.).	☐ Yes ☐ No
Site Visit-4	Establish pre-drilling critical zones appropriate to the project site	☐ Yes ☐ No
Site Visit-4	Review Selected Locations with the Client	☐ Yes ☐ No
Field Work-1	Review site utility maps against each proposed work activity. Check for legibility, accuracy, and scale while walking areas of concern. Evaluate the work area for any items in Site Visit-1 that may have been missed.	☐ Yes ☐ No
Field Work-2	Obtain all necessary permits and utility from the facility.	☐ Yes ☐ No
Field Work-3	Remove any surface paving or surface cover allow clear visibility of the subsurface conditions during hand augering/digging, and allow excavation with hand tools.	☐ Yes ☐ No
Field Work-4	Non-Invasive Clearing: Clear a minimum of a five foot radius for each proposed intrusive activity. Locations will be cleared using results of historical data research and with geophysical methods. Multiple appropriate instruments (ground penetrating radar, electromagnetic detector, magnetometer, metal detector) can be used for this work.	☐ Yes ☐ No
Field Work-5	Invasive Clearing: Delineate the subsurface at the borehole location by probing or digging. Dimensions of the intrusive method must exceed the diameter of the largest tool (hand auger, drill auger, sampling tube, etc.) to be advanced and	☐ Yes ☐ No

Step No.	Requirement	Step Completed[1]
	sufficiently large to allow for visual inspection of any obstructions encountered. Approved methods could include the following: ➢ Vacuum Extraction (Air Knifing, SoftDig®) ➢ Probing ➢ Hand Digging ➢ Hand Augering ➢ Post Hole Digging	

Rationale

Below, identify the step or steps the variance is being requested for and an explanation of why the waiver is necessary and/or justified.

Step No.	Rationale for Variance Request

Approvals

	Name	**Date**
Parsons Manager (Program, Sector, or Operations)		

Environmental Remediation Drilling Safety Guideline

A summary of industry practices and techniques to help drillers enhance safety performance, environmental performance, and overall project quality

Revision 0 - 2005

Special Notes

1. This publication addresses environmental remediation drilling and push-probe safety guidelines. Always review local, state, and federal laws and regulations as applicable for each project.

2. The authors of this guidance are not undertaking to meet the duties of employers, manufacturers, or suppliers to warn and properly train and equip their employees, and others exposed, concerning health and safety risks and precautions, nor undertaking their obligations under local, state, or federal laws.

3. Information concerning safety and health risks of materials and operations should be obtained from the employer, the manufacturer, or supplier of that material, or the Material Safety Data Sheet (MSDS).

4. Nothing contained in this publication is to be construed as granting any right, by implication or otherwise, for the manufactured by letters patent. Neither should anything contained in the publication be construed as insuring anyone against liability for infringement or letters patent.

ACKNOWLEDGEMENTS

AntiEntropics, Inc. and the collective authors would like to thank the National Drilling Association (NDA) for the permission to use selected content from their *Drilling Safety Guide*. The *Drilling Safety Guide* is recognized throughout the U.S. as a guideline for the safe operation of drilling equipment. It is available through the NDA by contacting them at:

National Drilling Association
11001 Danka Way North, Suite 1
St. Petersburg, FL 33716

Telephone: 727-577-5006
Facsimile: 727-577-5012
Email: info@nda4u.com

We would also like to thank the many companies that shared information reflecting the practices they use to achieve safe and successful remediation well drilling projects. Their goal is to enhance safety and environmental performance across the industry.

Table of Contents

Attachments

INTRODUCTION

This publication gives guidance to address some of the most common safety concerns that should be considered while performing drilling activities. It is not intended to address every possible situation that may arise or every hazard which may come to exist during drilling activities.

The intended audience for this guideline includes:

- Customers and client companies the work is performed for
- Facility managers
- Engineers
- Geologists
- Project managers
- Environmental health and safety professionals and managers
- Site health, environmental, and safety (HES) officers
- Drillers and rig operators
- Driller helpers
- Field technicians
- Utility clearance companies and field crews

Your safety is an ongoing concern for you, the organization for which you work, and the companies that you perform work for…in other words, safety is everyone's concern.

This drilling safety guideline has been prepared to assist the environmental remediation industry in understanding drilling and direct push safety guidelines and common practices. When working on a project where more stringent safety practices are required, always defer to the more conservative practice. It contains suggested safety practices and is not intended to establish standard industry requirements. This guideline is to assist workers associated with the environmental remediation industry to work safely and with close adherence to environmental requirements. Many aspects of drilling and direct push safety can only be accomplished by using every worker's intelligence, careful attention to detail, and common sense.

The vision of this guideline is to provide a brief summary of some of the best available drilling safety knowledge in the remediation industry. By adopting these proven practices, you can reduce the potential for personal injury and safety related losses.

THE PURPOSE AND SCOPE OF THIS GUIDELINE

This guideline's purpose is to assist in preventing losses to the following four situations during environmental remediation drilling and direct push operations:

- Injury to workers
- Negative impact on the community
- Negative impact on the environment
- Damage to surface and subsurface structures

Our goal is to augment, not replace, site-specific safety plans. This guideline is a collection of safety practices and lessons learned and compiled by knowledgeable remediation drilling and safety, health, and environmental professionals. As our industries progress and learn new techniques, we hope to keep this guideline evergreen by revising it periodically to evolve with new practices and technology so that it reflects future remediation drilling practices.

The following sections include guidance for:

- Drilling pre-clearance,
- Borehole siting,
- Drilling and direct push operating equipment,
- Mobilizing and demobilizing equipment,
- Well construction,

DEFINITIONS

Term	Definition
Access and Egress	Entry and exit.
Air Drilling	A method of rotary drilling that uses compressed air as its circulation medium to remove cuttings from the borehole.
Air Knife	A device that directs compressed air to advance a hole. Usually used in conjunction with a vacuum truck. Generally used to safely advance a borehole through depths where underground utilities are generally present but may have not been otherwise identified.
Angle Drilling	Drilling that is deliberately made to depart significantly from the vertical. Usually performed with standard drilling rig with the mast deliberately set non-vertical. Allows for installation of wells adjacent to, or just beneath surface structures.
Annular Space	The space between two well casings or between the casing and the wall of the drilled hole.
Auger Fork	A U-shaped tool that is inserted around the auger flights to hold them in place on the surface of a borehole.
Auger Head	The part of the auger that is attached to the drilling drive (gimbal and kelly).
Auger/Auger Flight	Any of various tools or devices having a helical shaft or member that are used for boring holes.
Bit	The cutting or boring element used in drilling wells.
Boom Truck	A vehicle with a crane arm used for lifting augers, casing, or other heavy equipment.
Borehole	The hole drilled by the bit. A borehole may have casing in it or may be open (uncased), or a portion of it may be cased and a portion of it may be open.
Casing	A tubular retaining structure which is installed in the well bore to maintain the well opening.
Casing Advancer Drilling	A drill method that pushes casing forward as the drill bit is advanced (air hammer)
Cathead	A spool-shaped attachment on the end of the cat shaft, around which rope for hoisting and moving heavy equipment on or near the rig floor is wound.
Chemical	Any element, chemical compound, or mixture of elements or compounds.

Term	Definition
Clearance Techniques	Application of specialized equipment used to detect the presence of buried structures.
Combustible liquid	Any liquid having a flash point at or above 100 deg. F (37.8 deg. C), but below 200 deg. F (93.3 deg. C), except any mixture having components with flash points of 200 deg. F (93.3 deg. C), or higher, the total volume of which make up 99 percent or more of the total volume of the mixture.
Compressed gas	Any compound that exhibits the following characteristics: • A gas or mixture of gases having, in a container, an absolute pressure exceeding 40 psig at 70 deg. F. • A gas or mixture of gases having, in a container, an absolute pressure exceeding 104 psig at 130 deg. F. regardless of the pressure at 70 deg. F. • A liquid having a vapor pressure exceeding 40 psig at 100 deg. F.
Concrete Coring	The cutting of surface concrete so drilling may be conducted in the soil beneath. This may be done with a circular drill bits or flat saws.
Container	Any bag, barrel, bottle, box, can, cylinder, drum, reaction vessel, storage tank, or the like that contains a hazardous chemical. For purposes of this section, pipes or piping systems, and engines, fuel tanks, or other operating systems in a vehicle, are not considered to be containers.
Core Barrels	A tubular device run in place of a bit and used to cut (collect) a core sample.
Coupling and Decoupling Augers	The act of joining or separating two augers by adding or removing auger bolts or screwing/unscrewing the augers.
Critical Areas	The subsurface spaces within ten feet of a structure where items may exist that if compromised could result in injuries, damaged equipment, damaged property, or at a minimum, disruption of utility services.
Critical Zones	An area of the drilling site that poses special hazards or increased risk to personnel.
Cuttings	The fragments of rock and soil dislodged by the bit and brought to the surface in the drilling mud or by the rotation of the auger.
Decontamination	The act of cleaning equipment to remove unwanted materials or chemicals. Commonly done by pressure washing, steam cleaning, or hand scrubbing with soap and water.
Direct Push	A drilling technique that uses percussion hammer or hydraulic ram to *push* or *hammer* various sample tooling into the subsurface, Geotechnical sampling, continuous soil sampling, in situ groundwater sampling, or small diameter well installation can be performed with these units.

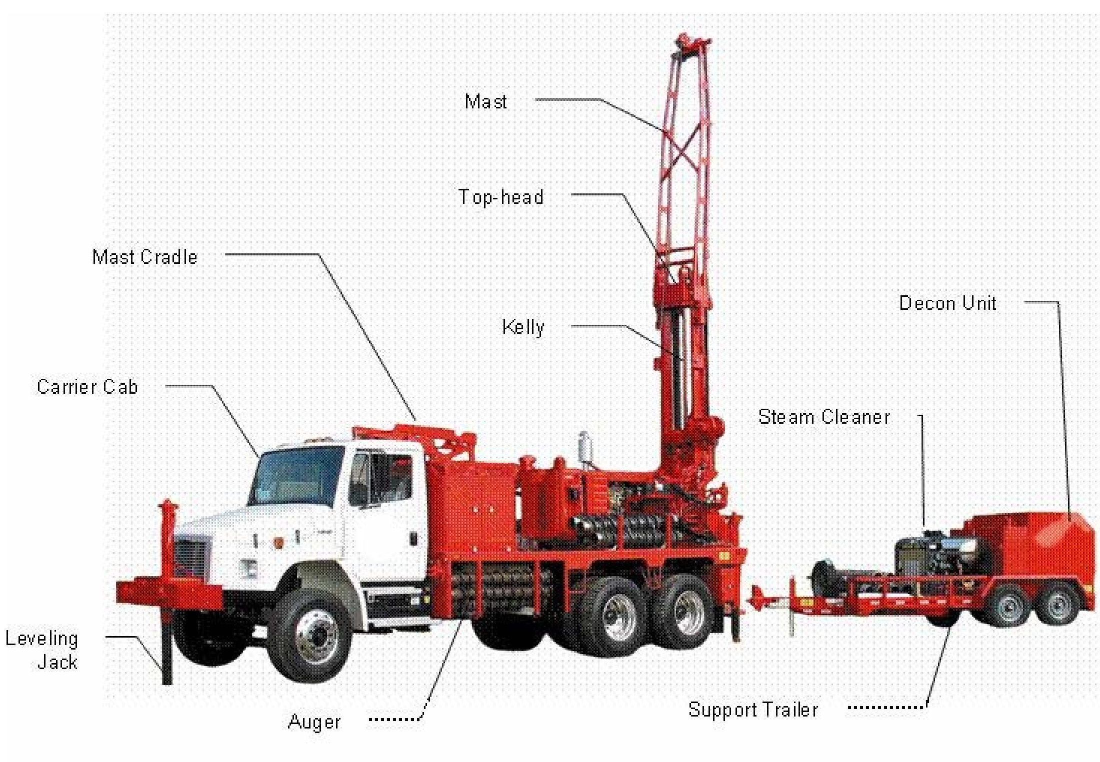
Term	Definition
Directional Drilling	Drilling that is deliberately made to depart significantly from the vertical.
Drill Rig Types	Hollow stem auger, flight auger, air rotary, casing hammer, mud rotary, rotosonic drilling, or direct push.
Drill Rod Chuck Jaws	Hydraulic driven equipment that holds the drill stem stable as the drill is rotated and advanced.
Drill Stem (Drill Rods)	All members in the assembly used for drilling by the rotary method from the swivel to the bit, including the kelly, drill pipe and tool joints, drill collars, stabilizers, and various subsequent items.
Driller (Rig Operator)	The employee of the drilling company directly in charge of a drilling rig and crew. Their main duty is operation of the drilling rig and hoisting equipment, but they are also responsible for the down-hole condition of the well, operation of down-hole tools, and pipe measurements.
Driller Helper	An assistant to the driller that moves the augers in and out, decouples and attaches the drive head, shovels cuttings, and otherwise assists the driller in all aspects of the operation except for the direct operation of the drill.
Drilling Fluid	Circulating fluid, one function of which is to force cuttings out of the borehole and to the surface. While a mixture of clay, water, and other chemical additives is the most common drilling fluid, boreholes can also be drilled using air, gas, or water as the drilling fluid.
Drive Hammer	A hydraulically driven hammer that advances casing as the drill bit advances.
Exclusion Zone	The exclusion zone is an area where inhalation, ingestion, or dermal contact with contaminants is plausible. The exclusion zone is sometimes called the hot zone. It is the area where the personnel have to be properly dressed in PPE and make sure any required respiratory protection is being worn.
Explosive	A chemical that causes a sudden, almost instantaneous release of pressure, gas, and heat when subjected to sudden shock, pressure, or high temperature.
Exposure or exposed	When an employee is subjected in the course of employment to a chemical that is a physical or health hazard, and includes potential (incidental or possible) exposure. Subjected in terms of health hazards includes any route of entry (such as inhalation and ingestion)

Term	Definition
Flammable and Combustible Material	Flammable and combustible liquids are liquids that can burn. They are classified, or grouped as either flammable or combustible, by their flashpoints (the temperature at which they start to burn). Generally speaking, flammable liquids will ignite (catch on fire) and burn easily usually at normal working temperatures. Combustible liquids have the ability to burn at temperatures that are usually above working temperatures. Flammable material is designated by a flashpoint of under 100^o F and combustible material is designated by a flashpoint between 100^o F and 200^o F.
Grouting	To fill the annulus between the casing and borehole with liquid slurry of grout (cement and/or bentonite) and water to support the casing and prevent fluid migration between permeable zones.
Hoisting Cables and Ropes	Ropes or metal cables that are used to lift or move augers, casing, and sampling tools. Usually attached to sheaves on the mast.
Hydraulic Ram	A fluid-pressurized device that pushes casing or sampling tools down.
Job Safety Analysis (JSA)	A step-by-step breakdown of a task. With each step, the hazard risks and precautions are identified. A JSA is frequently conducted using a three column document in which the first column is the step, the second the hazards which may be potentially encountered and the third column the precautions to take to avoid the hazard risk. Usually included in, attached to, or referenced by the Health and Safety Plan.
Kelly	The heavy square or hexagonal steel member suspended from the mast through the rotary table and connected to the topmost joint of drill pipe to turn the drill stem. Not for direct push or most hollow stem rigs.
Kill Switch	A safety device, normally a button or toggle stick that will turn off the drill rig engine when actuated. Usually located in the back of the rig near where the drilling is conducted.
Mast	A movable derrick capable of being raised as a unit, as distinguished from a standard derrick, which cannot be raised to a working position as a unit.
MSDS	A Material Safety Data Sheet (MSDS) is a report with descriptions of the physical properties, compatibilities, hazardous properties and other characteristic information of a material or chemical. MSDSs are usually attached to the Health and Safety Plan.
Mud	A liquid that may be used to circulate through the borehole during rotary drilling and work-over operations.
Non-Indigenous Material	Gravel or fill dirt that was used as backfill in a previous excavation or boring. Any material not naturally deposited.

Term	Definition
Non-Invasive GPR	Ground penetrating radar is a geophysical device that uses radar to search for underground structures without physically penetrating the ground.
Operations Foreman	Operations personnel managing/supervising a construction/installation project involving subsurface activities (another term for this position is *tool-pusher*).
Paving Scars	Scars left on pavement by the drill rig stabilizers.
Pinch Points	Any locations in a drilling operation where body parts may be pinched or crushed.
Post-Hole	A hole dug before drilling to search for underground structures or utilities.
Receptor Survey	Identification of utility vaults, monitoring wells, private and public supply wells, surface water bodies, basements, or any other subsurface exposure pathways.
Refusal	When the augers or drill cannot be advanced because of some subsurface blockage.
Rig	The mast, draw-works, and attendant surface equipment of a drilling unit.
Rotary Drilling	A drilling method in which a hole is made by a rotating bit to which a downward force is applied and cuttings are brought to the surface. The bit is fastened to and rotated by the drill stem, which also provides a passageway through which the drilling fluid is circulated. Additional "joints" of drill pipe are added as drilling progresses.
Safety Hammer	A hydraulically driven automatic hammer that advances a sampling tool. Used instead of a slide hammer.
Sampling Tools	Tools that capture and retrieve subsurface soil samples such as a shelby tube, sample extruder, or split barrel sampler.
Sheaves	A grooved pulley over which tape, wire, or cable rides.
Site-specific Health and Safety Plan (HASP)	That document which is designed to recognize potential risks, and identify precautions appropriate to the task. The document typically contains directions to the hospital, emergency contact information and health risk information. The plan will identify potential risks associated with field work, air monitoring requirements, environmental concerns (climate, insects, snakes, etc.), potential exposure to contaminants of concern, and provides requirements and thresholds for use of personal protective equipment to be employed during field operations. The plan may also address: worker training, waste characterization, contingency plans and other health and safety issues.

Term	Definition
Subsurface Activity	Activity carried out by mechanical equipment resulting in an intended disturbance of the earth.
Tenders	A rope attached to equipment hung on a boom that is used to guide the direction of movement.
Utility Mark-outs	The surface marking of underground utilities and structures. There are public services (one call centers) that will mark out underground utilities on public right-of-ways and private locaters that will mark out utilities on private property. A nation-wide one call center director maybe found at www.undergroundfocus.com/
Utility or Structure	Any underground object that could be damaged or cause harm if encountered during subsurface activities.
Water Swivels	A water-tight rotating connection located on top of the drill stem that connects to a hose delivering drilling mud, water or other drilling fluids.
Well Head	Equipment installed at the surface of the borehole when a casing is installed in the borehole. A well head may include such equipment as the casing head and tubing head.
Wire Rope Hoist or Draw Works	An arrangement of pulleys and wire rope used for lifting heavy objects, a winch or similar device.

A typical rig is presented below with major parts labeled



SECTION 1 - PRE-FIELDWORK

1.1 - Introduction

Environmental drilling can be performed safely with proper pre-fieldwork planning and proactive adjustment of planned safe work procedures to actual conditions in the field. As every experienced driller and environmental professional knows, it is very difficult to predict all hazards that may be encountered during drilling fieldwork. The pre-field work preparations suggested here are applicable to mechanical drilling and push probe where portable drill rigs are used for soil boring advancement, subsurface soil and water sample collection, or groundwater monitoring well installation. If these pre-fieldwork preparations are diligently completed, the job can proceed safely and smoothly with less down time. It is recommended that supporting documentation for the pre-fieldwork preparations is retained in the project files.

1.2 - Planning the Project

Project planning begins when the customer's drilling needs are made known to the environmental consultant or driller. Pre-fieldwork planning can be reflected in a proposal to the customer to secure the work assignment, or in a work plan used to communicate the technical approach and work procedures that will be used to safely complete the work. Following award of the project to a contractor, planning and scheduling should focus on preparations that will contribute to a safe and efficient operation at the job site. Much of the responsibility for planning, effective communication, and associated task work rests with the contractor's project manager, however, experience has demonstrated participation by the customer's project manager, (with other key personnel as needed) and the contractor's field team in the planning process significantly contributes to insuring a safe and efficient job site.

The following list of items should be considered during the project planning stage prior to mobilizing to begin fieldwork:

- Scope of work - overall project and drilling task objectives
- Customer, corporate, and job-site health and safety requirements
- Technical approach (the means and methods to accomplish customer scope of work)
- Procurement and vendor selection
    - Technical capabilities and equipment
        - Drillers
        - Public and private utility locators
        - Traffic control and security
        - Laboratory services (including data validation)
        - Waste transportation and disposal
    - Pre-qualification requirements to be considered
        - Safety performance
        - Training and experience of personnel
        - Age and condition of required equipment

        - Medical and substance abuse surveillance
        - Proof of adequate insurance
        - Licenses and registrations
        - References
    - Ability to meet schedule
- Roles and responsibilities (customer, owner, consultant, driller) for communications, work execution, and safety
- Schedule (work phasing and sequencing, prioritization, project kickoff, fieldwork, reporting, closeout)
- Permits and access agreements

1.3 - Preparing the Health and Safety Plan (HASP)

The site-specific hazards and potential risks associated with known conditions at the property or work area should be identified, reviewed, and addressed in the site-specific HASP. The site-specific HASP should be reviewed by project staff and readily available to them onsite during fieldwork. The typical topics addressed in a generic HASP are included as Attachment 1.A - *Typical Health and Safety Plan (HASP) Organization and Contents*.

Drilling activities are inherently dangerous and warrant detailed coverage in project specific health and safety planning. Drilling can be addressed in a HASP and Job Safety Analysis (JSA) developed by the contractor and the field team leader. The safe work procedures specified in the JSAs should be consistent with the overall project HASP, and the customer's site-specific health and safety requirements.

A JSA is a safety analysis tool that breaks down each work task into steps, assesses hazards and potential hazards associated with each step, and identifies corrective measures to mitigate or eliminate the hazard. JSAs should be prepared by workers experienced in the job to be performed and reviewed by the project team before going to the field, and then again onsite during the initial project kickoff and tailgate meetings. Examples of selected JSAs are included as Attachment 1.B and 1.C. The following are tasks that may be addressed by one or more JSA:

- Mobilization and Demobilization
- Traffic control
- Site security and site access
- Delineation and identification of critical zones
- Borehole siting and clearance - subsurface clearance protocol
- Rig maintenance
- Drilling operations
- Equipment decontamination procedures
- Well construction
- Well development
- Surface completions
- Well abandonment
- Well sampling
- Emergency situation notification and procedures

JSAs should be developed, reviewed, and approved prior to the start of field activities, and updated as necessary based on new information or changed conditions.

1.4 - Planning and Facilitating the Kick-off Meeting

Informed planning and communication allows drilling tasks to be consistently performed safely. Essential participants in the review and kickoff process are the customer/owner, consultant, driller, and field personnel that will execute the work. Following review, the participants should formally agree to or suggest revisions to the project plan. They should commit to rigorously implementing the HASP and stopping work when any unforeseen hazards are identified. Topics that may be addressed during the kickoff meeting include:

- Scope of work
  - Customer objectives
  - Technical approach - means and methods
- Roles and responsibilities
  - Site management – owner or operator
  - Project management or field team leader
  - Health and safety management
  - All site workers – stopping unsafe conditions
- Schedules
  - Mobilization
  - Drilling activities
  - Clean-up
  - De-mobilization
  - Sample management (e.g., deciding if rush turnaround services necessary for analytical results)
- Simultaneous operations - on or off site activities that could impact drilling activity logistics or safety
- Changed conditions
  - Access
  - Scope
  - Weather (include heat and cold management)
  - Work hour limitations
  - Construction
- Review, verify and validate hazards and mitigation measures
- Communication between field team, customer, and project mgmt.
  - Clearly communicate to project staff that stop work authority resides with every member of the project staff
  - Reporting incidents
  - Management of Change (MOC)
  - Schedule
- Documentation
  - Sign-off on review and acceptance of HASP
  - Workplace inspection and audits
  - Completed checklists (pre-drill protocol, borehole clearance review, and others)

1.4 - Planning and Facilitating the Kick-off Meeting cont.

Project planning and kickoff set the stage for safe work performance. However, incident free operation will be dependant on daily reviews of work to be performed and associated hazards and mitigation measures. Adjustments to JSAs to accommodate changed conditions should be made before work commences. Before beginning each field task, or when conditions change, employees should:

- Think through the task's work steps,
- Consider the potential for injury, and
- Identify what they must do to prevent injuries or accidents from occurring.

SECTION 2 - BOREHOLE LOCATION POSITIONING AND CLEARANCE

2.1 - Purpose

The purpose of this section is to provide guidance to protect underground facilities, owners of these facilities, the environment, and workers when conducting drilling activities. Risks can be minimized or eliminated when proper clearance procedures are followed. Typical underground facilities include, but are not limited to:

- pipelines of all types,
- utilities,
- electrical conduits,
- overhead structures such as signs or canopies,
- fiber optic lines, and
- tanks.

2.2 - Scheduling

Due to project budgets, resource allocation, and subcontractor agreements, scheduling is a key aspect to a successful result. After the client, the facility, and regulatory agency have approved the location(s), permits and any necessary access agreements have been obtained, the schedule should be developed. The following scheduling process should be followed:

1. Site visit (check for critical areas),
2. Schedule acquisition of permits and access agreements,
3. Schedule with the facility (utility locates, pavement cutting, drilling),
4. Schedule meeting with facility staff (underground structure locates),
5. Schedule *One Call* or other utility location representatives to mark public utilities,
6. Schedule private locators (if needed),
7. Schedule pavement removal crews,
8. Schedule drillers, and
9. Schedule traffic control companies.

2.3 - Obtaining Access Agreements

The next phase in the pre-fieldwork preparation is to determine if an access agreement is required to drill on the site property. If an access agreement is required, the proper legal agreements need to be drafted and executed prior to commencing the drilling operation. The project team should keep a copy of the applicable access agreement while on-site and during drilling activities. The following situations will most likely require an access agreement:

- Right of way agreements for access to railroad, county, city and state properties,
- Access to private property,
- Game and Fish permits for drilling within the high-water mark of any water way,
- Local jurisdiction permits as required, and
- Army Corp of Engineers for drilling on a levee.

2.4 - Positioning the Borehole

Some of the tasks involved in positioning the borehole can take place in the office. It is important to gather all the relevant information about each site to assist in identifying hazards, locations, and the necessary permits.

It is difficult to predict all problems that may occur during drilling fieldwork activities. Completing pre-fieldwork preparations will help to ensure that the project proceeds on schedule and in a safe manner. The project work plan should include (if applicable and available):

- Maps and figures showing underground and aboveground equipment, piping, utilities and/or any surface or subsurface hazards,
- Historic site information (maps, photos, files),
- Site as-built drawings,
- Easement maps,
    - Historic plot plans,
- Previous site investigations,
- Fire insurance plans,
- Tank dip charts, and
- Elevations and coordinates maps.

It is helpful to interview individuals who may have historical information. These individuals may be retired at the time the work is conducted, but may still have information needed to help avoid damaging underground facilities.

During pre-planning and site investigations, keep good notes, document preparation activities, question personnel who have historic site knowledge, identify below and above ground providers and services, and identify critical areas. Critical areas are those within ten feet of any structures or general high pressure pipeline corridor. If critical areas are encountered, there could be dramatic health, environmental, or operational impacts. Some examples of critical areas include: general high pressure pipeline corridors, underground storage tanks (USTs), utility lines, areas between an UST and a dispenser, areas between a dispenser rack and the building, areas within ten feet of the dispenser island canopy drip line, and overhead power or utility lines. Critical areas should be twice reviewed and hole clearance procedures completed prior to the drill team drilling.

2.5 - Selecting the Drilling Location

During the pre-fieldwork phase, determine the location and the type of drilling to avoid critical areas and structures. Regulatory requirements and investigation objectives need to be considered in determining the location and drilling types. For example, horizontal (directional) or angled drilling may be selected to drill in a desired location to avoid potentially hazardous or critical zones (including high traffic areas). The following is a list of questions the project team should ask when identifying a location, but note that this list is not all inclusive:

- Does the location allow for clear entry and exit (unobstructed)?
- Is there adequate work space (vertical and horizontal)?
- Will pavement, curbs, or other structures need to be removed?
- Are all locations located outside critical areas?
- Have access agreements been completed?
- Have all appropriate permits been obtained?
- Have selected areas been reviewed for structures, overhead power lines, and critical items?
- Have borehole clearance procedures been completed?

Review and investigate the location selection with the client during an on-site visit. The determined location should be identified on site maps and submitted to the facility, if required, in addition to the regulatory agency for approval.

2.6 - Methodologies for Locating Private Structures

Due to specific site conditions, no single method of locating subsurface utilities is universally fail proof. Surface and subsurface conditions may interfere with the effective use of a specific utility locating technology. Following is a discussion of some technologies available and the relative merits of each.

2.6.1 - Ground Penetrating Radar

Ground penetrating radar (GPR) is an advancing technology used for investigating shallow, geologic, and hydrologic features. The technique is also extremely useful in locating man-made features, such as buried drums, tanks, pipes, or other metallic objects. Locating rebar in concrete or detection of voids beneath concrete or asphalt is also a popular GPR application.

GPR operates on the principle that electromagnetic waves emitted from a transmitter antenna are reflected from buried objects having different electrical properties than the host material. The signals detected at the receiver antenna are recorded and provide a detailed cross section of the subsurface that is similar in appearance to a seismic reflection record. The depth of penetration of the radar pulse is controlled by site conditions and the frequency of the antenna chosen.

2.6.1 - Ground Penetrating Radar cont.

Figure 2.1 - Ground Penetrating Radar Being Demonstrated in a Non- Environmental Remediation Work Area. (Photo courtesy of Enviroscan, Inc.)

Limitations of GPR

Exploration depth can be limited by soil or water with high conductivity. Detection depends upon a dielectric contrast between the subsurface feature and the surrounding material.

GPR can be a very effective tool for location of subsurface structures, especially shallow obstructions. Although GPR has been applied at greater depths, it is generally considered to be more effective down to approximately 10 to 15 feet below the ground surface in most lithologies. Resolution is degraded with depths exceeding 20 to 30 feet. For utility locating, depth is usually limited to 10 feet or less to ensure safe drilling operation. Transducers exist that can penetrate to greater depths, but these use a lower frequency. Lower frequency means lower resolution, and narrow objects like utilities cannot be seen.

Some things to consider when evaluating GPR:

- Closely spaced survey lines are required to locate small objects,
- A relatively smooth surface is also necessary, and
- As with most utility locating technologies, GPR is not as effective where the ground surface is paved with highly reinforced concrete due to interference from the presence of the metal rebar. Interference is also prevalent if surface structures are immediately adjacent to the area.

Recent advances in radar antennae and computer software have made GPR more effective in difficult situations.

Limitations of GPR cont.

It is important to note the depth limitations of GPR when clearing horizontal or directional drilling boreholes. Horizontal drilling technology is usually used at depths greater than 20 feet below the surface which is beyond the detection limits for GPR. An option for clearing horizontally drilled boreholes is use of a template and water jet to clear the horizontal run to the required depth. This is a relatively extreme option and will only be justified in cases where utilities may be present.

2.6.2 - Pipe Tracing Transmitter and Receiver

A pipe and cable locator and tracer can be used to detect and trace metallic utilities, utility tracing wires, or warning tapes. In pipe and cable tracing mode, the transmitter can be coupled by direct contact (conductively) to exposed portions of a metallic pipe, cable, or wire; or by simple proximity (inductively) to a subsurface metallic utility with known location and orientation. The transmitter remains stationary and energizes or excites the metallic utility to be traced with a signal that can be traced at the ground surface using the mobile receiver wand or probe.

Figure 2.2 - A Pipe Tracing Transmitter/Receiver Being Demonstrated in a Non-environmental Remediation Work Area (Photo courtesy of Enviroscan, Inc.)

Limitations of Pipe Tracing Transmitter and Receiver

To use the transmitter in the most effective manner, all metallic pipes to be traced must be available for connection directly to the transmitter. The inductive mode is not as effective. Also, the detection is limited to metallic objects and is not useful for plastic, ceramic, or fiberglass utilities.

2.6.3 - Electromagnetic Utility Tracing Receiver

The electromagnetic technique locates buried materials having a high conductance. Alternating electromagnetic waves generated at the surface are induced into the ground during the survey. When the waves pass through a conducting body, they induce an alternating electrical current in the conductive materials. These currents become the source of secondary magnetic fields, which can be detected at the surface. The strength of the field is directly proportional to the average conductivity of the subsurface materials. Typical electromagnetic applications include:

- Location of:
    - buried pipes,
    - tanks,
    - drums and other metallic objects,
    - sludge wastes,
    - leachate plumes,
    - salt water intrusions,
    - acid mine drainage, and
    - other ground water contamination problems.

Other applications include quick and economical site assessment of areas with variable bedrock topography, such as those found in karst terrain, clay layer mapping, fault detection, or mine and quarry siting.

Figure 2.3 - An EM Tracer Being Demonstrated in a Non-environmental Remediation Work Area. (Photo courtesy of Enviroscan, Inc.)

Limitations of this technique that can adversely affect the electromagnetic measurements include:

- Power lines
- Metal fences
- Metal debris, and
- Utilities

2.6.4 - Deep Focused Sensing Metal Detector

A deep focused metal detector acts as a pipe and cable locator and tracer to detect and trace metallic utilities, utility tracing wires, or warning tapes. In pipe and cable search mode, the instrument is essentially a deep-sensing metal detector that detects any highly electrically conductive material (metals) by creating an electromagnetic field with a transmitting coil. A receiving coil at a fixed separation from the transmitter measures the field strength. As the instrument is swept along the ground surface, subsurface metallic bodies distort the transmitted field. The change in field strength or orientation is sensed by the receiver and triggers an audible alarm and deflection of an analog meter. The instrument can nominally detect a 2-inch metal pipe to a depth of 8 feet and a 10-inch metal pipe to a depth of 14 feet.

Figure 2.4 - A Deep Focused Metal Detector Being Demonstrated in a Non-environmental Remediation Work Area. (Photo courtesy of Enviroscan, Inc.)

This technique's effectiveness is limited to metallic objects. It is not useful for plastic, ceramic, or fiberglass utilities.

2.6.5 - Vibrocator

Vibrocators are used to detect and trace fluid-filled, non-metallic utilities (for example, PVC or concrete water lines). A vibrocator system involves a low-frequency pressure wave generator (called a *transonde*), which is attached to a faucet, hydrant, or other available fitting. The transonde produces a continuous vibration or throbbing in the pipe. This vibration can be detected at the ground surface with a sensitive geophone or ground motion detector tuned to the transonde-generated frequency.

2.6.5 - Vibrocator cont.

Figure 2.5 - A Vibrocator Being Demonstrated in a Non-environmental Remediation Work Area.
(Photo courtesy of Enviroscan, Inc.)

There are two limitations of this technology. One is that all non-metallic pipes to be traced must be available for connection directly to the transmitter. The second is that excessive energy imparted to the pipe may cause damage to the pipe.

2.7 - Training Workers for Borehole Clearing Tasks

The following are considered to be minimum levels of training for individuals performing the tasks associated with clearing a borehole:

- 40-Hour OSHA HAZWOPER training (required for HAZWOPER sites).
- Some level of internal training and prior drilling experience regarding safe locations in which to drill.

Specific drilling tasks may require more experience and training for the:

- Individual who makes the decision that the location is acceptable to drill,
- Quality Assurance (QA) Point Person.

A senior-level project team member should consult with the field personnel during the final location of the borehole.

2.8- Obtaining Required Permits

Determine the permits required for drilling activities under applicable local, state, and federal laws. Prepare the permit applications and proper documentation for submittal to permitting agencies or third parties. Examples of the various permits that may be required include, but are not limited to, the following:

- Work permits for agencies,
- Hot work permits for the facility,
- Work permit for the facility,
- Excavation permits for the facility, and
- Site work permits may also be required as mandated by site policies and procedures.

2.9 - Borehole Protection Steps

The following steps are recommended to reduce the potential for encountering subsurface utilities during drilling:

- Conduct a site walkthrough and verify utility location checklist is complete,
- Review proposed locations and the site with on-site personnel and obtain other historical information,
- Locate boreholes a safe distance (at least 5 feet) perpendicular from utility mark-out lines,
- Carefully break surface cover if present,
- Clear location to a depth of the utility window BGS (varies from client to client and location to location) and at least 120% of the borehole diameter, and

Proceed with caution when advancing the drill or probe.

2.10 - The Clearance Process

The goal of the entire clearance process is to verify absence of subsurface structures to avoid damage to property, the environment and injury to workers or others.

The first step in the clearance process is to contact the local area *ONE CALL* Utility Locate Service or, if inside a facility, the appropriate facility personnel. The local one call utility locator service must be contacted well ahead of the project, especially if directional drilling is planned. The service should be informed of the type of equipment to be used, and should be asked to space locator marks close together. This will allow the team to visualize sudden shifts or turns in the utility's path.

The clearance process is influenced by two geometric planes: vertical and horizontal. Considerations for completing the clearance process are:

1. Consider the depth and diameter of clearance.

    - When drilling vertically, the utility window profile depth must be considered. This can certainly vary with the amount of development in an area. The depth to clear will vary with the client, and may go until refusal is reached. Often the deeper utilities are high-pressure pipelines or high voltage power cables, which are very dangerous and warrant extreme caution.

- In all cases, it is preferable to clear a hole to about 120% of the diameter of the largest tool used for drilling, so as not to miss structures that might be just slightly tangential to the borehole. For instance, if a 10-inch hollow stem auger is being used to drill, a cleared area 12 inches in diameter should be used. The cutting head is often the largest diameter tool used for drilling and the cleared footprint should be 20% larger than the cutting head.
- When *angle* drilling, clearance should consider 120% of borehole length, along with the utility window profile. If possible, it is recommended to at least clear intended areas where the drill string will enter and exit the ground, and to use any means possible to positively identify the location and depth of any utilities that will be crossed in the boring process. The same vertical and horizontal considerations described for the vertical drilling should be used for angled or horizontal drilling.

2. In addition to completing all locates and completing clearance of subsurface locations along the path of the drilling head, additional excavations can be completed as described below:

   - If possible, excavate small areas to visually monitor the drill bit. A buried drill bit makes it impossible to tell a utility has been struck. Verify the drill bit remains at least 5 feet away from the utility. Keep the hole open until the drill bit has been pulled back and the drilling is complete.
   - Carefully excavate to expose utilities so the drill bit path can be monitored.

3. Calibrate the drill bit and locating device at the beginning of the project. Remember, the locating device can monitor the drill bit on the initial pass, but cannot monitor the backream head.

4. Workers should stay at least 5 feet (to 10 feet if space is available) away when boring parallel to buried utilities. Carefully excavate to expose utilities so the drill bit path can be monitored.

2.11 - Clearance Methodologies

Before drilling within 10 feet of an underground utility, the utility depth must be verified. Flags and locator marks indicate the direction the utility is running, but not how deeply it is buried. The only way to be sure of utility depth is to carefully expose and examine the utility line.

Clearance methodologies can be broken into two major categories:

- Those that can involve direct contact in order to reveal a subsurface structure, and
- Those that attempt to avoid the contact.

Direct contact is not universally acceptable. The following methods should be pursued only by experienced personnel. Proper hand-digging tools and techniques will protect both the workers and the utility.

- A blunt-nosed shovel is used to loosen the soil and a regular shovel is used to remove the soil. A pickax or a pointed spade should never be used. Do not stab at the soil or stomp on the shovel with both feet.
- Work with a gentle prying action and dig at an angle, so the shovel will slide along the surface of the wire, conduit, or pipe. Or, dig to the depth the utility is expected to be, but off to the side. Then, use a prying motion to break away soil as you approach the utility laterally.

2.11 - Clearance Methodologies cont.

Proper hand-digging tools and techniques must be used to safely verify the depth of any buried utilities that must be crossed or are located in close proximity to the work. Several types of direct contact methods include:

- Hand augers,
- Post hole diggers,
- Steel rods, and
- Hand digging tools.

A backhoe or similar machine may be used to uncover a utility. Clearly, the use of heavy equipment can produce severe damage to underground structures if not carefully performed. Due to hard soil structure or dense strata, use of hand tools to locate buried utilities may be precluded. In these instances, the clearance procedure requires excavation equipment. Extra measures must be taken to locate and identify buried utilities prior to excavation to protect against injury.

Methods that avoid direct contact:

- Air knifing or water jetting, and
- Vacuum soil excavation or wet vacuuming.

Air knife technology uses compressed air to break soil structure and allow for removal of the soil while reducing the potential for direct contact between buried utilities and the air knife operator. The compressed air essentially insulates the operator from directly contacting the buried utility. Compressed air, typically 90 to 100 psig, is converted to a supersonic jet while flowing through a nozzle especially designed for the purpose. Several nozzles are commercially available.

Figure 2.6 - Using an Air Knife (Photo courtesy of ATC Associates, Inc.)

2.11 - Clearance Methodologies cont.

As the stream leaves the nozzle, it expands concentrically, since it is surrounded by atmospheric air. This high velocity air penetrates the ground to a depth of about a foot, creating a momentary cavity of about a foot in diameter, in which the soil structure is crumbled.

Hard clays and other very hard soils will be slow during the first several inches of depth, and will produce increased scatter. But somewhat deeper, where the soil has usually retained greater moisture, the scatter will reduce, and the excavation rate will improve.
Both dry and wet applications of these technologies can be performed. Both methods have inherent problems associated with compromising the borehole for collection of environmental samples. Typically, dry air knifing and vacuum extraction are preferred where soil samples must be collected in the top 5 feet of profile. Water jetting or wet vacuuming may also compromise future collection of groundwater samples, so is usually selected for boreholes advanced for remediation wells only.

SECTION 3 - MOBILIZATION, SET UP, AND DEMOBILIZATION

This section applies to mobilization and demobilization for the following types of site operations: air knifing, air vacuuming, drilling, using geoprobes, and hand-augers. This section does not cover safety related to site mobilization in passenger vehicles.

3.1 - Performing Pre-Mobilization Tasks

3.1.1 - Inspections and Maintenance

- It is important to ensure vehicles are road worthy (that is, that they have been properly maintained and inspected) before using them on public roadways or project sites. Federal, state, and local laws require that vehicles be properly maintained and safe to operate upon our highways. It is the responsibility of the owner or operator to ensure that:
    - All drivers are properly licensed for the equipment that they are to be driving and that they are trained in safe driving procedures.
    - Equipment is inspected prior to being moved and any deficiencies corrected prior to moving the equipment.
    - Complete annual inspections of vehicles is performed.
    - All drivers should have in their possession the Federal Motor Carrier Safety Regulations Pocketbook**.** These regulations require that no motor vehicle be driven unless the driver thereof has satisfied him or her self that the following parts and accessories are in good working order, nor will any driver fail to use or make use of such parts and accessories when and as needed:
        - Service brakes, including trailer brake connections
        - Parking (hand) brake
        - Steering mechanism
        - Lighting devices and reflectors
        - Tires
        - Horn
        - Windshield wiper or wipers
        - Rear-vision mirror or mirrors
        - Coupling devices
        - Seat belts

The above is a representative list of items that must be checked prior to moving a vehicle. These and other items are included in Attachment 3.A - *Pre-Mobilization Checklist / Drilling Safety Guidance Document.*

Perform a final examination to verify that the vehicle and load are safe to be moved. Know the height, width and weight of the load. Verify that any needed permits are obtained or will be obtained en route to the drill site.

Verify that all necessary traffic-control devices for each site to be visited that day are loaded in the vehicles before they leave the office.

- For contract traffic-control services, verify that they are scheduled to be at the site with all needed equipment.

3.2 - Loading and Unloading a Truck Mounted Drill Rig

When loading or unloading a drill rig on a trailer or a truck, follow these precautions:

- Select an area of level ground for loading and unloading
- Have a spotter guide the driver off of the trailer or truck.
- Before using a ramp, verify the brakes of the drill rig are in working order
- Ensure that any ramps used are designed for this purpose and provide a sturdy and solid enough base to bear the weight of the drill rig with carrier including tooling.
- Verify that when the drill rig is on the trailer, the weight of the drill rig, carrier and tools are centered on the centerline of the trailer. In addition, some of the trailer load should be transferred to the hitch of the tow vehicle. Refer to the trailer recommendations for weight distribution provided by the manufacturer.
- Verify the drill rig is secured to the towing vehicle with ties, chains, or load binders that can handle the required weight.

3.3 - Physically Accessing the Equipment and Vehicles

Use proper mounting and dismounting techniques when climbing into and from vehicles or equipment. Some tips are:

- Face the equipment and use the hand and footholds provided – maintain three points of contact with the equipment
- Do not jump off equipment.
- Use vehicle ladders to access truck beds.
- Do not climb on tires.

3.4 - Traveling to the Site

3.4.1 - Driver Requirements

All drillers and drivers must:

- Be properly licensed and operate vehicles in compliance with federal, state, and local regulations
- Be aware that every car, truck, tractor, and drill rig has its own handling characteristics; every new driver should learn these characteristics in the company of an experienced driver.
- Every employee should be qualified on each type of vehicle and equipment the employee will operate prior to operating the vehicle or equipment unsupervised.
- Every employee knows the dimensions of any equipment he or she is driving, including the required overhead clearance, and the width, length and weight of the rig. The driver also knows the load limits for highways and bridges, and verifies that the vehicle is not exceeding those limits.

☑ **NOTE:** Service stations and other facilities frequently have canopies and electrical service lines that are too low for a drill rig to clear, extreme caution must be used in these areas.

3.4.2 - Road Travel and Vehicle Safety

Perform a pre-trip vehicle inspection and obey state and federal DOT guidelines. Check vehicle maintenance records to assure any needed maintenance has been performed. Pre-operate equipment before leaving for the site and be familiar with operator's manual. Leave early, practice defensive driving, and observe the speed limit.

- Drill rigs are top-heavy:
  - Maneuver highway ramps or tight curves at a slow and safe speed, avoid quick lane changes.
  - Allow a safe distance between you and the vehicle ahead and use your turn signals.
  - Know the traveling height of your equipment.
  - Secure any load(s) properly.
  - Inspect trailer and hitch, safety chains, wiring connectors, lights, and brakes, if applicable.
- While traveling to and from the site observe the following:
  - Move disabled vehicle off the road and set out flares and reflectors or cones, and leave trouble lights on and flashing.
  - Never work under a vehicle unless steps have been taken to prevent it from rolling. In addition to setting the parking brake, use chock blocks or other methods to secure the vehicle to prevent movement.
  - Never leave mobile equipment unattended unless the controls are placed in gear or the Park position and the parking brake is set. When parked on a grade, chock the wheels or turn them into the bank.
  - Allow for mast overhang when cornering or approaching other vehicles or structures.
  - Do not operate trucks 1-ton and above unless equipped with automatic backup alarms.
  - Wear seatbelts at all times as driver or passenger when the vehicle is in motion

3.4.3 - Transporting Drill Rigs

When transporting a drill rig onto and off of a drilling site, follow these procedures:

- Verify all measurements of the drill rig with carrier including the traveling height (overhead clearance), width, length, and the highway and bridge load, width and overhead limits. Allow adequate margins, it is your responsibility to verify they are not exceeded.
- Prior to moving a drill rig, check to verify that the brakes are in reliable working order.
- When cornering or approaching other vehicles or structures remember to allow room for the mast overhang.
- Keep in mind that the drill rig mast is often too tall to clear the canopies of service stations and other facilities, even in the travel position
- Monitor low hanging electrical lines, particularly at the entrances to drilling sites, restaurants, motels, or other commercial sites.
- When traveling on a street, road, or highway, the mast of the drill rig <u>must</u> be completely lowered.
- If the rig is being left unattended, remove all ignition keys.
- Passengers are not allowed to ride on the drill rig
- Use caution when driving equipment with a high center of gravity, such as a portable drill rig. Allow for the increased and higher weight by making turns slowly and allowing for a greater stopping distance than normally needed.
- Always know where your helper or driller is. Never move the drill until they are accounted for.
- Establish, learn, and use the proper signals when moving a drill rig.
- Never move the drill rig with the mast up- even short distances.

3.4.4 - Entering the Site

It is the responsibility of the owner or operator or the vehicle or rig to ensure that the drill site is safe to enter and that it is safe to begin work. Such inspections often include the following:

- Are high voltage overhead power lines or any other utility lines present in the immediate area? A safe distance of thirty or more feet laterally to either side of the overhead utility should be observed when setting up in the vicinity of overhead lines. This distance may need to be adjusted, depending on the hazards involved, size of mast on the drill rig, and other considerations.
- Have all underground utilities been identified?
- Is there a danger of being struck by other moving vehicles?
- Is there a danger because of possible instability of high walls, banks, pits, rivers, and other related items?
- Are poisonous plants, animals, or insects in the area of the drill site?
- Is the site designated as a Hazardous Waste Site or have other hazards been identified or suspected, such as H_2S, Methane, or other chemicals? If so, are proper procedures for working in these environments in place, including proper training of employees and certification of safety equipment?
- Is there a danger of lightning strikes? This subject must be addressed regardless of time of year or current weather conditions.
- MSDS sheets must be on hand for all materials and chemicals brought to the site.

3.5 - Confirmation Activities for Clearances and Borehole Positioning

3.5.1 - Permits

Copies of all necessary permits will be provided to the Lead Driller or Acting Lead Driller, and any further information relevant to the drilling operation.

It is the driller’s responsibility to verify the necessary permits have obtained and it is safe to drill.

Based on either site conditions or the planned ground disturbance activities, to ensure the safety of all on-site personnel and subsurface structure integrity, consideration should be given to locking out selected site utilities or temporarily shutting down a portion of or the entire facility.

3.5.2 – Markings

- Complete utility location prior to drilling [One Call: (800) 321-ALERT] and coordinate with the drilling contractor and site personnel.
- Mark locations in white.
- Field verify utility locations.
- Document all utility locates on a plot plan or other map of the site.
- Observe the area for indications of utilities.
- Hand dig if questions remain or if required by the property owner.
- Refer to your specific *Utility Clearance and Isolation* procedure.

3.5.3 - Site Communication and Safety Review

Verify all new drill rig workers are informed of safe operating practices and emergency procedures on and around the drill rig and provide each new drill rig worker with a copy of the organization's drilling operations safety manual and, when appropriate, the drill rig manufacturer's operations and maintenance manual. The safety supervisor should assure that each new employee reads and understands the safety manual. If applicable, the emergency shut off/kill switch location and use should be reviewed with all crew members as well as visitors to the site.

If the site poses a chemical safety hazard, review potential signs and symptoms of exposure, routes of exposure, and protective measures to be used to minimize or prevent exposures (such as protective clothing and monitoring).

3.5.4 - Walk Through and Visual Inspection

Upon arriving at the drill site, verify that it is safe to enter and set up on the site. As mentioned earlier, it is important to:

- Look for overhead and underground power and other utility lines.
- If present, verify that the rig is being set up a safe distance from these lines.
- Investigate and note all overhead obstructions.
- Check boring locations for proximity to any overhead lines.
- Maintain required clearance from electrical lines. Refer to section 4 – *Drilling Operations* for more detail. High-tension lines require greater clearances.
- Consider having lines in the work area covered to provide a greater safety margin
- If necessary, contact someone to verify that these lines are safe to work near (that they have been de-energized provided that they were supposed to have been deenergized).
- Assume a line is energized until you have verified it isn’t.
- If in doubt, do not raise the mast - ASK!

Examine the actual location where the drill is to be set. If possible, it is best to have a level and clean area. Remove rock and other debris that may interfere with the drilling operation or pose safety hazards.

Be sure to follow the instructions contained in the site health and safety plan. This includes the wearing of special chemical protective clothing, air purifying respirators or self-contained breathing apparatus before moving into location.

Walk the line the rig is to travel in order to delineate any soft or wet ground. Look for field tile washouts, hidden ditches or drop-offs, boulders, debris, or other potential obstacles.

3.6 - Preparing for Drilling

3.6.1 - Preparing the Site

Prior to drilling, adequate site clearing and leveling should be performed to accommodate the drill rig and supplies and provide a safe working area. Drilling should not be commenced when tree limbs, unstable ground, or site obstructions cause unsafe drilling conditions. Housekeeping should be done to ensure a clear area for all site personnel.

Prior to move-in, the site should be adequately cleared and leveled to accommodate the drilling equipment and supplies, and to minimize fire hazards.

Evaluate the drilling site prior to setting the leveling jacks, especially if the location is on water saturated, frozen, or loose, caving soil. Do no set up on sloped ground. If necessary, build up solid, compacted earth where the jacks will contact the ground.

If it is necessary to drill within an enclosed area, verify that exhaust fumes are conducted out of the area. Exhaust fumes can be toxic and some cannot be detected by smell.

3.6.2 - Traffic Control

Traffic control devices may consist of items such as:

- Traffic cones
- Flags
- Caution tape
- Other devices such as signs, barricades, amber flashing lights, or fencing

It is recommended that each work area be cordoned off with traffic cones or other traffic control devices as appropriate to site-specific conditions. To increase visibility to vehicular traffic, it is recommended that every other cone have a flag inserted through its middle. Caution tape should be used to join all of the traffic control devices so that no one can easily walk through the work area. It is also recommended that work vehicles be used to shield field personnel from traffic hazards when practical. In addition, high-visibility clothing should be worn by workers.

3.6.3 - Considerations for Retail Service Stations and Other Onsite Locations

As there are no lanes marked out for traffic flow through most of these sites, and there are typically numerous entry points onto them, field personnel are vulnerable to traffic from all sides. In order to minimize the risk of being struck by a vehicle while performing tasks on site, field personnel may consider the following guidelines when developing work site traffic control plans:

- Review the site-specific Health and Safety Plan (HASP) for safety and any special traffic control details for the site you will be working on and the tasks you will be performing.
- Wear the appropriate PPE for the work to be performed as indicated in the HASP.
- Assess the work location for potential traffic exposure. Stay alert at all times since vehicular traffic is often continuous and uncontrolled on these sites. Evaluate all possible directions from which traffic may approach including the possibility of vehicles backing up. Never assume any potential pathway to be safe. Attempt to set up the work area on site with field personnel facing toward the highest potential for traffic while they work.
- Conduct a site pre-job safety meeting and complete the Daily Site Checklist, if included in the HASP, and sign-off on both the checklist and the HASP.
- Using the traffic control devices, establish your work zone as per the specifications detailed within the HASP.
- Perform all work to be completed within the work zone before breaking down the traffic control system.
- Clear the work area and break down the traffic control system.

3.6.4 - Working in or Near Active Roadways

Traffic control in these areas should be managed through development of an appropriate traffic control plan. A traffic control plan specific to the work site should be developed and included in the HASP, prior to performing work in these areas. Local and state requirements should also be consulted for possible permitting or additional traffic control requirements prior to performing any work in these areas.

3.6.5 - Establishing Work Areas Using Monitoring or Barricades

The field supervisor will designate the work zone based on site constraints before drilling begins. Preferably, the geotechnical workstation should be set up outside of the immediate drilling work area a distance of at least 1.5 times the mast height away from the drill.

- Post No Smoking signs around work area
- Establish designated smoking area away from work area
- Monitor air concentrations using direct-reading, real-time instruments such as OVM and colorimetric detector tubes
- Define and secure all work areas with safety cones, safety tape, construction fence, other barriers, or signs as appropriate.

3.6.6 - Establishing Site Security

Confirm required security is in place and as dictated by the site or HASP prior to beginning drilling operations. This may involve security personnel, physical barriers, or both.

3.6.7 - Storage and Material Handling

The key for a safe and smooth startup is to organize the work area prior to commencing drilling operations:

- Do not attempt to commence drilling before everything is unloaded and organized. Drilling will progress smoothly and accidents will be less likely if the driller takes the time to properly set up and organize first.
- The first requirement for safe field operation is that everyone understands and fulfills the responsibility for maintenance and housekeeping on and around the drill rig.
    - Suitable storage locations should be provided for all tools, materials, and supplies so that tools, materials, and supplies can be conveniently and safely handled without hitting or falling on a member of the drill crew or a visitor. Store items so that the work can proceed in an orderly fashion, with sufficient room in the work area to move about without tripping over supplies or equipment. Do not store equipment in places that would interfere with escape routes in an emergency.
    - Avoid storing or transporting tools, materials, or supplies within or on the mast of the drill rig.
    - Establish a suitable location for storage of tools, equipment and supplies so those items can be safely and conveniently stored and located when needed. Keep all tools supplies and equipment in their proper places.
    - Every crewmember must inspect their work site upon arrival to verify that equipment is in safe condition and the job site is in proper order. Return the job site to proper order prior to proceeding with work.
    - Drill rod, casing, augers and similar tools should be stacked orderly on racks to prevent sliding, rolling, spreading, or falling. When stationed on the ground prior to use, these tools may need to be chocked to prevent inadvertent or unanticipated rolling.
    - Work areas, platforms, walkways and other access-ways should be kept free of obstructions such as materials and tools, and substances such as debris, grease, ice, and mud, in order to minimize the tripping, slipping and falling hazards around the drill rig.
    - All unattended boreholes must be adequately covered or otherwise protected to prevent drill rig personnel, visitors or animals from stepping or falling into the hole.
    - Use approved cleaning solvents instead of flammable liquids as cleaning agents on or near a drill rig.
    - Never use compressed air for the purpose of cleaning clothes.
    - All trash should be placed in bags and stored in areas outside of the immediate work area.
    - All controls, meters, dials, and operational and warning lights should be kept free of dirt, grease, and mud.
    - Keep all flammable liquids in proper containers and stored away from heat and spark sources.
    - All drilling fluids must be contained and disposed off-site
    - Pipe, drill rods, casing, augers, and similar drilling tools should be orderly stacked on racks or sills to prevent spreading, rolling, or sliding.
    - Penetration or other driving hammers should be placed at a safe location on the ground or be secured to prevent movement when not in use.
    - Work areas, platforms, walkways, scaffolding, and other access-ways should be kept free of materials, debris, and obstructions and substances such as ice, grease, or oil that could cause surfaces to become slick or otherwise hazardous.

3.6.8 - Fire Prevention

Fire prevention must be addressed prior to commencing any job. Failure to prevent a fire on a job site could result in severe injury or even death of employees. In addition to the potential for loss of life, severe equipment damage can result along with damage to surrounding areas. It is therefore the responsibility of the owner, operator, driller, helper, and anyone else involved in the drilling operation to take proper steps to reduce the possibility of a fire. Such steps should include:

- When possible, the surrounding area should be cleared of materials that are readily combustible, such as weeds, grass.

☑ **NOTE:** Some areas are environmentally sensitive. This type of clearing may not be allowed.

- No smoking policies should be observed when working on drilling operations.
- Fire extinguishers of the appropriate size and type for the particular fire hazard involved must be present on the drill site. It is recommended and required on some jobs, that a fire extinguisher be present in every vehicle involved with the drilling activities.

☑ **NOTE:** Operators must verify that fire extinguishers are serviced at appropriate intervals and that an inspection is performed on the fire extinguishers at least monthly. Such inspections and servicing must be documented.

- Only onsite personnel, trained in basic fire fighting techniques and in the proper operating procedures associated with the use of fire extinguishers, should respond to fires.

The best method, of course, is to prevent the fire entirely. Proper storage of fuels and good maintenance of hoses, and equipment on the rig will prevent many fires. A proactive approach is by far better than the best reactive solution to any problem.

3.6.9 - Safety Equipment

Safety equipment to consider includes but is not limited to traffic cones, PPE, barricades, barrier tape, signage, A fire extinguisher, blood borne pathogen kit, and first aid kit should be kept or available on site. Telephone access is essential. Identify the location of the nearest available telephone and, unless specifically forbidden by the site owner, ensure the team has access to a cell phone (unless prohibited). If the team is planning to use a cell phone, check for adequate signal strength upon arrival at the site. Refer to section 4.8 for additional information about safety equipment.

3.7 - Moving People and Equipment at the Site

Navigating across the site requires special attention. Many safety incidents occur in and around moving vehicles and equipment. The following guidelines will help eliminate some common dangers.

3.7.1 - Placing the Equipment

Figure 3.1 – Placing Equipment

The following safety suggestions relate to off-road movement:

- Never drive onto an off-road site or move a drill rig without first walking the route to check for depressions, rocks, stumps, gullies and similar obstacles.
- Check the brakes of the drill rig carrier before traveling, particularly on rough, uneven, or hilly ground.
- Check the complete drive train of a carrier at least weekly for loose or damaged bolts, nuts, studs, shafts, and mounting.
- Discharge all passengers before moving a drill rig on rough or hilly terrain.
- Use caution when traveling side-hill. Conservatively evaluate side-hill capability of drill rigs because the arbitrary addition of drilling tools may raise the center of mass. When possible, travel directly uphill or downhill. Increase tire-pressures before traveling in hilly terrain (do not exceed rated tire pressure).
- Attempt to cross obstacles such as small logs and small erosion channels or ditches squarely, not at an angle.
- Use the assistance of someone on the ground as a guide when lateral or overhead clearance is close.
- After the drill has been moved to a new drilling site, set all brakes and locks. When grades are steep, block the wheels.
- Never move a drill rig with the mast up.
- Maintain eye contact with the operator when directing the rig on to a boring location.
- Always walk around the truck prior to backing to assure that the area behind the truck is clear of equipment and workers.
- Never back out of a site onto a highway, unless traffic control is provided.
- Always position the vehicle in the safest possible place at drilling locations
- When working in a lane-closure do not enter the lane closure until it is set up, do not work in an improperly set up lane closure.
- CDL holders required by DMV to wear corrective lenses must wear them at all times performing Safety sensitive duties.
- When overhead electrical power lines exist at or near a drilling site or project, consider all wires energized.

3.7.1 - Placing the Equipment cont.

- Watch for sagging power lines before entering a site. Do not lift power lines to gain entrance. Call the utility and ask them to lift or raise the lines or de-energize (turn off) the power.
- Before raising the drill rig mast on a site in the vicinity of power lines, walk completely around the drill rig. Determine what the minimum distance from any point on the drill rig to the nearest power line will be when the mast is raised and while being raised. Do not raise the mast or operate the drill rig if this distance is less than 20 feet (6 m) or, if known, the minimum clearance stipulated by Federal, state, and local regulations.
- Keep in mind that both hoist lines and overhead power lines can be moved toward each other by the wind.
- If there are any questions concerning the safety of drilling sites in the vicinity of overhead power lines, call the power company. The power company will provide expert advice at the drilling site as a public service and at no cost.
- Watch for overhead obstructions. Never travel between borehole locations with the mast, or feed cylinders, in a raised position.
- Know the location(s) of any other heavy equipment moving or working on-site.
- Weekly, inspect the complete drive train of a carrier for loose or damaged bolts, nuts, studs, shafts, and mountings.
- When travel takes you off road and into hill terrain, use the front axle (for 4x4, 6x6, etc. type vehicles or carriers). If equipped with multiple speed transfer case, operate in low range. Always refer to the manufacturer's recommendations.

3.7.2 - Loading and Unloading Rigs

When loading or unloading a drill rig on a trailer or a truck, follow these precautions:

- Verify you are on level ground for loading and unloading
- Have someone on the ground guiding you.
- Before using a ramp, verify the brakes of the drill rig are in working order
- Ensure that any ramps used are designed for this purpose and provide a sturdy and solid enough base to bear the weight of the drill rig with carrier including tooling.
- When the drill rig is on the trailer, verify the weight of the drill rig, carrier and tools are centered on the centerline of the trailer. In addition, some of the trailer load should be transferred to the height of the towing vehicle. Refer to the trailer recommendations for weight distribution provided by the manufacturer.
- Verify the drill rig is secured to the towing vehicle with ties, chains, or load binders that can handle the required weight.
- Inspect the trailer tires before loading or unloading. A flat tire will cause the rig and trailer to lean and equipment could come off the trailer.
- When traveling on the road, be sure the rig's slide base is in fully, that the rig is completely on the trailer, in the proper position, and secured.
- Skidding the rig off the trailer and to boring locations requires forethought and caution. Do not ride the skids when moving the rig. Avoid potential rollovers by skidding the rig perpendicular up a slope, not parallel or at a shallow angle to the slope.
- Provide a secure base and use cribbing of the appropriate size to level the rig.
- Secure the rig to the pavement, floor, or ground with anchor bolts, frost augers, chains, cables, or as appropriate.

3.7.3 - Start Up

Precautions for Setting up and Blocking the Drilling Rig

It is the driller's responsibility to verify the rig is properly set up. The stability of the drilling rig is critical to assure safe drilling operations. Some things to consider when setting up are provided below. Refer to section 4 – TITLE for more detailed information.

- Whenever possible, the driller should choose a dry, level, and reasonably smooth drilling site. Verify the rig's parking brake is engaged and that the wheels which will remain on the ground are blocked. Blocking the rig will help to provide a more stable drilling structure by distributing the weight of the rig evenly. If the rig is equipped with jacks or outriggers, they will be extended from the rig to the ground, raising the rig partially or entirely off the ground. Proper blocking of the rig will prevent differential settling which could result in the rig toppling sideways. Blocks should be placed between the jack swivel and the ground to provide more support area under the pad.
- All drill rig personnel and visitors should be instructed to stand clear of the drill rig immediately prior to and during starting of an engine.
- Before start-up, check that all brakes are set, all gear boxes are in neutral, all hoist levers are disengaged, all hydraulic levers or air controls are in the correct position, and the cathead rope is not on the cathead.
- Follow all guidelines provided by manufacturers with regards to starting up engines.
- Check for warning or lockout tags on the controls. Do not start any engine without having the tag removed by the person responsible for the install.
- Prior to lowering the leveling jacks, we recommend that a timber or plank be placed beneath the jack. By performing this function, it will be less likely that the jacks will sink into the ground. Even on asphalt, jacks could possibly, over time, sink down to the point that the rig might not remain level. Insure that the rig is level and everything is secured prior to raising the mast. Before the mast is raised, the rig must be leveled and stabilized with the leveling jacks.
- Verify before drilling is started with a particular drill, that the operator (who may be the safety supervisor) has had adequate training and is thoroughly familiar with the drill rig, its controls, and its capabilities.
- Inspect the drill rig when it first arrives onsite and then at least daily for structural damage, loose bolts and nuts, proper tension in chain drives, loose or missing guards or protective covers, fluid leaks, damaged hoses, damaged pressure gauges, and pressure relief valves.
- Check and test all safety devices such as kill switches at least daily and preferably at the start of a drilling shift. Drilling should not be permitted until all kill switches and warning systems are working correctly. Do not wire around, bypass, or remove an emergency device.
- Verify all gauges, warning lights, and control levers are functioning properly and listen for unusual sounds on each starting of an engine.
- Verify nothing is loose on the mast that would fall when the mast is raised to its upright position. When the mast is raised, take measures to secure it properly.

3.8 - Shut Down - Temporary (Daily) and Permanent

3.8.1 - Temporary Shut Down

- Inspect equipment at the start of each shift (pre-op) and at the end of each shift (post-op).
- Correct all major defects and safety defects prior to the start of work.
- All air and water lines and pumps should be drained when not in use if freezing weather is expected. If appropriate, the rig should be winterized at the end of each day.
- All unattended boreholes must be adequately covered or otherwise protected to prevent drill rig personnel, site visitors, or animals from stepping or falling into the hole.
- For remote, idled, or access controlled sites, clearance holes can be left open, however, use hazard cones, fencing or other methods to identify the hazard.

3.8.2 - Demobilization

- Refer to the pre-travel inspection and safe driving procedures outlined in Section 1 and 2 when demobilizing.
- When loading equipment prior to demobilization, be especially alert to potential back injuries. Use proper lifting techniques including getting help if necessary.
- Verify any waste materials have been removed from the site or properly contained, labeled and scheduled for pickup.
- All open boreholes should be covered and protected or backfilled adequately and according to local and state regulations on completion of the drilling project.

SECTION 4 - DRILLING OPERATIONS

4.1 - Rig Set-up

The drilling contractor is responsible for ensuring that the rig is properly set-up. This includes such tasks as stabilizing the rig, clearing the location of overhead obstructions that may contact the mast as it is being raised or is in the fully raised position, and raising the mast. Each task is discussed in greater detail below.

4.1.1 - Drill Rig Stabilization

Rig stability is essential for conducting safe drilling operations. Components to assuring proper stabilization include rig placement (or location), use of hydraulic leveling jacks, use of blocking (or cribbing), and use of wheel chocks. Specific items to consider include the following:

Rig Placement

- To the extent possible, situate the rig on dry, level, and stable ground surface.
- To the extent possible, avoid rough terrain and sites that do not allow sufficient space for worker access and egress to and from rig and associated support equipment.
- Carefully evaluate the drilling site prior to setting the leveling jacks, especially if the location is on water saturated, frozen, or loose, caving soil.
- Avoid situating rig on sloped ground. If necessary, build up solid, compacted earth where the jacks contact the ground.
- Avoid situating rig where overhead obstructions, such as tree limbs, canopies, overhead power lines, and piping racks, create unsafe drilling or tool handling conditions.
- Engage the emergency brake once the rig has been positioned.

4.1.1 - Drill Rig Stabilization cont.

Jacks

- Lower or extend leveling jacks and outriggers to raise the rig partially, or in some cases entirely, off the ground and to minimize the potential for the rig to tip over once the mast is raised.
- Do not position hands on or near jacks as jacks are being lowered or raised.
- Maintain jacks in lowered position as long as mast is raised.

Blocking and Cribbing

- When drilling on non-compacted soil, use blocks of sufficient strength to support the weight of the rig and to provide a more stable drilling structure. Blocks will more evenly distribute the rig's weight and will prevent differential settling.
- Recheck the status of blocking and cribbing at the beginning of each shift to evaluate stability.
- Locate blocks between the jack swivel and ground.
- Re-level drill rig if settling occurs after initial set-up.

4.1.1 - Drill Rig Stabilization cont.

Wheel Chocks

- If the rig is positioned on an incline and leveling of ground is impossible or impractical:
    - Chock the wheels of the rig remaining in contact with the ground.
    - Chock wheels of all support equipment and trailers.
    - It is highly recommended that wheel chocks be used even if the rig is on level ground.

4.1.2 - Overhead Hazards

Contact with overhead obstructions when raising the rig mast can result in property damage, injury, and, most importantly, loss of life. The most frequent cause of job-related death in the drilling industry is electrocution caused by contact of the drill rig with overhead power lines. Additionally, contact with overhead power lines can result in electrical shock and electrical burns. Drilling should not commence without first determining the risk posed by obstructions such as tree limbs, protruding objects and structures, and overhead power lines. The proposed drilling location should be inspected by the drilling contractor prior to setting-up the rig to ensure that all such obstructions have either been removed or that the risk of contacting such obstructions has otherwise been mitigated. Specific items to consider include the following:

Structures

- Prior to raising mast, review location for the presence of overhead structures, such as canopies, trees, or piping racks.
- Maintain sufficient horizontal space (approximately 10 ft) between overhead structures and rig to allow for mast to go past vertical when being raised.

Overhead Power Lines

- Contact the power company for expert advice on drilling in the vicinity of overhead power line(s) at a specific location and to determine if the power line(s) can be de-energized during drilling operations. Never assume a line is de-energized - ASK! If in doubt, do not raise the mast.
- Inspect location for sagging power lines before making entry with rig. Never lift power lines to gain entry to location.
- Note location of overhead utilities on all boring location plans and site work plans. Whenever possible, locate borings to avoid any possibility of contact with power lines. Walk completely around the rig to determine what the distance will be between the nearest power line and the mast as it is being raised and in the raised position
- When drilling near overhead power lines is unavoidable, allow sufficient space between the mast and the overhead lines. Because of the difficulty in estimating distances from the ground and the effects of wind on the power lines and hoist lines of the mast, it is advisable to maintain a 20-foot clearance.
- Post signs on ground level to alert workers to the presence of overhead utilities.
- Never raise the mast of the rig without a designated spotter.

4.1.2 - Overhead Hazards cont.

- Except where electrical distribution and transmission lines have been de-energized and visibly grounded at point of work or where insulating barriers, not a part of or an attachment to the equipment or machinery, have been erected to prevent physical contact with the lines, equipment or machines shall be operated proximate to power lines only in accordance with the following per 29 CFR 1926.550(ii):
  - For lines rated 50 kV or below, minimum clearance between the lines and any part of the crane or load shall be 10 feet,
  - For lines rated over 50 kV, minimum clearance between the lines and any part of the crane or load shall be 10 feet plus 0.4 inch for each 1 kV over 50 kV, or twice the length of the line insulator, but never less than 10 feet,
  - In transit with no load and boom lowered, the equipment clearance shall be a minimum of 4 feet for voltages less than 50 kV, and 10 feet for voltages over 50 kV, up to and including 345 kV, and 16 feet for voltages up to and including 750 kV.
- Unless a more conservative spacing requirement is stipulated by state or local regulations, use the following table as minimum spacing guidance:

TABLE 4.1 - Spacing Guidelines for Electrical Service

Nominal Voltage (Phase to Phase)	Minimum Required Clearance (feet)
≤ 50,000	10
Over 50,000 to 75,000	11
Over 75,000 to 125,000	13
over 125,000 to 175,000	15
over 175,000 to 250,000	17
over 250,000 to 370,000	21
over 370,000 to 550,000	27
over 550,000 to 1,000,000	42

Adapted from Code of Safe Drilling Practices, California Dept. of Transportation, Division of Engineering Services, Revised April 30, 2004

- Because of the difficulty in estimating distances from the ground and the effects of wind on the power lines and hoist lines of the mast, it is advisable to maintain at least a 20-foot clearance.
- Confirm with the power company that overhead power lines have been de-energized prior to drilling.
- Never drive the drill rig from hole to hole with the mast in the raised or partially raised position.

4.1.2 - Overhead Hazards cont.

If contact between rig and power line occurs:

Assume the entire rig to be electrified. Do not attempt to enter or leave the rig or touch any part of it. Although people in the rig may not be affected, anybody touching the rig while in contact with the ground is in danger of being electrocuted.
Have someone call the power company and the local fire rescue squad immediately for assistance.
Do not touch any person who may be in contact with the current.
If a rescue is attempted, use a dry, clean rope or a dry, unpainted wood pole to remove the victim. Do not touch the victim until he has been removed from the current.
If the victim is unconscious when released from the current, check his breathing and pulse and, if needed, begin CPR immediately.

- Under most circumstances, the operator and other personnel on the seat of the vehicle should remain seated and not leave the vehicle. Do not move or touch any part, particularly a metallic part, of the vehicle or the drill rig.
- If you are on the ground, stay away from the vehicle and the drill rig, do not let others get near the vehicle and the drill rig, and seek assistance from local emergency personnel, such as the police or fire department.

4.2 - Raising the Mast

Once the rig has been properly stabilized and the location cleared of overhead obstructions, the rig mast can be raised. Specific items to consider include the following:

Starting the engine

- Start all engines in accordance with the manufacturer's manual.
- All drilling rig personnel and visitors should be instructed to stand clear of the drilling rig immediately prior to and during starting of an engine.
- Check for warning or lockout tags on the engine controls. If a warning or lockout tag is attached to the switch, do not start the engine until the warning tag has been removed by the person who installed it.
- Verify all gear boxes are in neutral, all hoist levers are disengaged, all hydraulic levers are in the correct non-actuating positions, and the cathead rope is not on the cathead before starting a drilling rig engine.

4.2.1 - Jump Starting an Engine with a Dead Battery

Use the following procedure when jump starts are necessary:

☑ **NOTE:** do not connect the negative clamp to the negative (-) terminal of the discharged battery.

1. Connect one of the positive (+) cable clamps (red) to the positive terminal of the discharged battery.
2. Connect the positive clamp (red) from the other end of the jumper cable to the positive (+) terminal of the good battery.
3. Connect the clamp from the negative jumper cable (black) to the negative (-) terminal of the good battery.
4. Connect the negative cable clamp (black) on the other end of the jumper cable to the engine block or other good engine metal surface on the vehicle with the discharged battery. Do not connect the negative clamp to the negative (-) terminal of the discharged battery. This may trigger a spark and result in explosion of the gases surrounding the battery, causing injury.

Raising the Mast

- Before raising the mast, look up to check for overhead obstructions.
- Remove all loose objects, such as equipment and tools from the mast and inspected for damaged parts
- Raise the mast only after the leveling jacks are down. Do not raise the jacks until the mast has been lowered completely.
- Before raising the mast, all drill rig personnel (with exception of the operator) and visitors should be cleared from the areas immediately to the rear and the sides of the rig. No other work should be performed in the vicinity of the mast while it is being raised or lowered.
- Only qualified personnel may raise or lower the mast.
- Raise the mast a few inches in order to check brakes.
- Never drive the drill rig from hole to hole with the mast in the raised or partially raised position.

Securing Mast

- Secure or lock the mast in upright position according to the drilling manufacturer's recommendations.

4.3 - Auger Drilling

Auger drilling uses direct power to rotate (screw) flighted augers into the ground. Drill rigs must have kill switches in operable condition. Familiarize yourself with their location and operation. At least two persons must be present when operating the rig. Do not wear loose clothing, jewelry, hair, or equipment near the auger

The operator and tool handler should establish a system of responsibility for the series of various activities required for auger drilling, such as connecting and disconnecting auger sections, and inserting and removing the auger fork. The operator must assure that the tool handler is well away from the auger column and that the auger fork is removed before starting rotation.

Be aware of the following hazards which may be unique to this type of drilling:

- Clean the auger's male and female ends with a wire brush. Do not clean out bolt holes with your fingers. When applicable, couple the rig to the next auger while that auger is on the ground, then allow the machine to pick it up and place it on the down-hole string. Idle the machine down before engaging the rotation.
- Only use the manufacturer's recommended method of securing the auger to the drill drive coupling. Do not touch the coupling or the auger with your hands, a wrench, or any other tools during rotation.
- Whenever possible, use tool hoists to handle auger sections.
- Never place hands or fingers under the bottom of an auger section when hoisting the auger over the top of the auger section in the ground, or over other hard surfaces such as the drilling rig platform.
- Never allow feet to get under the auger section that is being hoisted.
- Prepare to start an auger boring with the drill rig level, the clutch or hydraulic rotation control disengaged, the transmission in low gear, and the engine running at low RPM.
- Use low-profile auger pins.
- Apply an adequate amount of down pressure prior to rotation to seat the auger head below the ground surface.
- Look at the auger head while slowly engaging the clutch or rotation control and starting rotation.
- When rotating augers, stay clear of the rotating augers and other rotating components of the drilling rig. Never reach behind or around a rotating auger for any reason whatsoever.
- Slowly rotate the auger and auger head while continuing to apply down pressure. Keep one hand on the clutch or the rotation control at all times until the auger has penetrated about 1 foot or more below the ground surface.
- If the auger head slides out of alignment, disengage the clutch or hydraulic rotation control and repeat the hole starting process.
- An auger guide can facilitate the starting of a straight hole through hard ground or a pavement.
- Never place your hands between the drill rig and an auger, even when attempting to free damaged or bound sampling equipment from the auger.
- Use a long-handled shovel to move auger cuttings away from the auger. Never use hands or feet to move cuttings away from the auger. It is preferable to move cuttings while the auger is inactive.
- Augers should be cleaned only when the drill rig is in neutral and the augers have stopped rotating.
- After loosening the top auger from the down-hole string, allow the machine to pick up the auger off of the string and set it on the ground, then uncouple from the machine.
- Care should be taken to ensure augers are properly stored and secured when not in use and during transport.

4.3 - Auger Drilling cont.

When using screw together augers consider the following:

- When coupling augers, idle the machine down while screwing together the augers and remove the auger catcher before rotating the auger string.
- When uncoupling augers, clean off the area where the pipe wrench jaws will engage the bottom auger.
- Drillers should remove their hands from the rotation lever or clutch handle while allowing the helper to place the wrench in the proper position. The helper should loosely hold on to a rope attached to the end of the pipe wrench to maintain tension. After breaking the auger, drillers should remove their hand from the rotation lever or clutch handle while allowing the helper to remove the wrench and put the auger catcher in place.

When using bolt-together augers, consider the following:

- Do not use bolts with excessively rounded heads or worn out threads.
- Do not use a worn out socket or breaker bar.
- Pull on the breaker bar to tighten bolts. Do not push.
- Drillers should remove their hands from the rotation lever or clutch handle while auger bolts are removed and the auger catcher is positioned.
- If the top auger will not disengage from the string, strike the auger with a hammer on the thick area of the female coupling end.
- Do not strike the flights, bolt holes, or the body (tube) of the auger.
- If the auger cap bolt will not loosen by hand, tap it with a hammer or use the breaker bar and socket.
- If the top cap will not disengage from the auger, strike the cap with a hammer.

When using solid stem flight augers, consider the following:

- Place the C-pin so the movement of cuttings up the flights will not disengage it.
- Drillers should remove their hands from the rotation lever or clutch handle while allowing the helper to remove the C-pin and put the auger catcher in place.
- When hoisting a string of augers from the borehole, use the proper top adapter that will not allow the string to become disengaged from the hoist line.

4.4 - Rotary Drilling

The term *mud rotary* means direct rotary drilling using mud slurry or water circulation to remove cuttings and keep the borehole wall stabilized. Be aware of the following hazards which may be unique to this type of drilling:

- Lifting heavy equipment (such as drill rods, flight augers)
- Rotating equipment and parts, flight augers, and
- Slippery or dangerous work areas caused by messy mud pits or troughs (workers could fall in), keep work area clear.
- Water swivels and hoisting plugs should be lubricated and checked for frozen bearings before use.
- Do not hold on to the discharge hose, or allow it to coil around your feet, while the tools are rotating.
- When unscrewing a side-mount water swivel from the drill string, be sure the string is sitting on the bottom of the borehole. Do not hold on to the back-up wrench while tools are rotating.
- Use the proper size wrench to makeup and breakout joints of casing. Put yourself in a stable position and pull, do not push, on the wrench.
- Keep hands away from the bottom of the bit assembly when removing it from, or inserting it into, the casing or boring. Set the assembly on the ground and remove it from the overshot - do not allow it to hang from the wire line.
- Use full grip circle wrenches to assemble and disassemble core barrels.
- Keep hands away from the bottom of the core barrel or inner tube when removing it from, or inserting it into, the casing, augers, or drill rods.

Air rotary is direct rotary drilling using high pressure air circulation to remove cuttings and keep the bit cool. Be aware of the following hazards which may be unique to this type of drilling:

- Rotating/lifting equipment,
- High pressure air lines,
- Air discharge of cuttings at high velocity (use a cover to control discharge of cuttings),
- Heavy drill rods being lifted,
- High noise levels, wear hearing protection,
- Space limitations (large drill rig and support vehicle), and
- Dust generation in dry formations (move upwind and use a cover or water spray for dust control).

4.4 - Rotary Drilling cont.

Listed below are general rotary (air and mud) drilling hazards:

- Do not brake drill rods during their lowering into the hole with drill rod chuck jaws.
- Drill rods should not be held or lowered into the hole with pipe wrenches.
- If a string of drill rods is accidentally or inadvertently released into the hole, do not attempt to grab the falling rods with your hands or a wrench.
- In the event of a plugged bit or other circulation blockage, high pressure in the piping and hose between the pump and the obstruction should be relieved or bled down before breaking the first tool joint.
- When drill rods are hoisted from the hole, they should be cleaned for safe handling with a rubber or other suitable rod wiper. Do not use your unprotected hands to clean drilling fluids from drill rods.
- If work must progress over a portable drilling fluids (mud) pit, do not attempt to stand on narrow sides or cross members. The mud pit should be equipped with a rough surface or cover panels of adequate strength to hold drilling rig personnel.
- Drill rods should not be lifted and leaned unsecured against the mast. Either provide some method of securing the upper ends of the drill rod sections for safe vertical storage or lay down the rods in a safe area.
- Drill rod chuck jaws should be checked periodically and replaced when necessary.
- The capacities of hoists and sheaves should be checked against the anticipated weight of the drill rod string plus other expected hoisting loads.
- Only the operator of the drill rig should brake or set a manual chuck so that rotation of the chuck will not occur prior to removing the wrench from the chuck.

4.5 - General Drilling Safety

4.5.1 - Training

- Employees working in the proximity of an operating drilling rig and the support equipment required to complete wells should be thoroughly familiar with the operational hazards involved.
- Prior to commencing investigative work, all employees must review the Site-Specific HASP and the hazards surrounding a drill operation. Document this by having the employees read and agree with the provisions of the Site-Specific HASP and then by having them sign an acknowledgement form.

4.5.2 - Housekeeping On and Around the Drill Rig

Good housekeeping is a proactive approach to keeping the job-site clean which in-turn reduces accidents and injuries. A clean work environment adds to drilling speed and efficiency. Customers like it when you keep and leave a work-site clean because it shows professionalism. Together, good housekeeping improves working conditions and safety practices. Every crewmember should inspect the work site upon his arrival to assure that equipment is in safe condition and the job site is in proper order. Return the job site to proper order prior to proceeding with work.

☑ **NOTE:** The right time to clean-up is immediately after a mess is made.

Housekeeping means cleaning-up, *which is an ongoing part of drilling*, rather than an occasional activity. Follow these suggestions to make your housekeeping efforts more efficient:

- Identify where to unload equipment and supplies
- Put materials in a convenient place where they can be safely handled without hitting or falling on anyone
- Find a safe place for tools you pick up, not on the edge of a truck bed
- Drill rods, casing, augers, and similar tools should be orderly stacked on racks to prevent sliding, rolling, spreading, or falling
- Place fire extinguishers and first aid kits in easily accessible locations
- Decide on a location for trash collection: All trash should be placed in bags and stored in areas outside of the immediate work area.
- Determine a steam cleaning site that reduces the mess
- Every crew member is responsible for site clean-up
- Good housekeeping can eliminate most trip hazards

☑ **NOTE:** When you are not given a task to do, *clean-up something*.

4.5.2 - Housekeeping On and Around the Drill Rig cont.

The first requirement for safe field operation is that everyone understands and fulfills the responsibility for maintenance and housekeeping on and around the drill rig.

- Suitable storage locations should be provided for all tools, materials, and supplies so that tools, materials, and supplies can be conveniently and safely handled without hitting or falling on a member of the drill crew or a visitor, without creating tripping hazards, and without protruding at eye or head level.
- Avoid storing or transporting tools, materials, or supplies within or on the mast of the drill rig.
- Pipe, drill rods, casing, augers, and similar drilling tools should be stacked orderly on racks or sills to prevent spreading, rolling, or sliding.
- Penetration or other driving hammers should be placed at a safe location on the ground or be secured to prevent movement when not in use.
- Work areas, platforms, walkways, scaffolding, and other access ways should be kept free of materials, debris, and obstructions and substances such as ice, grease, or oil that could cause surfaces to become slick or otherwise hazardous.
- Keep all controls, control linkages, warning and operation lights, and lenses free of oil, grease, and ice.
- Do not store gasoline in any portable container other than a self-closing, non-sparking, red container with flame arrester in the fill spout and having the word *gasoline* clearly visible. The container must also comply with all other hazard communication requirements.
- Dirty or contaminated pipe, drill rods, augers, or sampling equipment, should be moved away from the work area to prevent possible exposure to non-protected personnel and also to prevent cross-contamination of clean materials.
- Wastewater and drilling fluids must be properly contained and labeled and stored out of the operational area.
- The use of additional footing safeguards (mats) should be evaluated on a case-by-case basis.
- Remove and dispose of empty bags or other containers, which have held drilling mud, cement or other dust producing materials.
- Do not leave items such as hand tools, rakes, shovels, or other small equipment left lying on the ground to pose a trip hazard.
- Welding gas cylinders should be stored in an upright and secured position. Protective caps should be in place when the cylinders are not in use.
- Never use compressed air for cleaning clothes.
- All unattended boreholes must be adequately covered or otherwise protected to prevent personnel, site visitors, or animals from falling into the hole. All open boreholes should be covered, protected, or back filled adequately and according to local and state regulations or customer requirements upon completion of the drilling project.
- Walk around, not over, obstacles. Carefully choose a walking path to avoid ruts and steep slopes. Walk around freshly placed fill, gravel, or rip-rap. Keep your eyes on the path.
- Avoid storing or transporting tools, materials, or supplies within or on the mast of the drill rig.

4.5.3 - Equipment Inspection

- Inspect equipment at the start of each shift (pre-op) and at the end of each shift (post-op).
- Correct all major defects and safety defects prior to the start of work.

4.5.4 - General Inspection Routine

- Inspect drilling equipment, cranes, winches, generators and compressors prior to use - correct any identified problem before proceeding with work
- Verify that the emergency shutoff switch works
- Verify that preventative maintenance has been conducted
- Wear proper PPE: Hardhat, safety glasses with side shields, and steel-toed boots as a minimum
- Conduct tailgate safety meetings and facilitate a safe work culture
- Pre qualify drilling subcontractors
- Verify that Drillers and Helpers have proper training and experience
- Refer to company specific *Drilling Safety Guidelines*, *Subcontractor Health and Safety Requirements*, and *Behavior Based Safety* procedures.

4.5.5 - Set-up

- **See details below for set-up precautions related to proximity to power lines.**

4.5.6 - Start-up

All Drillers will:

- All personnel should know location and use of emergency shut-down/kill switch.
- Identify potential pinch points and hazards which could injure fingers and toes.
- Traffic barricades should be positioned.
- Operate as a team in which every crewmember is responsible for their own safety and that of each of the other crewmembers.
- Know their individual duties so that work can progress smoothly, efficiently and safely.
- Stay alert with their minds on their jobs.
- Stay observant for safety problems and correct them as they occur or report the problem to the lead worker.
- Use all required and recommended safety equipment.
- Refrain from engaging in practical jokes/horseplay around the drilling rig and work site.
- Get proper rest and nutrition so that they report to work in a physically and mentally fit condition.
- Never work under the influence of alcohol or drugs, whether legal or illegal.
- Pass an operational capability test administered by the employee's supervisor or supervisor's representative on each type of equipment the employee will operate on state business prior to operating the equipment unsupervised.
- Always use the buddy system whenever working near areas of vehicular traffic, public roads or public property.
- Remove cuttings with a long-handled shovel, not your hand or foot.

4.5.7 - Drilling

Considerations during general operation**:**

No visitors are permitted in the vicinity of the work area without proper protective clothing and authorized permission.
Only personnel necessary to achieve drilling objectives should remain within the exclusion zone. All others should remain outside the exclusion zone.
Effective communication (hand signals), especially under high noise conditions, is essential to safety. Clarify use of hand signals.
If the operator of the rig must leave the area of the controls, he operator should shift the transmission controlling the rotary drive and the feed control to neutral.
All crew members should be familiar with basic controls of the rig, including how to stop the engines, align the kelly with the borehole, raise and lower the drive head, raise and lower hoists, and chuck or unchuck the rods.
Do not climb the rig mast while equipment is running. Shut down/lock out equipment and use full body safety harness if climbing mast is necessary.
The operator of a drilling rig should only operate the rig from the position of the controls.
The operator should shut down the drilling engine before leaving the vicinity of the drilling rig.
Drilling should always proceed cautiously, especially at depths less than ten feet.
Operation of drilling equipment should be limited to qualified personnel.
Do not exceed the manufacturers' technical specifications for items such as speed, force, torque, pressure, and flow.
If drilling in an enclosed area, make certain the exhaust fumes are vented from the work site.
If drilling with air, direct the exhaust and cuttings away from the workers.
Never operate the drill rig with any of the machinery guards removed.
Drill rods and sampling barrels should never be left unsecured, leaning against or balanced across the drill rig.
Never exceed the pipe and rod racks design maximum load.
Always make provisions to prevent stock from accidental rolling.
When core is being extruded from a core barrel, hands should be kept out of line of the end of the barrel.
Attach safety chains or cables swivel, air, and other pressure hoses.
When cranking pumps or other motors keep head well back of the crank area to avoid being hit when motor turns over.
Fugitive dust control is to be used during dry drilling, especially in potential areas of naturally occurring asbestos.

4.5.7 – Drilling cont.

- When adding and removing drill rod:
  - Only the drill operator will brake or set the chucks, to eliminate the possibility of engaging the transmission prior to removing the chuck wrench.
  - Do not use the chucks as a brake on a string of drill rods that are being lowered into a hole. Braking the drill string with the chuck will result in metal slivers on the drill rod and consequent hand injuries, and could result in losing the drill rod down the hole.
  - Check the chuck jaws periodically and replace them as necessary.
  - Never place hands on wrenches where they can get trapped between the wrench and the drill rig.
  - Ensure that wrenches are removed from rods before starting to drill.
  - Do not take hold of the male thread end of drill rod. Watch for sharp burrs on rods and casing, and file sharp edges off rods when necessary.
  - Do not use extension leverage (cheaters) on pipe wrenches to break drill rod. If extension leverage is needed, the wrong tool is being used.
  - Clean drill rods with a rubber wiper or other suitable device when being removed from a hole.
  - Allow drilling fluids to drain from drill rods into the mud pit before setting the rod to the side, to minimize the amount of mud around the work area.
  - The operator knows the capacity of the hoist and mast, and the weight of the drill rod, to prevent the hoist capacity from being exceeded.
  - The drill rig operator must exercise care to lower the hoist slowly while the drill rod is being carried away from the hole.
  - There should be at all times at least three wraps of hoisting line on the hoist drum to prevent a line load from being applied directly to the fastening clamp.
  - Do not guide or hold onto moving wire line work cables with bare hands.

4.5.8 - Adding and Removing Drill Rods

When adding and removing drill rod:

Only the drill operator will brake or set the chucks, to eliminate the possibility of engaging the transmission prior to removing the chuck wrench.

Do not use the chucks as a brake on a string of drill rods that are being lowered into a hole. Braking the drill string with the chuck will result in metal slivers on the drill rod and consequent hand injuries, and could result in losing the drill rod down the hole.

Check the chuck jaws periodically and replace as necessary.

Never place hands on wrenches where they can get trapped between the wrench and the drill rig.

Ensure that wrenches are removed from rods before starting to drill.

Do not take hold of the male thread end of drill rod. Watch for sharp burrs on rods and casing, and file sharp edges off rods when necessary.

Use of extension leverage (like a cheater pipe) on pipe wrenches to break drill rod should be avoided whenever possible. If extension leverage is needed, the wrong tool is probably being used. In rare instances where extension is required, use extreme caution to avoid slippage and possible injury.

Clean the drill rod with a rubber wiper or other suitable device when being removed from a hole.

Allow drilling fluids to drain from drill rods into the mud pit before setting the rod to the side, to minimize the amount of mud around the work area.

Do not guide or hold onto moving wire line work cables with bare hands.

4.5.9 - Positioning Pipe and Casing

When positioned in the mast, drill pipe or casing should be secured until attached and in the drilling position

If work stops during positioning of drill pipe or casing into the mast, lower any suspended load to the ground or lay it down on the support vehicle. The following are general field practices that apply to all drilling operations regardless of method:

- Direct water discharge hoses away from leveling blocks

4.5.10 - Pressurized Systems

- No repair or maintenance will be performed on pressurized systems unless all pressure has been relieved
- Extreme caution will be used when opening any valve
- All relief valves will be installed so that any discharge will be directed away from workers and equipment
- Any extensions necessary for proper venting of relief valves will be secured against whipping and incorporate whip checks

4.5.11 - Most Common Injuries

- Slipping and falling
- Getting dirt in the eye while steam cleaning or while hitting auger and rods with hammer
- Cutting fingers from handling augers and heavy objects
- Injuring back from improper lifting

4.5.12 - Near Losses, Incidents and Injuries and Treatment

- No matter how minor, all near losses, incidents, and injuries will be reported to a supervisor immediately.

4.5.13 - First Aid Kits/Fire Extinguishers

- Each rig will be equipped with a fully supplied, approved first aid kit and an ABC fire extinguisher of suitable size for the fire hazard to be encountered at the job site.

4.5.14 - Underground utilities

- Complete utility locates prior to drilling [One Call: (800) 321-ALERT] and coordinate with the drilling contractor and site personnel.
- Mark locations in white
- Field verify utility locations
- Document all utility locates on a plot plan or other map of the site.
- Observe the area for indications of utilities
- Hand dig if questions remain or if required by the property owner
- Refer to your specific *Utility Clearance and Isolation* procedure

4.5.15 - Environmental Contamination (if applicable)

- Before Visqueen or other plastic is laid down, the site will be cleared of trip hazards, obstacles or debris such as rocks, sticks, ruts and holes.
- Contain cuttings in drums or plastic sheeting
- Wear proper PPE and minimize contact with soil, sediment, groundwater, or other contamination.
- Work upwind of the boring
- If unusual soil discoloration or odors are encountered, stop work, evacuate area and contact the safety manager. The approach will need to be re-evaluated and Level C PPE may be required
- Follow all provisions of the Health and Safety Plan

4.5.16 - Working on Streets or Highways

- Follow state and local laws concerning traffic control signage, cones, and barricades.
- Do not work before sun-up, after sundown, or any time visibility is poor.
- Position support vehicle(s) between the work area and oncoming traffic.
- Use safety strobe lights on all vehicles and equipment.
- Wear appropriate reflective safety vests.
- Use radios when flagging.

4.5.17 – Operating the Drilling Rig

- Only employees will operate the drilling rig or handle equipment associated with drilling operations, including winches, augers, drive rods, ropes, and cables. Technicians, field personnel and any visitors must be aware of the location of the emergency shut-down/kill switches and operation of these devices, and the devices must be in safe working condition prior to the start of the project and thereafter.
- The Technician should never leave the controls of the drilling rig while the tools are rotating unless all employees are clear of rotating equipment.
- During drilling operations the Well Technician at the controls must be aware of the Assistant Technicians position and actions at all times. Operation of the winches and or rotary actions should only occur once the Well Technician has visually or verbally confirmed that the Assistant Technician is all clear. During assembly operations (auger attachment or rodding connection) no mechanical operations should occur until body position or hand placement is confirmed to be in a non-pinch or crush position.
- Only employees necessary to run the rig are allowed in close proximity, except during essential sampling and other activities.
- Technicians will not reach into or near pinch points, the borehole, or the rotating equipment, unless the drilling rig has been shut down.

4.5.18 - Working on the Mast - General Repairs

- Drillers should not climb the mast to make repairs if the mast can be lowered. If the mast cannot be lowered to make repairs, workers may use a ladder or may climb the mast if proper fall protection, such as a harness and attached lanyard, is available. Fall protection devices, in the form of a harness and lanyard, will be used where workers are 6 feet or greater in height (if a ladder or personal lift is not available). No one should climb the mast to make repairs while the drilling rig is operating
- During general repairs or maintenance actions Technicians must also consider extra caution with respect to hand tools and potential slippage actions. Keep tools clean and free of grease and oils, plus thoroughly clean any bolt heads or parts before wrenching. These actions may prevent slippage and possible hand injuries. Where possible, leather gloves should be worn (cotton gloves may be worn where dexterity is an issue).

4.5.19 - Special Precautions for Drilling in Landfills

In addition to the usual physical hazards of drilling, employees drilling in landfills may experience an increased hazard from methane gas. Methane, a decomposition product of organic materials is a very flammable gas, which may accumulate in the borehole or in the general work area. To help reduce the hazards due to the presence of methane while drilling in landfills, the following procedures should be implemented:

- No smoking within 75 feet from the drilling area.
- The drilling rig should be equipped with a spark-arresting muffler; a diesel engine can sometimes be preferred.
- All ignition sources should be at least 75 feet from the borehole and, if possible the rig should be located upwind of the borehole,
- Monitor methane concentrations as frequently as possible using a Combustible Gas Indicator (CGI).
    - The frequency of monitoring must be established in the Site-Specific (HASP).
    - The meter should be kept near the rig.
    - Results of the monitoring data should be entered into the field log,
    - Calibrate the CGI against a reference gas at least weekly.
- **All work will stop if gases are detected at 10 percent or greater of the lower explosive limit (LEL)** in the hole being drilled.
- Under such circumstances it may become necessary to inert, ventilate, or flood the borehole with water during drilling to reduce the risk of down-hole explosions.

4.5.20 - Lighting

Lighting around a drilling operation should be sufficient to provide illumination at all times. See the table below for guidance.

Table 4.2 - Minimum Illumination Intensities in Foot-Candles

Foot-Candles	Area of Operation
5 Foot-Candles	General construction area lighting.
3 Foot-Candles	General construction areas, concrete placement, excavation and waste areas, access ways, active storage areas, loading platforms, refueling, and field maintenance areas.
5 Foot-Candles	Indoors: warehouses, corridors, hallways, and exit ways.
5 Foot-Candles	Tunnels, shafts, and general underground work areas: (Exception: minimum of 10 foot-candles is required at tunnel and shaft heading during drilling, mucking, and scaling. Bureau of Mines approved cap lights shall be acceptable for use in the tunnel heading)
10 Foot-Candles	General construction plant and shops (batch plants, screening plants, mechanical and electrical equipment rooms, carpenter shops, rigging lofts and active store rooms, mess halls, and indoor toilets and workrooms.)
30 Foot-Candles	First aid stations, infirmaries, and offices.

☑ **NOTE:** The above are minimum requirements. Many circumstances, including weather, may warrant higher lighting values.

4.6 – Electrical Safety

4.6.1 - Supplying Power to the Job Site

Drilling projects sometimes require around the clock operations and, therefore, require temporary electrical lighting. In general, all wiring and fixtures used to provide electricity for drilling operations should be installed by qualified personnel in accordance with the National Electrical Code (NFPA70 1999) with consideration of the American Petroleum Institute's recommended practices for electrical installations for production facilities (API RP 500B). Lights should be installed and positioned so that the work area and operating positions are well lighted without shadows or blind spots. The following are specific recommendations for land based drilling operations:

- Before working on an electrical power or lighting system, lockout the main panel box with your own lock and keep the key on your person at all times.
- Install all wiring using high quality connections, fixtures, and wire. Be sure that the wiring is insulated and protected with consideration for the drilling environment.
- Do not use makeshift wiring and equipment.
- Place all lights positioned directly above working areas in cages or similar enclosures to prevent loose or detached lamps or vapor tight enclosures from falling on workers.
- Install lights so as to eliminate glare or blind spots on tools, ladders, walkways, platforms, and the complete working area.
- Locate and guard electrical cables to prevent damage by drilling operations or by the movement of personnel, tools, or supplies.
- Use only three prong, U blade, grounded type plug receptacles and have adequate current carrying capacity for the electrical tools that may be used.
- Use only electrical tools that have three prong, U blade, ground wire plugs, and cords.
- Do not use electrical tools with lock on devices.
- Provide adequate grounding for all electrical welders, generators, control panels, and similar devices.
- Provide secure protective enclosures on control panels, fuse boxes, transformers, and similar equipment.
- Avoid attaching electrical lighting cables to the mast or other components of the drill rig. If this must be done, use only approved fasteners. Do not string wire through the mast.
- Do not use poles used to hold wiring and lights for any other purpose.
- Turn power off before changing fuses or light bulbs.
- Require all workers in a drilling area illuminated with electrical lighting to wear safety head gear that protects the worker's head, not only against falling or flying objects, but also against limited electrical shock and burns according to ANSI Z89.1 and Z89.2.
- Allow only trained, designated personnel to operate electrical equipment.
- Do not permit unqualified field personnel to work on or near electric lines or devices.

4.6.2 - Safe Use of Electricity

Electrical shock can occur if equipment is maintained improperly or operated unsafely. Care and common sense minimizes danger and reduces the chance of fire resulting from electrical faults.

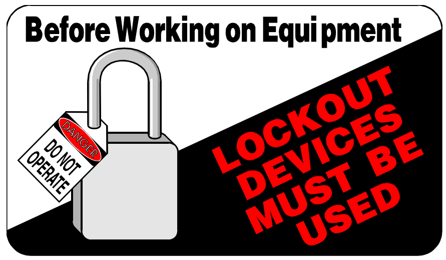


Figure 4.2 – Lockout Tagout Reminder

- Do not work on electrical parts unless you are sure they are disconnected
- Never splice, connect, or handle live circuits
- Verify test flow or possible leaks will not spray water into any electrical enclosures such as starters, control boxes, or connection boxes during testing
- Verify all electrical equipment is properly grounded

4.6.3 - Reacting to Contact with Electricity

Figure 4.3 – High Voltage Warning Sign

- If a drill makes contact with electrical wires, it may or may not be insulated from the ground by the tires of the carrier. Under either circumstance, the human body, if it simultaneously comes in contact with the drill rig and the ground, will provide a conductor of the electricity to the ground. Death or serious injury can be the result.

4.6.4 - Electrical Equipment

Get permission from the owner's representative before utilizing electrical outlets on-site. Do not operate electrical equipment in standing water or excessively wet conditions.

4.7 - General Equipment Safety

4.7.1 Safe Use of Hand Tools

With a vast number of hand tools that are likely to be used on a drill rig or during repair, the best rule of thumb is to use a tool only in the manner for which it was intended. Keep cutting tools sharp. If an accident occurs, treat all cuts and scratches immediately with simple first aid measures to prevent infection, which can occur in a matter of hours. Some other guidelines are:

Inspect tools prior to use
Use tools for their intended use only
Do not use damaged tools
Pull, do not push wrenches - verify there is a good grip
Never use excessive force on a tool. If excessive force is required, the wrong tool is being used.
Keep all tools clean and orderly stored when not being used.

- Do not leave tools on ladders or other overhead working spaces.
- Do not leave tools on the ground.

Never throw or drop tools. Use hoists or hand lines to raise or lower tools.
Always use non-sparking tools in areas of potentially explosive materials or atmosphere.

Hand Tools

As many different types of hand tools may be used on or around a drill rig and in repair shops, there are an equal number of instructions for proper use. *Use the tool for its intended purpose* - is the most important rule.

The following suggestions apply to safe use of several hand tools that frequently are used on and around drill rigs:

- When a tool becomes damaged, either repair it before using it again or get rid of it.
- Do not use tools with split or defective handles or worn parts. If a tool becomes damaged, repair it before using it again or replace it.
- When using a hammer, any kind of hammer for any purpose, wear safety glasses and require all others around you to wear safety glasses.
- When using any kind of chisel or punch, for any purpose, wear safety glasses and require all others around you to wear safety glasses.
- Keep all tools cleaned and stored appropriately when not in use

Hammers

Use only hammers that are in good condition with handles firmly attached. Repair or replace hammers with defective handles or mushroomed heads. If the head has mushroomed, dress it prior to using it. When repairing a handle, never use nails as a substitute for a wedge.

Always grip the handle close to the end. Choking the grip near the head is less accurate and effective.

Set nails with a light blow to minimize the possibility of finger injuries.

Always use a hammer with a flat face to drive nails, never use a machinist's hammer for this purpose.

Never pound objects with the hammer's handle.

To prevent flying metal splinters, never strike a hardened object such as a wrench or another hammer with anything but a rawhide or soft-metal hammer.

Wrenches

- Keep all pipe wrenches clean and in good repair. Use a wire brush frequently to clean the jaws of pipe wrenches. An accumulation of dirt and grease can cause wrenches to slip.
- Use a wrench of adequate size, a larger wrench is safer than using a cheater pipe.
- If using an adjustable wrench, note that the fixed jaw is stronger than the movable one.
- If possible, pull on a wrench using your arm muscles rather than push on it.
- Maintain good footing, one foot bracing behind the other, when using a wrench. Remove sharp objects from the area in case of a fall.
- Position your hands so they will not be crushed or smashed if the nut or joint releases.
- Never apply a wrench to moving machinery.
- Never use a wrench as a hammer.
- Wire brush the jaws of pipe wrenches frequently, and replace worn jaws periodically.
- Use wrenches - not pliers - on nuts.
- Never use pipe wrenches in place of a rod holding device.
- Replace hook and heel jaws when they become visibly worn.
- When breaking tool joints on the ground or on a drilling platform, position your hands so that your fingers will not be pinched between the wrench handle and the ground or the platform if the wrench should slip or the tool joint suddenly let go.
- When using a wrench on a tight nut: first use some penetrating oil, use the largest wrench available that fits the nut, when possible pull on the wrench handle rather than pushing, and apply force to the wrench with both hands when possible and with both feet firmly placed. Do not push or pull with one or both feet on the drill rig or the side of a mud pit or some other blocking-off device. Always assume that you may lose your footing -- check the place where you may fall for sharp objects.
- Never use a cheater bar on an aluminum pipe wrench

Screwdrivers

Always use a screwdriver that closely fits the screw slot.

Never use a screwdriver with a worn, chipped, or broken tip.

Never use a screwdriver as a substitute for a chisel or pry bar.

Keep cutting tools sharp.

If an accident occurs, treat all cuts and scratches immediately with simple first aid measures to prevent infection, which can occur in a matter of hours.

Pinch points

Never place your hand or other body parts under auger or in holes in the auger
Attach one flight at a time
Stand clear of outriggers
Wear leather gloves
Identify any and all places where moving equipment could trap a body part and act to eliminate the hazard.

Power Tools

- Always read the owner's manual of the tool that you are using to learn the correct application and the limitation of the tool.
- Lubricate tools as recommended by the manufacturer.
- Properly ground power tools.
- Never operate power saws or grinders without safety guards.
- Never run power tools in damp or wet locations.
- Always have proper lighting when using power tools.
- Do not abuse the cord - never carry a tool by its cord, or yank the cord to remove the plug from a receptacle.
- Secure the work with clamps to allow both hands to be free to operate the tool.
- Remove adjusting keys and wrenches prior to starting the power tool.
- Keep the work area clean and free of clutter that can interfere with the work or get caught in the power tool.
- Do not overreach, keep good footing and balance when using power tools.
- Do not carry plugged-in tools with your finger on the start switch.
- Disconnect all tools from power source when not in use and when servicing.

4.8 - Personal Protective Equipment

4.8.1 - Individual Protective Equipment

Certain personal protective equipment (PPE) must be worn because of the physical hazards posed by the drilling operation. For most geotechnical, mineral, and groundwater drilling projects, individual protective equipment must include a safety hat, safety shoes, safety glasses, and close fitting gloves and clothing. The Site-Specific Health and Safety Plan will dictate other PPE and precautions necessary to address site related hazards and risks. All protective equipment is provided by the respective employer(s).

Hard Hats

Hard hats must be worn by everyone working or visiting at or near a drilling site (worn with the brim in front, only). All hard hats must be kept clean and inspected each working day to assure they are in good repair with the headband and crown straps properly adjusted for the individual drill rig worker or visitor. A hard hat is the number one piece of safety equipment. They should be worn on all drilling sites, shop or yard areas where work might be performed under heavy objects, or where there is the possibility of injury from falling objects. A hard had protects you from falling objects. For your protection, OSHA regulations allow government inspectors to assess fines for not wearing hard hats.

Safety Shoes or Boots

Safety shoes or boots should be worn by all drilling personnel and all visitors to the drill site that observe drilling operations within close proximity of the drill rig. All safety shoes or boots must meet the requirements of ANSI.

Gloves

All drilling personnel should wear gloves for protection against cuts and abrasions that could occur while handling wire rope or cable and from contact with sharp edges and burrs on drill rods and other drilling or sampling tools. All gloves must be closefitting and not have large cuffs or loose ties that can catch on rotating or translating components of the drill rig.

Where possible, leather gloves should be worn (cotton gloves may be worn where dexterity is an issue).

Gloves should be worn when work activities involve handling the drilling equipment, sampling devices or even when servicing the drill unit. The type of glove will be dependent upon the task being performed and potential for chemical or other contaminants. At a minimum leather gloves should be worn when assembling tooling or servicing and repairing the drill unit. If dexterity is an issue (small bolts or screws), cotton or nitrile gloves maybe adequate.

Eye Protection

- All drilling personnel should wear safety glasses. General prescription glasses and sunglasses are not safety glasses. All safety glasses must meet the requirements of ANSI.
- Use safety glasses whenever using a hammer, chisel, power tool or any other tool that can cause particles to fly.

Hearing Protection

- Hearing protection devices such as ear plugs and ear muffs should be worn as required when the noise exposure is 85 dBA or greater over an 8-hour workday. Although noise levels vary with the type of drilling equipment used, potentially hazardous noise levels are likely to be generated during split-spoon sampling and air drilling. Typically, speech at normal conversational levels becomes difficult at 2 to 3 feet when noise levels are in excess of 85 dBA.
- When appropriate, each drill rig worker must wear noise-reducing hearing protection that meets the requirements of ANSI.

Fall Protection

- Fall protection is required when working at heights of greater than 6 feet (guard rails or a personal fall arrest system). Establish a good solid footing and that walking and working surfaces are as clean and dry as possible.
- Work to be done above three feet on the mast should require use of a safety harness, or the mast must be lowered. At a minimum fall protection must be used in accordance with applicable regulatory or client requirements. The most stringent being applicable.

Clothing

The clothing of the individual drill rig worker is not generally considered protective equipment, however, the worker's clothing should be comfortable but must be close fitting, without loose ends, straps, draw strings, belts or otherwise unfastened parts that might catch on some rotating or translating component of the drill rig. Rings and jewelry must not be worn during a work shift. In addition to loose clothing, hair should be tied back, as loose long hair can catch in mechanical equipment. All jewelry, including rings must be removed before beginning each shift. All personnel should wear clothing appropriate for the weather conditions.

High Visibility Clothing

High visibility clothing is required when working in environments that are regulated by Department of Transportation and or when working on active roadways or other high traffic areas such as service stations. It is also required for night work operations.

Other Protective Equipment

For some drilling operations, the environment or regulations may dictate that other protective equipment be used. The requirement for such equipment must be determined jointly by the management of the drilling organization and the safety supervisor. Such equipment might include face shield, respirator, and insect repellent. When drilling is performed in chemically or radiological contaminated environment, special protective equipment, and clothing may, and probably will, be required. The design and composition of the protective equipment and clothing must be determined jointly by the management and the client who requests the drilling services, and under some circumstances, with the concurrence of a health and safety professional.

4.9 - Weather and Night Work

4.9.1 - Weather Considerations

Cold

Extended exposure to windy, cold weather can lead to frostbite, hypothermia, and possibly death. The cold stress equation is as follows:

LOW TEMPERATURE + WIND SPEED + WETNESS = INJURY & ILLNESS

The Occupational Safety and Health Administration (OSHA) and the Mine Safety and Health Administration (MSHA) offer the following steps for recognizing, evaluating, and controlling cold stress:

- Recognize the environmental and workplace conditions that lead to potential cold-induced illnesses and injuries.
- Learn the signs and symptoms of cold-induced illnesses/injuries and what to do to help the worker.
- Drink warm, sweet beverages (sugar water, sports-type drinks). Avoid drinks with caffeine (coffee, tea, or hot chocolate) or alcohol, which cause dehydration. Eat warm, high-calorie foods like hot pasta dishes.
- Dress appropriately, layer clothing to adjust to changing environmental temperatures. Wear a hat and gloves, in addition to underwear that will keep water away from the skin (i.e., polypropylene).
- Take frequent breaks in warm, dry shelters to allow the body to warm up.
- Perform work during the warmest part of the day.
- Avoid exhaustion or fatigue because energy is needed to keep muscles warm.
- Workers are at greater risk when they have predisposing health conditions such as cardiovascular disease, diabetes, and hypertension, they take certain medications (check with a doctor, nurse, or pharmacy to see if any medications being taken have adverse affects while working in cold environments), or they are in poor physical condition, have a poor diet, or are older.
- During freezing weather, do not touch any metal parts of the drill rig with exposed flesh. Freezing of moist skin to metal can occur almost instantaneously.
- All air and water lines and pumps should be drained when not in use if freezing weather is expected. If appropriate, the rig should be winterized at the end of each day.
- Take breaks as necessary to warm up.

Heat

- During hot weather take frequent breaks and drink plenty of fluids.
- Dress appropriately for the conditions expected.
- Maintain a supply of drinking water.
- Take breaks as needed to cool off.

Inclement Weather

- Drilling operation should be terminated during an electrical storm, and the complete crew should move away from the drill rig.
- Although drilling operations can proceed through a wide range of weather conditions, operations must cease if weather conditions are severe enough to create a safety hazard.
- Safety hazards from weather may include, but are not limited to, low visibility for approaching traffic, inability for the driller's to see, grasp, or handle equipment, and rough seas while working on the barge. Other conditions can create safety hazards, and can be decided in the field.
- The Driller has the responsibility to determine if the severity of the conditions warrants stopping the drilling operation.
- If performing tasks during inclement weather, work deliberately and adjust the work procedures to address the changed conditions.
- Stay away from the drill during electrical storms.

Lightning

Because of the high potential for lightning strike on the mast of a drilling rig, drilling must cease when thunder and lightning storms approach and are within 5 miles. Workers should take shelter away from the rig during the potential for lightening. If possible, the mast should be lowered prior to the advancement of thunder and lightning storms. A minimum of 20 minutes should be allowed after a lightning strike before drilling resumes.

4.9.2 - Night Work Safety

Schedule night work in advance to allow employees to adjust their schedules and avoid unnecessary fatigue.
Wear required protective clothing:
Orange or lime-green vests with reflective strips, and
White coveralls.
Use sufficient illumination.
Traveling public must be able to identify all locations where employees are grouped together and engaged in work activities.
The lighting must be oriented so that the traveling public is not temporarily blinded.
- The intensity of the illumination should not be any brighter than that necessary to perform the work.

4.10 - Wire Rope, Hoists and Cat Head Safety

This section concerns rotating equipment, catheads, wire ropes, and hoists (the part of the drilling rig which may cause serious injuries), and drilling techniques most commonly used during auger and rotary drilling:

- Use tools only for the job for which they were intended.
- Stay clear of cables while lifting equipment or while drilling rig is under heavy strain.
- Do not ride on hook, ropes, or other traveling lines of the rig.
- When moving or hoisting stabilizers or drill collars, tag lines should always be used. A helper should not use his hands to hold or control heavy tooling. Instead, he should loop a rope around it and hold onto both ends of the rope.
- Inspect pulley sheaves for wear and cable and rope positioning.

4.10.1 - Wire Rope Safety

Worn or misused wire rope is potentially one of the most dangerous pieces of equipment on any drilling rig. When a wire rope breaks, it is typically under significant tension and therefore has a tendency to snap back, like a rubber band. Be constantly aware of the condition of wire rope, which is used to hoist drill pipe or other heavy object. Wire rope used for such purposes and has begun to fray or unravel, or which has a number of breaks, should be removed from service and replaced prior to mobilization. This also applies to hemp rope, which is used to hoist the hammer during split-spoon sampling. See the chart below.

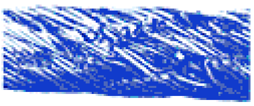
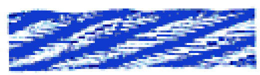
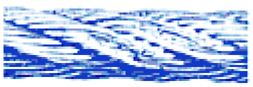
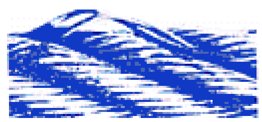
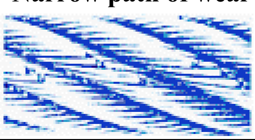
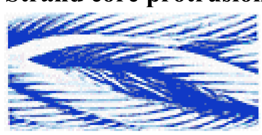
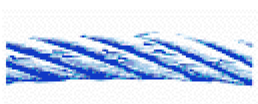
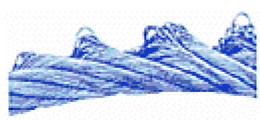
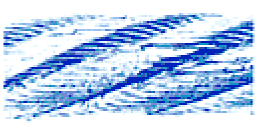
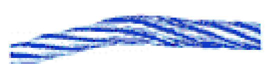
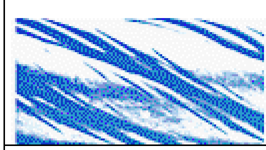
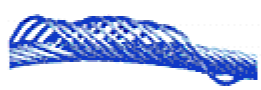
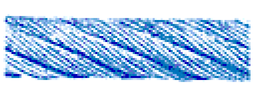
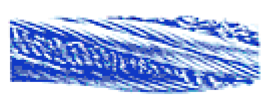
 **Mechanical damage due to rope movement over sharp edge projection while under load.**	 **Typical wire fractures because of bending fatigue.**
Localized wear due to abrasion on supporting structure. Vibration of rope between drum and jib head sheave. 	 **Wire fractures at the strand, or core interface, as distinct from crown fractures, caused by failure of core support.**
Narrow path of wear resulting in fatigue fractures, caused by working in a grossly oversize groove, or <u>over small support rollers.</u> 	**Strand core protrusion because of torsional unbalance created by drop ball or other shock loading application.** 
Two parallel paths of broken wires indicative of bending through an undersize groove in the sheave. 	 **Break up of IWRC resulting from high stress application. Note nicking of wires in outer strands.**
 **Severe wear, associated with high tread pressure. Protrusion of fiber main core.**	 **Typical example of localized wear and deformation created at a previously kinked portion of rope.**
 **Severe wear in Lang Lay, caused by abrasion or cross-over points on multi-layer coiling application.**	 **Multi strand rope bird-caged due to torsional unbalance. Typical of build up seen at anchorage end of multi-fall crane application.**
 **Corrosion of severe degree caused by immersion of rope in chemically treated water.**	 **Protrusion of IWRC resulting from shock loading.**

Figure 4.1 – Types of Wire Rope Wear

4.10.1 - Wire Rope Safety cont.

Listed below are guidelines regarding wire ropes and hoists:

- Always wear the appropriate gloves when handling wire ropes.
- Minimize shock loading on wire rope, apply loads smoothly and steadily.
- Protect wire rope from sharp corners or edges.
- Do not guide wire ropes onto cable drum with your hands.
- Discard cable when kinked or frayed.
- Thoroughly inspect all wire ropes that have not been used for a period of a month or more.
- Install all connections and end fittings, which consist of spliced eyes and various manufactured devices, according to the manufacturer's specifications.
- If a ball bearing type hoisting swivel is used to hoist drill rods, inspect and lubricate swivel bearing daily to assure that the swivel freely rotates under load.
- If a rod slipping device is used to hoist drill rods, do not drill through or rotate drill rods through the slipping device, do not hoist more than 1 ft. (0.3 m) of the drill rod column above the top of the mast, do not hoist a rod column with loose tool joints, and do not make, tighten, or loosen tool joints while the rod column is being supported by a rod slipping device. If drill rods should slip back into the borehole, do not attempt to break the fall of the rods by hand or by tensioning the slipping device.
- Most sheaves on drill rigs are stationary with a single part line.
- Never increase the number of parts of line without first consulting with the manufacturer of the drill rig.
- Wire ropes must be properly matched with each sheave. If the rope is too large, the sheave will pinch the wire rope. If the rope is too small, it will groove the sheave. Once the sheave is grooved, it will severely pinch and damage larger sized wire ropes.
- Following the installation of a new wire rope, first lift a light load to allow the wire rope to adjust.
- Use replacement wire ropes that conform to the drill rig manufacturer's specifications.
- Apply loads smoothly and steadily to minimize shock loading of a wire rope.
- There should be at all times at least three wraps of hoisting line on the hoist drum to prevent a line load from being applied directly to the fastening clamp

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DANGER!
Do not subject a cable to *shock load*. Rapidly engaging and disengaging the hoist while attached to a load puts an enormous strain on the cable and may lead to catastrophic failure.

4.10.1 - Wire Rope Safety cont.

All wire ropes and fittings should be visually inspected prior to and during use and thoroughly inspected at least once a week for:

- abrasion
- broken wire
- wear
- reduction in rope diameter
- reduction in wire diameter
- fatigue, corrosion
- damage from heat
- improper reeving
- jamming, crushing
- bird caging
- kinking,
- core protrusion
- damage to lifting hardware

Wire ropes should be replaced when inspection indicates excessive damage. End fittings and connections consist of spliced eyes and various manufactured devices. All manufactured end fittings and connections should be installed according to the manufacturer's instructions and loaded according to the manufacturer's specifications.

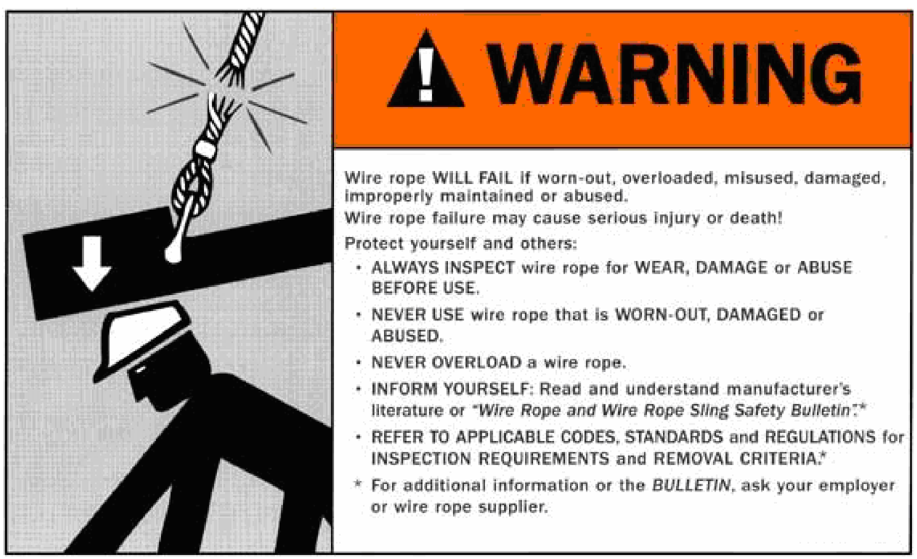

Figure 4.2 – Wire Rope Warning Sign

4.10.2 - Hoist Safety

DANGER!
Drill rig hoists and masts are designed for *vertical* lifting of drilling tools only. Do not attempt to lift something away from the borehole as damage to the cable, sheave, or structural failure may occur.

Listed below are guidelines regarding wire ropes and hoists:

- Replace damaged safety latches on safety hooks before using.
- Always use proper lifting devices.
- Use tool handling hoists only for vertical lifting of tools (except when angle hole drilling).
- Do not use tool handling hoists to pull on objects away from the drill rig, however, drills may be moved using the main hoist of the drill if the wire rope is spooled through proper sheaves according to the manufacturer's recommendations.
- When stuck tools or similar loads cannot be raised with a hoist, disconnect the hoist line and connect the stuck tools directly to the feed mechanism of the drill.
- Do not use hydraulic leveling jacks for added pull to the hoist line or to the feed mechanism of the drill.
- When attempting to pull out a mired down vehicle or drill rig carrier, only use a winch on the front or rear of the vehicle and stay as far as possible away from the wire rope. Do not attempt to use tool hoists to pull out a mired down vehicle or drill rig carrier.
- Avoid sudden loading in cold weather.
- Never use frozen ropes.
- Replace faulty guides and rollers.
- Know the working load of the equipment and rigging being used and the weight of the load being lifted. Never exceed these limits.
- Periodically inspect and test hoist clutches and brakes.
- Know and do not exceed the rated capacity of mast hooks rings, links, swivels, shackles, and other lifting aids.
- Never conduct any hoisting operations when the weather conditions are such that hazards to personnel, the public, or property are created.
- Never use a hoist line to ride up the mast of a drill rig.
- The drill rig operator must exercise care to lower the hoist slowly while the drill rod is being carried away from the hole.

4.10.3 - Sheaves

Inspect and lubricate sheave wheels, shafts, and pins often. Use the proper sheave diameter and width to match the hoist line that runs over it.

- Most sheaves on drill rigs are stationary with a single part line.
- Replace worn sheaves or worn sheave bearings.

4.10.4 - Cat Head Safety

The following safety procedures should be employed during cathead operation:

- Only drilling personnel familiar with cathead operation should be allowed to operate equipment.
- Keep the cathead clean and free of rust and oil and grease.
- The cathead should be cleaned with a wire brush if it becomes rusty.
- Check the cathead periodically, when the engine is not running, for rope-wear grooves. If a rope groove forms to a depth greater than 1/8 inch (3 mm), the cathead should be replaced.
- Always use a clean, dry, sound rope. A wet or oily rope may grab the cathead and cause drill tools or other items to be rapidly hoisted to the top of the mast.
- Should the rope grab the cathead or otherwise become tangled in the drum, release the rope and sound an appropriate alarm for all personnel to rapidly back away and stay clear. The operator should also back away and stay clear. If the rope grabs the cathead, and tools are hoisted to the sheaves at the top of the mast, the rope will often break, releasing the tools. If the rope does not break, stay clear of the drill rig until the operator cautiously returns to turn off the drill rig engine and appropriate action is taken to release the tools. The operator should keep careful watch on the suspended tools and should quickly back away after turning off the engine.
- Do not operate the cathead in rain.
- The rope should always be protected from contact with all chemicals. Chemicals can cause deterioration of the rope that may not be visibly detectable.
- Never wrap the rope from the cathead (or any other rope, wire rope, or cable on the drill rig) around a hand, wrist, arm, foot, ankle, leg, or any other part of your body.
- Always maintain a minimum of 18 inches of clearance between the operating hand and the cathead drum when driving samplers, casing, or other tools with the cathead and rope method. Be aware that the rope advances toward the cathead with each hammer blow as the sampler or other drilling tool advances into the ground.
- Never operate a cathead (or perform any other task around the drill rig) with loose, unbuttoned, or otherwise unfastened clothing or when wearing gloves with large cuffs or loose straps or lacings.
- Do not leave a cathead unattended with the rope wrapped on the drum.
- Position all other hoist lines to prevent contact with the operating cathead rope.
- When using the cathead and rope for driving or back-driving, verify that all threaded connections are tight and stay as far away as possible from the hammer impact point.
- The cathead operator must be able to operate the cathead standing on a level surface with good, firm footing conditions without distraction or disturbance.
- Never use more wraps of the rope than are required to hoist the load. Extra laps can lead to the rope feeding on to the drum by itself resulting in entanglement.

4.10.4 - Cat Head Safety cont.

- Use extreme caution when returning to the rig and while turning off the engine.

DANGER!
If the cathead rope becomes entangled, immediately release the rope, sound an alarm to notify other personnel in the area, and quickly move a safe distance away from the area in a direction perpendicular to the orientation of the drill rig.

4.11 - Health and Hygiene

4.11.1 - Personal Hygiene Requirements

The Site-Specific HASP should identify exclusion zone requirements and decontamination needs. Often a break area outside the restricted work areas will be established with a hand and face washing facility. Before eating, drinking, or smoking, all employees should thoroughly wash their hands and face. To help limit the potential for ingestion of contaminants, eating, drinking, chewing, or smoking is not allowed when working in the immediate vicinity of the drilling rig or in any restricted work areas (exclusion and decontamination zones).

4.11.2 - Chemical Hazards

- Review material safety data sheets
- Follow manufacturer’s instructions for use, handling and storage
- Use recommended protective equipment
- Label all containers

4.11.3 - Dust

- Minimize generation of dust from soil, sand or bentonite.
- Stay out of visible dust clouds.
- Wet materials if necessary to eliminate visible dust.

4.11.4 - Noise

- Wear hearing protection when operating or working near the rig.

4.11.5 - Ambient Air Monitoring

Vapors

Approach areas where vapors are suspected from the upwind direction and stay upwind or crosswind from potential sources of vapors (use flagging, wind socks, or similar devices to indicate wind direction).

4.11.6 - A Sample Hazard Communication and Chemical Safety Program

Attachment 4.A represents a sample hazard communication and chemical safety program document from the fictional MAKEHOLE Drilling Company. It may be used as an example for developing customized plans for environmental remediation drillers.

Safety Sensitive Employees

All safety sensitive employees are *prohibited* from the following conduct:

- **Alcohol**
    - Perform safety sensitive functions while under the influence of alcohol.
    - Operate a commercial vehicle while possessing alcohol. This includes the possession of medicines containing alcohol (prescription or over-the-counter), unless the packaging seal is unbroken.
    - Use alcohol while performing safety-sensitive functions.
    - Perform safety-sensitive functions within four (4) hours after using alcohol.
    - Use alcohol for eight (8) hours after an accident requiring a post-accident alcohol test or until a post-accident is administered, whichever occurs first.
    - Refuse to submit to a post-accident, random, reasonable suspicion, or follow-up alcohol test

- **Drugs or Controlled Substances** (include marijuana, cocaine, amphetamines, opiates and phencyclidines)
    - Perform a safety-sensitive function when the driver uses any controlled substance, except when the use is under the instructions of a physician who has advised the driver that the substance does not adversely affect the driver's ability to safely operate a commercial vehicle.
    - Refuse to submit to a post-accident, random, reasonable suspicion, or follow-up drug test.

☑ **NOTE:** Any CDL holder who has engaged in prohibited conduct will be immediately removed from the performance of any safety-sensitive function related to a commercial vehicle, including driving, and may not perform any safety-sensitive functions until certain evaluations have been met.

4.12 - Materials Handling

4.12.1 - Proper Lifting

Back injury is a common drilling injury. Improper lifting causes lower-back pain even for those who are strong and in good condition. Almost 65 percent of workers have back pain at some point during their working career.
Think through the process - How can you move the material or equipment and still minimize total weight, distance traveled, and frequency of movement? Be sure of your footing. When possible, let the drill rig do the work or use other mechanical devices to lift and move materials. Ask others to help with awkward or heavy items and equipment. Offer to help someone else with lifting. Stretch and warm-up muscles before lifting. Use proper lifting techniques. Move heavy objects with the aid of handcarts whenever possible.

Proper lifting takes the hazard out of moving heavy objects. Ask someone who knows how to demonstrate the following procedures. Then use them whenever you lift something either at work or at home:

- Establish you can lift the load safely or ask for help
- Use a mechanical lifting device if available
- Inspect route to be traveled making sure of sufficient clearance
- Look for any obstructions or spills
- Inspect the object to decide how it should be grasped
- Look for sharp edges, slivers, or other things that might cause injury
- Do not move any object that will obstruct your field of vision when transporting the load.

Before lifting a relatively heavy object:

1. Approach the object by bending at the knees,
2. Keeping your back vertical and un-arched while obtaining a firm footing.
3. Grasp the object firmly with both hands.
4. Stand slowly and squarely while keeping your back vertical and un-arched.

☑ **NOTE:** Lift with the muscles in your legs, not the muscles in your lower back. If the object is in excess of 50 pounds, request assistance.

4.12.2 - Heavy Materials, Drums and Containers - Lifting and Moving

- Do not lift or move heavy containers without assistance
- Do not lift or move awkward loads without assistance.
- Use proper bending and lifting techniques by lifting with arms and legs and not with back
- If possible, use powered lift truck, drum cart, or other mechanical means
- Take breaks if feeling faint or overexerted
- Spot drums in storage area prior to filling
- Wear appropriate PPE including leather gloves and steel-toed boots

4.12.3 - Drum Handling

- If a hoist is used to load drums, only lifting attachments specifically designed for drum lifting should be used. Do not use makeshift lifting attachments.
- Use only the proper tools and equipment to move, load or unload drums.
- Drums should be lined with a clear plastic before any material is placed in them.
- All drums should be placed into spill containment basins. If basins are not available, drums should be stored or placed on edge in such a manner as to avoid the accumulation of rainwater on the lids. The exterior of drums should be wiped clean before being stored to eliminate run off contaminants due to rain.
- Use chemical and leather gloves will to protect hands from cuts caused by mill burrs or rough edges.
- Avoid pinching or crushing hands or fingers between other drums or objects while moving.
- Before drums are pulled over on their sides, all caps and bungs should be secured and there should be sufficient clearance for hands and feet.
- When opening closed drums that have been exposed to heat from the sun or other sources, personnel should stand clear and open slowly until any pressure is relieved.
- All fluid and material containers should be clearly labeled to avoid improper use.
- Hazardous materials should be labeled and handled accordingly.
- Hazardous waste drums must be labeled in accordance with applicable federal and state regulations.
- Position hands and fingers to avoid pinching, smashing, or crushing when closing drum rings
- Do not lift or move heavy containers without assistance
- Use proper bending and lifting techniques by lifting with legs and avoid lifting with the back.
- If possible, use powered lift truck, drum cart, or other mechanical means
- Designate an appropriate drum storage area

4.13 - Forklift Operations

☑ **NOTE:** Do not operate a forklift or any other equipment unless you have completed the appropriate training for that forklift or other equipment. Doing so may be grounds for disciplinary action.

4.13.1 - Forklift and Forktruck Operations

- Only drivers and operators authorized by the employer and trained in the safe operations of industrial trucks and forklifts or industrial tow tractors are permitted to operate such vehicles. Devise methods to train operators in safe operation of powered industrial truck and forklifts.
- Stunt driving and horseplay are prohibited.
- No riders are permitted on vehicles unless provided with adequate riding facilities.
- Employees may not ride on the forks of lift trucks.
- Employees may not place any part of their bodies outside the running lines of an industrial truck and forklift, or between mast uprights or other parts of the truck where shear or crushing hazards exist.
- Employees are not allowed to stand, pass, or work under the elevated portion of any industrial truck and forklift, loaded or empty, unless it is effectively blocked to prevent it from falling.
- Drivers will check the industrial truck and forklift at least once per shift, and if it is found to be unsafe, report the matter immediately to your supervisor. Do not put the vehicle in service again until it has been made safe. Check for the proper functioning of tires, horn, and any other warning devices, lights, battery, controller, brakes, steering mechanism, cooling system, and the lift system for fork lifts (forks, chains, cable, and limit switches).
- No industrial truck and forklift will be operated with a leak in the fuel system.
- Industrial trucks and forklifts will not exceed the authorized or safe speed, always maintaining a safe distance from other vehicles, keeping the truck under positive control at all times and observe all established traffic regulation. For trucks traveling in the same direction, a safe distance may be considered to be approximately 3 truck lengths or preferably a time lapse-3 seconds-passing the same point.
- Do not pass trucks traveling in the same direction at intersections, blind spots, or dangerous locations.
- Slow down and sound the horn at cross aisles and other locations where vision is obstructed. If the load being carried obstructs forward view, travel with the load trailing.
- Look in the direction of travel and do not move a vehicle until certain that all persons are in the clear.
- Industrial trucks and forklifts will not be driven up to anyone standing in front of a bench or other fixed object of such size that the person could be caught between the truck and object.
- Grades will be ascended or descended slowly.
  - When ascending or descending grades in excess of 10 percent, loaded trucks should be driven with the load upgrade.
  - On all grades the load and load engaging means should be tilted back if applicable, and raised only as far as necessary to clear the road surface.
  - Motorized hand and hand-rider trucks should be operated on all grades with the load-engaging means downgrade.
- Carry the forks as low as possible, consistent with safe operations.

4.13 - Forklift Operations cont.

☑ **NOTE:** When the operator is over 25 feet (7.6 meters) from or out of sight of the industrial truck and forklift, the vehicle is *unattended* and (A) above should apply.

- When leaving a industrial truck or forklift unattended, either:
  - The power will be shut off, brakes set, the mast brought to the vertical position, and forks left in the down position. When left on an incline, block the wheels, or
  - The power may remain on provided the brakes are set, the mast is brought to the vertical position, forks are left in the down position, and the wheels will be blocked, front and rear.
- When the operator of an industrial truck and forklift is dismounted and within 25 feet (7.6 meters) of the truck which remains in the operator's view, the load engaging means will be fully lowered, controls placed in neutral, and the brakes set to prevent movement. Exception: Forks on fork-equipped industrial truck and forklifts may be in the raised position for loading and unloading if the forks are raised no more than 42 inches above the level where the operator and loaders are standing and the power is shut off, controls placed in neutral and the brakes set. If on an incline, the wheels will be blocked.
- Vehicles will not be operated on floors, sidewalk doors, or platforms that will not safely support the loaded vehicle.
- Prior to driving onto trucks, trailers and railroad cars, check their flooring for breaks and other structural weaknesses.
- Cross railroad tracks diagonally, wherever possible. Parking closer than 8 ½ feet from the centerline of railroad tracks is prohibited.
- Do not load trucks in excess of their rated capacity.
- Do not move a loaded vehicle until the load is safe and secure.
- Take extreme care when tilting loads. Tilting forward with the load engaging means elevated is prohibited except when picking up a load. Elevated loads will not be tilted forward except when the load is being deposited onto a storage rack or equivalent. When stacking or tiering, backward tilt will be limited to that necessary to stabilize the load.
- Place the load-engaging device in such a manner that the load will be securely held or supported.
- Take special precautions in securing and handling of loads by trucks equipped with attachments, and during the operation of these trucks after the loads have been removed.

Every employee who operates an industrial truck and forklift will be instructed in the following procedures and in any other practices dictated by the work environment. Such information will be provided at the time of initial employment. Copies of these instructions, printed in a language understood by the majority of the employees, will be conspicuously posted at a place frequented by the drivers.

4.13.2 - Employee Operating Instructions

- Securely fasten your seat belt.
- Where possible, avoid operating the forklift/industrial truck near ditches, embankments, and holes.
- Reduce speed when turning, crossing slopes, and on rough, slick, or muddy surfaces.
- Stay off slopes too steep for safe operation.
- Watch where you are going, especially at row ends, on roads, and around trees.
- Do not permit others to ride.
- Operate the forklift/industrial truck smoothly-no jerky turns, starts, or stops.
- Hitch only to the drawbar and hitch points recommended by forklift manufacturers.
- When forklift is stopped, set brakes securely and use park lock if available.

Every employee who operates an industrial truck or forklift will be required to check the industrial truck or forklift prior to operation each day and if it is unsafe report the matter immediately to a foreman or mechanic and will not use the industrial truck or forklift again until it has been made safe.

Employees are prohibited from stunt driving or horseplay while operating an industrial truck or forklift.

No repairs will be performed on any agricultural or industrial trucks, forklifts or tractors until arrangements have been made to reduce the probability of injury to repairmen or others caused by sudden movement or operation of such equipment or its parts.

4.14 - Fire Protection

4.14.1 - Fire on the Rig

Always carry an approved Class ABC fire extinguisher on the drill rig that meets the requirements of DOT regulation 49 CFR 393.95. The fire extinguisher should be located to permit visual determination of whether it is fully charged and is readily accessible for use

- Learn how to use fire extinguishers and know where they are located on the drilling rig and support vehicles.

- Remember the four letter word ***PASS*** and the fire is controllable, you can put a fire out successfully.

  ***P* - PULL** the pin
  ***A* - AIM at** the base of the fire standing approximately eight feet from the fire
  ***S* - SQUEEZE** the handle
  ***S* - SWEEP** the fire by moving the extinguisher back and forth as you aim at the base of the fire until it is out.

- Fire Extinguishers will be inspected monthly for condition and expiration date and tag with the date of annual inspection and inspector's name. If the tag is not located on the extinguisher, replace it with one that is properly tagged.
- Place the fire extinguisher in an easily accessible location within 10 ft of drilling of drilling rig.

4.14.2 - Other Fire and Explosion Precautions

- Do not refuel an engine while it is running or while it is still hot.
  - Use a funnel when refueling from a can.
  - No Smoking while handling or dispensing fuels.
  - Fuels should be handled, transported, and stored in approved, properly marked containers.
  - Store fuels away from equipment exhaust.
  - Do not store fuels inside a building.
- Flammable and combustible materials are typically present at drilling sites.
  - These materials include gasoline, diesel fuel, polyethylene, wood, weeds, and others.
  - To help prevent these materials from igniting, employees should first and foremost ensure that all sources of ignition (such as matches or lighters) have been identified and maintained at a safe distance from flammable and combustible materials.
- Smoking, open flames, or spark producing equipment should not permitted within 75 feet of drilling rigs, open wells, gasoline-driven pumps, or fuel storage areas.
- Flammable liquids (includes empty and full cans) should not be stored or left within 50 feet of drilling rigs, pumps, or other related machinery.
- Containers used for fuel will be bonded and grounded during dispensing to prevent the discharge of static electricity.
- Safety fuel containers must be returned to a designated safe storage area after fueling is completed.

4.15 - Rig Inspections and Maintenance

Drilling contractors are responsible for maintaining the drilling rig in proper working condition. Conducting routine inspection of the rig and associated support equipment and performing all required maintenance are key components to ensuring proper working condition. Specific items to consider when performing inspection and routine maintenance are discussed in greater detail below.

Inspections

The drilling contractor should inspect the drill rig when it first arrives onsite and at least daily thereafter for structural damage, loose bolts and nuts, proper tension in chain drives, loose or missing guards or protective covers, fluid leaks, damaged hoses, or damaged pressure gauges and pressure relief valves. Daily inspections should include the following:

- Inspect and test major systems to ensure proper operating condition and to identify signs of excessive wear.
  - Kill Switches
  - Protective Guards
  - Cable Systems
  - Leveling Jacks and Outriggers
  - Drill Controls
  - Hydraulic Lines
  - Connections, fittings, and valves
  - Exhaust Systems
  - Brake Systems
- Immediately notify Senior Driller of any equipment or safety device in need of repair.
- Correct all identified equipment and safety device defects prior to drilling.

4.15 - Rig Inspections and Maintenance cont.

An example checklist is included as Attachment 4.B - *Drill/Direct Push Type Rig Inspection Checklist*.

Maintenance

The drilling contractor should maintain logs, documenting all preventative maintenance performed on a given rig. Any maintenance determined to be necessary once the rig has arrived on location should be completed prior to drilling. Maintenance activities should never be performed while drilling. Specific items to consider when performing maintenance include the following:

General

- Never use gasoline or other flammables to perform cleaning duties around the rig.
- Place all transmissions, gearboxes, hydraulic valves, and hoist levers in neutral before initiating repairs.
- Have all preventative maintenance, or other scheduled maintenance, completed as recommended.
- Shut down the drill rig and remove the positive cable from the battery to clean, repair or lubricate fittings, unless the adjustment requires the rig to be running. The operator and lubricator must coordinate their efforts to successfully perform the maintenance safely.
- While performing maintenance, either remove or tag the key to prevent accidental starting of the rig.
- Apply grease and oil only through oil and grease inlets.

- Always chock wheels, lower leveling jacks, and set hand brakes prior to working under a drill rig.
- Whenever possible, reduce operating systems to a zero energy state, that is, release all pressure from hydraulic, drilling fluid and air pressure systems, prior to performing maintenance. Use extreme caution when opening drain plugs, pressure caps, valves, and removing hoses and hydraulic lines.
- Never weld or cut on or near a fuel tank.
- Replace all caps, plugs, clamps, cables and guards prior to returning the rig to service.
- Never modify any part of the mast without permission from the equipment shop.
- If it should become necessary to drain oil, fuel, hydraulic fluid or any other industrial fluid in the field, never allow the fluid to drain onto the ground. The fluid must be containerized and disposed of in an appropriate manner according to site-specific requirements. Avoid spillage.
- All cab areas should be clean and free of loose materials, equipment, tools, and unsecured personal items.

4.16 - Decontamination

Decontamination procedures are used to remove or neutralize contaminants that have accumulated on personnel, samples, tools or equipment and to ensure the protection of personnel from permeating substances, chemicals, and infectious agents. Decontamination reduces or eliminates transfer of these contaminants to clean areas, prevents the mixing of incompatible substances, and minimizes the likelihood of sample contamination. Various decontamination methods will physically remove, inactivate by chemical detoxification, disinfection, sterilization, or remove contaminants by both physical and chemical means. In many cases, gross contamination can be removed by physical means.

4.16.1 - Typical Cleaning Methods

Typical cleaning methods work by either dissolution or by forcing the contaminant off a surface with pressure. In general, less of the equipment surface is removed using non-abrasive methods.

- High-Pressure Water - using a high-pressure pump, an operator controlled directional nozzle, and high-pressure hose. Operating pressure usually ranges from 340 to 680 psig, which relates to flow rates of 20 to 140 lpm.
- Steam Cleaning - using water delivered at high pressure and high temperature in order to remove accumulated solids or oils.
- Mechanical - using brushes with metal, nylon, or natural bristles or utilizing appropriate tools to scrape, pry, or otherwise remove adhered materials.
- Dissolving - using chemicals to dissolve surface contaminants as long as the solvent is compatible with the equipment and protective clothing. Organic solvents include alcohols, ethers, ketones, aromatics, straight-chain alkanes, and common petroleum products. Halogenated solvents are generally incompatible with protective clothing and are toxic.
- Surfactants reduce adhesion forces between contaminants and the surface being cleaned and prevent reposition of the contaminants. Non-phosphate detergents dissolved in tap water is an acceptable surfactant solution.
- Disinfection and Sterilization - using chemical disinfectants to inactivate infectious agents. Standard sterilization methods are impractical for large equipment and personal protective clothing.

4.16.2 - Personnel and Equipment Decontamination Plan

As part of the site-specific health and safety plan, a personnel and equipment decontamination plan should be developed and set up before any personnel or equipment enters the areas of potential contamination. These plans should include:

- Number and layout of decontamination stations,
- Decontamination equipment needed,
- Appropriate decontamination methods,
- Procedures to prevent contamination of clean areas,
- Methods and procedures to minimize worker contact with contaminants during removal of protective clothing,
- Methods and procedures to prevent cross-contamination of samples and maintain sample integrity and sample custody, and
- Methods for disposal of contaminated clothing, equipment, and solutions.

Revisions to these plans may be necessary for health and safety when the types of protective clothing, site conditions, or on-site hazards are reassessed based on new information.

4.16.3 - Standard Materials and Equipment

The following are standard materials and equipment that may be used as a part of the decontamination process:

- Appropriate protective clothing,
- Air purifying respirator (APR),
- Field log book,
- Non-phosphate detergent,
- Selected high purity, contaminant-free solvents,
- Long-handled brushes,
- Drop cloths (plastic sheeting),
- Trash containers,
- Paper towels,
- Galvanized tubs or equivalent (baby pools),
- Tap water,
- Contaminant-free distilled or deionized water,
- Metal or plastic container for storage and disposal of contaminated wash solutions,
- Pressurized sprayers, water,
- Pressurized sprayers, solvents,
- Trash bags,
- Aluminum foil,
- Sample containers,
- Safety glasses or splash shield, and
- Emergency eyewash bottle.

Specific decontamination materials and equipment will be specified in the site-specific HASP.

4.16.4 - Field Sampling Equipment Cleaning Procedures

The general equipment cleaning steps that may be followed for general field sampling activities are provided below:

1. Physical removal
2. Scrub with non-phosphate detergent plus tap water.
3. Tap water rinse.
4. 10% nitric acid (required during sampling for inorganics only).
5. Distilled or deionized water rinse.
6. Solvent rinse (required during sampling for organics only).
7. Total air dry (required during sampling for organics only).
8. Triple rinse with distilled or deionized water.

4.16.4 - Field Sampling Equipment Cleaning Procedures cont.

This procedure can be expanded to include additional or alternate solvent rinses that will remove specified target compounds if required by site-specific work plans or as directed by a particular client.

Table 4.2 - Decontamination Solvents Table

Solvent	Soluble Contaminants
Water	Low-chain compounds Salts Some organic acids and other polar compounds
Dilute Bases • Detergent • Soap	Acidic compounds Phenol Thiols Some nitro and sulfonic compounds
Organic Solvents (note: some solvents can degrade or permeate protective clothing) • Alcohols (methanol) • Ethers • Ketones • Aromatics • Straight-chain alkanes (hexane) • Common petroleum products (fuel oil, kerosene)	Non-polar compounds (such as some organic compounds)

Special considerations for solvents:

- Solvent rinses are not necessarily required when organics are not a contaminant of concern.
- An acid rinse is not necessarily required if analysis does not include inorganics.
- Always reference appropriate analytical procedure for specific decontamination solutions required for adequate removal of the contaminants of concern.
- Sampling equipment that requires the use of plastic or Teflon tubing should be disassembled, cleaned, and the tubing replaced with clean tubing, if necessary, before commencement of sampling or between sampling locations.
- The use of distilled or deionized water may be acceptable for decontamination of sampling equipment provided that it has been verified by laboratory analysis to be analyte-free distilled or deionized water.
- The use of an untreated potable water supply may not be an acceptable substitute for tap water.

4.16.5 - Preventing the Spread of Contamination

Several procedures can be established to minimize contact with waste and the potential for contamination including:

- Employing work practices that minimize contact with hazardous substances (avoid areas of obvious contamination, avoid touching potentially hazardous substances),
- A specified area will either be available or can be constructed where fluids generated during decontamination can be captured for disposal.
- Use of remote sampling, handling, and container-opening techniques,
- Covering monitoring and sampling equipment with plastic or other protective material,
- Use of disposable outer garments and disposable sampling equipment with proper containment of these disposable items,
- Use of disposable towels to clean the outer surfaces of sample bottles before and after sample collection, and
- Encasing the source of contaminants with plastic sheeting or over packs.

4.16.6 - Hazards of Decontamination

Due to the presence of water, chemicals, solvents, heat, pressure, and heavy equipment, decontamination activities can be very dangerous. The following are safety items to be considered during equipment decontamination.

Proper procedures for dressing prior to entrance into contaminated areas will minimize the potential for contaminants to bypass the protective clothing. Generally, all fasteners (zippers, buttons, and snaps) should be used, gloves and boots tucked under or over sleeves and pant legs, and all junctures taped, which should be detailed in the site health and safety plan.

- Only properly trained personnel should operate cleaning equipment.
- Use PPE as directed in the health and safety plan, which may include safety glasses with face shield, goggles, poly-coated Tyvek®, aprons, gloves (nitrile, neoprene, or leather), steel toed boots, chemical resistant rubber boots, and respirators to prevent physical contact with potential contaminants and debris.
- Be aware of the slipping hazards of wet or dry plastic inside the decontamination area.
- When drill rods are hoisted from the hole, they should be cleaned for safe handling with a rubber or other suitable rod wiper. NEVER use unprotected hands to clean drilling fluids from drill rods.
- Practice good housekeeping at all times, keeping the decontamination area free of slip, trip, or fall hazards.
- Do not allow eating, smoking, drinking, chewing, or any hand-to-mouth contact in decontaminant areas.
- Monitor affects of heat or cold stress or overexertion in the decontamination area.
- Monitor air concentrations using direct-reading, real-time instruments such as organic vapor monitors (OVMs) and Draeger tubes.
- Establish action levels or limits for ambient air concentration, explosive atmosphere, O_2 deficient atmosphere, and make sure these action levels are understood by decontamination personnel.

4.16.6 - Hazards of Decontamination cont.

- Monitor air concentrations using direct-reading, real-time instruments such as OVM and Draeger tubes.
- Upgrade PPE as necessary (safety glasses with splash shields or goggles, respirators, neoprene gloves, and slicker suit or laboratory apron).
- Stay upwind (use flagging or similar device to indicate wind direction)
- Avoid blocking traffic and stay out of the way of drilling activities.
- Set up near a water supply and keep natural drainage in mind to reduce run-off and clean up.
- Position equipment so over-spray does not get on vehicles or private property.
- Allow for adequate ventilation because exhaust fumes can be lethal.
- Do not operate near anything flammable where a spark or open flame could start a fire or explosion.

4.16.7 - Wastewater and Decontamination Fluids

- Reference MSDS of decontamination solutions for incompatibilities with site contaminants, skin or inhalation hazards, or flammable properties.
- Avoid decontamination chemicals/solutions that permeate, degrade, or damage personal protective equipment.
- Adhere to all Federal, State, and local agency laws, codes, and regulations when handling, transporting, and storing of wastewater, drilling fluids and decontamination fluids.
- The material being removed from drill sites must be packaged, moved, stored, treated, and disposed of in a manner that prevents its release into the environment.
- Drums and containers used to transport drilling waste will meet the appropriate US Department of Transportation (DOT), OSHA, and EPA regulations for the materials that they contain. Appropriate manifest and chain of custody documentation should be used and the waste generator should maintain records as required by applicable regulations.
- Drums and containers used to contain and store drilling wastes and other hazardous materials must be appropriately labeled in accordance with federal and state regulations.
- Drums and containers will be inspected as required by regulations.
- Drum and container integrity will be assured prior to being moved.
- If leakage or spillage occurs, it will be cleaned up immediately. If necessary, the waste material will be transferred to another container to minimize leakage and appropriate measures taken to prevent reoccurrence.
- The drums will have exterior contamination removed at the worksite prior to transportation.
- Blocking devices to plug flow paths to create a collection point for filtration and protection of material entering drain inlets or contaminating drill sites are to be used if necessary (such as waddles, sand bags, or plastic dams).

4.16.8 - Steam Cleaning/Pressure Washing

- The steam cleaner flame may not be intrinsically safe.
- Check hose for possible weakness or potential break points prior to use.
- Avoid pointing any cleaning wand toward body and never use steam, high pressure water, or compressed air for the purpose of cleaning clothes because injury can occur from contact with a high-pressure stream, water, or air.
- Be aware of heat and hot water from steam cleaner.
- Burns can occur from contact with hot equipment or water
- Wear appropriate eye protection as foreign objects may enter eyes due to splashing.
- Be aware of slip/trip hazards while walking on wet surfaces.
- Avoid contact of skin with hazardous rinsing agents (solvents or acids)
- Keep hoses, troughs, and support equipment in good condition.
- Do not spray inside vehicle cab.
- Avoid spraying painted surfaces to keep from removing paint.
- When shutting down steam cleaner, press spray gun release lever for two minutes or until cool water flows out
- Drain hoses and debris into storage containers.

4.16.9 - Health and Safety Hazards of Sampling

Soil and groundwater sampling present various hazards. Besides the usual physical hazards of normal drilling activities and hazards that the individual sites pose, chemical, biological, radiological, and explosive hazards are added when drilling and sampling from monitoring wells. Drilling and sampling activities expose workers to various chemicals that were placed in the ground, either accidentally or intentionally and extreme caution must always be taken when performing these activities in areas of known or suspected waste sites. Not only should workers be aware of the hazards that individual chemicals pose, but of the potential effects of mixtures or chemical interactions because the combination of substances at a waste site may have a more powerfully adverse effect on human health than they would individually. Some of the most significant hazards identified when sampling in known or suspected hazardous waste areas are:

- Exposure to chemicals or waste
- Strains
- Sprains
- Cuts
- Pinch points
- Slips trips, falls.

Sampling procedures are highly complex and must be tailored to fit the chemical being monitored, the hydrogeologic situation, and the design of the monitoring wells. Detailed descriptions of groundwater and soil sampling techniques can be found in publications by the Environmental Protection Agency (Environmental Investigations Standard Operating Procedures and Quality Assurance Manual, EPA 542-S-02-001, EPA-540-S-95-504), ASTM (D5088-02), National Ground Water and National Drilling Associations as well as various scientific journals.

4.16.10 – Work Area Monitoring

Before sampling in areas of potential contamination, it is important to understand what potential physical or chemical hazards the site may pose in addition to the chemical hazards of the materials and preservatives being brought onsite for the purpose of sampling. Historical land use, waste manifests, environmental site assessments, surveys, as built drawings or any other historical documentation may be used to help provide site information. Once a site is ready to be sampled or drilled, the real or potential dangers from fire, explosion, airborne contaminants, radiation, or oxygen deficient atmospheres may need to be monitored. The following details hazards and the equipment used to identify those hazards. Action limits should be set prior to entering the field based on the known or suspected contaminants that may be encountered onsite.

- Combustible Gases -- The atmosphere in any location capable of containing or generating a combustible concentration of gases should be monitored with a combustible gas meter. Actions should be taken in response of the meter reaching a defined percentage of the lower explosive limit (LEL); 25% is often used to cause an immediate evacuation of the site.
- Oxygen Deficiency -- A location capable of containing or generating an oxygen deficiency either by depletion or displacement should be monitored with an oxygen meter. Any reading less than 19.5% oxygen will result in the use of self-contained breathing apparatus (SCBA).
- Organic Vapors and Gases -- The atmosphere can be monitored with either a photoionization detector (PID) or a flame ionization detector (FID). When appropriate, cyanide gas and halogenated vapors will also be monitored. Any response above background concentrations may trigger an upgrade in PPE and respiratory protection. In addition, chemical specific Draeger tubes can also be used to identify presence of specific chemicals.

- Inorganic Vapors and Gases -- There are only a few direct reading instruments with the capability to detect and quantify non-specific inorganic vapors and gases. PIDs have a very limited capability in this area. If specific inorganics are known or suspected of being present, an attempt should be made to provide appropriate monitoring if possible. In the absence of a monitoring capability always assume a worse case scenario and upgrade the level of protection to a level that gives respiratory and skin protection that is appropriate to a worse case assumption.
- Radiation - When radiation may be encountered at a site, a Geiger-Mueller detector for beta and gamma radiation should be used to monitor airborne levels.

Hazards

- Explosions from methane gas produced by the decay of organic materials in sanitary landfills. An explosion potential also exists in monitoring work involving hydrocarbon recovery.
- Toxic substances used in manufacturing pesticides, herbicides, solvents, paints, and other common products. Sometimes certain nontoxic chemicals placed in a disposal site will react with other chemicals to produce highly toxic chemicals.
- Biologic wastes from hospitals or medical laboratories at universities that contain bacteria and viruses.
- Chemical wastes that are corrosive, highly reactive, flammable, or explosive.
- Radioactive wastes from hospitals and industrial and university laboratories.
- Before attempting to conduct monitoring work at a waste site, the drilling contractor should learn exactly what types of wastes were handled there, provide the necessary protective clothing and training for personnel, and stress that any physical changes in a worker's health may be caused by contact with the waste. Always be prepared for worst case conditions.

Precautions

The following precautions should be assessed when sampling:

- Maintain good housekeeping practices, store sampling supplies, coolers, tools, and equipment orderly and out of the main traffic area to avoid unnecessary slip, trip, and fall hazards.
- Be aware of the electrical hazards associated with using groundwater-sampling pumps.
- Use ground fault circuit interrupters in wet or moist conditions.
    - Inspect wires for cuts, wearing and fraying. Remove these wires from service and mark DANGER DO NOT USE if faulty.
    - Follow manufacturer's instructions when using generators.
    - Use intrinsically safe electrical equipment in areas suspected to have flammable or explosive hazards.
- Be aware of biological hazards when revisiting wells for sampling. Often wasps, bees, ants, spiders and other insects and animals take up residence inside or around monitoring wells. Be aware of these potential hazards as wells caps are opened.
- Request MSDSs for sample preservatives as well as site constituents. Wear appropriate chemical gloves when handling samples as preservatives often contain acidic or corrosive chemicals.
- When using bailers for groundwater sampling, consider the following:
    - Use caution and proper lifting techniques when utilizing larger bailers as they are extremely heavy and awkward when full of sampling liquid.
    - Use increased level of PPE, Tyvek, respirator (if necessary), goggles, splashguard, gloves, chemical resistant boots, or booties to protect skin and eyes from contact with contaminated liquids.

4.16.10 – Work Area Monitoring cont.

- When moving equipment consider the following:
    - Avoid wearing loose or baggy clothing.
    - Wear appropriate PPE including leather gloves.
    - Wear appropriate PPE including gloves, goggles, Tyvek suit, respirator, rubber boots, or splashguard when handling contaminated materials as detailed in the health and safety plan.
    - Upgrade PPE as site conditions change and additional PPE is warranted.

- When handling sharp sampling tools:
    - Use correct tools for opening soil sleeves.
    - Cut away from body when opening sleeve or cleaning soil cores.
    - Always use a sturdy surface when cutting and handling soil cores.
    - Consider using a carrot peeler or metal putty knife in lieu of knifes while preparing and cutting soil samples.

Avoid sample cross contamination by:

- Decontaminating or disposing of sampling equipment between sampling locations.
- Double-checking sample labels to ensure accuracy and adhesion to containers.

When performing standard penetration test, consider the following:

- Split barrel samplers should be inspected daily for excessive wear to threads or bowing of split-tube halves.
- Keep the ball check free of debris to ensure proper operation.
- Keep hands away from the bottom of the sampler when removing it from, or inserting it into, the casing or augers.
- When using pipe wrenches to disassemble the sampler, put yourself in a stable position, and place hands and fingers such that they will not be smashed between the handle and the ground.
- Inspect 140 lb Safety Hammer daily for cracks or excessive wear to the hammer body, top bail, or threads. Do not hold on to the sampling rods while operating the hammer
- Do not use hands to manipulate the own hole hammer when transferring it to vertical use.
- Inspect inner workings of the automatic hammer regularly and lubricate lifting mechanism(s) often.

When conducting Shelby Tube Sampling, consider the following:

- Use the correct size socket-head bolts.
- Keep the ball check free of debris to ensure proper operation.
- Pull, do not push, the pipe wrench while turning the sampling rods to break the sample free while down hole.
- Do not use the machine to turn the rods.
- Keep hands away from the bottom of the sampler when removing it from, or inserting it into, the casing or augers.
- When removing a tube from the head, do not suspend the sampling rods from a slip ring.

4.16.10 – Work Area Monitoring cont.

Consider the following when using all types of core barrels:

- Use full grip circle wrenches to assemble and disassemble core barrels.
- Keep hands away from the bottom of the core barrel or inner tube when removing it from, or inserting it into, the casing, augers, or drill rods.

When using a sample extruder (hydraulic ram), consider the following:

- There are two extremely dangerous pinch points that can crush or sever extremities.
    - The first pinch point is located at the hydraulic ram, where the ram is inserted into the top of the Shelby tube. This is typically a tight fit and a potential pinch point.
    - The second pinch point area is where the Shelby tubes seats against the front plate.
- The Shelby tube often becomes unseated when retracting the hydraulic ram, which can cause the Shelby tube to be shoved up onto the ram header and split the metal at the top of the tube causing sharp metal fragments to be become high-speed projectiles or for the tube to bend abruptly and hit the person operating the extruder. To prevent this ALWAYS steady the Shelby tube by placing your hand on the mid-portion of the tube while retracting the ram.
- Use proper lifting techniques when moving this equipment.
- Only trained and qualified personnel should operate sample extruders
- Always use side shield safety glasses or goggles when operating the extruder and operate the extruder slowly.
- Be aware of pinch points and keep hands and clothing away from these areas.
- When extruding very moist soils, be aware of formation water spraying from the end of the Shelby tube.
- Inspect hydraulic fluid lines of the hydraulic extruder leading to and from the ram assembly for wear or cuts. If cuts occur, hydraulic fluid could be expelled from a line at high velocity.

SECTION 5 - WELL CONSTRUCTION, DEVELOPMENT, AND ABANDONMENT

5.1 - Introduction

Well construction consists of placing a well screen and casing (riser) into the open borehole. A drawing is provided as Attachment 5.A - *Simplified Well Construction Diagram*. The materials of construction can include screen and blank casing composed of polyvinyl chloride (PVC), low carbon steel, fiberglass, stainless steel, and other more exotic materials. Annular materials such as gravel or filter pack (surrounding the screen), fine sand seal, (above the gravel pack), bentonite pellets, (above the fine sand seal) and a grouting material (impervious materials such as cement or high-solids bentonite grout) are placed in the annulus between the borehole and screen or riser casing, after the screen and casing are installed. Finally a surface completion consisting of a well pad, locking riser and protective bollards are installed to protect the above ground portions of the well.

Well development includes the operations, performed on the constructed well, which mitigate the formation damage caused by the drilling methods. Both chemical and physical techniques can be used during well development operations. Chemical methods include treating the well with specialty chemicals such as polyphosphates, acids and other specific compounds designed to increase the flow from the formation into the well. Physical methods may include, high pressure jetting of water into the well, surging, bailing, swabbing or even the introduction of dry ice or compressed air into the well to create a low pressure environment inside the well screen and casing.

Well abandonment activities are performed on extraction, injection and monitor wells when the well is no longer needed for its intended function. Wells can be abandoned by simply installing and impermeable material (grout) inside of the well, or requirements may dictate that the entire well must be removed from the ground (over drilling).

5.2 - Roles and Responsibilities

In most instances the consultant or owner determines the depth of the well and the precise location of the well materials. The data are then provided to the driller who physically installs the well materials into the borehole. Depending on the contractual arrangements, the driller or owner may purchase the well materials and transport the materials to the actual well site. Well development criteria are also provided to the driller by the owner or consultant. Finally, well abandonment parameters are many times determined by state and local regulations.

5.3 - Personal Protective Equipment (PPE)

The PPE requirements for well construction are similar to the protection worn during the drilling operations. At a minimum the following PPE is required:

- Hard hat
- Steel toed boots
- Gloves
- Safety glasses
- Hearing protection

Additional dermal and respiratory protection is dictated by the site-specific health and safety plan. The field personnel must remember that as the well materials are being added to the borehole, fluids are being displaced and may rise to the ground level in the borehole. Therefore, the PPE should mitigate potential exposure to the contaminants present in the subsurface or ground water.

PPE for well development must also be determined based on the chemicals used for well development and the potential for exposure to contaminated ground water.

5.4 - Waste containment

Two waste streams will be generated during well construction, subsurface materials such as soil and ground water and rubbish including, empty filter pack and cement bags, five gallon pails, boxes and bags from the well screen and casing along with other packing containers.

The soil cuttings and ground water should be contained in the same manner as the material generated during the drilling operations.

The rubbish and trash must be properly controlled in labeled containers during well construction. Placing the material in receptacles as they are used eliminates the potential for slips, trips, and falls caused by personnel movement around the well site.

Well development activities generate a rubbish waste stream (from packaging of the chemicals) and the ground water produced during pumping activities.

5.5 - Traffic

Many times the well is constructed in a high traffic area such as a retail service station. The traffic control plan developed for the drilling operations should also be used for the well construction, development, and abandonment phases of the project.

5.6 - Housekeeping of Bagged Material

Filter pack, transition sand, cement, and high solids bentonite grout are normally packaged in paper bags weighing between 50 lbs and 100 lbs. Many times the bagged material is stored on the project location in inclement weather conditions. Rain and sunlight can and will degrade the packaging material which leads to breakage and spillage of sand, gravel and grout material. Additionally, the bagged material must be stacked in a manner which is safe for personnel moving the sacks.

The following sections detail the steps used in well construction activities along with potential hazards of the operations.

5.7 - Transport Well Materials to Location

Prior to the movement of materials to the well location the following items will need to be considered:

- Distance from supply vehicle to the well location
- Weight, size and length of the materials
- Site terrain and pathways
- Method of movement and equipment to be used

5.7.1 - Well Casing and Annular Materials

Movement of the well casing material (PVC, Stainless) and annular materials (filter pack, seal materials and cement or grout) may involve the use of manual or mechanical handling methods such as:

- Forklift
- Manually (PVC screen and casing, individual bags of gravel, sand and grout)

5.7.2 - Potential Hazards for Moving Well Materials

Potential hazards include:

- Manual lifting of heavy bags and awkward lengths of pipe
- Slips trips and falls
- Pinch points
- Obstructions (overhead and pathway)
- Long lengths of piping
- Traffic

5.8 - Install Screen and Casing

Prior to installation of well screen and casing into the borehole the following items should be considered:

- Type of screen and casing PVC (manual installation) steel and stainless steel (rig installation)
- Weight of casing string (rig capacity)
- Overhead obstructions and clearance
- Connection type (threaded, welded)

Potential Hazards for Screen and Casing Installation include:

- Manual screen slotting
- Manual lifting of awkward lengths or heavy pipe
- Pinch points
- Obstructions (overhead and pathway)
- Connections
    - Torque
    - Pinch Points
    - Pipe length and weight
    - Hand Tools - pipe wrenches

5.9 - Install Annular Materials

Prior to the installation of annular materials the following should be considered:

- Weight of bagged materials (typically 50 - 100 lbs)
- Package shape, bags, pails
- Dust and chemical issues (minimization of dust generation)
- Distance from the staging area or off-load location to the well

Potential Hazards of annular material installation include:

- Silica and other dust (Avoid skin and eye contact; Wear respiratory protection)
- Pressurized lines during grout mixing and placement
- Opening bags
- Knives, box cutters, hammers, screw driver
- Trash obstacles

5.10 - Develop the Well

In most cases, well development activities are performed by a separate rig and crew - not by the drilling rig and crew. Therefore the development rig crew must consider the same operational safety checks as the drilling rig. Refer to previous sections of this guide for information about:

- Pre-Mobilization Tasks
- Traveling to Site
- Confirmation Activities
- Preparation and Set Up
- Moving People and Equipment to Site
- Rig Set Up
- Raising the Mast

Prior to well development the following should be considered:

- Methods
- Physical
    - Swab
    - Bail
    - Airlift
    - Overpump
- Chemical
    - Acid
    - Mud thinners (polyphosphates, liganosulfates)
- Fluid containment - drums tanks
    - Labeling
    - Long term storage
    - Hauling

5.10.1 - Potential Hazards of Well Development

- Pinch points
- Tool lengths
- Moving cables
- Contaminated fluids
- Acids and polyphosphates
- Electricity
- Noise
- Pressurized lines

5.11 - Surface Completion

Prior to well surface completion the following should be considered:

- Type of completion - flush mount, above grade, locking
- Bollard location and clearances

5.11.1 - Potential Hazards of Surface Completion:

- Traffic control
- Mixing concrete
- Heavy vaults and boxes
- Striking underground utilities
- Vault settlement - trip hazard, surface water intrusion

5.12 - Abandoning Wells

Prior to well abandonment the following should be considered:

- Rig mobilization and rig up - from *Section 4 – Drilling Operations*
- Method
    - Over drill
    - Abandon in place

5.12.1 - Potential Hazards of Over Drill

- All previous sections of the guideline apply.

5.12.2 - Potential Hazards of Abandon in Place

- Silica and other dust – Skin and eye contact must be avoided and respiratory protection worn.
- Pressurized lines during grout mixing and placement
- Opening bags – knives, box cutters, hammers, screw drivers may be unsafe if not used properly
- Trash obstacles
- Fluid containment
- All pipe handling safety guidelines apply

Each job location has site-specific parameters that govern the means and methods for well installation, development and abandonment activities. The drilling method and drill rig will dictate the specific hazards involved. Daily tailgate meetings and job safety analysis should be developed for the specific tasks based on the drilling method and rig, type of well materials, or location of material staging area.

Specific job safety analysis for well construction may include:

- Proper lifting techniques
- Loading and unloading of forklift or truck beds
- Hand tool usage
- Drum handling

Attachment 5.B - *Typical Job Safety Analysis for Equipment Loading and Unloading* is included as an example.

REFERENCES AND RESOURCES

- Federal Motor Carrier Safety Regulations Pocketbook
- American Iron and Steel Institute *Wire Rope Users Manual*
- American Public Works Association: http://www.apwa.net/
- Common Ground Alliance: http://www.commongroundalliance.com/
- Gas Utility Manager: http://www.gasindustries.com/
- National Utility Locating Contractors Association: http://www.nulca.org/
- Underground Focus: http://www.undergroundfocus.com/

Code of Safe Drilling Practices, California Dept. of Transportation, Division of Engineering Services, April 30, 2004

Attachment 1.A - Typical Health and Safety Plan (HASP) Organization and Contents

NOTE: The list of topics offered below is presented as an example. It is not comprehensive or intended to be adequate for all project applications and work plans.

MAKEHOLE HEALTH AND SAFETY PLAN - TABLE OF CONTENTS

COVER - REVIEW SIGNATURE PAGE

EMERGENCY CONTACT SHEET

MAP TO HOSPITAL

PROCEDURES FOLLOWING AN INCIDENT

SECTION 1 - INTRODUCTION

- Purpose and Policy
- Organization of This Health and Safety Plan
- Site Description and History
- Scope of Work
- Project Team Organization

SECTION 2 - INCIDENT NOTIFICATION AND REPORTING

- Forms and Procedures

SECTION 3 - HAZARD ANALYSIS

- Hazards Analysis of Work Tasks
- Chemical Hazards
- Physical Hazards
- Traffic
- Vehicle Operation
- Avoiding Traffic
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- Environmental Biological Hazards

SECTION 4 - PERSONNEL PROTECTION AND MONITORING

- Medical Surveillance
- Site-Specific Training
- Personal Protective Equipment and Action Levels
- Monitoring Requirements
- Routine Monitoring
- Oxygen Monitoring

MAKEHOLE HEALTH AND SAFETY PLAN
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Attachment 1.B - Example JSA for Clearance Activities

JOB SAFETY ANALYSIS FORM			
JOB TITLE/TASK: Pre-Ground Disturbance Clearance Activities			
PROJECT ID		PROJECT MANAGER:	
DATE:	REVISION:	HEALTH/SAFETY DIRECTOR:	
RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT (PPE): _X_ Safety Glasses w/ Sideshields _X_ Steel-toed Boots _X_ Hard Hat _X_ Nitrile Gloves _X_ Leather Work Gloves _X_ Other _As specified in HASP and JSA Job Step_______			

JOB STEP	POTENTIAL HAZARDS	PREVENTATIVE/CORRECTIVE ACTION	APPLIES TO PROJECT (Y/N)
All Pre-Ground Disturbance Clearance Activities including Site Inspection, Subsurface Features Mark-out, Removal of Surface Cover and Ground Clearance	Slips, Trips, Falls	Keep work area free of excess material and debris	
		Remove all trip hazards by keeping materials/objects organized and out of walkways	
		Keep work surfaces dry when possible	
		Wear appropriate PPE including non-slip rubber boots if working on wet or slick surfaces	
		Install rough work surface covers where possible	
		Stay aware of footing and do not run	
	Heat/Cold Stress	Take breaks if feeling faint or overexerted	
		Consume adequate food/beverages (water, sports drinks)	
		If possible, adjust work schedule to avoid temperature extremes	
	Biological Hazards: Insects, Snakes, Wildlife, Vegetation	Inspect work areas when arrive at site to identify hazard(s)	
		Use insect repellant if observe mosquitoes/gnats	
		Survey site for presence of biological hazards and maintain safe distance	
		Wear appropriate PPE including leather gloves, long sleeves and pants, and snake chaps as warranted by site conditions	
	Traffic (including pedestrian)	Notify attendant or site owner/manager of work activities and location	
		Use cones, signs, flags or other traffic control devices as outlined in the Traffic Control Plan	
		Set up exclusion zone surrounding work area using cones, signs, flags or other traffic control devices	
		Wear appropriate PPE including high visibility clothing such as reflective vest	
		Inspect area behind vehicle prior to backing and use spotter	
	Fire/Explosion	Post No Smoking signs around work area	
		Establish designated smoking area away from work area	

JOB SAFETY ANALYSIS FORM			
JOB TITLE/TASK: Pre-Ground Disturbance Clearance Activities			
PROJECT ID		PROJECT MANAGER:	
DATE:	REVISION:	HEALTH/SAFETY DIRECTOR:	
RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT (PPE): _X_ Safety Glasses w/ Sideshields _X_ Steel-toed Boots _X_ Hard Hat _X_ Nitrile Gloves _X_ Leather Work Gloves _X_ Other _As specified in HASP and JSA Job Step_______			

JOB STEP	POTENTIAL HAZARDS	PREVENTATIVE/CORRECTIVE ACTION	APPLIES TO PROJECT (Y/N)
		Ensure type ABC, 20-lb, fully charged fire extinguisher on-site and within inspection period	
		As site conditions/activities warrant, establish Hot Work Permit including air monitoring using direct-reading, real-time instruments such as LEL/O meter	
		Stop work if hazardous conditions (explosive atmosphere) are identified	
Ambient Air Monitoring	Vapors	Approach area where vapors are suspected from upwind direction and stay upwind/crosswind of from potential sources of vapors (use flagging or similar device to indicate wind direction)	
	Ineffective Air Monitoring	Ensure personnel using have been trained on instrument use	
		Calibrate instrument prior to use	
Breaking-Up and Removing Asphalt/ Concrete Cover by Saw Cutting or with Heavy Equipment	Heavy Equipment Movement	Heavy equipment should be equipped with back-up alarm or use horn when backing	
		Do not allow personnel to stand within the swing radius of equipment booms/arms when equipment is in operation	
		Stay clear of operating equipment and heavy equipment when moving	
		When approaching heavy equipment, approach should be made from the front ensuring eye contact is made with operator	
	Suspended Loads	Do not walk under suspended loads	
		Wear appropriate PPE including hard hat	
	Ignition Sources	Ensure electrical equipment properly grounded	
		Apply water as necessary to address surface sparking potential	
		Equip heavy equipment with non-sparking bucket/blade	
	High Noise Levels	Hearing protection required when working around operating equipment if levels are suspected to be >85 dBA (if have to yell to person at a dist of 3 ft to be heard, likely exceeding 85 dBA).	
	Airborne Particulates and Debris	Use water as necessary to control dust in area	
		Wear appropriate PPE including face shield or safety glasses with side shields, dust mask, leather gloves and long sleeves	
	Heavy Material Lifting	Use heavy equipment to lift	
		Do not lift or move heavy materials (greater than 50 lbs) without	

JOB SAFETY ANALYSIS FORM			
JOB TITLE/TASK: Pre-Ground Disturbance Clearance Activities			
PROJECT ID		PROJECT MANAGER:	
DATE:	REVISION:	HEALTH/SAFETY DIRECTOR:	
RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT (PPE): _X_ Safety Glasses w/ Sideshields _X_Steel-toed Boots _X_ Hard Hat _X_ Nitrile Gloves _X_ Leather Work Gloves _X_ Other _As specified in HASP and JSA Job Step_______			

JOB STEP	**POTENTIAL HAZARDS**	**PREVENTATIVE/CORRECTIVE ACTION**	**APPLIES TO PROJECT (Y/N)**
		adequate assistance	
		Bend and lift with legs and arms, keeping back straight	
		Wear appropriate PPE including leather gloves, long sleeves and pants, and steel-toed boots	
	Impact to Subsurface Lines	Ensure all underground features have been identified in area per Subsurface Clearance Protocol (SCP) prior to start of activities	
	Equipment Rollover	If soil appears unstable, the soil should be assessed by a qualified professional engineer to ensure safe conditions with implementation of design control measures prior to start of work	
Soil Clearance using hand tools or heavy equipment (probe, auger, air knife rig, backhoe)	Heavy Equipment Movement	Heavy equipment should be equipped with back-up alarm	
		When approaching heavy equipment, approach should be made from the front ensuring eye contact is made with operator	
	Physical Injury from Managing Equipment	Take breaks if feeling faint or overexerted	
	Ignition Sources	Ensure equipment properly bonded and grounded	
		Use sufficient hose so that equipment does not have to be located in critical zone	
		Apply water as necessary to address sparking potential if equipment comes in contact with rocks/buried objects	
		Equip heavy equipment with non-sparking bucket/blade	
	High Noise Levels	Hearing protection required when working around operating equipment if levels are suspected to be >85 dBA (if have to yell to person at a dist of 3 ft to be heard, likely exceeding 85 dBA).	
	Airborne Debris	Wear appropriate PPE including leather gloves, long sleeves and pants, and face shield or safety glasses with side shields	
	Vapors and Airborne Particulates	Monitor air concentrations using direct-reading, real-time instruments such as OVM and Draeger tubes	
		Stop work if hazardous conditions (explosive atmosphere, O_2 deficient atmosphere) identified until precautions are taken	
		Wear appropriate PPE including dust masks and respirators	
		Stay upwind (use flagging or similar device to indicate wind direction)	
	Impact to	Ensure underground features in area have been identified to extent	

JOB SAFETY ANALYSIS FORM			
JOB TITLE/TASK: Pre-Ground Disturbance Clearance Activities			
PROJECT ID		PROJECT MANAGER:	
DATE:	REVISION:	HEALTH/SAFETY DIRECTOR:	
RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT (PPE): _X_ Safety Glasses w/ Sideshields _X_ Steel-toed Boots _X_ Hard Hat _X_ Nitrile Gloves _X_ Leather Work Gloves _X_ Other _As specified in HASP and JSA Job Step_______			

JOB STEP	**POTENTIAL HAZARDS**	**PREVENTATIVE/CORRECTIVE ACTION**	**APPLIES TO PROJECT (Y/N)**
	Underground Lines/ Tanks	possible per SCP (line locators, drawing review,)	
		Wear insulating gloves or stand on insulating mat when advancing hand tools	
	Open Excavation	Personnel should stay at least two feet away from edge	
		Install orange construction fence or temporary chain link fence around excavated area if to be left unattended	
Solid Waste Management/ Disposal	Vapors and Airborne Particulates	Monitor air concentrations using direct-reading, real-time instruments such as OVM and Draeger tubes	
		Stop work if hazardous conditions (explosive atmosphere, O_2 deficient atmosphere) identified until precautions are taken	
		Wear appropriate PPE including safety glasses with side shields, dust masks and respirators	
		Stay upwind (use flagging or similar device to indicate wind direction)	
	Contaminated Materials and Container Pinch Points	Wear appropriate PPE including nitrile and leather gloves	
		Position hands/fingers to avoid pinching/smashing/crushing when closing drum rings	
	Heavy Materials and Container Lifting/Moving	Do not lift or move heavy containers without assistance	
		Use proper bending/lifting techniques by lifting with arms and legs and not with back	
		If possible, use powered lift truck, drum cart, or other mechanical means to move containers	
		Take breaks if feeling faint or overexerted	
		Spot drums in storage area prior to filling	
		Wear appropriate PPE including leather gloves and steel-toed boots	

Attachment 1.C - Example JSA for Drilling or Boring and Soil Sampling

<table>
<tr><th colspan="4">JOB SAFETY ANALYSIS FORM</th></tr>
<tr><td colspan="4">JOB TITLE/TASK: Drilling/Boring and Associated Soil Sampling</td></tr>
<tr><td colspan="2">PROJECT ID</td><td colspan="2">PROJECT MANAGER:</td></tr>
<tr><td>DATE:</td><td>REVISION:</td><td colspan="2">HEALTH/SAFETY DIRECTOR:</td></tr>
<tr><td colspan="4">RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT (PPE): _X_ Safety Glasses w/ Sideshields _X_ Steel-toed Boots _X_ Hard Hat _X_ Nitrile Gloves _X_ Leather Work Gloves _X_ Other __Hearing protection and High Visibility Vest ___X____</td></tr>
<tr><th>JOB STEP</th><th>POTENTIAL HAZARDS</th><th>PREVENTATIVE/CORRECTIVE ACTION</th><th>APPLIES TO PROJECT (Y/N)</th></tr>
<tr><td rowspan="20">All Drilling/ Boring Activities</td><td rowspan="6">Slips, Trips, Falls</td><td>Keep work area free of excess material and debris</td><td></td></tr>
<tr><td>Remove all trip hazards by keeping materials/objects organized and out of walkways</td><td></td></tr>
<tr><td>Keep work surfaces dry when possible</td><td></td></tr>
<tr><td>Wear appropriate PPE including non-slip rubber boots if working on wet or slick surfaces</td><td></td></tr>
<tr><td>Install rough work surface covers where possible</td><td></td></tr>
<tr><td>Stay aware of footing and do not run</td><td></td></tr>
<tr><td rowspan="3">Heat/Cold Stress</td><td>Take breaks if feeling faint or overexerted</td><td></td></tr>
<tr><td>Consume adequate food/beverages (water, sports drinks)</td><td></td></tr>
<tr><td>If possible, adjust work schedule to avoid temperature extremes</td><td></td></tr>
<tr><td rowspan="5">Biological Hazards: Insects, Snakes, Wildlife, Vegetation</td><td>Inspect work areas when arrive at site to identify hazard(s)</td><td></td></tr>
<tr><td>Use insect repellant if observe mosquitoes/gnats</td><td></td></tr>
<tr><td>Open enclosures slowly</td><td></td></tr>
<tr><td>Survey site for presence of biological hazards and maintain safe distance</td><td></td></tr>
<tr><td>Wear appropriate PPE including leather gloves, long sleeves and pants, and snake chaps as warranted by site conditions</td><td></td></tr>
<tr><td rowspan="5">Traffic (including pedestrian)</td><td>Notify attendant or site owner/manager of work activities and location</td><td rowspan="2"></td></tr>
<tr><td>Use cones, signs, flags or other traffic control devices as outlined in the Traffic Control Plan</td></tr>
<tr><td>Set up exclusion zone surrounding work area using cones, signs, flags or other traffic control devices</td><td></td></tr>
<tr><td>Wear appropriate PPE including high visibility clothing such as reflective vest</td><td></td></tr>
<tr><td>Inspect area behind vehicle prior to backing and use spotter</td><td></td></tr>
<tr><td>Fire/ Explosion</td><td>Post No Smoking signs around work area</td><td></td></tr>
</table>

JOB SAFETY ANALYSIS FORM			
JOB TITLE/TASK: Drilling/Boring and Associated Soil Sampling			
PROJECT ID		PROJECT MANAGER:	
DATE:	REVISION:	HEALTH/SAFETY DIRECTOR:	
RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT (PPE): _X_ Safety Glasses w/ Sideshields _X_ Steel-toed Boots _X_ Hard Hat _X_ Nitrile Gloves _X_ Leather Work Gloves _X_ Other __Hearing protection and High Visibility Vest___X____			

JOB STEP	**POTENTIAL HAZARDS**	**PREVENTATIVE/CORRECTIVE ACTION**	**APPLIES TO PROJECT (Y/N)**
		Establish designated smoking area away from work area	
		Ensure type ABC, 20-lb, fully charged fire extinguisher on-site and within inspection period	
		As site conditions/activities warrant, establish Hot Work Permit including air monitoring using direct-reading, real-time instruments such as LEL/ O_2 meter	
		Stop work if hazardous conditions (explosive atmosphere) are identified	
Ambient Air Monitoring	Vapors	Approach area where vapors are suspected from upwind direction and stay upwind/crosswind of from potential sources of vapors (use flagging or similar device to indicate wind direction)	
	Ineffective Air Monitoring	Ensure personnel using have been trained on instrument use	
		Calibrate instrument prior to use	
Concrete Coring	Ignition Sources	Ensure electrical equipment properly grounded	
		Apply water as necessary to address surface sparking potential	
	High Noise Levels	Hearing protection required when working around operating equipment if levels are suspected to be >85 dBA (if have to yell to person at a dist of 3 ft to be heard, likely exceeding 85 dBA).	
	Airborne Particulates and Debris	Use water as necessary to control dust in area	
		Wear appropriate PPE including face shield or safety glasses with side shields, dust mask, leather gloves and long sleeves	
	Sharp Rough Materials	Wear appropriate PPE including leather gloves, long sleeves and pants, and steel-toed boots	
	Impact to Subsurface Lines	Ensure all underground features have been identified in area per SCP prior to start of activities	
Drill Rig Set-Up	Rig Roll Over	Do not move rig with mast raised	
		Cross all hills and obstructions head on	
		Set riggers prior to raising mast	
		If soil appears unstable, the soil should be assessed by a qualified professional engineer to ensure safe conditions with implementation of design control measures prior to start of work	
	Contact with Electric Lines	Position rig to avoid overhead utility lines by distance defined by voltage and local regulations	

JOB SAFETY ANALYSIS FORM			
JOB TITLE/TASK: Drilling/Boring and Associated Soil Sampling			
PROJECT ID		PROJECT MANAGER:	
DATE:	REVISION:	HEALTH/SAFETY DIRECTOR:	
RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT (PPE): _X_ Safety Glasses w/ Sideshields _X_ Steel-toed Boots _X_ Hard Hat _X_ Nitrile Gloves _X_ Leather Work Gloves _X_ Other __Hearing protection and High Visibility Vest___X____			

JOB STEP	**POTENTIAL HAZARDS**	**PREVENTATIVE/CORRECTIVE ACTION**	**APPLIES TO PROJECT (Y/N)**
	and Other Overhead Obstacles	Use a spotter when raising mast to confirm clearance of overhead lines and other obstructions	
	Rig Movement	Heavy equipment should be equipped with back-up alarm or use horn when backing - use spotter when available	
		Stay clear of operating equipment and rig when moving	
	Heavy Equipment Lifting/ Carrying	Use at least 2 people to lift and carry sections, use mechanical lift devices whenever possible, bend and lift with legs and arms, not back	
	Sharp or Elevated Equipment	Wear appropriate PPE including steel-toed safety boots, leather gloves and hard hat	
		Establish communication system between workers involved in moving/attaching sections	
Ground Disturbance: Auger/Boring Advancement	Faulty or Inappropriate Equipment	Qualified driller must inspect drill rig prior to use, if faulty or inappropriate, do not proceed until repaired or replaced	
		Inspect all hand tools prior to use, if faulty or inappropriate, do not proceed until repaired or replaced	
	Moving Equipment	Clear area of obstructions and communicate with all workers involved that drilling is beginning	
		Do not exceed manufacturer's recommended speed, force, torque, or other specifications. and penetrate the ground slowly with hands on the controls for at least the first foot of soil to minimize chance of auger kick-out	
		Stay clear of rotating auger	
		Use long-handled shovel to clear away cuttings when auger has stopped	
		Do not wear loose clothing	
		Wear appropriate PPE including leather gloves and steel-toed boots	
	Suspended Loads	Do not walk under suspended loads	
		When possible, remove overhead hazards promptly	
		Wear appropriate PPE including hard hat and steel-toed boots	
	High Noise Levels	Use hearing protection if within 20 feet of active drill rig	
	Vapors and Airborne	Monitor air concentrations using direct-reading, real-time instruments such as OVM and Draeger tubes	

JOB SAFETY ANALYSIS FORM

JOB TITLE/TASK: Drilling/Boring and Associated Soil Sampling

PROJECT ID		PROJECT MANAGER:
DATE:	REVISION:	HEALTH/SAFETY DIRECTOR:

RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT (PPE): _X_ Safety Glasses w/ Sideshields _X_ Steel-toed Boots _X_ Hard Hat _X_ Nitrile Gloves _X_ Leather Work Gloves _X_ Other __Hearing protection and High Visibility Vest___X____

JOB STEP	POTENTIAL HAZARDS	PREVENTATIVE/CORRECTIVE ACTION	APPLIES TO PROJECT (Y/N)
	Particulates	Stop work if hazardous conditions (explosive atmosphere, O_2 deficient atmosphere) identified until precautions are taken	
		Wear appropriate PPE including face shield or safety glasses with side shields, dust masks or respirators, long sleeves and pants	
		Stay upwind (use flagging or similar device to indicate wind direction)	
	Impact to Subsurface Lines/Tanks	Only drill in areas where underground features have been identified and cleared per Subsurface Clearance Protocol (SCP) if hole has to be moved, clear new location first	
		Wear appropriate PPE including insulating gloves or stand on an insulating mat when in contact with drill rig	
		Ensure first aid responders are trained to deal with electric shock and flash burns	
Ground Intrusion: Split Spoon	Faulty Equipment	Inspect rope/cable/rod for wear, fraying, oils and moisture prior to use, do not use if faulty until repaired or replaced	
		Inspect cathead for rust and rope grooves prior to use, do not use if faulty until repaired or replaced	
	Moving Equipment	Do not wrap rope around any part of the hand or body	
		Maintain distance of at least 18-inches from in-running points on running/reciprocating equipment	
		Eliminate excess rope	
		Do not wear loose clothing	
		Wear appropriate PPE including leather gloves	
Soil Sampling	Contaminated Materials	Wear appropriate PPE including Nitrile gloves	
	Sharp Sampling Tools	Use correct tools for opening sleeves	
		When opening sleeve, cut away from body	
		Place soil core on sturdy surface prior to cutting	
	Vapors	Wear appropriate PPE including respirator if conditions warrant	
	Sample Cross Contamination	Decontaminate or dispose of sampling equipment between sampling locations	
		Double-check sample labels to ensure accuracy and adhesion to containers	

JOB SAFETY ANALYSIS FORM

JOB TITLE/TASK: Drilling/Boring and Associated Soil Sampling

PROJECT ID		PROJECT MANAGER:
DATE:	REVISION:	HEALTH/SAFETY DIRECTOR:

RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT (PPE): _X_ Safety Glasses w/ Sideshields _X_ Steel-toed Boots _X_ Hard Hat _X_ Nitrile Gloves _X_ Leather Work Gloves _X_ Other __Hearing protection and High Visibility Vest___X____

JOB STEP	POTENTIAL HAZARDS	PREVENTATIVE/CORRECTIVE ACTION	APPLIES TO PROJECT (Y/N)
Solid/Liquid Waste Management/ Disposal	Vapors and Airborne Particulates	Monitor air concentrations using direct-reading, real-time instruments such as OVM and Draeger tubes	
		Stop work if hazardous conditions (explosive atmosphere, O_2 deficient atmosphere) identified until precautions are taken	
		Wear appropriate PPE including safety glasses with side shields, dust masks and respirators	
		Stay upwind (use flagging or similar device to indicate wind direction)	
	Contaminated Materials and Container Pinch Points	Wear appropriate PPE including Nitrile and leather gloves	
		Position hands/fingers to avoid pinching/smashing/crushing when closing drum rings	
	Heavy Materials and Containers Lifting/ Moving	Do not lift or move heavy containers without assistance	
		Use proper bending/lifting techniques by lifting with arms and legs and not with back	
		If possible, use powered lift truck, drum cart, or other mechanical means	
		Take breaks if feeling faint or overexerted	
		Spot drums in storage area prior to filling	
		Wear appropriate PPE including leather gloves and steel-toed boots	

Attachment 3.A - Pre-Mobilization Checklist / Drilling Safety Guidance Document

Check When Completed	Checklist of Items
	Participate in boring, utility, locate and walk site
	Verify equipment needs
	Verify equipment staging area(s)
	Verify sequence of onsite mobilizations
	Service brakes, including trailer brake connections
	Service Parking (hand) brake
	Service Steering mechanism.
	Service Lighting devices and reflectors
	Service Tires
	Service Horn
	Service Windshield wiper or wipers
	Service Rear-vision mirror or mirrors.
	Service Coupling devices
	Inspect the windshield for cracks, repair or replace as necessary
	Verify that an appropriate, permitted fire extinguisher is within the driver's grasp and that the extinguisher is properly secured.
	Verify supply of sufficient flares or reflectors which can be used in the event of a breakdown while on the highway.
	Verify that seat belts are in good working condition.
	Verify all windows function properly. Repair or replace as necessary
	Verify all doors lock and function properly. Repair or replace as necessary.
	Verify back-up alarms are installed and function properly. Repair or replace as necessary.
	Verify that all lug nuts are properly tightened and that the wheels appear to be in good condition. While performing this task, the driver should make certain that the spare tire is in good condition, properly inflated, and that a suitable jack and lug wrench are available.
	Verify the mast, jacks, deck (s), and tools are completely secured prior to moving the vehicle.
	Verify all tool boxes are closed and properly secured.
	Inspect all spools containing wire rope (cable) and verify they are secured and that the cables will not unwind while driving down the road.

Attachment 4.A - Sample Hazard Communication and Chemical Safety Program

MAKEHOLE Drilling Co. - Hazard Communication and Chemical Safety Program

Section 1 - Purpose

This document serves as the MAKEHOLE Drilling Hazard Communication Program. It provides detailed safety guidelines and instructions for receipt, use, and storage of chemicals at our jobsites by employees and subcontractors. Our goal is to provide all employees and affected personnel with the tools, knowledge and information necessary to protect their selves and co-workers from hazards encountered in the work place.

Section 2 - Scope

In general, employees do not handle hazardous chemicals as part of their normal work routine; however, employees work in facilities that manufacture, transport and store hazardous chemicals. Thus management has included a Hazard Communication and Chemical Safety Program for the purpose of MAKEHOLE employee awareness. Employees are instructed not to handle potentially hazardous chemicals and to alert proper facility officials in the event that a substance of unknown origin is spotted. In addition to hazardous substance training and right to know training, employees receive specific awareness training for Asbestos, Benzene, Hydrogen Sulfide and lead exposure.

Section 3 - Regulatory References

This Hazard Communication and Chemical Safety Program is intended to comply with the following OSHA requirements. 29 CFR 1910.1200,

Section 4 - Company Policy

A written Hazard Communication Program shall be developed, implemented and maintained at each work site. Company HS&E manager shall have full authority and responsibility for implementation and execution throughout operations. Business unit managers shall have full authority and responsibility for implementation and execution within their areas of control and senior site supervisors shall have full authority and responsibility for implementation and execution within their areas of control.

- All employees and affected personnel shall receive Hazard Communication and Chemical Safety Program training. In addition, employees and affected personnel shall receive training and information regarding hazardous chemicals and safety precautions specific to their assigned work sites.
- Employees shall not handle potentially hazardous chemicals unless they have been properly trained and instructed to do so.
- Employees shall immediately alert proper facility officials in the event that a substance of unknown origin is spotted.
- Employees shall immediately report all chemical spills, releases or exposures to their immediate supervisor or proper facility official.
- Each company operation and job-site shall establish emergency response and evacuation plans per company Emergency Preparedness Program.
- All containers shall have the appropriate label, tag or marking prominently displayed that indicates the identity, safety and health hazards.
- Each job-site shall have a copy of the Material Safety Data Sheet (MSDS) for each hazardous chemical present.
- A Master Chemical information List (CIL) shall be maintained by Manager of HS&E. Each site-operation

and jobsite may use this master or develop a subset CIL covering chemicals present at those specific jobsites.

- Non-routine tasks shall be evaluated by the Project Supervisor before the task commences, to determine all hazards present.

Section 5 - Responsibilities

- **Management**
  - Business unit managers have full authority and responsibility for the implementation and execution of this Hazard Communication and Chemical Safety Program, within his or her area of control.
  - Ensure compliance with this program.
  - Conduct immediate corrective action for deficiencies found in the program.
  - Maintain an effective Hazard Communication training program.
  - Make this plan available to employees or their designated representative

- **Shipping and Receiving**
  - Ensure all received containers are properly labeled and that labels are not removed or defaced.
  - Ensure all shipped containers are properly labeled
  - Ensure shipping department employees are properly trained in spill response
  - Ensure received Material Safety Data Sheets (MSDS) are properly distributed

- **Purchasing Agent**
  - Obtain, from the manufacturer, MSDS for chemicals purchased from retail sources

- **Safety Manager**
  - Manager of HS&E has full authority and responsibility for the implementation and execution of this Hazard Communication and Chemical Safety Program, company wide.
  - Develop and maintain a list of hazardous chemicals using the identity that is referenced on the MSDS
  - Monitor the effectiveness of the program
  - Conduct annual audit of the program
  - Monitor employee training to ensure effectiveness
  - Keep management informed of necessary changes
  - Ensure MSDSs are available as required
  - Monitor jobsites for proper use, storage and labeling of chemicals

- **Supervisors**
  - The senior site supervisor has full authority and responsibility for the implementation and execution of this Hazard Communication and Chemical Safety Program, within his or her area of control.
  - Comply with all specific requirements of the program
  - Provide specific chemical safety training for assigned employees
  - Ensure chemicals are properly used stored and labeled
  - Ensure only the minimum amount necessary is kept at work stations
  - Ensure up to date MSDS are readily accessible to all employees on all shifts

- **Employees**
  - Comply with chemical safety requirements of this program
  - Report any problems with storage or use of chemicals
  - Immediately report spills of suspected spills of chemicals
  - Use only those chemicals for which they have been trained

- Use chemicals only for specific assigned tasks in the proper manner

- **Subcontractors**
  - Comply with all aspects of this program
  - Coordinate information with the Project Supervisor
  - Ensure Subcontractor employees are properly trained
  - Notify the Project Supervisor before bringing any chemicals into client's property of facilities
  - Monitor and ensure proper storage and use of chemicals by subcontractor employees

Section 6 - HAZCOM Definitions

TERM	DEFINITION
Chemical	Any element, chemical compound, or mixture of elements or compounds.
Combustible liquid	Any liquid having a flash point at or above 100 deg. F (37.8 deg. C), but below 200 deg. F (93.3 deg. C), except any mixture having components with flash points of 200 deg. F (93.3 deg. C), or higher, the total volume of which make up 99 percent or more of the total volume of the mixture.
Compressed gas	Any compound that exhibits: • A gas or mixture of gases having, in a container, an absolute pressure exceeding 40 psig at 70 deg. F. • A gas or mixture of gases having, in a container, an absolute pressure exceeding 104 psig at 130 deg. F. regardless of the pressure at 70 deg. F. • A liquid having a vapor pressure exceeding 40 psig at 100 deg. F.
Container	Any bag, barrel, bottle, box, can, cylinder, drum, reaction vessel, storage tank, or the like that contains a hazardous chemical. For purposes of this section, pipes or piping systems, and engines, fuel tanks, or other operating systems in a vehicle, are not considered to be containers.
Employee	A worker who may be exposed to hazardous chemicals under normal operating conditions or in foreseeable emergencies. Workers such as office workers or bank tellers who encounter hazardous chemicals only in non-routine, isolated instances are not covered.
Explosive	A chemical that causes a sudden, almost instantaneous release of pressure, gas, and heat when subjected to sudden shock, pressure, or high temperature.
Exposure or exposed	An employee is subjected in the course of employment to a chemical that is a physical or health hazard, and includes potential (incidental or possible) exposure. Subjected in terms of health hazards includes any route of entry (for example, inhalation or ingestion)

TERM	DEFINITION
Flammable	A chemical that falls into one of the following categories: • Aerosol, flammable means an aerosol that yields a flame projection exceeding 18 inches at full valve opening, or a flashback (a flame extending back to the valve) at any degree of valve opening, • Gas, flammable means: –) A gas that, at ambient temperature and pressure, forms a flammable mixture with air at a concentration of thirteen (13) percent by volume or less, or – A gas that, at ambient temperature and pressure, forms a range of flammable mixtures with air wider than twelve (12) percent by volume, regardless of the lower limit. • Liquid, flammable means any liquid having a flash point below 100 deg. F., except any mixture having components with flash points of 100 deg. F. or higher, the total of which make up 99 percent or more of the total volume of the mixture. • Solid, flammable means a solid, other than a blasting agent or explosive as defined in 1910.109(a), that is liable to cause fire through friction, absorption of moisture, spontaneous chemical change, or retained heat from manufacturing or processing, or which can be ignited readily and when ignited burns so vigorously and persistently as to create a serious hazard. A chemical shall be considered to be a flammable solid if it ignites and burns with a self-sustained flame at a rate greater than one-tenth of an inch per second along its major axis.
Flash point	The minimum temperature at which a liquid gives off a vapor in sufficient concentration to ignite.
Hazardous chemical	Any chemical this is a physical hazard or a health hazard.
Hazard warning	Any words, pictures, symbols, or combination appearing on a label or other appropriate form of warning which convey the specific physical and health hazard(s), including target organ effects, of the chemical(s) in the container(s). (See the definitions for *physical hazard* and *health hazard* to determine the hazards which must be covered.)
Health hazard	A chemical for which there is evidence that acute or chronic health effects may occur in exposed employees. The term *health hazard* includes chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, and neurotoxins, agents which act on the hematopoietic system and agents which damage the lungs, skin, eyes, or mucous membranes.
Identity	Any chemical or common name which is indicated on the material safety data sheet (MSDS) for the chemical. The identity used shall permit cross-references to be made among the required list of hazardous chemicals, the label and the MSDS.
Immediate use	The hazardous chemical shall be under the control of and used only by the person who transfers it from a labeled container and only within the work shift in which it is transferred.

TERM	DEFINITION
Label	Any written, printed, or graphic material displayed on or affixed to containers of hazardous chemicals.
Material Safety Data Sheet (MSDS)	Written or printed material concerning a hazardous chemical which is prepared in accordance with OSHA Standard 1910.1200 requirements.
Mixture	Any combination of two or more chemicals if the combination is not, in whole or in part, the result of a chemical reaction.
Oxidizer	A chemical other than a blasting agent or explosive as defined in 1910.109(a) that initiates or promotes combustion in other materials, thereby causing fire either of itself or through the release of oxygen or other gases.
Physical hazard	A chemical that it is a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable (reactive) or water-reactive.
Pyrophoric	A chemical that will ignite spontaneously in air at a temperature of 130 deg. F. or below.
Specific chemical identity	The chemical name, Chemical Abstracts Service (CAS) Registry Number, or any other information that reveals the precise chemical designation of the substance.
Unstable (reactive)	A chemical which in the pure state, or as produced or transported, will vigorously polymerize, decompose, condense, or will become self-reactive under conditions of shocks, pressure, or temperature.
Use	To package, handle, react, emit, extract, generate as a byproduct, or transfer.
Water-reactive	A chemical that reacts with water to release a gas that is either flammable or presents a health hazard.
Work area	A room or defined space in a workplace where hazardous chemicals are produced or used, and where employees are present.
Workplace	An establishment, job site, or project, at one geographical location containing one or more work areas.

Section 7 - Hazard Recognition

This Hazard Communication and Chemical Safety Program is primarily a hazard recognition program. Elements such as, product warning labels and material safety data sheets, detailed in the sections that follow provide useful tools and knowledge enabling employees to identify hazardous chemicals in the work place.

7.1 - General Chemical Safety

Assume all chemicals are hazardous. The number of hazardous chemicals and the number of reactions between them is so large that prior knowledge of all potential hazards cannot be assumed. Use chemicals in as small quantities as possible to minimize exposure and reduce possible harmful effects. The following general safety rules shall be observed when working with chemicals:

Read and understand the Material Safety Data Sheets.
Keep the work area clean and orderly.
Use the necessary safety equipment.
Carefully label every container with the identity of its contents and appropriate hazard warnings.
Store incompatible chemicals in separate areas.
Substitute less toxic materials whenever possible.
Limit the volume of volatile or flammable material to the minimum needed for short operation periods.
Provide means of containing the material if equipment or containers should break or spill their contents.

Task Evaluation

Each task that requires the use of chemicals should be evaluated to determine the potential hazards associated with the work. This hazard evaluation or JSA must include the chemical or combination of chemicals that will be used in the work, as well as other materials that will be used near the work.

Chemical Storage

The separation of chemicals (solids or liquids) during storage is necessary to reduce the possibility of unwanted chemical reactions caused by incidental mixing. Explosives should be stored separately outdoors. Use either distance or barriers (trays) to isolate chemicals into the following groups:

- Flammable Liquids - store in approved flammable storage lockers.
- Acids - treat as flammable liquids
- Bases - do not store bases with acids or any other material
- Other liquids - ensure other liquids are not incompatible with any other chemical in the same storage location.
- Restraints and Containment - Lips, strips, or bars are to be installed across the width of storage shelves to restrain the chemicals in case of earthquake or unexpected shock.
- Chemicals shall not be stored in the same refrigerator used for food storage. Refrigerators used for storing chemicals must be appropriately identified by a label on the door.

Container Labels

It is extremely important that all containers of chemicals are properly labeled. This includes every type of container from a 5000 gallon storage tank to a spray bottle of degreaser. The following requirements apply:

- All containers shall have the appropriate label, tag or marking prominently displayed that indicates the identity, safety, and health hazards. The name and address of the manufacturer or importer must also be provided.
- Portable containers which contain a small amount of chemical need not be labeled if they are used immediately that shift, but must be under the strict control of the employee using the product.
- All warning labels, tags, and markings must be maintained in a legible condition and not be defaced or removed. Facility weekly supervisor inspections shall check for compliance of this rule.

- Incoming chemicals are to be checked for proper labeling. The symbol below is an example of labeling used to rate the hazard of products in storage tanks. It is a National Fire Protection Association (NFPA) standard. Each square contains a number based upon the accompanying table.

7.2 - Rating Summary

Chemical (Blue)
4 - **Danger -** May be fatal on short exposure. Specialized protective equipment required
3 - **Warning -** Corrosive or toxic. Avoid skin contact or inhalation
2 - **Warning -** May be harmful if inhaled or absorbed
1 - **Caution -** May be irritating
0 - No unusual hazard

Flammability (Red)
4 - **Danger** Flammable gas or extremely flammable liquid
3 - **Warning** Flammable liquid flash point below 100° F
2 - **Caution** Combustible liquid flash point of 100° to 200° F
1 - Combustible if heated
0 - Not combustible

Reactivity (Yellow)
4 - **Danger** Explosive material at room temperature
3 - **Danger** May be explosive if shocked, heated under confinement or mixed with water
2 - **Warning** Unstable or may react violently if mixed with water
1 - **Caution** May react if heated or mixed with water but not violently
0 - **Stable** Not reactive when mixed with water

Special Notice Key (White)
W - Water Reactive
Oxy - Oxidizing Agent

Section 8 - Emergencies and Spills

Each operation and job-site shall establish emergency response and evacuation plans per company Emergency Preparedness Program. The required emergency response and evacuation plans shall include the following elements:

8.1 - Environmental Response Plan

Each location shall have an Environmental Response Plan that includes the following:

- Instructions on how to report an environmental spill.
- Location and phone number of the local company approved spill response contractor.
- In case of an emergency, implement the proper Emergency Action Plan:
    - Evacuate people from the area.
    - Isolate the area.
- If the material is flammable, turn off ignition and heat sources.
- Only personnel specifically trained in emergency response are permitted to participate in chemical emergency procedures beyond those required to evacuate the area.
- Call for Emergency Response Team assistance if required.

8.2 - Emergency Evacuation Plan (Fires and Other Emergencies)

Each location where personnel occupy a building shall have a Building Emergency Evacuation Plan that indicates the following:

- Instructions on how to report a fire or other emergency.
- A floor plan indicting each room, the available exits, fire extinguisher locations, fire alarms, evacuation route(s).
- A designated assembly point.
- Main electrical disconnects, main gas supply and water shut off valves, and hazardous material storage locations (for solvents, paints, fuels, pesticides - indicate quantities).

Each location where personnel are assigned to a client's facility shall have a Job Site Evacuation Plan that includes the following:

- Instructions on how to report a fire or other emergency.
- The alarm signal(s) and the all clear signal for the facility and the immediate work area.
- A site plan that indicates a primary and a secondary evacuation route, an assembly point, the location of fire alarms, fire extinguishers, and safety showers.
- Communication network to keep employees and supervising business unit appraised of job site status.
- Spills - Chemical spill or release reporting criteria varies by agency and type of spill.

Section 9 - Housekeeping

Housekeeping is a fundamental part of all safety programs but caution must be exercised not to create additional or more serious hazards by improperly handling, storing, and disposing of chemicals in the interest of housekeeping. The following housekeeping rules shall apply with regard to hazardous chemicals:

Maintain the smallest possible inventory of chemicals to meet immediate needs.
Periodically review stock of chemicals on hand.
Ensure that storage areas, or equipment containing large quantities of chemicals, are secure from incidental spills.
Rinse emptied bottles that contain acids or inflammable solvents before disposal.
Recycle unused laboratory chemicals wherever possible.
DO NOT Place hazardous chemicals in salvage or garbage receptacles.
DO NOT Pour chemicals onto the ground.
DO NOT Dispose of chemicals through the storm drain system.
DO NOT Dispose of highly toxic, malodorous chemicals down sinks or sewer drains.

Section 10 - Hazard Communication Program and Procedure

10.1 - Hazard Communication Plan

This written Hazard Communication Plan (HAZCOM) has been developed based on the OSHA Hazard Communication Standard and consists of the following elements:

Written Hazard Communication Program
Identification of Hazardous Materials
Product Warning Labels
Material Safety Data Sheets (MSDS)
Effective Employee Training

Multiple Jobsites

Each jobsite shall have a copy of the Hazard Communication Program, a list of all hazardous chemicals in company possession and a MSDS for each of those chemicals. In the event that crews are working in various locations, a primary location shall be designated for the location of the hazardous chemical information. In the event multiple jobsites are too remote to designate a primary location and still have timely and effective access to the information, a copy shall be carried with the crew. The onsite supervisor is responsible for notifying the client and other contractors of the particular hazardous chemicals used in our company's scope of work and obtaining the information from the client and other contractors regarding the hazardous chemicals that may be encountered in the work area.

Non-Routine Tasks are defined as working on, near, or with unlabeled piping, unlabeled containers of an unknown substance, confined space entry where a hazardous substance may be present and a one-time task using a hazardous substance differently than intended (example: using a solvent to remove stains from tile floors).

Steps for Non-Routine Tasks

Step 1: Hazard Determination
Step 2: Determine Precautions
Step 3: Specific Training and Documentation
Step 4: Perform Task

All non-routine tasks shall be evaluated by the Project Supervisor before the task commences, to determine all hazards present. Once the hazard determination is made, the Project Supervisor shall determine the necessary precautions needed to either remove the hazard, change to a non-hazard, or protect from the hazard (use of personal protective equipment) to safeguard the Employees present. In addition, the Project Supervisor shall provide specific safety training for Employees present or affected.

Subcontractors

All subcontractors working under our companies control are required to follow the requirements of this program. We shall provide subcontractors information concerning:

Location of MSDS
Precautions to be taken to protect subcontractor employees
Potential exposure to hazardous substances
Chemicals used in or stored in areas where they will be working
Location and availability of Material Safety Data Sheets
Recommended Personal Protective Equipment
Labeling system for chemicals

Multiple Employer Worksites

As industrial contractor company employees will often be assigned to jobsites where employees from multiple companies are working together or in close proximity. Many of these jobsites may have hazardous materials present, either being used by other employers, stored or transported through the area. In these facilities, jobsites or work areas where this company is a subcontractor or does not have total control of the procedures being used, company supervision shall identify and communicate to all employees in his or her area of control the following:

Methods of supplying or locations of MSDS provided by the primary employer or organization in control of the facility or worksite.
Methods the primary employer or organization in control of the facility or worksite will use to inform other employers and their employees of any precautionary measures required to protect employees during normal operations and emergencies.
Methods of notification, labeling, or warnings used by the primary employer or organization in control of the facility or worksite to inform other employers and their employees of material hazards in the work area.

Non-English Speaking Employees

Where non-English speaking employees are exposed to material hazards, a method, or methods shall be employed to communicate hazardous material information to these employees in their own language.

10.2 - Identification of Hazardous Materials

Some chemicals are explosive, corrosive, flammable, or toxic. Other chemicals are relatively safe to use and store but may become dangerous when they interact with other substances. To avoid injury and property damage, persons who handle chemicals in any area must understand the hazardous properties of the chemicals. Before using a specific chemical, safe handling methods and health hazards must always be reviewed. Supervisors are responsible for ensuring that the equipment needed to work safely with chemicals is accessible and maintained for all employees on all shifts.

10.3 - Product Warning Labels

In addition to the National Fire Protection Association (NFPA) standard illustrated in section 8.4 above, there are numerous other types of labeling schemes in use. Most combine symbols with text to communicate the hazards involved. Some even identify specific PPE requirements, body organs at risk if exposed, and emergency procedures.

10.4 - Chemical Information List and Material Safety Data Sheets

Chemical information List (CIL) is the list of all hazardous substances in a specific location. Every substance on the CIL shall have a Material Safety Data Sheet (MSDS) on file at the jobsite or local project/business unit office. Each supervisor is required to maintain a list such as this and forward copies of the added product MSDS to the Safety Manager for addition to the master Chemical Information List.

Chemical Information List by Product Name (*partial example*)

PRODUCT NAME	COMMON NAME	MANUFACTURER	MSDS CODE
2-26 Aerosol	2-26	CRC Industries	# 36001
40-600 Moisture Displacer	Moisture Displacer	Ideal Industries Lab	# 36660
40-620 HD Electric Motor Cleaner	Motor Cleaner	Ideal Industries Lab	# 36544
40-625 Red Insulating Varnish,	Varnish Ideal	Industries Lab	# 43145
40-630 Zinc Cold Galvanize	Cold Galv	Ideal Industries Lab	# 42282
40-680 All Purpose Cutting Oil	Cutting Oil	Ideal Industries Lab	# 38207
40-685 Penetrating Oil	Penetrating Oil	Ideal Industries Lab	# 26438
40-690 Gray Electric Equipment Paint	Gray Paint	Ideal Industries Lab	# 47720
40-695 Hand Cleaner	Hand Cleaner	Ideal Industries Lab	# 47237
40-700 Hornet/ Wasp Spray	Wasp Spray	Ideal Industries Lab	# 43821
40-705 Switch and Contact Cleaner	Contact Cleaner	Ideal Industries Lab	# 32850
40-705 Switch and Contact Cleaner With Lubricant	Contact Cleaner	Ideal Industries Lab	# 46498
40-720 Fluorescent Orange Marking Paint	Orange Paint	Ideal Industries Lab	# 45790
40-725 Cable Cleaner	Cable Cleaner	Ideal Industries Lab	# 36363

Material Safety Data Sheet (MSDS) Information

Each job-site shall have a copy of the Material Safety Data Sheet (MSDS) for each hazardous chemical present. A Material Safety Data Sheet, often referred to by its acronym MSDS, is a detailed informational document prepared by the manufacturer or importer of a hazardous chemical which describes the physical and chemical properties of the product. Information included in a Material Safety Data Sheet aids in the selection of safe products, helps employers and employees understand the potential health and physical hazards of a chemical and describes how to respond effectively to exposure situations. The employee responsible for the purchase of all hazardous chemicals is also responsible for obtaining the MSDS for those chemicals from the supplier and forwarding a copy to the Safety Manager. The Safety Manager shall add the chemical to the hazardous chemical list and forward copies to the onsite supervisors to update the worksite MSDS binder. The format of a Material Safety Data Sheet may vary but there is specific information that must be included in each sheet. It is useful to review this information to increase your ability to use a Material Safety Data Sheet. All Material Safety Data Sheets should include the following information:

Section 1: Chemical Product and Company Information - provides the chemical name on the label to the MSDS. Also listed is the name, address and the phone number of the company, manufacturer, or distributor who provides the chemical.

Section 2: Composition and Ingredients - identifies all hazardous ingredients, OSHA permissible exposure limits (PEL) and ACGIH (American Conference of Governmental Industrial Hygienists) Threshold Limit Values (TLV).

Section 3: Hazard Identification - information about the health effects of exposure. Description of the material appearance, potential symptoms and health effects, routes of entry and target organs.

Section 4: First Aid - Provides first aid procedures for each route of entry.

Section 5: Fire-Fighting - information on the explosive and fire properties, extinguishing agents and items and general fire-fighting information.

Section 6: Accidental Release - information on material spill response, containment and required spill response PPE.

Section 7: Handling and Storage - information about chemical storage and handling and measures to prevent over-exposure.

Section 8: Exposure Controls and Personal Protection - engineering controls and personal protective equipment to reduce chemical exposure.

Section 9: Physical and Chemical Properties - this section tells about the physical and chemical properties of the chemical. Characteristics include appearance, odor, physical state, pH, vapor pressure, vapor density, boiling point, freezing point, melting point, solubility in water and specific gravity or density.

Section 10: Stability and Reactivity - all potentially hazardous chemical reactions are identified in this section, including information on chemical stability, conditions to avoid, incompatibility, hazardous decomposition and hazardous polymerization.

Section 11: Toxicological Information - provides information such as acute data, carcinogen potential, reproductive effects, target organ effects, and other physiological aspects.

Section 12: Ecological Information - information concerning the environmental impact if a chemical is released into the environment.

Section 13: Disposal Considerations - information concerning proper chemical disposal, recycling and reclamation.

Section 14: Transport Information - shipping information includes the hazardous materials description, hazard class and the identification number (UN or NA numbers).

Section 15: Regulatory Information - provides information about applicable federal regulations. Examples include OSHA, TSCA (Toxic Substance Control Act), CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act), SARA Title III (Superfund Amendments and Reauthorization Act).

Section 16: Additional Information - provides other information about the chemical such as hazard ratings, preparation, and revisions of the MSDS, and label information. Manufacturers may withhold certain information as proprietary (such as hazardous ingredients) on a Material Safety Data Sheet if the information is considered a trade secret.

10.5 - Effective Training

All affected employees shall receive Hazard Communication and Chemical Safety Program training. In addition, employees shall receive training and information regarding hazardous chemicals and safety precautions specific to their assigned work sites.

Training Content

All new and affected employees shall receive safety orientation training covering the elements of the HAZCOM and Chemical Safety Program. This training shall consist of the following:

- Requirements of OSHA's standard 29 CFR 1910.1200.
- Detailed review of the Hazard Communication and Chemical Safety Program
- Location and availability of the written Hazard Communication Program
- Location and availability of the List of Chemicals used in the workplace
- Methods and observation used to detect the presence or release of a hazardous chemical in the workplace.
- The specific physical and health hazard of all chemicals in the workplace
- Specific control measures for protection from physical or health hazards
- Explanation of the chemical labeling system
- Location and use of MSDS
- Locations and operations in their work area where hazardous chemicals are present

Job Specific Training

Employees shall receive on the job training from their supervisor. This training shall cover the proper use, inspection, and storage of necessary personal protective equipment and chemical safety training for the specific chemicals they will be using or will be working around.

Personnel Training

All company personnel shall be trained in Hazard Communication and Chemical Safety Awareness.

Training Frequency

Hazard Communication and Chemical Safety Program training and re-training shall be provided as follows:

- **Initially** - on hire or upon assignment to tasks or locations where hazardous chemicals are used, stored or may present in some manner. Hazard Communication and Chemical Safety Awareness training shall be included in the Short Service Employee Program and shall be covered in first 180 days of service or prior to new employees assignment to locations where hazardous chemicals are used.
- **Annually** - prior to anniversary of pervious training. Hazard Communication and Chemical Safety Awareness training shall also be refreshed annually as part of the Toolbox Safety Meeting Program
- **Upon changes** - in the Hazard Communication and Chemical Safety Program.
- **Introduction of new hazards** - Whenever a new chemical, physical, or health hazard is introduced to the work site that has not been effectively covered by previous training.
- **Immediate On-the-Spot Training** - This training shall be conducted by supervisors for any employee that requests additional information or exhibits a lack of understanding of the safety requirements.

Section 11 - Reporting and Recordkeeping

Training - All training shall be recorded.

Reports

- All exposure incidents shall be reported.
  - Incident/Accident Report
  - All exposure events resulting in injury, illness or loss of consciousness of an employee shall be recorded as Incidents on an Incident/Accident Report.
- Spills
  - Spills or releases that meet the following criteria shall be recorded as Incidents on an Incident/Accident Report
  - Oil based fluids spilled on land or water in excess of five (5) gallons
  - Chemical based fluids or products spilled on land or water in excess of (5) gallons or five (50) pounds whichever is less.
- Near Miss Reports
  - Failures in containment, control methods, or isolation, not resulting in employee injury, illness, or exposure, shall be recorded as near miss events on a Near Miss Report.

Record Control and Retention

Records associated with this program shall be handled in the following manner:

Custodian - Manager of HS&E shall be the custodian of the Master Chemical Information List (CIL) required by OSHA's 29 CFR 1910.1200.

Incident/Accident records - shall be handled per the Incident Reporting and Record Keeping Program.

Availability - A copy of this plan shall be made available, upon request, to all by the employee, and the required OSHA officials.

END

Attachment 4.B - Drill/Direct Push Type Rig Inspection Checklist

SITE/PROJECT NAME: ______________________________
RIG INSPECTOR (NAME/CO.): ______________________________
RIG INFORMATION:

Rig Type: Rotary/Auger Drilling Rig ☐ Direct Push Type (DPT) ☐
Owner: ____________________
Yr/Make: ____________________
Model: ____________________
VIN #: ____________________
Mileage: ____________________
Drill Hrs: ____________________

Inspector to initial columns below as appropriate

CATEGORY	INSPECTION ITEMS	PASS	FAIL	N/A	ACTION NEEDED
Emergency Switches	Kill switches are located and accessible to workers on both sides of the rotating stem. **NOTE:** Location and number of switches depend on the rig manufacturer, please refer to owner's manual (DPT typically has one switch on control panel).				
	Kill switches installed by the manufacturer are verified to be in operable condition and all workers are familiar with the location and operation of these switches. **NEVER BYPASS, DISABLE, OR REMOVE KILL DEVICES.**				
Protective Guards	Drive shafts, belts, chain drives, and universal joints are guarded to prevent accidental insertion of hands, fingers, or tools.				
Cables	Cables on drill rig are free of kinks, frayed wires, birdcages, flat spots, grease, and worn or missing sections.				
	Cables are terminated at the working end with a proper eye splice; either swaged, coupled, or using cable clamps.				
	Cable clamps are installed with the saddle on the live or load side. Clamps are not alternated and are of the correct size and number for the cable size.				
	Wire ropes are not allowed to bend around sharp edges without cushion material.				
Pulleys	Pulleys are not to be bent, cracked, or broken.				
	Pulleys operate smoothly and freely, without resistance.				
Cable Winches	Motor is mounted in correct location and tightly secured to drill rig.				
	Winch is capable of being placed in the free spool (unwind smoothly) and locked position correctly, demonstrating that the cable is suitable for lifting during drilling operations.				
Safety Latches	Hooks installed on hoist cables are the safety type with a functional latch to prevent accidental separation.				
	Safety latches are functional and completely span the entire throat of the hook and have positive action to close the throat except when manually displaced for connecting or disconnecting a load.				
Flights/Augers	Flights/Augers should not be bent, cracked, or broken. **NOTE:** Flights/Augers failing inspection must be removed from jobsite.				
	Flights should be blunt to prevent the risks of cuts.				
	Auger keys should not be bent, have any cracks/fractures, be excessively worn, or otherwise damaged.				
	Auger bolt holes and threads should not be damaged.				

CATEGORY	INSPECTION ITEMS	PASS	FAIL	N/A	ACTION NEEDED
Flights/Augers (cont.)	Inspect flights/augers for metal burrs. **NOTE:** Burrs must be filed to flat surface.				
	Avoid stacking augers; all should lay flat on ground.				
	Avoid manually lifting/moving augers. Should be lifted/moved with cable lines, or, at a minimum, by two persons.				
Drill String	Drill string should not be bent or have any cracks/fractures.				
	Drill string connecting pins should not be bent, have any cracks/fractures, or be excessively worn.				
Mast	Mast is free of bends, cracks, or broken sections.				
	All mounting hardware (pins, bolts, etc.) should be in place.				
	No moving of drill rig while mast is in vertical position.				
	Maintenance/repairs to be performed on mast only in horizontal position.				
Hammering Device	Hammer free of cracks, fatigue, or other signs of excessive wear.				
	Hammer connections are secure.				
Leveling Devices	Outriggers move in/out and up/down smoothly and freely while using controls on drill rig, with no hydraulic leaks.				
	Outriggers are extended prior to and whenever the mast is raised off its cradle. Outriggers must maintain pressure to continuously support and stabilize the drill rig (even while unattended).				
	Outriggers are properly supported on the ground surface to prevent settling into the soil (use of outrigger support pads).				
Controls	Controls are intact, properly labeled, have freedom of movement, and have no loose wiring or connections.				
	Controls are not blocked or locked into an operating position.				
	Installed lights, signals, gauges, and alarms operate properly.				
Lifting Devices	Slings, chokers, and lifting devices are inspected before using and are in proper working order. **NOTE:** Damaged units are to be labeled and removed from jobsite.				
	Shackles/Clevises are in proper working order with pins/ screws in place that is to be used while lifting.				
	Cables and lifting devices are not operated erratically or with a jerking action to overcome resistance.				
Hydraulic System	Hydraulic lines are secure, in good condition with no signs of excessive wear, and not leaking. **NOTE:** Check while pressurized.				
	Hydraulic lines are not in a bent or pinched position causing additional fluid restrictions/pressures.				
	Hydraulic oil reservoir has appropriate amount of oil and not leaking.				
	Documentation available to confirm that pressure relief valve was checked during shop maintenance activity and noted on maintenance log.				
Pump Lines (water, grout, etc.)	Suction/Discharge hoses, pipes, valves, and fittings are secured and not leaking.				
	High pressure hoses have a safety chain, cable, or strap at each end to prevent whipping in the event of a failure.				
Fire Prevention	A fire extinguisher of appropriate size is located on drill rig and readily available/accessible for drilling crew (recommended 20 lb.).				
	Documentation available to confirm that the drilling crew has received training on proper use of fire extinguishers.				
Ladders	Drill rig has a permanently attached or proper portable ladder to be used for access to drilling platform.				
Tracks	Tracks on rig are not excessively worn and free of any debris or foreign material.				

CATEGORY	INSPECTION ITEMS	PASS	FAIL	N/A	ACTION NEEDED
General	Drill rig meets regulations for transport on state/federal highways (inspection sticker, license plate, etc.).				
	Documentation available to verify that rig was inspected prior to arriving at ExxonMobil job sites.				
	Does the rig size meet job requirements?				
	Maintenance log available for previous 3 months to confirm proper maintenance/inspection.				
Exhaust	Exhaust system should be free from defect and routes engine exhaust away from drill rig workers.				
Fuels	Fuel stored in an approved and properly labeled container.				
	Fuel transfer lines free from signs of excessive wear and not leaking.				
	Refueling and transferring of fuel is performed in an approved area with sufficient containment to prevent spillage.				
Exclusion/ Work Zones	The exclusion/work zone is centered over the borehole and the radius equal to or greater than the height of the mast (measured from ground level).				
	The exclusion/work zone should be clear of tripping hazards.				
Overhead Obstructions	Except where electrical distribution and transmission lines have been de-energized and visibly grounded, drill rigs will be operated proximate to under, by, or near power lines in accordance with the following: * 50 KV or less - minimum clearance of 10 feet * 50 KV or greater - add 0.4 inches for every KV over 50 KV * If voltage is unknown, maintain at least 20 feet of clearance.				
	While the rig is in transit, clearance from energized power lines will be maintained as follows: * Less than 50 KV - 4 feet * 50 thru 365 KV - 10 feet * 366 thru 720 KV - 16 feet				
Rig Repairs	Repairs, when possible, are conducted offsite to reduce the risk of any onsite incidents.				
Specialized PPE	When working at elevated heights, workers are to wear a fall restraining device attached in a manner to restrict fall to less than six feet.				
	When working in wet/slippery conditions, all workers have a lug-type sole or similar slip resistant sole, on their safety footwear to prevent slipping.				

RECOMMENDED SPARE PARTS OR ITEMS TO BE SENT WITH DRILL CREW

DRILL RIG

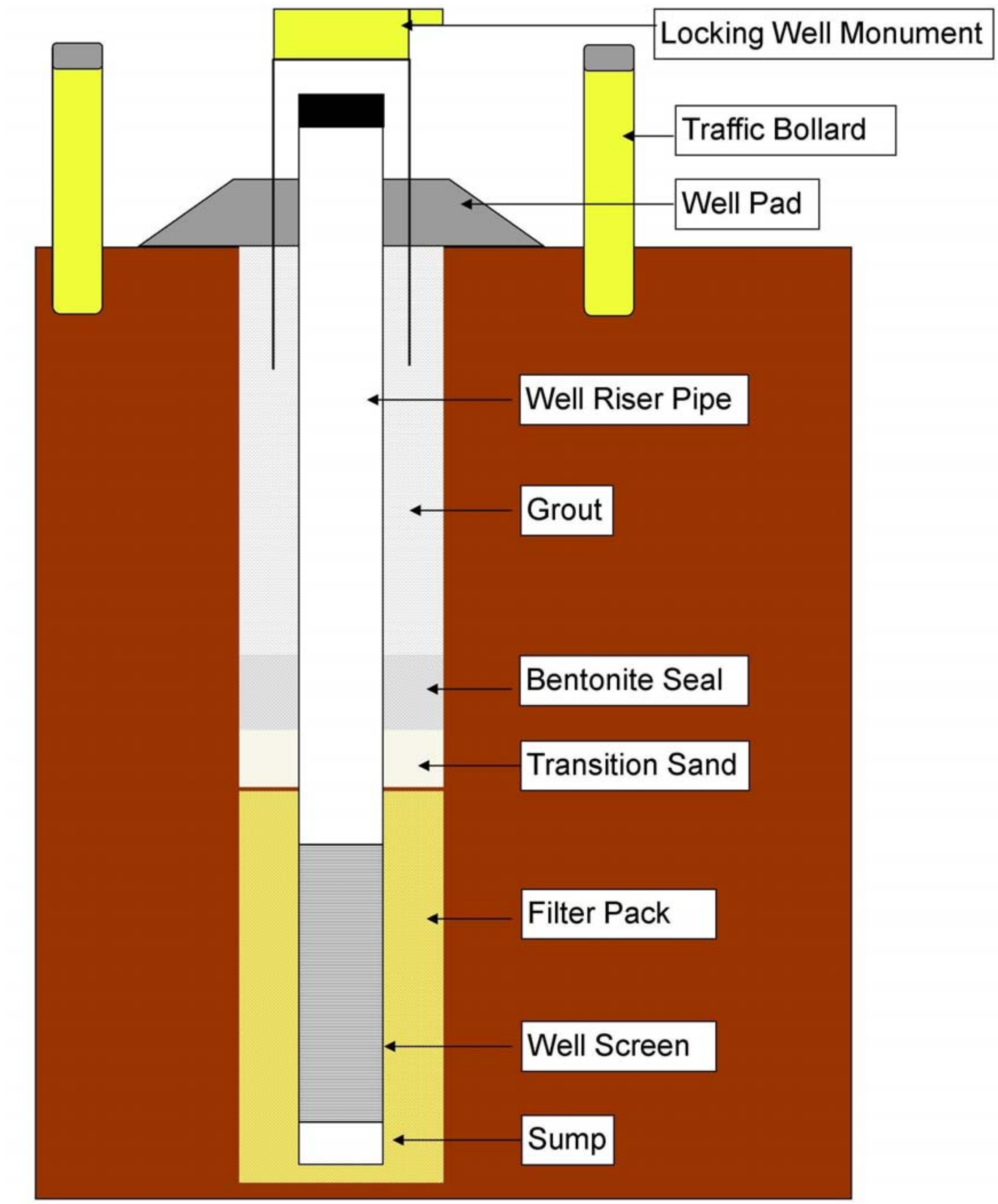
Emergency Switch
Drive Coupling
Shear pins/keys (for drive coupling)
Pump Packing
Pump Hoses
Auger Bolts
Rod to cap pins
Cutter Head

Safety Latches, Hooks, Clamps
Split Spoon Cutter Head
Spill Kit (5 gal. bucket with oil dry and absorbent pads)

DPT RIG

Emergency Switch
Drive Caps
Cutter Head
Pull Cap
Liner Cutter
Rod to Cap Pins
Liner Holder (used while cutting)
Spill Kit (5 gal. Bucket with oil dry and absorbent pads)

Attachment 5.A - Simplified Well Construction Diagram



Attachment 5.B - Typical Job Safety Analysis for Equipment Loading and Unloading

Job Being Analyzed:	LOADING AND UNLOADING BACKHOE/FORKLIFT	Date Started:	

Instructions: load and unload in dry even area. Watch for lift sliding on ramps, to close to the side, lift in right gear		
FLAT AND LEVEL WORK		
STEPS	**HAZARDS**	**PREVENTION**
1. Check area for hazards	Uneven ground, wet obstruction	Park on dry flat area with nothing in the way
2. Try to have a spotter	Vision not being able to see where you are	Spotter - to check closeness to sides and ramp
3. Verify truck is in gear with brake on and wheels chalked	Truck and trailer could move when loading or unloading	Leave in gear, brake on and wheels chalked
4. Check hitch	Hitch coming loose when loading	Check hitch, verify it is locked with pin and safety chain is attached
5. Loading	Weather can make lift slide on ramps and trailer	Load in dry, level area - use 4-wheel drive, low gear: watch and be aware
6. Ramps	Not even, pins loose: raise and lower properly	Check ramps before lowering and when raising lift properly
7. Tying down	Mast too high, not enough chains, in gear with brake on and wheels chalked	Check mast height: use 4 chains tying down, chalk wheels, check load after driving a few miles
8. Unloading - same steps in reverse, check lift, verify it is in good condition		
9. Check forklift	Brakes out of adjustment popping out of gearing, shutting off emergency brake	Check out before loading and driving off lift, oil levels
10.		
11.		

Comments:		
If off unloading with forks, fwd insure forks are high enough for fork clearance		
Complete forklift inspection		
Do not load/unload equipment with engine running		
OPERATOR SAFETY COMMITTEE:		
Operator 1:	**Operator 2:**	**Operator 3:**
Management 1:	Safety Director:	Guest:

APPENDIX D FIELD SAMPLING PLAN

FIELD SAMPLING PLAN

BAUSCH AND LOMB SUNTRU STREET SITE

Prepared For:

1400 N. Goodman Street
Rochester, NY 14609

Prepared By:

301 Plainfield Road, Suite 330
Syracuse, New York 13212

MAY 2023

TABLE OF CONTENTS

LIST OF ATTACHMENTS

1.0 SITE PREPARATION AND SUBSURFACE CLEARANCE

Parsons’ policy requires that the Parsons Project Manager follow all local, state, and federal laws that apply to intrusive subsurface work, where appropriate (i.e., inform agencies, obtain utility clearances and other similar activities). The Parsons Project Manager shall review, as available, current and historical site drawings and plans from the facility owner or tenant, utility providers, municipal government offices (i.e., city engineer, building department) and third parties as appropriate.

The Pre-Drilling/Subsurface Checklist for Intrusive Fieldwork shall be completed prior to initiating fieldwork. It is the responsibility of the Parsons Project Manager to require that the Pre-Drilling/Subsurface Checklist for Intrusive Fieldwork and Utility Clearance Variance Request form is followed. If a variance is sought, it is the responsibility of the Parsons Project Manager to gain written approval of the appropriate Parsons Sector Leader and/or Health and Safety Manager.

The Parsons Project Manager will be responsible for fulfilling the objectives of this protocol by requiring that the procedures are carried out by Parsons employees, subcontractors, and any other person acting on behalf of Parsons. The Parsons Project Manager will require that individuals working on drilling and other subsurface exploration projects are adequately trained and supervised. Parsons will practice sound investigation and work practices and employ necessary measures to avoid damage to subsurface systems and structures. The Parsons Sector Leader will be contacted and advised in advance of beginning field work in the event that a variance to this protocol is requested by the Parsons Project Manager or designee.

1.1 Pre-Clearance Tasks

The objectives of these tasks include compiling relevant information needed to identify accessibility improvement needs at the planned borehole locations.

One task is to obtain available as-built drawings and/or existing site plans. As-built drawings may not accurately depict the locations of improvements or the most recent subsurface features and should therefore not be solely relied upon to determine subsurface conditions.

Another task is to obtain utility mark outs. Parsons project staff will request a utility mark-out via the local utility’s one-call system and subcontract with a private utility locating company for the work site. Investigation staff will document efforts to locate subsurface utilities (e.g., electrical, gas, communications, sewer, water, cable). The Parsons Project Manager must be notified of the status of locating underground utilities before fieldwork begins. If locating utilities becomes problematic, the Parsons Project Manager will update the property owners and discuss potential additional methods for locating or reducing risk of damage to underground utilities/structures. Such additional actions may include subcontracting a private locating service to use additional subsurface locating methodologies than those previously used/or and re-evaluating risk/reward of specific locations or utilizing intrusive non-destructive methods. Site plans will be updated as appropriate to include utility mark-out information. Detailed coordination with the site owner's representatives for mark-outs, review of as-builts, and other informational reviews will be conducted prior to the start of intrusive work.

Parsons will obtain information needed to prepare a vicinity map of the area that may include significant neighboring addresses, land use, surface water bodies, and other natural, as well as manmade features of note, as appropriate. A site visit/walkover will be scheduled concurrent with, or soon after the utility mark-out. The walkover will include inspections and notations of the locations of utility mark-outs and above-ground utilities/structures, including:

- Light standards
- Communication lines (phone, fiber optic)
- Sewer lines
- Site infrastructure
- Overhead lines
- Water lines and spigots/hydrants
- Catch basins
- Manholes
- Junction boxes
- Natural gas lines
- Other utilities
- Paving scars such as areas of new pavement or saw cuts

1.2 Subsurface Clearance

Parsons staff will ensure that no subsurface utilities, structures, or improvements exist where intrusive subsurface activities will occur. Locations will be cleared using results of historical data research and with geophysical methods within 25 feet in radius around the proposed boring location.

In accordance with Parsons Subsurface Soil Disturbance Protocol, intrusive clearance (e.g., hand clearing, air/water knife, or similar techniques) must be performed to clear the top five feet below ground surface. In addition, site knowledge by project staff, non-invasive clearance techniques, and close monitoring of drilling rates will be employed to avoid contact with utilities and anomalies as further detailed below.

Proactive investigative methods to clear specific drilling locations at the site will include non-invasive geophysical remote sensing. Ground-penetrating radar (GPR), electromagnetic detectors, magnetometers, or metal detectors will be used to survey an area around the boring location to a distance of 25 feet to identify potential subsurface utilities or facilities.

Utilities and associated site infrastructure will be located prior to drilling operations using remote sensing techniques in the event that borings are relocated, or that step-out borings are required.

Subsurface clearance may be performed on multiple sampling points prior to mobilization of the drill rig. To minimize confusion in the field, a survey stake will mark the drilling location as proposed in the work plan. The survey stake will include the sample point ID, written in black marker. Upon clearing the 25-foot radius using the above techniques, the stake will be spray painted with pink paint.

Significant anomalies detected by the geophysical remote sensing justifies the relocation of the staked sample point. New coordinates should be collected upon moving the stake to the alternative sample point. Any relocation of sample points shall be communicated to the Parsons Project Manager. Upon approval of the relocation, maps and lists of drilling points will be updated.

The final list and map of drilling points, with global positioning system (GPS) coordinates and whether the original point had been moved or not, shall be provided to the drilling team for their reference. The supervisor of the drilling team shall acknowledge through documentation that the final sample point and, if applicable, the original, relocated point have been positively identified.

Geophysical technologies may include but not be limited to GPR, radio frequency (RF), and electromagnetic induction (EM).

1.3 Event Notification

If any portion of a tank, pipe, utility, or other subsurface structure is encountered, or if there is any doubt it has been encountered, the work is to cease in that area and the Parsons Project Manager notified immediately. If there is reason to believe that the structure has been damaged, any emergency shut-off switches should be activated (if applicable) and the appropriate regulatory entity, municipality, and property owner notified immediately. The Parsons Project Manager, in consultation with the client, will decide if additional uncovering by hand is required. If it is confirmed that an underground storage tank system has been encountered, the appropriate regulatory entity should be notified and regulations followed. Under no circumstances is the area to be backfilled without notifying the Parsons Project Manager, unless risk of personal injury or damage warrants temporary backfilling.

In case of refusal or if an unknown subsurface object is encountered during intrusive subsurface activities, then the following specified resolution process must take place.

- If the cause CAN be readily and correctly defined as not destructive or hazardous, drilling may proceed ONLY after consultation with the Project Manager.
- Otherwise, drilling MUST STOP so that location re-evaluation can take place. The client, the utility owner (if applicable) and, if required, the appropriate regulatory agency, must be advised of the situation and consulted to determine if (1) the location is necessary, which may require additional effort to clear a new location, or (2) the location is not necessary, and can be deleted from the program.

2.0 SOIL BORING INSTALLATION

A Parsons Geologist will be the on-site representative responsible for overseeing boring installation activities. This representative will monitor that the work is performed with due caution and will be alert for warning signs that could indicate the presence of underground tanks, lines, or other hazards or structures.

Drilling equipment will be in proper working order and inspected to determine if it meets safety requirements, with inspection documentation to be provided by the drilling contractor. Field personnel will be briefed daily on potential hazards including working around moving equipment, physical hazards, biota, and risks associated with chemical exposures. Health and safety protocol/procedures pertaining to drilling in potentially impacted areas are included in the Project Safety, Health, and Environmental Plan (PSHEP).

It is anticipated that all work will be completed in modified Occupational Safety and Health Administration (OSHA) Level D personal protective equipment (PPE).

Once the data collection needs of the borehole, including laboratory sample collection have been met, the borehole will be decommissioned consistent with the methods described in American Society for Testing and Materials (ASTM) D5299 (2018a).

2.1 Drilling Methods

Depending on site-specific objectives and/or drilling conditions, soil borings may be advanced using conventional drilling methods. Typical drilling methods used to collect overburden soils and create boreholes for monitoring well installations include:

- Hollow stem augers (HSA)
- Drive and wash or spin and wash flush joint casing
- Fluid rotary methods (using potable water only)
- Air rotary
- Hand sampling

These drilling methods typically allow for the advancement of borings through most soil types including denser soils (e.g., glacial till), and when coupled with split spoon sampling conducted in accordance with ASTM Method D1586, can provide geotechnical information. When used, the following procedures will be followed by field personnel:

2.1.1 Equipment and Supplies

- Applicable drill rig and all associated supplies and equipment
- Digging implement: hand auger, garden trowel, disposable trowel, shovel, spoons, post-hole digger, etc. (if collecting by hand)
- Field log
- PID
- Re-sealable plastic bags (e.g., Ziploc®)
- Lab-provided sample containers

- Coolers, ice, sample labels

2.1.2 Conventional Drill Rig Procedure

- Soil samples will be collected continuously from the ground surface to the bottom of the borings using 2-inch diameter split-barrel samplers in accordance with ASTM Method D1586.
- Soil samples retrieved from the borehole will be described for: 1) percent recovery; 2) soil type; 3) color; 4) moisture content; 5) density; 6) texture; 7) grain size and shape; 8) consistency; 9) evidence of staining or other chemically-related impacts; and 10) any other relevant observations. In addition, soil will be screened with a photoionization detector (PID) to allow evaluation of the bulk volatile organic concentration of each soil sample. Soils will be described in accordance with the Unified Soil Classification System (USCS) and the modified Burmister system. This descriptive information will be recorded on a soil boring log form. An example of the typical soil boring log form is provided in Attachment 1.
- Samples for headspace screening samples will be collected. A representative portion of each soil sample will be placed in a re-sealable plastic (e.g., Ziploc®) bag filled approximately half full. The bag will be labeled with the boring number and interval sampled. After allowing the bagged soil to warm, the tip of the sample probe attached to the PID will be inserted into the bag to measure the headspace for organic vapors.
- Soil samples collected for laboratory analysis will be collected in laboratory-supplies containers according to the Quality Assurance Project Plan (QAPP) and as described below. Samples will be submitted to an approved New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP)-certified laboratory. Analyses will be conducted using U.S. Environmental Protection Agency (USEPA) methodologies. Samples will be managed in accordance with the QAPP.
- During sampling, volatile organic compound (VOC) samples will be obtained first from the center of the sample and placed in sample containers. VOC containers will be filled without headspace. The remainder of the interval will be homogenized in a stainless steel mixing bowl and distributed to the appropriate sample jars.
- Drilling equipment will be decontaminated between each boring in accordance with methods specified in Section 2.7.
- Decontamination water will be handled in accordance with the Investigation Work Plan.
- Each boring will be located using a total station GPS device that can provide coordinates with sub-inch accuracy, and will be performed with a licensed professional land surveyor (PLS).

If refusal is encountered during drilling operations, the Parsons Field Team Lead will evaluate the soils previously collected from the location for evidence of the cause of refusal. The Parsons Field Team Lead will also consider observed penetration rates, blow counts where measured, as well as input from the Field Geologist and Lead Driller. This information will be discussed with the Parsons Project Manager to determine if the borehole should be abandoned and relocated, or if drilling operations should cease and data collection (e.g., soil sampling, downhole measurements) should move forward. Should the boring location be abandoned or relocated, the borehole will be properly decommissioned consistent with the methods included in ASTM D5299 (2018a).

Once decommissioned, the boring location will be surveyed by a licensed PLS for the development of an as-drilled topographic survey.

2.1.3 Hand Sampling Methods

The soil at the selected sampling location will be loosened to the target depth using a trowel or other digging implement. Large rocks, vegetation, foreign objects, parking surface material, and fill will be removed (these items may also be collected as separate samples, if appropriate). Samples should be collected immediately below the zone of grass cover and associated roots (if present), or below the base of asphalt/concrete/gravel fill or other surface material, as applicable.

The remaining soil from each sampling interval (i.e., 0-2, 0 - 6 or 6 – 12 inches as dictated by the sampling plan) will be homogenized in a stainless-steel mixing bowl and distributed to the sampling containers. Homogenized soils will then be distributed to the appropriate sample containers. Subsequent depth intervals will be processed in the same manner for each interval collected if additional depths are being collected using hand sampling techniques. The field technician will record the sample identification, location, and other pertinent data on appropriate record forms, maps, drawings, and/or site logbook.

Sampling tools will be cleaned between each boring and sample according to the procedure outlined in Section 2.7 before proceeding with further sampling.

2.2 Monitoring Well/Borehole Decommissioning

There may be occasions when monitoring wells will require abandonment. The abandonment approach will be in accordance with New York State Department of Environmental Conservation (NYSDEC) Policy CP-43 – Groundwater Monitoring Well Decommissioning Policy.

Borings installed to collect soil samples for laboratory and geotechnical analysis only do not require sheeting or casing following borehole advancement. Following collection of subsurface measurements and soil samples (Section 2.4), the borehole will be decommissioned with grout. Grout will consist of a mixture high-solids bentonite in compliance with CP-43 which will be tremied through the drill string as it is being removed and completed in accordance with the requirements of CP-43.

2.3 Soil Sampling

2.3.1 Soil Description

Site media consisting of soil and soil/fill mixtures are referred to as “soil” for the purposes of this Field Sampling Plan. Soil will be collected at the site using HSA. Soils will be classified and described according to the methods and procedures outlined in the following sections.

2.3.1.1 Burmister Classification System

Samples described based on the Burmister Classification System (Burmister 1970) include the following components and are reported in the order shown below.

<u>Moisture Content</u>

The relative moisture content of the soil at the time of sampling shall be designated as “dry,” “moist,” or “wet.”

Consistency

The consistency of the soil sample shall be described for fine grained soils (silts and clays) as “stiff,” “medium stiff,” or “soft” and state whether the soil is “plastic” or “non-plastic.” Coarse-grained soils (sands and gravels) shall be described as “loose,” “medium dense,” or “soft” and will include the degree of cementation. The description will also include the shape of the grains (“flat”, “angular,” or “rounded”) and the grading (“Well Graded,” “Poorly Graded,” or “Uniform”).

When applicable, the penetration rate while conducting standard penetration test (SPT) with split spoons is also an indication of the compaction/density of the material. The table shown below is a penetration guide and will be used to determine the consistency of the material. The SPT values across the middle of the 2-foot split spoon will be used to select a consistency description from the penetration guide below. SPT values are typically recorded in 6-inch intervals. For example: a 2-foot spoon has values (or blows) of four, three, six, eight for each 6-inch interval. The SPT value used to determine consistency is the sum of the last two values (6+8=14). If the material is sand the consistency from the table is “Medium Dense,” while if the material is clay the consistency is “Stiff.” For materials that are predominantly silt the “clay” section of the guide will be used.

PENETRATION GUIDE			
SAND		CLAY	
Very Loose	0-4 Blows per foot	Very Soft	<2 Blows per foot
Loose	4-10 Blows per foot	Soft	2-4 Blows per foot
Medium Dense	10-30 Blows per foot	Medium Stiff	4-8 Blows per foot
Dense	30-50 Blows per foot	Stiff	8-15 Blows per foot
Very Dense	50+ Blows per foot	Very Stiff	15-30 Blows per foot
		Hard	30+ Blows per foot

Color

The predominant color of the soil sample in the natural state shall be designated as “white,” “brown,” “yellow,” “red,” “gray,” “blue,” or “black.” In some cases, the sample may be “mottled” (a combination of colors such as red/gray, blue/gray, etc.)

Color codes and designations should follow those provided in Munsell soil color charts. Grain size description is listed in order of predominance starting with the most predominant.

Grain Size

Soils are predominantly classified based on grain size. The four main grain sizes are “gravel,” “sand,” “silt,” and “clay.” Sands are further described as coarse, medium, or fine and gravels are described as coarse or fine.

The first entry will be the most predominant grain size in the sample. The entry is fully capitalized (SAND, SILT, CLAY, and GRAVEL) if it comprises 50% or more of the sample. Otherwise the predominant fraction is listed first with only an initial capital.

The second, third, and other entries represent the most predominant grain size materials in order of predominance. The percentages of the constituents are indicated by the following descriptors:

- “and” 50-35%

- "some" 35-20%
- "little" 20-10%
- "trace" 10-1%

For example, a soil description may be SILT, some fine sand, trace clay (50% or more of silt with 20-35% fine sand, 1 to 10% of clay). Other common descriptions might be fine SAND, some silt and clay; SILT, trace of fine sand and clay; SILT, some coarse sand and gravel, trace clay.

The following table lists the breakdown of grain sizes and sieve numbers for each category (modified Burmister system).

GRAIN SIZE AND SIEVES				
SOIL	FROM SIEVE NUMBER	TO SIEVE NUMBER	FROM MM	TO MM
Gravel – coarse	3-inches	¾-inches	75	19.0
Gravel -fine	¾-inches	#4	19.0	4.75
Sand – coarse	#4	#10	4.75	2.0
Sand - medium	#10	#40	2.0	0.425
Sand - fine	#40	#200	0.420	0.075
Silt	#200	Material passing the No. 200 sieve that is usually non-plastic in character and exhibits little or no strength when air dried.		
Clay	#200	Material passing the No. 200 sieve that can be made to exhibit plasticity within a certain range of moisture contents and which exhibits considerable strength when air dried.		

Vegetable Muck and Peat

Vegetable mucks and peats are soil mixtures with varying percentages of organic and vegetable matter formed by decomposition of leaves, grasses, and other fibrous materials. The color ranges from light brown to black. The soil content of the mixture should be identified and an estimate should be made of the amount of vegetable material present. The vegetable matrix comprising the peat should be identified as "fibrous" or "woody." The sample composition should be further described with respect to texture as "cake-like," "spongy" or predominantly "granular."

Miscellaneous

Certain materials may be incorporated that do not fall under foregoing classifications and require further qualification for proper identification. Additional terms may be used, but should not replace the basic description. These additional terms may be used specifically to designate materials as "rock fragments," "stones," "cobbles," "rock flour," or other qualifying descriptions.

Field Observations to Identify Silt and Clay Characteristics

The field test listed in the table below may be used to distinguish between structural characteristics of a silt or clay soil. For mixtures of silt and clay, the tests indicate the predominant constituent.

FIELD OBSERVATIONS OF SILT AND CLAY CHARACTERISTICS		
CHARACTERISTICS	SILT	CLAY
Plasticity in moist state	Very little or no plasticity.	Plastic and sticky. Can be rolled.
Cohesiveness in dry state	Little or no cohesive strength in dry state and will slake readily.	Has a high dried strength. Crumbles with difficulty, slakes slowly in water.
Visual inspection and feel	Coarse silt grains can be seen. Silt feels gritty when rubbed between fingers.	Clay grains cannot be observed by visual inspection. They feel smooth and greasy when rubbed between fingers.
Settlement in water	Will settle out of suspension within one hour.	Will stay in suspension in water for several days unless it flocculates.
Movement of water in the voids	When a small quantity of silt is shaken in the palm of a hand, water will appear in the surface of the soil. When shaking is stopped, water will gradually disappear.	When a small quantity is shaken in the palm of the hand it will show no signs of water moving out of the voids.

2.3.1.2 Unified Soil Classification System

The USCS is based on textural characteristics. Soils fall into one of 15 groups, where each group is defined by a two-letter symbol. In general soils are classified as one of two broad categories:

- Coarse-grained soils: Group symbols start with either “G” for gravel or gravelly soils, or “S” for sand or sandy soils.
- Fine-grained soils: Group symbols start with “M” for non-plastic or low plasticity fines (inorganic silt), “C” for plastic fines (inorganic clays), “O” for organic silts and clays, or “Pt” for peat, muck, humus, swamp soils, and other highly organic soils.

2.3.1.3 Field Observations of Contamination, Putrescence or Site-Specific Characteristics

Environmental samples will also be screened for visual evidence of contamination or presence of non-aqueous phase liquid (NAPL). Descriptions of these observations and screening results should be added to the physical descriptions of samples including:

Stain

Stains are discoloration and coatings potentially of non-native materials on or in the sample. The stains can range from light tan to black. When handled, the staining material in the sample may transfer to fingers or gloves.

Sheens

Sheens are films floating on the water in saturated samples. The films may have rainbow colors, an oily appearance, or a silvery appearance.

Visible NAPL/Free Product/Gross Contamination

"Free product" means an immiscible NAPL present as a liquid in surface or sub-surface soil, surface water or groundwater in a potentially mobile state. Grossly contaminated media means soil, sediment, surface water or groundwater which contains sources or substantial quantities of mobile contamination in the form of NAPL that is identifiable either visually, through strong odor, by elevated contaminant vapor levels or is otherwise readily detectable without laboratory analysis.

<u>Odor</u>

Coal tar has a distinctive “mothball” odor. While describing the sample characteristics, note odors present in the sample. Understand that odor classification is a subjective measure; therefore, avoid making conclusions about specific chemical character of the sample.

<u>Screening</u>

Samples will be screened with a PID for VOCs and semivolatile organic compounds (SVOCs) as discussed in Section 2.4.1.7. VOC/SVOC screening will be performed using a MiniRAE 3000 portable handheld PID with 10.6 eV lamp or equivalent.

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES
COARSE-GRAINED SOILS (More than 50% of the material is LARGER than No. 200 sieve size).	GRAVELS (More than 50% of coarse fraction is LARGER than the No. 4 sieve size)	CLEAN GRAVELS (Little or no fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines.
			GP	Poorly graded gravels or gravel-sand mixture, little or no fines.
		GRAVELS WITH FINES (Appreciable amount of fines)	GM	Silty gravels, gravel-sand-silt mixtures.
			GC	Clayey gravels, gravel-sand-clay mixtures.
	SANDS (More than 50% of coarse fraction is SMALLER than the No. 4 sieve size).	CLEAN SANDS (Little or no fines)	SW	Well-graded sands, gravelly sands little or no fines.
			SP	Poorly graded sands or gravelly sands, little or no fines.
		SANDS WITH FINES (Appreciable amount of fines)	SM	Silty sands, sand-silt mixtures.
			SC	Clayey sands, sand-clay mixtures.
FINE-GRAINED SOILS (More than 50% of material is SMALLER than the No. 200 sieve size).	SILTS AND CLAYS (Liquid limit LESS than 50)		ML	Inorganic silts and very fine sands, rock flour, silty or clayed fine sands or clayey silts with slight plasticity.
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
			OL	Organic silts and organic silty clays of low plasticity.

MAJOR DIVISIONS		GROUP SYMBOLS	TYPICAL NAMES
	SILTS AND CLAYS (Liquid limit GREATER than 50)	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
		CH	Inorganic clays of high plasticity, fat clays.
		OH	Organic clays of medium to high plasticity, organic silts.
HIGHLY ORGANIC SOILS		Pt	Peat and other highly organic soils.
BOUNDARY CLASSIFICATIONS: Soils possessing characteristics of two groups are designated by combinations of group symbols.			
PARTICLE SIZE LIMITS – see particle size limits in Burmister table (Section 2.4.1.3).			

2.4 Monitoring Well Development

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

- Monitoring well development will be performed or overseen by a field geologist.
- Development will be performed by surging and purging the well, as appropriate, using either a bailer or pump.
- Groundwater parameters will be recorded before, during, and after well development. Parameters will include turbidity, pH, temperature, and specific conductance.
- Water levels will be measured in each well to the nearest 0.01 foot prior to development.
- Monitoring wells will be developed until the water discharge from the well is 50 nephelometric turbidity units (NTU) or less, or until pH, temperature, and specific conductivity stabilize, or until a maximum of 10 borehole volumes of the water have been removed. If the well goes dry during development, it will be allowed to recharge to 80% of initial water level and pumped or bailed again. The well will be considered developed after pumping the well dry three times.
- Well development information will be recorded on a Well Development Log. An example of the Well Development Log is provided in Attachment 2.
- Ideally, dedicated and/or disposable equipment will be used for well development. However, if non-dedicated well development equipment is used, it will be decontaminated after use in accordance with Section 2.7.
- Development water will be containerized for characterization and disposal in accordance with Section 2.8.
- Following development, the monitoring wells will be allowed to equilibrate for a minimum of 24 hours prior to groundwater sampling.

2.5 Groundwater Sampling

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

2.5.1 Hand Bailing

2.5.1.1 Equipment and Supplies

- Field book or log forms;
- Well gauging and sampling logs;
- Project plans;
- PPE in accordance with the PSHEP;
- PID, or other monitoring equipment if required by PSHEP;
- Water level probe and/or electronic oil/water interface probe;
- Disposable polyethylene bailers and/or stainless-steel bailers;
- Polypropylene rope;
- Temperature, conductivity, and pH meter;
- Turbidity meter;
- Graduated 5-gallon buckets plus lids;
- Decontamination supplies;
- Plastic sheeting;
- Clear tape, duct tape;
- Coolers and ice;
- Laboratory sample bottles; and
- Shipping labels.

2.5.1.2 Purging

- Prior to sampling, the static water level and thickness of any light non-aqueous phase liquid (LNAPL) or dense non-aqueous phase liquid (DNAPL) will be measured to the nearest 0.01 foot from the surveyed well elevation mark on the top of the PVC casing with a decontaminated oil/water interface probe. NAPL thickness will be confirmed using a clear bailer or a weighted string. The measurement will be recorded in the field book or log forms.
- Prior to commencing sampling activities and daily thereafter, the groundwater quality monitoring probes/meters including pH, conductivity, and turbidity will be calibrated in accordance with the manufacturer's instructions. At a minimum, two-point calibrations will be conducted for pH, conductivity, and turbidity. Calibration results will be recorded in the field log book or log forms.
- Initiate bailing of the well from the bottom. Lower and raise the bailer slowly to avoid causing turbidity. Keep the polypropylene rope on the plastic sheet. Pour the groundwater from the bailer into a graduated 5-gallon bucket to measure the volume withdrawn from the well.
- Continue bailing the well until at least three well volumes have been removed or until the well is dry. If the well is dry, allow sufficient time for the well to recover before proceeding. Record this information on the Standard Groundwater Sampling Log. An example of the Standard Groundwater Sampling Log is provided in Attachment 3.

- During the removal of successive well volumes, measure the water temperature, pH, conductivity, and turbidity with calibrated meters. Record the data on the Groundwater Sampling Field Log.
- Purge water will be containerized for characterization and disposal in accordance with Section 2.8.

2.5.1.3 Sampling

- Keep sample bottles cool and with their caps on until they are ready to receive samples. For per- and polyfluoroalkyl substances (PFAS) sampling, sample bottles for PFAS samples should be kept separate from other sample bottles. Be sure to change gloves prior to handling the PFAS bottleware. The type of analysis for which a sample is collected determines the type of container, preservative, holding time, and filtering requirement as specified in the QAPP.
- Minimize agitation of the water in the well; begin sampling by lowering the bailer slowly into the well. Lower it only far enough to fill it completely.
- Place a sample of well water in a container and measure and record the water temperature, pH, conductivity, and turbidity with calibrated meters. Record the data on the Groundwater Sampling Field Log. Turbidity reading should be less than 50 NTUs before sample collection. If turbidity levels remain high, consult the Parsons project manager to discuss the possibility of having the analytical laboratory filter samples prior to analysis.
- Record the appearance of the groundwater on the Standard Groundwater Sampling Log (Attachment 3).
- When you are ready to fill the bottles, remove them from their transport containers. Prepare them to receive the samples.
- Samples are transferred directly from the bailer to the container. The container should hold any necessary preservative and should be correctly labeled before the sample is transferred to it. VOC containers should be filled first with zero headspace, followed by other parameters, and then securely capped. Fill each sample container in accordance with the QAPP or other sampling outline.
- Inspect labels to see that the samples are properly identified.
- Return each sample bottle to its proper transport container.
- If the sample bottle cannot be filled quickly, keep them cool with the caps on until they are filled.
- Samples must not be allowed to freeze.
- Record the date and time and secure the well head.
- The sample containers will be labeled, placed in a laboratory-supplied cooler, with protective packaging (i.e. bubble wrap) and packed on ice (to maintain a temperature of 4˚C).
- A temperature blank in the appropriate sample bottle should accompany each cooler. VOC samples, if collected, should be placed in the same cooler, if possible, and a trip blank should accompany each cooler containing VOCs.
- Samples for laboratory analysis will be shipped overnight or delivered to an approved NYSDOH ELAP-certified laboratory. Analyses will be conducted using USEPA methodologies as specified in the Work Assignment Scoping Documents. Samples will be managed in accordance with the QAPP. Chain-of-custody (COC) procedures will be followed as outlined in the QAPP and Section 3.2.

2.5.2 Standard Purging

2.5.2.1 Equipment and Supplies

- Field book or field log forms;
- Well gauging and sampling logs;
- Project plans;
- PPE in accordance with the HASP;
- PID, or other monitoring equipment, if required by HASP;
- Water level probe and/or electronic oil/water interface probe;
- Polypropylene rope;
- Temperature, conductivity, and pH meter;
- Turbidity meter;
- Graduated 5-gallon buckets and lids;
- Generator;
- Extension cords;
- Decontamination supplies;
- Peristaltic or submersible pump;
- Plastic tubing;
- Plastic sheeting;
- Clear tape, duct tape;
- Coolers and ice;
- Laboratory sample bottles; and
- Shipping labels.

2.5.2.2 Purging

- Equipment will be decontaminated prior to use at each location.
- Prior to sampling, the static water level and thickness of any LNAPL or DNAPL will be measured to the nearest 0.01 foot from the surveyed well elevation mark on the top of the PVC casing with a decontaminated oil/water interface probe. NAPL thickness will be confirmed using a clear bailer or a weighted string. The measurement will be recorded in the field book or log forms.
- Prior to commencing sampling activities and daily thereafter, the groundwater quality monitoring probes/meters including pH, conductivity, and turbidity will be calibrated in accordance with the manufacturer's instructions. At a minimum, two-point calibrations will be conducted for pH, conductivity, and turbidity. Calibration results will be recorded in the field log book or log form.
- Prepare the pump for operation. Follow the manufacturer's directions.
- Lower the pump intake to the middle of the water column for sites with unknown screen intervals and lower the pump intake to the mid-screen interval for sites with known screen intervals. For LNAPL or DNAPL sites, the pump intake depth should be biased towards the upper or lower portions of the water column, respectively.
- Pump the groundwater into a graduated 5-gallon bucket. Continue pumping until at least three well volumes have been removed or the well is pumped dry. Lower the pump's intake as necessary.

- If the well is pumped dry, allow sufficient time for the well to recover before proceeding. Record this information on the Standard Groundwater Sampling Log (Attachment 3).
- During the removal of successive well volumes, measure the water temperature, pH, conductivity, and turbidity with calibrated meters. Record the data on the Groundwater Sampling Field Log.
- Purge water will be containerized for characterization and disposal in accordance with Section 2.8.

2.5.2.3 Sampling

- Keep sample bottles cool and with their caps on until they are ready to receive samples. The type of analysis for which a sample is collected determines the type of container, preservative, holding time, and filtering requirement as specified in the QAPP.
- Place a sample of well water in a container and measure and record the water temperature, pH, conductivity, and turbidity with calibrated meters. Record the data on the Groundwater Sampling Field Log. Turbidity reading should be less than 50 NTUs before sample collection. If turbidity levels remain high, consult the Parsons project manager to discuss the possibility of having the analytical laboratory filter samples prior to analysis.
- Record the appearance of the groundwater on the Standard Groundwater Sampling Log (Attachment 3).
- When you are ready to fill the bottles, remove them from their transport containers. Prepare them to receive the samples.
- Arrange the sampling containers to allow for convenient filling.
- Fill the containers that will undergo analysis. VOC containers should be filled first with zero headspace, followed by other parameters, and then securely capped. Fill each sample container in accordance with the QAPP or other sampling outline.
- Inspect labels to see that the samples are properly identified.
- Return each sample bottle to its proper transport container.
- If the sample bottle cannot be filled quickly, keep them cool with the caps on until they are filled.
- Samples must not be allowed to freeze.
- Record the date and time and secure the well head.
- The sample containers will be labeled, placed in a laboratory-supplied cooler with protective packaging (i.e. bubble wrap) and packed on ice (to maintain a temperature of 4˚C).
- A temperature blank in the appropriate sample bottle should accompany each cooler. VOC samples, if collected, should be placed in the same cooler, if possible, and a trip blank should accompany each cooler containing VOCs.
- Samples for laboratory analysis will be shipped overnight or delivered to an approved NYSDOH ELAP-certified laboratory. Analyses will be conducted using USEPA methodologies as specified in the Work Assignment Scoping Documents. Samples will be managed in accordance with the QAPP. COC procedures will be followed as outlined in the QAPP.

2.5.3 Low Flow Purging and Sampling

2.5.3.1 Equipment and Supplies

- Field book or log forms;

- Well gauging and sampling logs;
- Project plans;
- PPE in accordance with the PSHEP;
- PID, or other monitoring equipment, if required by PSHEP;
- Water level probe and/or electronic oil/water interface probe;
- Polypropylene rope;
- Temperature, conductivity, and pH meter;
- Turbidity meter;
- Graduated 5-gallon buckets and lids;
- Flow-through cell;
- Generator;
- Extension cords;
- Decontamination supplies;
- Peristaltic or submersible pump capable of achieving flow rates of 0.5 liters per minute or less;
- Plastic tubing;
- Plastic sheeting;
- Clear tape, duct tape;
- Coolers and ice;
- Laboratory sample bottles; and
- Shipping labels.

2.5.3.2 Purging

- Equipment will be decontaminated prior to use at each location.
- Prior to sampling, the static water level and thickness of any LNAPL or DNAPL will be measured to the nearest 0.01 foot from the surveyed well elevation mark on the top of the PVC casing with a decontaminated oil/water interface probe. NAPL thickness will be confirmed using a clear bailer or a weighted string. The measurement will be recorded in the field book or log forms.
- Prior to commencing sampling activities and daily thereafter, the groundwater quality monitoring probes/meters including pH, conductivity, oxidation-reduction potential (ORP), dissolved oxygen, and turbidity will be calibrated in accordance with the manufacturer's instructions. At a minimum, two-point calibrations will be conducted for pH, conductivity, and turbidity. The dissolved oxygen probe will be checked against a zero-dissolved oxygen solution. In addition, the dissolved oxygen calibration will be corrected for local barometric pressure and elevation. Calibration results will be recorded in the field log book or log forms.
- Prepare the pump for operation. Follow the manufacturer's directions.
- Lower the pump intake to the middle of the water column for sites with unknown screen intervals and lower the pump intake to the mid-screen interval for sites with known screen intervals. For LNAPL or DNAPL sites, the pump intake depth should be biased towards the upper or lower portions of the water column, respectively.
- Pump the groundwater into a graduated 5-gallon bucket. The flow rate shall not exceed 0.5 liters/min (500 ml/min). Initially, a flow rate between 200 ml/min and 500 ml/min will be used. The drawdown will be monitored using a water level probe and the flow rate will be reduced if the drawdown exceeds 0.3 ft. Efforts should be made to minimize the generation of air bubbles in the

sample tubing by either increasing the flow rate as appropriate, or restricting the flow by clamping the tubing.

- Record the appearance of the groundwater on the Low Flow Groundwater Sampling Log, provided in Attachment 3.
- During purging, pH, specific conductivity, temperature, oxidation-reduction potential (redox), dissolved oxygen, and turbidity will be monitored and recorded at time intervals sufficient to evacuate the volume of the flow-through cell. This information along with water level readings to monitor drawdown will be recorded on the Low Flow Groundwater Sampling Log (Attachment 3).
- Well sampling will commence after equilibration of water quality parameters. The equilibration guidelines are as follows:

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

- If the water level will not stabilize even at lower flow rates then the well will not be able to be sampled using the low flow method. In this situation, the well will be pumped to dryness and the water will be allowed to recover prior to collection of the sample. Purge water will be containerized for characterization and disposal in accordance with Section 2.8.

2.5.3.3 Sampling

- Prior to filling the sample bottles, the temperature, pH, dissolved oxygen, conductivity, and ORP will be measured within a flow-through cell. Turbidity will be measured with a hand-held turbidity meter. All measurements will be recorded on the Low Flow Groundwater Sampling Log (Attachment 3). If turbidity levels remain high, consult the Parsons Project Manager to discuss the possibility of having the analytical laboratory filter samples prior to analysis.
- Prior to collecting the sample, the flow-through cell will be disconnected from the tubing. Record the appearance of groundwater on the Low Flow Groundwater Sampling Log.
- Laboratory provided sample containers appropriate to meet USEPA requirements for each analysis will be used. Groundwater will be allowed to flow from the tubing into the sample container carefully so as to limit aeration of the sample. If preservative is present in a container, the container will not be overfilled.
- Keep sample bottles cool and with their caps on until they are ready to receive samples. The type of analysis for which a sample is collected determines the type of container, preservative, holding time, and filtering requirement as specified in the QAPP.
- When you are ready to fill the bottles, remove them from their transport containers. Prepare them to receive the samples.
- Arrange the sampling containers to allow for convenient filling.
- Fill the containers that will undergo analysis. VOC containers should be filled first with zero headspace, followed by other parameters, and then securely capped. Fill each sample container in accordance with the QAPP or other sampling outline.

- Inspect labels to see that the samples are properly identified.
- Return each sample bottle to its proper transport container.
- If the sample bottle cannot be filled quickly, keep them cool with the caps on until they are filled.
- Samples must not be allowed to freeze.
- Record the date and time and secure the well head.
- The sample containers will be labeled, placed in a laboratory-supplied cooler with protective packaging (i.e. bubble wrap) and packed on ice (to maintain a temperature of 4˚C).
- A temperature blank in the appropriate sample bottle should accompany each cooler. VOC samples, if collected, should be placed in the same cooler, if possible, and a trip blank should accompany each cooler containing VOCs.
- Samples for laboratory analysis will be shipped overnight or delivered to an approved NYSDOH ELAP-certified laboratory. Analyses will be conducted using USEPA methodologies as specified in the Work Assignment Scoping Documents. Samples will be managed in accordance with the QAPP. COC procedures will be followed as outlined in the QAPP.

2.6 Field Meter Calibration

The Site Supervisor is responsible for documenting that quality control and the approach to calibrating adhere to the procedures described below. Site workers are responsible for following the procedures. Field measurement equipment will be calibrated according to the manufacturers' recommended guidelines. If a meter exhibits unacceptable error according to manufacturer specifications, it will be recalibrated. If after recalibration, the meter still exhibits unacceptable error, it will be replaced. Field equipment will be supplied and maintained by a manufacturer-approved supplier.

2.6.1 Calibration of Organic Vapor Monitors

The purpose of this guideline is to provide general standards for the use and calibration of air quality monitoring equipment, designated as organic vapor monitors (OVMs) such as the PID, used to detect and quantify specific organic vapors. These instruments can be used for headspace gas analysis of collected soil samples as well as for site safety.

Proper implementation of these guidelines relies upon the following special considerations, requirements, and equipment. The OVMs will be charged nightly prior to field use the next day. Instrument life span between charges is approximately 8 hours. The instruments will be turned off between readings to conserve battery life. Operating instructions issued by the manufacturer will be used, as they are regularly updated.

The field instrument will be calibrated daily in accordance with the manufacturer's operating instructions and procedures, which will be provided on site with the instrument. OVMs should be calibrated using a two-point calibration system consisting of both zero and span gasses and will then be compared to an ambient air baseline. Instrument calibration readings will be recorded in field notes and on a record of calibration. Calibration documentation will be maintained in an on-site project office.

2.6.2 Calibration of Water Quality Meter

The purpose of this guideline is to provide general standards for the use and calibration of the water quality meter, which is used to take field measurements of turbidity, DO, pH, specific conductivity, ORP, and temperature.

Proper implementation of these guidelines relies upon the following special considerations, requirements, and equipment. Operating instructions and procedures issued and updated by the manufacturer will be used for field calibration and will be provided with the instruments. Instrument sensors (except temperature) will be calibrated daily and recorded in field notes. Calibrated parameters should read within the manufacturer's specification. If calibrated values do not fall within the manufacturer-specified threshold troubleshooting will be performed as outlined in the equipment manual or the equipment will be replaced. Calibration documentation detailing the calibration and maintenance history will be maintained at the on-site project office.

Prior to calibration, instrument probes should be cleaned and decontaminated in accordance with Section 2.7 below.

2.7 Decontamination

To prevent cross-contamination of the sample locations, field instruments to be re-used (e.g., electronic water level indicator, submersible pump, slug) will be thoroughly decontaminated after use at each location. Drilling equipment (i.e., HSAs, sonic drill rods) will be decontaminated by steam cleaning and/or pressure washing after use at each sample location. Decontamination activities will be performed over a temporary decontamination area lined with polyethylene sheeting for rinse water collection. Rinse water from the decontamination activities will be collected, drained into 55-gallon drums or polyethylene-lined roll-off containers, and labeled for appropriate waste management in accordance with Section 2.8.

Field instruments will be decontaminated in the following manner:

1. Tap water rinse
2. Scrub with tap water containing non-phosphate detergent Alconox™
3. Tap water rinse
4. De-ionized water rinse (for in-situ monitoring equipment)
5. Air dry

Disposable equipment (e.g., bailers, tubing, and soil sampler liners) will not be reused.

2.7.1 Equipment Decontamination

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

- Drilling equipment including the backhoe, bucket, and drilling rig; augers; bits; rods; tools; split-spoon samplers; and tremie pipes will be cleaned with a high-pressure, steam-cleaning unit before beginning work, following the completion of borings, wells, test pits/excavations, and prior to exiting the site.

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

2.7.2 Sampling Equipment Decontamination

2.7.2.1 Equipment and Supplies

- Potable water;
- Phosphate-free detergent;
- Water, including potable water, distilled water, and/other laboratory-grade deionized water;
- Aluminum foil;
- Plastic/polyethylene sheeting;
- Plastic buckets and brushes; and
- PPE in accordance with the PSHEP

2.7.2.2 Decontamination Procedures

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

2.8 Management of Investigation-Derived Waste

Field activities may generate waste materials that will require management. This section describes management procedures for investigation-derived waste (IDW).

Various IDW will be generated during many of the field activities associated with the Suntru Street Site. These wastes consist of liquids, solids, and PPE. Liquid IDW generally consists of water used for equipment and/or personnel decontamination (rinsate) and water produced during monitoring well development, sampling, and/or aquifer testing. Other potential sources of liquid IDW may include stormwater that has contacted temporarily exposed waste (from drilling) and surface accumulations of leachate that may require handling so as not to interfere with investigation activities. Solid IDW includes native soil cuttings and/or wastes extracted from the subsurface during drilling activities, used disposable items (PPE, decon pad), disposable sampling materials (bailers, plastic sampling liners and sheeting), used PVC pipe, and materials used during decontamination activities. All generated IDW will be properly containerized in polyethylene-lined rolloff boxes or 55-gallon drums, characterized by analytical sampling, and disposed offsite. Liquid IDW is currently planned to be trucked to the West Station MGP site to undergo treatment at the West Station Construction Water Treatment Plant. All offsite disposal will be done in compliance with the applicable local and federal regulations.

3.0 SAMPLE MANAGEMENT

3.1 Field Sampling Records

Information will be recorded in field notebooks to document the procedures used and the prevailing conditions during the field investigation. Previous field records will be reviewed at each site visit, and any unusual site conditions encountered during the field investigation will be described. Field documentation of activities will be comprehensively recorded. For example, when sampling is conducted, the following types of information will be recorded:

- Name of sampler(s)
- Date and time of sampling
- Sample type
- Sampling location description and/or grid coordinates (including photographs, if needed)
- Sampling method, sample containers, and preservatives used
- Sample weight or volume (if applicable)
- Number of samples taken
- Unique sample identification number (Location ID)
- Amount of water purged (for groundwater sampling)
- Field observations (prevailing weather conditions and other relevant factors that might influence sample integrity)
- Field measurements conducted
- Name/initials of person responsible for observation

The sample nomenclature system for the site was developed to provide consistency in field sample ID. Three identification labels will be associated with field samples:

- COC Number (#)
- Location ID
- Field Sample ID

3.1.1 COC

The COC # is a numeric designation that will be assigned by the Data Manager (DM) and provided to field team in advance of field operations.

3.1.2 Location ID

The Location ID represents the physical location where samples are collected. Each unique field sample will be associated with a Location ID and identified on the COC form at the time of sample collection. The Location ID consists of a description of the sampling event (BL), the sample location type (such as well or boring), and a three-digit sample location number:

B L - * * # # #
Sampling Event - Location type Location number

The location types will be:

- GW for groundwater
- SB for soil boring

The location numbers will be:

- Monitoring well IDs for groundwater samples
- Generic numbered counts for soil samples

Waste characterization samples will not have associated location numbers.

3.1.3 Field Sample ID

The Field Sample ID is the unique label assigned to each individual sample.

For soil samples, the Field Sample ID will consist of the Location ID, sample depth interval (d1-d2) and a signifier at the end denoting sample type. Groundwater samples will follow the same pattern, with the exception of the depth interval.

B L - * * # # # - d 1 - d 2 *
Location ID- Depth Sample Type

The sample types will be:

- A for normal analytical samples
- QC for analytical field duplicate, matrix spike, and matrix spike duplicate samples
- WC for waste characterization samples

For blanks, the Field Sample ID will consist of the sample type (TB, EB, FB), 6 digit date, and a cooler number. For example, a trip blank collected on 02/26/2020 for cooler 1 would be TB-022620-1.

Upon collection of the sample(s), a field team member will affix an identification label to the sample container(s). A label provided by the laboratory may be used or any other label that includes the information provided herein.

3.2 Sample Handling

Samples will be collected into the laboratory-supplied pre-preserved sample containers. Each individual sample container will be sealed according to laboratory specifications after sampling. Clean, disposable nitrile gloves will be worn during the handling of all samples and sampling devices.

3.2.1 Preservation of Samples

Each containerized sample will be labeled and placed as soon as possible into an insulated sample cooler. The cooler will serve as a shipping container and should be provided by the laboratory along with the appropriate sample containers. Wet ice will be placed directly in contact with the sample containers within a heavy-duty polyethylene bag. Samples will be maintained at a cool temperature (optimum 4°C ± 2°C) from the time of collection until the coolers arrive at the laboratory (if required).

Plastic "bubble wrap" and/or polystyrene foam will be used to protect glass sample jars during shipping.

3.2.2 Field Custody Procedures

The custody of samples collected during the field investigation will be traceable at all times. Prior to shipment of the samples to the laboratory, a COC form will be completed by the field sample custodian. Sample locations, sample identification numbers, description of samples, number of samples collected, and specific laboratory analyses to be run on each sample will be recorded on the sample COC form. The field sample custodian will sign and date the sample COC form and will retain a copy for the project records (if available). The sample COC form will record possession of the samples from the time of collection until disposing or archiving the sample. A sample is considered under custody if:

- It is in the investigator's possession.
- It is in the investigator's view after possession has been established.
- The investigator locks up the sample after possession.
- It is in a designated secure area.

The sample COC must be maintained at all times prior to analysis.

Prior to shipment by a registered courier, the sample shipping container (e.g., cooler, box) will be sealed with the signed sample COC inside. The authorized laboratory custodian that receives the samples will sign the sample COC forms, thus terminating custody of the field sample custodian.

3.2.3 Laboratory Custody Procedures

Sample custody at the analytical laboratory is maintained through systematic sample control procedures composed of the following items:

- Sample receipt
- Sample log-in
- Sample storage
- Sample archival/disposal

As samples are received by the laboratory, they will be entered into a sample management system. The following minimum information will be provided:

- Laboratory sample number/identification
- Field sample designation
- List of analyses requested for each sample container

Immediately after receipt, samples will be transferred to a secure storage area with appropriate temperature control to await preparation and analysis. The laboratory's COC procedures are documented in the laboratory's quality assurance plan, which will be provided upon request.

3.2.4 Quality Control Checks

Equipment blanks, method/preparation blanks, field duplicates, matrix spike/matrix spike duplicates /replicate samples, and laboratory control samples will be analyzed to assess the quality of the data resulting from the field sampling and analytical programs. The QAPP dictates the frequency of duplicate and blank collection.

Field quality assurance/quality control (QA/QC) samples are handled, transported, and analyzed in the same manner as the actual field samples. If possible, the QA/QC samples should not be held on site for more than four calendar days. If sample preservation includes cooling, the temperature of the blanks, except the trip blanks, must be maintained at 4°C while on site and during shipment. The trip blank is not shipped to the site on ice but must be maintained at 4°C when accompanying collected samples requiring cooling. Holding times for individual parameters are dictated by the specific analytical method used.

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ATTACHMENT 1 BORING LOG DRILLING RECORD

Contractor:	PARSONS DRILLING RECORD	BORING/ WELL NO.	Page of
Driller:		Location Description:	
Oversight:	PROJECT NAME:		
Rig Type:	PROJECT Location:		

GROUNDWATER OBSERVATIONS					Location Plan
Apparent Borehole DTW:			ft bls		
Measured Water Level:			ft (TOC)	Date/Time Start:	
Total Depth of Well:			ft bls	Date/Time Finish:	
Additional Comments:					

Sample Type	SPT	% Recovery	PID (ppm)	USCS Symbol	Depth (ft bls)	FIELD IDENTIFICATION OF MATERIAL	SCHEMATIC Drawing Not to Scale	COMMENTS

SAMPLING METHOD

HC = Hand Cleared (post hole)

SS= Split Spoon

COMMENTS:

ATTACHMENT 2 MONITORING WELL DEVELOPMENT LOG

WELL DEVELOPMENT LOG

Well ID:

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

Well information:

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

* Measuring point ______ Pump setting* (intake) ______

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

Development Water Characteristics:

Total volume of Development water removed: ______

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

NOTES:

Geologist Signature:

ATTACHMENT 3 LOW FLOW GROUNDWATER SAMPLING LOG

Low Flow Ground Water Sampling Log

Date ____________ Personnel ____________ Weather ____________

Site Name ____________ Evacuation Method ____________ Well # ____________

Site Location ____________ Sampling Method ____________ Project # ____________

Well information:

Depth of Well * ____________ ft.

Depth to Water * ____________ ft.

Length of Water Column ____________ ft.

Depth to Intake * ____________ ft.

* Measurements taken from

☐ Top of Well Casing

☐ Top of Protective Casing

☐ (Other, Specify)

Start Purge Time: ____________

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

End Purge Time: ____________

Water sample:

Time collected: ____________ Total volume of purged water removed: ____________

Physical appearance at start

Color ____________

Odor ____________

Sheen/Free Product ____________

Physical appearance at sampling

Color ____________

Odor ____________

Sheen/Free Product ____________

Field Test Results:

Dissolved ferrous iron: ____________

Dissolved total iron: ____________

Dissolved total manganese: ____________

Analytical Parameters:

Sample	Container Type	# Collected	Field Filtered	Preservative	Container pH

APPENDIX E QUALITY ASSURANCE PROJECT PLAN

QUALITY ASSURANCE PROJECT PLAN (QAPP)

BAUSCH AND LOMB SUNTRU STREET SITE

Prepared For:

1400 N. Goodman Street
Rochester, NY 14609

Prepared By:

301 Plainfield Road, Suite 330
Syracuse, New York 13212

DECEMBER 2024

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LIST OF ACRONYMS

ACRONYM	Definition
ASTM	American Society for Testing and Materials
BFB	4-Bromofluorobenzene
°C	degrees Celsius
CAR	corrective action request
CCS	contract compliance screening
CFR	Code of Federal Regulations
CLP	Contract Laboratory Program
COC	chain-of-custody
DFTPP	decafluoro-triphenyphosphene
D	absolute difference
DL	detection limit
DOT	Department of Transportation
DQO	data quality objective
DUSR	Data Usability Summary Report
EDD	electronic data deliverable
FAP	Field Activities Plan
GC	gas chromatography
GC/MS	gas chromatography/mass spectroscopy
HASP	Health and Safety Plan
ICP	inductively coupled plasma
IDL	instrument detection limit
LCS	laboratory control sample
LIMS	Laboratory Information Management System
LPM	Laboratory Project Manager
MD	matrix duplicate
MDL	method detection limit
mg/kg	milligram per kilogram
mg/L	milligrams per liter
mL	milliliter
MS	matrix spike
MS/MD	matrix spike/matrix duplicate
MS/MSD	matrix spike/matrix spike duplicate
MSB	matrix spike blank
MSD	matrix spike duplicate
NCM	Nonconformance Memo
NIST	National Institute of Standards and Technology
OM	Operations Manager
PARCCS	precision, accuracy, representativeness, completeness, comparability, and sensitivity
PFOA	perflourooctanoic acid
PID	photoionization detector
PRRL	Project Required Quantitation Limit
PQL	project quantitation limit
QA	quality assurance
QA/QC	quality assurance/quality control
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
QC	quality control
QL	quantitation limit
RL	reporting limit
%R	percent recovery
ROD	Record of Decision
RPD	relative percent difference
SDG	sample delivery group
SOP	Standard Operating Procedure
SOW	statement of work
SVOC	semivolatile organic compound
TAL	target analyte list
TOGS	Technical and Operational Guidance Series
ug	micrograms
USEPA	Unites States Environmental Protection Agency
VOC	volatile organic compound

SECTION 1 PROJECT DESCRIPTION

1.1 Introduction

This Quality Assurance Project Plan (QAPP) has been prepared to support activities and specifies the quality assurance/quality control (QA/QC) procedures for field and laboratory sampling and measurements for the investigation at the Suntru Street Site. The specific objectives of the QAPP are:

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

This QAPP has been prepared in accordance with Unites States Environmental Protection Agency (USEPA) guidance (USEPA 2001 and 2002).

SECTION 2 PROJECT ORGANIZATION

2.1 Project And Team Organization

The project organization will include Nathan Kranes serving as the Project Manager and Maryanne Kosciewicz serving as the Quality Assurance Officer and Qualified data usability summary report (DUSR) Preparer for the Remedial Investigation. The credentials for each are included in Attachment 2. The project organization is designed to promote the exchange of information and for efficient project operation.

2.1.1 Analytical Services

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

2.2 Special Training/Certification

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

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

Laboratories will have trained and experienced staff capable of performing the analyses specified in this QAPP. Laboratories will have current ELAP certification for all project analyses where applicable. Additionally, the laboratories must be able to demonstrate that they have analyzed performance-evaluation or proficiency-testing samples within 12 months of beginning the analyses.

All personnel independent of the laboratory generating the data who are performing data validation and verification must have experience in data validation, quality assurance oversight, and auditing. The data validator must have a Bachelor's degree in chemistry or natural sciences with a minimum of 20 credit hours in chemistry; one year experience in the implementation and application of analytical laboratory methodologies; and one year experience evaluating data packages of all matrices (e.g., soil, water, air, tissue) for compliance and usability with respect to the USEPA National Functional Guidelines with regional modifications. In the case of this project, Mrs. Maryanne Kosciewicz will be performing the data validation. She has 35 years of experience, 30 of which are with Parsons as a quality assurance chemist.

SECTION 3 DATA QUALITY OBJECTIVES AND DATA QUALITY CRITERIA

3.1 Introduction

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

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

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

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

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

This data assessment activity is an on-going coordinated process with data production and is intended to assure that data produced during the project are acceptable for use in subsequent evaluations. Both statistical and qualitative evaluations will be used to assess the quality of the data. The primary evaluation of the data will be based upon the field quality control samples described in **Section 8.1.1** and the laboratory quality control samples described in **Section 8.1.2**. The “blank” samples (laboratory QC blank samples and field QC blank samples) will be used to evaluate whether or not the laboratory and/or the field team’s procedures for handling of samples represent a possible source of sample contamination. Laboratory duplicate sample results will be used to evaluate analytical precision. Field duplicate sample results will be used to evaluate the overall precision of the sampling and analysis process, as well as sample representativeness and site heterogeneity. Laboratory control samples will be used to evaluate the accuracy of analytical results, as will other analysis-specific criteria, such as surrogate compound recoveries for applicable organic analyses. Matrix spike/matrix spike duplicate (MS/MSD) analysis of project samples will be used to evaluate potential sample matrix effects on the analytical results (both of the sample utilized for MS/MSD and of other samples collected from the site). For all sample results, the impact of sample-specific, analysis-specific, and site-specific factors will be evaluated and an assessment will be made as to their impact, if any, on the data. Duplicate sample (field and laboratory QC samples) results will be used to evaluate data precision.

3.1.1 Data Use Objectives

Data use objectives define why analyses are being conducted and how ultimately the data will be used to meet the overall project objectives. For the investigation activities, these project objectives are described in the Supplemental Site Characterization Work Plan.

3.2 Data Quality Objectives (PARCCS Parameters)

3.2.1 Introduction

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

- **Level I, Field screening or analysis using portable instruments (e.g., photoionization detector [PID]):** Results are often not compound-specific but results are available in real time. Depending on the analysis being performed and the instrumentation used, the results may be considered qualitative, semi-quantitative, or quantitative.
- **Level II, Field analysis using more sophisticated portable analytical instruments (e.g., on-site mobile laboratory):** There is a wide range in the quality of data that can be generated depending on the use of suitable calibration standards, reference materials, and sample preparation equipment. Results are available in real-time or typically within hours of sample collection.
- **Level III, All analyses performed in an off-site analytical laboratory using methods other than USEPA-approved analytical methods**: These data generally do not include the level of formal documentation required under Level IV and are not subject to formal data validation. These data are typically used for engineering studies (e.g., treatability testing), site investigations and remedial design.
- **Level IV, Data generated using USEPA methods and enhanced by a rigorous QA program, supporting documentation, and data validation procedures:** These data are typically used for engineering studies (e.g., treatability testing), risk assessment, site investigations, and remedial design, and may be suitable for litigation/enforcement activities. Results are both qualitative and quantitative.

Project data quality level requirements for sample analyses have been determined to be as follows:

- Level I data quality will be obtained for field screening data collected with portable instruments such as pH meters, temperature probes, and PIDs which will be used for health and safety and field operational monitoring. In addition, these instruments or field test kits may be used to produce data for determining where to collect a sample to assess impacts and for field screening of samples to be designated for laboratory confirmation analyses. A Level III data quality assurance program will be executed by the laboratory for chemical analyses not required to be Level IV, such as pH.

- A Level IV data quality assurance program will be executed, in general, by the laboratory for chemical analyses necessary to meet the work assignment objectives.

3.2.2 PARCCS Parameters (Data Quality Indicators)

3.2.2.1 Precision

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

The objectives for precision for each chemical are based on the capabilities of the approved EPA analytical method with respect to laboratory performance. For this project, field-sampling precision will be determined by analyzing coded (blind) duplicate samples for the same parameters, and then, during data validation, calculating the %RPD for duplicate sample results. Field duplicate precision criteria for the water samples will be 30%RPD, and 50%RPD for soil and sediment samples. The laboratory will determine analytical precision by calculating the %RPD or %D, as applicable to the analytical method being used, e.g., pH will be evaluated using %D.

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

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

where:

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

For data evaluation purposes, in instances where both sample concentrations are less than five times (<5x) the RL, duplicate precision will be evaluated using the calculated %D result. In this instance, the applicable precision criterion will be two times the RL (2xRL). If a value is not detected, the %RPD criterion will be considered to be not applicable and the %RPD will not be calculated (i.e., precision will not be quantitatively determined). The data quality objectives for analytical precision, calculated as the RPD between duplicate analyses, are presented in **Tables 3.1A** and **3.1B**.

3.2.2.2 Accuracy

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

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

Accuracy is normally measured as the percent recovery (%R) of a known amount of analyte, called a *spike*, added to a sample (matrix spike or laboratory control). The accuracy on a per sample basis will be measured using surrogates for the organics analyses. The %R is calculated as follows:

Matrix Spike Recovery:

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

where:

%R	=	Percent recovery
SSR	=	Spike sample result: concentration of analyte obtained by analyzing the sample with the spike added
SR	=	Sample result: the background value; *i.e.,* the concentration of the analyte obtained by analyzing the sample
SA	=	Spiked analyte: concentration of the analyte spike added to the sample

Surrogate Recovery:

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

LCS Recovery:

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

The acceptance limits for accuracy for each parameter are presented in **Tables 3.1A and 3.1B**.

3.2.2.3 Representativeness

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

Field and laboratory procedures will be performed in such a manner as to ensure, to the degree technically possible, that the data derived represents the in-place quality of the material sampled. Care will be exercised to see that chemical compounds are not introduced to the sample from sample containers, handling, and analysis.

Field blanks, equipment rinse blanks, trip blanks, and laboratory method/prep blanks will be analyzed to monitor for potential sample contamination from field and laboratory procedures.

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

3.2.2.4 Completeness

Completeness is defined as the percentage of measurements that meet the project's data quality objectives (USEPA 1987). Completeness is calculated for each method (or analyte) and sample matrix for an assigned group of samples. Completeness for a data set represents the results usable for data interpretation and decision making. The completeness objective for the analytical and field data is 95%. Completeness is defined as follows for all sample measurements:

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

where:

%C = Percent completeness

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

T = Total number of measurements

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

3.2.2.5 Comparability

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

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

- Requiring that the significance of all validation qualifiers be assessed any time an analytical result is used for any purpose.

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

3.2.2.6 Sensitivity and Quantitation Limits

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

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

The MDL is defined as "the minimum measured concentration of a substance that can be reported with 99% confidence that the measured concentration is distinguishable from method blank results" (40 CFR 136 Appendix B). MDLs are experimentally determined and verified for each target analyte of the methods in the sampling program. The laboratory will determine MDLs for each analyte and matrix type prior to analysis of project samples. In addition, when multiple instruments are employed for the analysis of the same method, each individual instrument will maintain a current MDL study. MDLs are statistically calculated in accordance with the Title 40, Code of Federal Regulations Part 136 (40 CFR 136) as promulgated in September 2017. If risk-based project objectives are developed, then where practicable, MDLs must be lower than the risk-based criteria determined for the project.

Laboratory RLs and MDLs for all analyses will meet at a minimum the standards criteria specified according to applicable state or federal regulations.

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

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

For samples that do not meet the project-specified RLs or MDLs, (taking into consideration elevated detection limits due to percent solids or percent moisture and aliquots used for the designated analysis), the laboratory must make available compelling documentation (e.g., screening data) and a justifiable explanation for its inability to meet the specified limits using the project protocols. It must also provide an appropriate, justifiable explanation of the issues and resolution in the analytical report/data package (dilution factor, interference, etc.). Excessive, unnecessary dilutions on any sample for a project are unacceptable. The laboratory will analyze all samples initially undiluted, unless for gas chromatography/mass spectroscopy (GC/MS) analyses (i.e., SW8260C and SW8270D), a preliminary GC-screen is performed and indicates that GC/MS instrument damage or compromise may occur if the sample is not analyzed initially at dilution. In this instance, the sample will be analyzed at the lowest possible dilution factor. If multiple extractions/ analyses are performed (such as undiluted and diluted analyses), resulting in several data sets for the same sample, the laboratory will report all data and results from each of the multiple analyses in the data package.

Quantitation limits for all definitive data quality level laboratory analytical methods, compounds, and matrices are presented in the Work Plan.

SECTION 4 DATA ACQUISITION

4.1 Sampling Methods

Any non-disposable sampling equipment used for chemical sampling will be cleaned and decontaminated prior to use to prevent potential cross-contamination between each use. The project sampling plan documents standard operating procedures, best practices, and field decontamination methods to mitigate cross contamination. Additionally, this QAPP describes management, handling, and tracking procedures for investigation-derived waste, including solid and liquid materials, and personal protective equipment.

The special precautions described here will be taken to confirm that each sample collected is representative of the conditions at that location and that the sampling and handling procedures neither alter nor contaminate the sample. If failure in the sampling or measurement system occurs, the procedures specified in **Section 10.3** of this QAPP will be followed to identify who is responsible for implementing the appropriate corrective action. This section presents sample container preparation procedures, sample preservation procedures, and sample holding times.

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

Laboratory-supplied sample kits (coolers containing field chain-of-custody forms, custody seals, sample containers, preservatives, and packing material) will be prepared by the laboratory's Sample Management Staff and shipped to the Field Team Leader. The type of containers, required sample volumes, preservation techniques, and holding times for specific analyses are presented in the **Tables 4.1A, 4.1B,** and **4.1C.**

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

4.2 Sample Handling And Custody

This section presents sample handling and custody procedures for both the field and laboratory. Implementation of proper handling and custody procedures for samples generated in the field is the responsibility of field personnel. Both laboratory and field personnel involved in the chain of custody and transfer of samples will be trained as to the purpose and procedures prior to implementation. For transfer of samples within the laboratory, an internal chain of custody will be required.

4.2.1 Sample Handling

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

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

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

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

- Fill a dry shipment cooler with inert cushioning to a depth of 1 inch to prevent bottle breakage.
- Place the bagged samples and the laboratory-provided temperature blank upright in the sample cooler. The temperature blank should be placed in the center (horizontally and vertically) with the samples surrounding.
- Place additional cushioning material around the sample bottles as necessary.
- Place bags of ice in the remaining void space to keep the samples cooled to 4°C.
- Complete the chain-of-custody form (see **Section 4.2.2**). Place the chain-of-custody form in a polyethylene, sealable bag (such as a 1-gal Ziploc® bag or equivalent) and tape the bag to the interior of the cooler lid. Field personnel retain a copy of the chain-of-custody form; another copy is transmitted to the Quality Assurance Officer (QAO) and the Project Manager specified.
- Prior to sealing for shipment, the list of samples will be checked against the container contents to verify the presence of each sample listed on the chain-of-custody record including the temperature blank.
- Affix a custody seal to the cooler.
- Seal the cooler securely with packing tape, taking care not to cover labels if already present.
- Label the cooler appropriately in accordance with the Department of Transportation (DOT) regulations (49 CFR 171 through 179).
- Ship the samples in accordance with the DOT requirements outlined in 49 CFR 171 through 179. Complete the carrier bill of lading and retain a copy on file.
- Samples will be delivered to the laboratory by the most expedient means to meet holding times. Whenever practicable, samples will be shipped on the day of collection for delivery to the laboratory the morning of the day after collection. The laboratory will be required to adhere to holding times for sample analyses. The field team will carefully coordinate sampling activities with the laboratory to see that holding times are met.

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

4.2.2 Field Sample Custody

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

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

The sample custody flowchart is shown in **Figure 4.1**.

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

A chain-of-custody record will accompany the samples from the time the samples leave the original sampler's possession through the sample shipments' receipt at the laboratory. Triplicate copies of the chain-of-custody record must be completed for each sample set collected. See chart for data requirements. An example chain-of-custody form is shown in **Figure 4.2**.

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

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

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

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

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

4.2.3 Laboratory Sample Management

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

4.2.4 Sample Receipt and Logging

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

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

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

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

4.2.5 Sample Storage Security

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

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

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

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

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

4.2.6 Retention and Disposal of Samples

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

SECTION 5 DATA MANAGEMENT

5.1 Introduction

The electronic data management systems for each work assignment will be implemented to process the information effectively without loss or alteration.

5.2 Field Data Management

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

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

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

5.3 Laboratory Data Management

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

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

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

SECTION 6 DOCUMENTS AND RECORDS

6.1 Introduction

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

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

6.2 Field Records

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

6.2.1 Field Log

A Field Log will be used to document pre-design investigation activities. The field log will have consecutively numbered pages, and documentation will be recorded using waterproof ink. Incomplete lines, pages, and changes in the log will be lined out with a single line, dated, and initialed. More detailed procedures for documenting investigation activities (such as field sampling records and boring log forms) and type of information to include in the field log may be developed.

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

6.2.2 Electronic Field Data Management

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

6.2.3 Chain-of-Custody Record

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

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

6.3 Laboratory Records

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

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

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

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

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

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

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

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

6.3.1 Operational Calibration Records

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

- Standard preparation information, to trace the standards to the original source solution of neat compound, is maintained in LIMS or laboratory standard preparation logs.
- Instrument logbook provides an ongoing record of the calibration for a specific instrument. The logbook should be indexed in the laboratory operations records and should be maintained at the instrument by the chemist. The chemist must sign and date all entries, and the QM or his designee must review them.
- For Level IV data packages, copies of the raw calibration data will be kept with the analytical sample data so the results can readily be processed and verified as one complete data package. If samples from several

projects are processed together, the calibration data is copied and included with each group of data. The laboratory will maintain all calibration, analysis, and corrective action documentation (both hard copy and electronic data) for a minimum of 7 years. The documentation maintained must be sufficient to show all factors used to derive the final (reported) value for each sample. Documentation must include all calculation factors such as dilution factor, sample aliquot size, and dry-weight conversion for solid samples. The individual who performs hand calculations must sign and date them. This documentation must be stored with the raw data. Calculations performed by the data system will be documented and stored as electronic and hard copy data. The instrument printouts will be kept on file, and the electronic data will be stored by the laboratory for a minimum of 7 years.

6.3.2 Maintenance Records

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

6.3.3 Nonconformance Memos

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

6.3.4 Corrective Action Request (CAR) Forms

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

6.3.5 Analytical Data Reports

Analytical data will be reported as an electronic data deliverable (EDD) and as an analytical data package. The laboratory will provide Category A (also known as Level 2 reports) for all samples, as well as Category B deliverables (also known as Level 4 deliverables) for confirmation samples. The EDD will be provided as a NYSDEC EQuIS EDD. The analytical laboratories are required to submit all data, preliminary and final, in formatted EDDs in accordance with these requirements. The laboratory must meet 100% compliance with these requirements. The Parsons Database Manager will submit written requests dictating the requirements and appropriate files to be supplied by the laboratory.

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

6.4 Data Validation and Audit Records

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

6.4.1 Data Usability Summary Reports

The data usability summary report or data validation report will be prepared and will summarize the impacts of using data that do not achieve overall data quality objectives or that do not meet PARCC and sensitivity criteria identified in **Section 3.3**. Additionally, the report will be used to identify, assess and present issues associated with the overall data.

6.4.2 Audit Reports

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

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

SECTION 7 ANALYTICAL PROCEDURES

7.1 Introduction

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

7.2 Standard Operating Procedures

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

- Storage containers and sample preservatives
- Sample receipt and logging
- Sample custody
- Sample handling procedures
- Sample transportation
- Glassware cleaning
- Laboratory security
- QC procedures and criteria
- Equipment calibration and maintenance
- Documentation
- Safety
- Data handling procedures
- Document control
- Personnel training and documentation
- Sample and extract storage
- Preventing sample contamination
- Traceability of standards
- Data reduction and validation
- Maintaining instrument records and logbooks
- Nonconformance
- Corrective actions
- Records management

SECTION 8 QUALITY CONTROL

8.1 Introduction

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

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

8.1.1 Field Quality Control Samples

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

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

8.1.1.1 Equipment Rinse Blanks

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

8.1.1.2 Field Duplicates

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

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

8.1.1.3 Trip Blanks

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

8.1.1.4 Field Blank

The primary purpose of this type of blank is to provide an additional check on possible sources of contamination. A field blank serves a similar purpose as a trip blank regarding water quality and sample bottle preparation. However, it is primarily used to indicate potential contamination from ambient air as well as from sampling instruments used to collect and transfer samples from point of collection into sample containers.

8.1.1.5 Temperature Blank

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

8.1.2 Laboratory Quality Control Samples

QC data from the laboratory are necessary to determine precision and accuracy of the analyses and to demonstrate the absence of interferences and contamination of glassware and reagents. The laboratory will analyze QC samples routinely as part of the laboratory QC procedures. Laboratory QC results will consist of analysis of MS/MSD, LCS, method/preparation blanks, and surrogate spikes. The frequency of the analysis of laboratory QC is summarized in **Table 8.2**. QC samples will be prepared and analyzed utilizing the same preparation and analysis procedures as the field samples. These laboratory QC sample analyses will be run independently of the field QC samples. Results of these analyses will be reported with the sample data and kept in the project QC data file.

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

8.1.2.1 Matrix Spike/Matrix Spike Duplicate/ Matrix Duplicates

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

Spiked samples will be analyzed, and the percent recovery will be calculated. Results of the analysis will be used to evaluate accuracy and precision of the actual sample matrix. For MS/MSD, the result will be compared and used to evaluate the precision of the actual sample matrix. The percent recovery for each analyte in the MS and MSD should fall within the limits established by laboratory QC protocol.

The original sample, MS, and MSD sample aliquots will be treated exactly the same throughout the sample preparation and analysis and will not be homogenized more than any other project sample (either in the field or at the laboratory). The spike samples will be analyzed for the same parameters as the sample. Field personnel must indicate on the chain-of-custody form which sample(s) are designated as MS/MSD. If samples are not designated for these QC purposes and/or insufficient sample is available the Project Manager and/or QAO will be notified for resolution.

8.1.2.2 Laboratory Control Samples

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

8.1.2.3 Method and Preparation Blanks

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

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

8.1.2.4 Surrogate Spike Analyses

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

8.2 Instrument/Equipment Testing, Inspection, And Maintenance

8.2.1 Field Equipment

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

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

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

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

8.2.2 Laboratory Instrumentation

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

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

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

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

8.3 Instrument/Equipment Calibration And Frequency

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

8.3.1 Field Instruments

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

8.3.2 Laboratory Instruments

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

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

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

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

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

8.3.3 Calibration System

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

8.3.3.1 Calibration Procedures

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

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

8.3.3.2 Equipment Identification

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

8.3.3.3 Calibration Frequency

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

8.3.3.4 Calibration Reference Standards

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

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

- **Chemical standards,** such as vendor certified stock solutions and neat compounds, will generally be used for operational calibration. The laboratory, to provide traceability for all standards used for calibration and QC samples, will document standard preparation activities.

8.3.4 Operational Calibration

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

8.3.4.1 Preparation of a Calibration Curve

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

8.3.4.2 Periodic Calibration

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

8.4 Inspection/Acceptance Of Supplies And Consumables

In the laboratory, personnel qualifying reagents and standards must be trained to perform the associated instrumental analysis, including instrument calibration, calculations, and data interpretation. Laboratory personnel must document the purchase, receipt, handling, storage, and tracking of supplies and consumables used during analysis. For example, analytical standards, source materials, and reference materials used for instrumental calibration/tunes/checks must be certified and traceable to the USEPA or NIST through reference numbers documented directly in each analytical sequence. Calibration for all requested analyses must be verified by an independent second source reference. Adhering to these procedures precludes the use of expired supplies and consumables or supplies and consumables that do not meet standard acceptance criteria.

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

SECTION 9 DATA VALIDATION AND USABILITY ELEMENTS

9.1 Data Review, Verification, And Validation

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

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

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

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

Before the laboratory submits data, the laboratory's data review process will include a full first level "technical" review by the laboratory's analyst during sample analysis and data generation. The review must include a check of all QC data for errors in transcription, calculations, and dilution factors and for compliance with QC requirements. Failure to meet method performance QC criteria may result in the reanalysis of the sample or analytical batch. After the initial review is completed, the data will be collected from summary sheets, workbooks, or computer files and assembled into a data package.

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

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

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

The laboratory analytical data will be validated using project-specific data validation procedures to confirm that data meet the applicable data quality objectives. Depending on the type of data and the intended data uses, the data validation process for a given SDG (or a specific percentage of sample analyses) or analytical method may be performed following a Level IV protocol (full validation), or a Level III protocol (sample plus QC summary data only, no raw data review). The project-specific Level III data validation protocol will provide a level of review resulting in the generation of a data validation report. Level III validation will be performed on all DQO Level III and all DQO Level IV data. Ten percent (10%) of the DQO Level IV Data for each analytical method will undergo a Level IV validation (i.e., USEPA Stage 3 data validation) with the remaining ninety percent (90%) of the DQO Level IV Data for each analytical method will undergo a Level III validation (i.e., USEPA Stage 2B data validation). Certain geotechnical and field screening data may be evaluated in a manner suitable for the intended data uses.

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

After data validation, the data will be evaluated for consistency with site conditions and developed conceptual models. Data validation personnel will prepare a project data validation report that summarizes the implications of the use of any data out of criteria. In addition, the data usability report will include the percentage of sample completeness for critical and non-critical samples and a discussion of any issues in representativeness of the data that may develop as a result of validation. The data usability report will address overall data quality and achievement of PARCCS criteria and assess issues associated with the overall data and data quality for all validated Level III and Level IV data.

9.2 Verification And Validation Methods

9.2.1 Laboratory

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

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

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

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

9.2.2 Analytical Data Validation

The data review process is performed in two phases:

1. **Initial phase, contract compliance screening (CCS)**: Review of sample data deliverables for completeness. Completeness is evaluated by ensuring that all required data deliverables are received in a legible format with all required information. The CCS process also includes a review of the chain-of-custody forms, case narratives, and RLs. Sample resubmission requests, documentation of nonconformances with respect to data deliverable completeness, and corrective actions often are initiated during the CCS review. The results of the CCS process are incorporated into the data validation process.
2. **Second phase, data validation:** A project-specific data validation procedure based on a “Level III” or the “Level IV” validation protocol will be performed on the analytical results from the fixed-base laboratory or laboratories, with the exception of the bench-scale testing data. The Level III validation protocol, which be applied to Level III data packages and Level IV data packages not receiving “full” Level IV validation includes a review of summary information to determine adherence to analytical holding times, results from analysis of field duplicates, method blanks, field blanks, surrogate spikes, MS/MSDs, LCSs, and sample temperatures during shipping and storage. Data qualifiers are applied to analytical results during the data validation process based on adherence to method protocols and laboratory-specific QA/QC limits. The Level IV validation protocol incorporates the Level III validation protocol and adds calculation checks from the raw data of reported and summarized sample data and QC results.

The laboratory will send the required analytical data package deliverables, consisting of hardcopy versions and the EDD, following completion of the laboratory’s validation process (**Section 9.2.2**). Data validation will be performed in accordance with the USEPA National Functional Guidelines for organic and inorganic data review (USEPA 2020a, 2020b). In addition, Parsons will refer to this QAPP and the Work Assignment Scoping Documents to verify that DQOs were met. If problems are identified during data validation, the QAO and the laboratory QA manager will be alerted, and corrective actions will be requested. The LPM and data validation chemists will maintain close contact with the QAO to ensure all nonconformance issues are acted upon prior to data manipulation and assessment routines. Where USEPA guidelines and SW-846 disagree, this QAPP and data validation professional judgment will prevail.

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

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

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

9.3 Reconciliation With User Requirements

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

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

SECTION 10 ASSESSMENT AND OVERSIGHT

10.1 Assessments And Response Actions

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

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

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

10.2 Project-Specific Audits

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

10.2.1 System Audits

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

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

10.2.2 Performance Audits

The laboratory may be required to conduct an analysis of PE samples or provide proof that PE samples were submitted by an approved USEPA or applicable state performance testing provider within the past 12 months. If necessary, proof that applicable PE samples have been analyzed at the laboratory within the past 12 months will be included in the laboratory procurement package.

10.2.3 Formal Audits

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

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

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

10.2.4 Laboratory Audits

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

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

10.2.4.1 Laboratory Performance Audits

Performance audits are independent sample checks made by a supervisor or auditor to arrive at a quantitative measure of the quality of the data produced by one section or the entire measurement process. Performance audits are conducted by introducing control samples, in addition to those used routinely, into the data production process. These control samples include PE samples of known concentrations. The results of performance audits will be evaluated against acceptance criteria. The results will be summarized and maintained by the laboratory QA manager and distributed to the supervisors who must investigate and respond to any results that are outside control limits.

10.2.4.2 Laboratory Internal Audits

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

10.2.4.3 Laboratory Data Audits

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

10.2.4.4 Laboratory Audit Procedures

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

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

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

10.2.4.5 Laboratory Documentation

To confirm that the previously defined scope of the individual audits is accomplished and that the audits follow established procedures, a checklist will be completed during each audit. The checklist will detail the activities to be executed and ensure that the auditing plan is accurate. Audit checklists will be prepared in advance and will be available for review.

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

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

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

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

10.3 Corrective Actions

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

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

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

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

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

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

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

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

SECTION 11 REPORTS TO MANAGEMENT

11.1 QA Reports

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

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

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

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TABLES

TABLE 3.1A QUALITY CONTROL LIMITS FOR GROUNDWATER SAMPLES

			Laboratory Accuracy and Precision				
Analytical Parameters	**Analytical Method**	**Matrix Spike (MS) Compounds**	**MS/MSD (a) % Recovery**	**MS/MSD RPD (b)**	**LCS (c) % Recovery**	**Surrogate Compounds**	**Surrogate % Recovery**
VOCs	SW-846 Method 8260	All VOCs	Lab QC Limit	Lab QC Limit	Lab QC Limit	Toluene-d8 4-Bromofluorobenzene 1,2-Dichloroethane-d4 Dibromofluoromethane	Lab QC Limit
SVOCs	SW-846 Method 8270	All SVOCs	Lab QC Limit	Lab QC Limit	Lab QC Limit	Nitrobenzene-d5 2-Fluorobiphenyl Terphenyl-d14 Phenol-d5 2-Fluorophenol 2,4,6-Tribromophenol	Lab QC Limit
Metals	SW-846 Method 6010	All Metals	75-125	0-20	80-120	NA	NA
PCBs	SW-846 Method 8082	PCB-1016 PCB-1260	Lab QC Limit	Lab QC Limit	Lab QC Limit	Decachlorobiphenyl Tetrachloro-m-xylene	Lab QC Limit
Pesticides	SW-846 Method 8081	All Pesticides	Lab QC Limit	Lab QC Limit	Lab QC Limit	Decachlorobiphenyl Tetrachloro-m-xylene	Lab QC Limit
Herbicides	SW-846 Method 8151	All Herbicides	Lab QC Limit	Lab QC Limit	Lab QC Limit	DCAA	Lab QC Limit
PFAS	USEPA Method 1633	All PFAS	Lab QC Limit	Lab QC Limit	Lab QC Limit	All PFAS Isotope Dilution	Lab QC Limit
1-4 Dioxane	SW-846 Method 8270 SIM	1,4-Dioxane	Lab QC Limit	Lab QC Limit	Lab QC Limit	1,4-Dioxane-d8	Lab QC Limit

(a) Matrix Spike/Matrix Spike Duplicate
(b) Relative Percent Difference
(c) Laboratory Control Sample
NA - Not Applicable

TABLE 3.1B QUALITY CONTROL LIMITS FOR SOIL SAMPLES

			Laboratory Accuracy and Precision				
Analytical Parameters	**Analytical Method**	**Matrix Spike (MS) Compounds**	**MS/MSD (a) % Recovery**	**MS/MSD RPD (b)**	**LCS (c) % Recovery**	**Surrogate Compounds**	**Surrogate % Recovery**
Metals	SW-846 Method 6010	All metals	75-125	0-20	80-120	NA	NA
Mercury	SW 846 Method 7471	Mercury	75-125	0-20	80-120	NA	NA
VOCs	SW-846 Method 8260	All VOCs	Lab QC Limit	Lab QC Limit	Lab QC Limit	Toluene-d8 4-Bromofluorobenzene 1,2-Dichloroethane-d4 Dibromofluoromethane	Lab QC Limit
SVOCs and 1,4-Dioxane	SW-846 Method 8270	All SVOCs and 1,4-Dioxane	Lab QC Limit	Lab QC Limit	Lab QC Limit	Nitrobenzene-d5 2-Fluorobiphenyl Terphenyl-d14 Phenol-d5 2-Fluorophenol 2,4,6-Tribromophenol	Lab QC Limit
Chromium (trivalent and hexavalent)	SW-846 Method 7196	Chromium (trivalent and hexavalent)	Lab QC Limit	Lab QC Limit	Lab QC Limit	NA	NA
Cyanide	SW-846 Method 9014	Cyanide	80-120	0-20	90-110	NA	NA
PCBs	SW-846 Method 8082	PCB-1016 PCB-1260	Lab QC Limit	Lab QC Limit	Lab QC Limit	Decachlorobiphenyl Tetrachloro-m-xylene	Lab QC Limit
Pesticides	SW-846 Method 8081	All Pesticides	Lab QC Limit	Lab QC Limit	Lab QC Limit	Decachlorobiphenyl Tetrachloro-m-xylene	Lab QC Limit

			Laboratory Accuracy and Precision				
Analytical Parameters	**Analytical Method**	**Matrix Spike (MS) Compounds**	**MS/MSD (a) % Recovery**	**MS/MSD RPD (b)**	**LCS (c) % Recovery**	**Surrogate Compounds**	**Surrogate % Recovery**
PFAS	USEPA Method 1633	All PFAS	Lab QC Limit	Lab QC Limit	Lab QC Limit	All PFAS Isotope Dilution	Lab QC Limit

(a) Matrix Spike/Matrix Spike Duplicate
(b) Relative Percent Difference
(c) Laboratory Control Sample
NA - Not Applicable

TABLE 4.1A GROUNDWATER SAMPLE CONTAINERIZATION, PRESERVATION, AND HOLDING TIMES

Analysis	Bottle Type	Preservation [(a)]	Holding Time [(b)]
VOCs	3-40 mL glass vial w/ Teflon septum	HCl to pH<2 Cool to 4^{o}C	14 days
SVOCs	1000 mL glass w/ Teflon lined cap	Cool to 4^{o}C	7 days for extraction, 40 days for analysis
Iron, Manganese	250 mL plastic	HNO_3 to pH<2 Cool to 4^{o}C	6 months
Dissolved Gases	2-40 mL glass vial w/ Teflon septum	HCl to pH<2 Cool to 4^{o}C	14 days
Oil and Grease	1000 mL glass w/ Teflon septum	HCl to pH<2 Cool to 4^{o}C	28 days
TOC	2-40 mL glass vial w/ Teflon septum	HCl to pH<2 Cool to 4^{o}C	28 days
Nitrate, Nitrite	100 mL plastic	Cool to 4^{o}C	48 hours
Sulfate	100 mL plastic	Cool to 4^{o}C	28 days

(a) All samples to be preserved in ice during collection and transport.

(b) Days from sample collection.

TABLE 4.1B SOIL SAMPLE CONTAINERIZATION, PRESERVATION, AND HOLDING TIMES

Analysis	Bottle Type	Preservation [(a)]	Holding Time [(b)]
VOCs	3-TerraCore or Encore vials	$NaHSO_4$ / Methanol Cool to 4^oC	14 days
SVOCs	8 oz jar	Cool to 4^oC	14 days for extraction 40 days for analysis
Metals	4 oz jar	Cool to 4^oC	6 months
Mercury	4 oz jar	Cool to 4^oC	28 days
Cyanide	4 oz jar	Cool to 4^oC	14 days
Hexavalent Chromium	4 oz jar	Cool to 4^oC	24 hours after extraction

(a) All samples to be preserved in ice during collection and transport.

(b) Days from sample collection.

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

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

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

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

TABLE 8.1 SUMMARY OF FIELD QC SAMPLE TYPES AND COLLECTION FREQUENCY

Field QC Sample Type	Sample Type	Collection Frequency
Equipment Rinse Blank	Water, Soil	1:20 samples per type of sample collection activity using non-disposable sampling equipment. Once per lot for disposable sampling equipment.
Field Blank	Water	1:20 Samples
Trip Blank	Water	One per cooler of aqueous VOC samples
Field Duplicates	Water, Soil	1:20 Samples
Extra Volume Sample (collected for MS/MSD)	Water, Soil	1:20 Samples

TABLE 8.2 LABORATORY QUALITY CONTROL SAMPLE FREQUENCY

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

TABLE 8.3 OPERATIONAL CALIBRATION FORMULAS

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

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

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

TABLE 8.4 PERIODIC CALIBRATION REQUIREMENTS

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

TABLE 8.5 SAMPLE CONCENTRATION CALCULATION FORMULAS

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

1. Used for quantitation by the external standard technique
2. Used for quantitation by the internal standard technique
3. Used for total, filterable, nonfilterable, and volatile residues as well as gravimetric oil and grease
4. Used to calculate the dry-weight concentration of a solid sample from the analytical concentration of the processed sample.
5. Conversion factor to convert g/mL to mg/L:
   $\frac{mg}{L} = \frac{g}{mL} \times \frac{10^3 mL}{L} \times \frac{10^3 mg}{}$

FIGURES

FIGURE 4.1 SAMPLE CUSTODY FLOW CHART

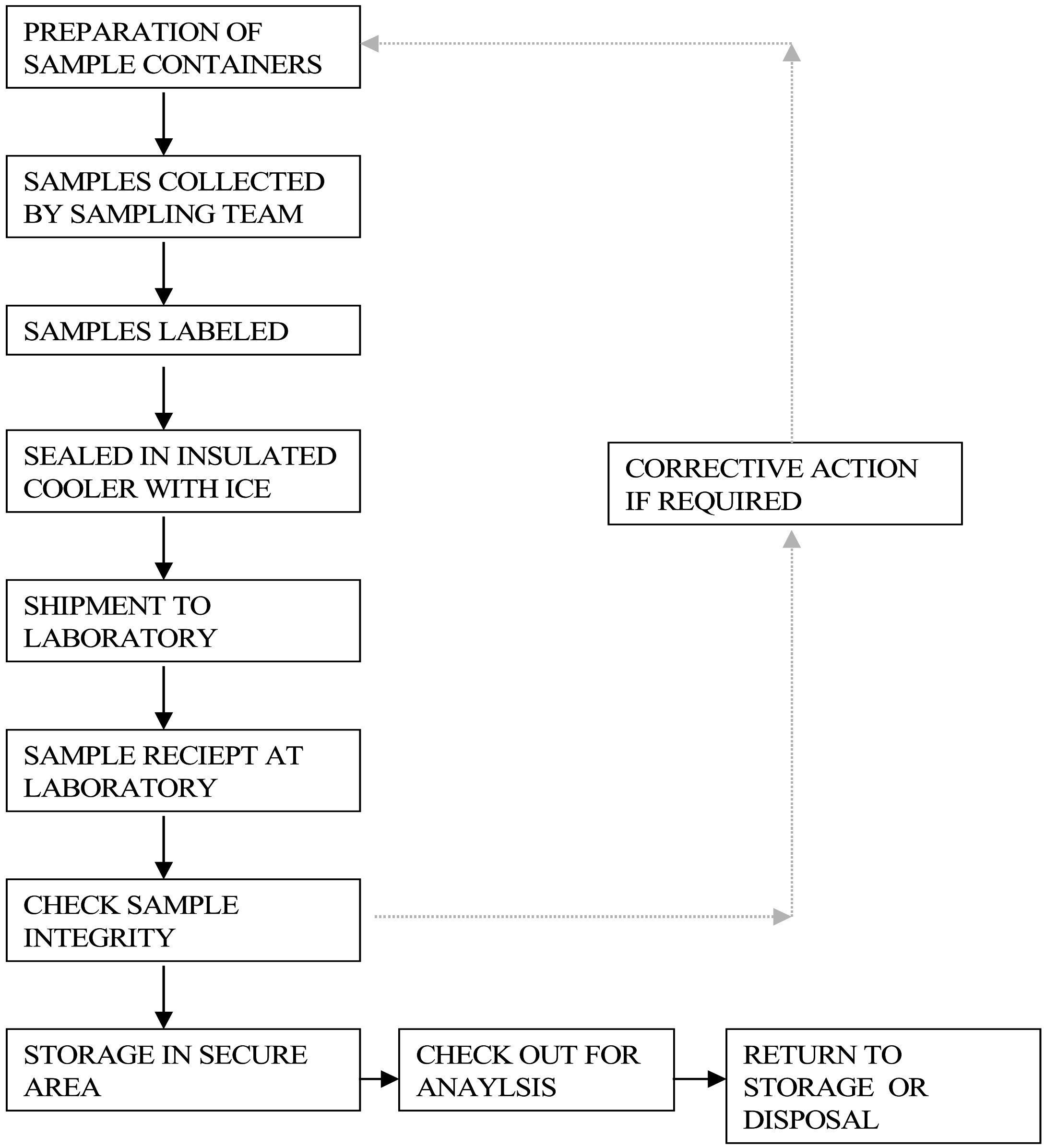

FIGURE 4.2 EXAMPLE CHAIN-OF-CUSTODY RECORD

Submitted to:	Chain Of Custody / Analysis Request		AESI Ref:
			COC #:
			Lab Use Only
	Privileged & Confidential	Site Name:	Lab Proj #
	EDD To:	Location of Site:	Lab ID
Client Contact: (name, co., address)	Sampler:	Grab/Composite; Field Filtered Sample ?; Preservative: 0, 0, 2	
	P O #		Job No.
	Analysis Turnaround Time:		
	Standard - Y		Column Study Sediment
	2 weeks -		
Hardcopy Report To:	1 week -		
Invoice To:	Next Day -		

Sample Identification

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

Special Instructions:

Notes:

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

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

FIGURE 10.1 CORRECTIVE ACTION REQUEST FORM

CORRECTIVE ACTION REQUEST

Number ______________________ **Date:**____________________

TO: ____________________

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

Condition:

Reference Documents:

_______________ __________ ____________ ___ ___ ___________

Originator Date Approval Date Approval Date

Response

Cause of Condition:

Corrective Action

(A) Resolution:

(B) Prevention

(B2) Affected Documents

Signature____________________ Date_________

CA Follow-up

Corrective Action verified by:____________________ Date ________

ATTACHMENT 1 SUMMARY OF ANALYTICAL DATA PACKAGE (DQO LEVEL IV)

1.0 INTRODUCTION

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

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

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

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

2.0 GENERAL DOCUMENTATION REQUIREMENTS

2.1 Data Package Format

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

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

Level II data packages will not contain the raw data.

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

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

2.2 Case Narrative

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

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

2.3 Chain-of-Custody

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

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

3.0 ORGANIC ANALYSES DOCUMENTATION REQUIREMENTS

These requirements are applicable to organic methods (e.g., volatile organic compounds (VOCs) and semivolatile organic compounds [SVOCs]).

3.1 Summary of Environmental Sample Results

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

- Client's sample identifications and corresponding laboratory identifications;
- Sample collection dates;
- Dates and times of sample extraction and/or analysis;
- Weights or volumes of sample used for extraction and/or analysis;

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

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

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

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

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

3.2.1 Instrument Calibration (for each instrument used)

- **GC/MS Tuning**. Report mass listings, ion abundance criteria, and percent relative abundances. List the instrument identification (ID) and the date and time of analysis. Ensure that all ion abundances have been appropriately normalized.
- **Initial Calibration**. Report analyte concentrations of initial calibration standards and the date and time of analysis. List the instrument identification (ID), response factors (RF), relative response factors (RRF), or calibration factors (CF), percent relative standard deviation (%RSD), and retention time (RT) for each analyte. The initial calibration (IC) report must also include a sample identifier (ID), associated injection volume or quantity of sample analyzed, the acceptance criteria, such as minimum RF values, and associated maximum %RSD values.
- **Continuing Calibration**. Report the concentration of the calibration standard used for the continuing calibration and for the mid-level standard, and the date and time of analysis. List the ID, RF, RRF, CF, percent difference (%D), and RT for each analyte.
- **Quantitation Limit** or Project Required Reporting Limit (PRRL) Verification (if applicable). Report results for standards that are used to verify instrument sensitivity. Report the source for the verification standards. Report the concentration for the true value, the concentration found, the percent recovery, and control limits for each analyte analyzed. The date and time of analysis must also be reported.

3.2.2 Method Blank Analysis

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

3.2.3 Surrogate Standard Recovery

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

3.2.4 Internal Standard Summary

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

3.2.5 Compound Confirmation

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

3.2.6 Peak Resolution Summary

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

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

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

3.2.8 Laboratory Duplicate Analysis

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

3.2.9 Laboratory QC Check Sample Analysis

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

3.2.10 Other QC Criteria

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

3.3 Raw Data

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

3.3.1 Gas Chromatographic (GC) Analyses

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

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

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

- Appropriately scaled chromatograms (label all analyte peaks, internal standards and surrogate standards with chemical names). All chromatograms shall be scaled such that individual peaks can be readily resolved from any neighboring peaks;
- Appropriately scaled before and after manual integrations;
- Area print-outs or quantitation reports;
- Instrument analysis logs for each instrument used;
- Sample extraction and cleanup logs;
- Standards preparation logs and manufacturer certificates of analyses for standards, if applicable, sufficient to document traceability of all standards (including surrogates, internal standards, and spike solutions) maintained in "job file" in laboratory, unless otherwise requested;
- Percent Moisture or Percent Solids for soil samples; and
- GC/MS confirmation, as applicable.

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

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

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

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

Raw data for each analysis shall include the following:

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

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

4.0 INORGANIC ANALYSES DOCUMENTATION REQUIREMENTS

4.1 Summary of Environmental Sample Results

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

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

4.2 Summary of QA/QC Results

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

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

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

4.2.1 Instrument Calibration Verification (if applicable)

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

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

4.2.2 Blank Analysis

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

4.2.3 Matrix Spike (MS) Analysis

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

4.2.4 Post Digestion Spike Analysis (if applicable)

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

4.2.5 Laboratory Duplicate Analysis

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

4.2.6 Laboratory Control Sample

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

4.2.7 Other QC Criteria (if applicable)

- **Method of Standard Additions (MSA).** This summary must be included if MSA analyses are performed. Report absorbance values with corresponding concentration values. Report the final analyte concentration and list the associated correlation coefficient and control limits.
- **ICP-AES Serial Dilution.** Report initial and serial dilution results, associated %D, and control limits.
- **ICP-AES Linear Dynamic Ranges.** For each instrument and wavelength used, report the date on which linear ranges were established, the integration time, and the upper limit concentration.
- **MDL Determination.** List most recent method detection limits as determined using the September 2017 promulgation of the 40CFR136, with dates determined maintained in laboratory file. MDL summary forms may be submitted at start of project and not included in individual data packages.
- **Any Performance Evaluation (PE) Samples** (if identified) associated with the environmental samples.

4.3 Raw Data

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

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

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

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

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

4.3.2 Titrimetric and Colorimetric Analyses

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

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

Raw data for each analysis shall include the following:

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

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

4.3.3 Gravimetric Analyses

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

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

Raw data for each analysis shall include the following:

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

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

ATTACHMENT 2 CREDENTIALS FOR NATHAN KRANES – PROJECT MANAGER AND MARYANNE KOSCIEWICZ – QUALITY ASSURANCE OFFICER AND QUALIFIED DUSR PREPARER

NATHAN KRANES, PG

PROJECT MANAGER

Nathan (Nate) Kranes has extensive experience in environmental geology, hydrogeology, and geochemistry, including designing, scoping, costing, and implementing all phases of remediation, including site characterizations, remedial investigations, predesign investigations, feasibility studies, remedial design, remedial action, and post-remediation site management. Nate has served as a technical advisor, project manager, and portfolio manager for numerous hazardous waste sites for private clients, industrial and manufacturing facilities, regulatory agencies, and federal agencies in New York and New England. His expertise includes all phases of the environmental cleanup life cycle from potential contaminant identification through site management and monitoring to project closeout.

Nate's technical expertise includes a broad range of experience with complex aqueous geochemical modeling; surface and groundwater heat tracing methods and modeling; pumping test design, implementation, and analysis; and injection design. He has significant experience in aqueous and non-aqueous inorganic geochemical evaluations. He has developed and applied innovative investigation methods for identifying and evaluating geochemical mechanisms causing inorganic precipitation of metals, identifying and evaluating inorganic groundwater conditions, and identifying and evaluating heat transfer via surface water/groundwater interactions to refine conceptual site models and refine transport of groundwater and site-related constituents.

Nate's project management experience includes serving as a project manager and portfolio manager working with multidisciplinary teams of technical experts, remedial engineers, and project managers for small- and large-scale hazardous waste sites. He has experience managing overall project direction and day-to-day project activities, tracking multisite action items, communicating with clients and regulators, and maintaining project schedules, scopes, and budgets for multiple, industrial, state, and federal clients. Nate has working knowledge of New York State Department of Environmental Conservation Division of Environmental Remediation-10, New York State Department of Health Guidance for Evaluating Soil Vapor Intrusion in New York, and 6 New York Code of Rules and Regulations Part 375.

Work Experience

Project Geologist. Bausch + Lomb Americas Inc., Legacy Glass Plant Remediation, Rochester, New York, United States. 02/2023-07/2024.
Employer: Parsons
Nate is responsible for providing technical and strategic support to the client for developing a remedial approach for entering a property into the Brownfield Cleanup Program. The site, a vacant property, was the former location of a 100-year-old glass-making operation. Responsibilities include helping prepare the Brownfield Cleanup Program application and a remedial investigation work plan with a team of engineers and scientists and successfully submitting the documentation to the New York State Department of Environmental Remediation for review.

YEARS OF EXPERIENCE

Total: 25

With Parsons: 2

EDUCATION

- Master of Science, Geology, Syracuse University, New York, 2007
- Bachelor of Science, Earth Sciences, Hobart and William Smith Colleges, New York, 1998

REGISTRATIONS

- Professional Geologist, 001068, New York

CERTIFICATIONS

- Project Manager Development (PMD) Model, Parsons

COMPUTER/SOFTWARE SKILLS

- ArcGIS
- Geochemist's Workbench

Project Manager. FMC Corporation, Norco Site Building Demolition, Middleport, New York, United States. 08/2023-07/2024.
Employer: Parsons
Nate is responsible for managing a team of engineers, scientists, and construction managers for the demolition of six structures (three of which are asbestos-containing structures) on multiple parcels requiring remediation for impacts from a 100-year-old former arsenical pesticide manufacturing facility. Duties include managing and coordinating the preparation and review of the technical approach for the request for proposals; reviewing subcontractor responses to the request for proposals; selecting a subcontractor for the project; managing and the demolition, transportation, and disposal of materials generated during the demolition with the on-site team of construction managers; and coordinating with the selected subcontractor throughout the process.

Project Manager. New York State Department of Environmental Conservation, Airco Speer Carbon-Graphite Site Characterization, Niagara Falls, New York, United States. 03/2023-06/2024.
Employer: Parsons
Nate is responsible for managing this project, including managing the preparation of a work assignment package for preparing and executing a site characterization investigation for review by the client. The scope includes investigating a former graphite carbon manufacturing facility and an unregulated landfill located underneath an active metal recycling business. Responsibilities include managing the preparation of a site characterization work plan for review by the client. Fieldwork is expected to begin in 2024.

Project Manager. New York State Department of Environmental Conservation, Corning International Study Area Remedial Construction Oversight, Corning, New York, United States. 11/2022-03/2024.
Employer: Parsons
Parsons is providing third-party field oversight and on-site monitoring during remedial investigation and remedial construction. Oversight tasks include observing technical work to ensure consistency with approved project work plans, designs, safety plans, and other documents, along with New York State Department of Environmental Conservation standards, criteria, and guidelines, and future outreach activities associated with the remediation project. Nate was responsible for performing a technical review of site management plans provided by the responsible party and providing plan revision comments for the client. Applied working knowledge of the New York State Department of Environmental Conservation’s DER-10 policy (Technical Guidance for Site Investigation and Remediation) and other associated New York State Department of Environmental Conservation and New York State Department of Health guidance and policy documents for managing hazardous waste sites following cleanup.

Project Manager. FMC Corporation, Norco Properties Haul Road Design, Middleport, New York, United States. 12/2022-09/2023.
Employer: Parsons
Nate is responsible for managing a team of engineers and construction managers for redesigning, planning, and constructing a gravel haul road adjacent to an active rail line to provide truck access for two soil remediation projects and a building demolition project. Work includes coordinating and managing other aspects related to the project, including performing a closed-circuit television survey of local sanitary sewer lines, coordinating monitoring well decommissioning, and providing universal

and regulated waste packaging and disposal, tree clearing and grubbing, and utility disconnects.

Project Manager and Senior Project Geologist. TRC. 02/2019-10/2022. Nate managed two portfolios with a total of 54 Class 2 and Class 4 inactive hazardous waste sites in the site management phase located across New York State for the New York State Department of Environmental Conservation. Project-specific responsibilities included developing scopes of work, estimating costs, coordinating fieldwork, and preparing required reports in accordance with the site management plans for each site in the portfolio. Project objectives involved completing all requirements identified in the site-specific site management plans, reviewing site data from completed remedial actions, routinely monitoring analytical data, and preparing other regulatory documentation. Objectives also included providing recommendations for site monitoring and reporting optimization, site reclassification, and remedial site optimization and identifying potential corrective actions resulting from changes in site conditions that could potentially impact human health and the environment. The sites were led by the New York State Department of Environmental Conservation, responsible parties, the Voluntary Cleanup Program, and environmental restoration parties. Site contaminants of concern included all nature of contaminants from volatile organic compounds, semi-volatile organic compounds, polychlorinated biphenyls, metals, polycyclic aromatic hydrocarbon, and perfluoroalkyl and polyfluoroalkyl substances in groundwater, drinking water, surface water, soil, and sediment.

Project Manager. EA Engineering, Science, and Technology. 04/2014-01/2019. Nate managed multiple sites in the US Department of Defense Installation Restoration Program at the Niagara Falls Air Reserve Station. Site contaminants included chlorinated solvents, Target Analyte List metals, and BTEX. Sites included fire training pits, an unregulated landfill, underground storage tank releases, fuel spills, former missile launch facilities, petroleum spills, and former hazardous waste drum storage areas. Responsibilities included designing, budgeting, and coordinating multiple in situ injections using metal-assisted emulsified vegetable oil to remediate six of the Installation Restoration Program sites. Served as project and lead technical resource for multiple groundwater pump-and-treat systems on the base, including evaluating and optimizing the systems to increase efficiency and lower operating costs. Coordinated and provided oversight for operations and maintenance visits. Served as the site geologist for a remedial investigation and feasibility study work assignment for the inactive hazardous waste site in Tonawanda, New York. The project involved investigating and delineating polychlorinated biphenyls and metals in site's industrial fill, soil, groundwater, surface water, and sediment. Supplemental remedial investigation activities were completed to further delineate the impacts of polychlorinated biphenyls. Oversaw an interim remedial measure, including buried drum and demolition debris removal. Developed the remedial investigation scope of work, coordinated fieldwork, interpreted data, and managed the preparation of the remedial investigation and feasibility study reports. Served as senior technical lead to the project teams during field program implementation, prepared and evaluated site analytical data, developed the conceptual site model, and prepared and reviewed the remedial investigation report.

Geologist. O'Brien & Gere. 01/2006-03/2014. Nate served as a technical expert, team member, and task manager for field and office efforts related to numerous Honeywell sites, including Solvay Wastebeds 1-8, Harbor Brook, Willis Avenue, and

Semet Residue Ponds in Syracuse, New York. Developed the conceptual site models for complex, variable-density groundwater plume migration for multiple sites, working with other subject matter experts. Also led a technical team in developing a geochemical model used for determining the interactions between high pH leachate with surface water and native groundwater. Completed bench-scale testing based on geochemical modeling to provide remedial options for mitigating high pH leachate migration. Coordinated subcontractors, managed field staff, and reviewed and tracked budgets for multiple project phases, including preliminary site investigations, remedial investigations, feasibility studies, and interim remedial measures at multiple sites in the Syracuse portfolio. Served as site geologist and technical lead for evaluating the hydraulic effectiveness of a passive groundwater collection trench system designed to mitigate the migration of polychlorinated biphenyls and dissolved metals contamination from impacting sensitive receptors in a New York City and Environmental Protection Agency–regulated watershed. The project included designing and implementing a multiphase pumping test using groundwater trench drawdown to evaluate the effectiveness of the passive groundwater collection wells discharging site-impacted groundwater into the trench. Designed and implemented the fieldwork, evaluated data, and led the preparation of the technical report.

Teaching Assistant and Research Assistant. Syracuse University. 08/2004-05/2006. Nate provided teaching support for the Introduction to Geology professor and laboratory instructor. Assisted the hydrogeology laboratory with graduate student research, including sample collection and laboratory analysis.

Wastewater Plant Operator. Abscope Environmental. 09/2003-08/2004. Nate was responsible for the day-to-day operations and maintenance of an on-site wastewater treatment plant treating groundwater and surface water runoff contaminated with BTEX and polycyclic aromatic hydrocarbon compounds on an inactive hazardous waste site in New York. Routine operations included monitoring sediment and flocculant tanks, bioreactors, and carbon finishing tanks and adjusting pH controls.

Drill Rig Operator. CME Associates. 08/2000-09/2003. Nate operated a drill rig and managed a drilling crew on multiple environmental and geotechnical investigations across New York State.

Drill Rig Assistant. Geologic-Earth Exploration. 09/1999-08/2000. Nate assisted a drill rig operator with multiple environmental and geotechnical projects in New England.

Geotechnical Technician. CTL | Thompson. 08/1998-08/2000. Nate provided geotechnical testing for multiple projects, including asphalt density testing, soil compaction testing, and geotechnical building and foundation inspections for housing developments and new commercial and industrial construction projects. Also provided laboratory support for geotechnical analysis of soil.

PARSONS

MARYANNE KOSCIEWICZ

QUALITY ASSURANCE (QA) OFFICER / PROJECT CHEMIST

Ms. Maryanne Kosciewicz is a QA officer and project chemist with more than twenty-six years of experience with various hydrogeologic and remedial investigations. She oversees the review and evaluation of analytical data generated for the project; prepares data usability / data validation reports and site-specific Quality Assurance Project Plans (QAPPs); and provides technical support in data quality assessment and interpretation. She is familiar with environmental analytical methods employed by the U.S. Environmental Protection Agency (USEPA), U.S. Department of Defense (DoD), the New York State Department of Environmental Conservation (NYSDEC), the New Jersey Department of Environmental Protection (NJDEP), and the Massachusetts Department of Environmental Protection (MassDEP); experienced in data validation with USEPA CLP guidelines, revisions, and regional modifications (e.g., USEPA Regions I, II, and III), DoD Quality Systems Manual (QSM), and with the NYSDEC Analytical Services Protocol (ASP); experienced in field sampling and on-site laboratory analysis screening of volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and pesticides using GC and GC/MS instrumentation; and experienced in the analytical laboratory with extractions of SVOCs and pesticides/polychlorinated biphenyls (PCBs) and the analysis of pesticides/PCBs using GC instrumentation.

YEARS OF EXPERIENCE

Total: 35

With Parsons: 30

EDUCATION

- BS/Mathematics
  BS/Chemistry

TRAINING

- Parsons START and SHARP Health and Safety Training; OSHA 40-hour HAZWOPER Training

PROFESSIONAL AFFILIATION

- American Chemical Society

WORK EXPERIENCE

Primary Experience

October 1994 – Date **QA Officer / Project Chemist, Parsons**

Responsible for project team analytical program development; responsible for quality control procedures and system/performance auditing techniques; reviews project analytical data and verifies analytical methodology and procedures in compliance with NYSDEC ASP and USEPA protocols for USEPA Regions I, II, and III; conducts data validation for various NYS RI/FS sites in addition to Superfund and federal sites; determines data usability and interprets data utility; prepares QAPPs for various projects; interfaces with analytical laboratories to resolve analytical and work scope problems; works with project managers to identify and implement appropriate corrective actions; and provides technical support in assessing nature and extent of contamination. Experienced in project data quality assessments and data interpretation involving VOCs, SVOCs, pesticides, PCBs, metals, cyanide, dioxins/furans, per- and polyfluorinated alkyl substances (PFAS), cations, anions, and various general chemistry parameters in groundwater, surface water, pore water, soil/sediment, and DNAPL; VOCs in soil gas and air; and pesticides, PCBs, mercury, and dioxins/furans in fish/tissue. Currently provides project support to the following programs:

- **Honeywell Program**
  QA Officer and Project Chemist of the feasibility study, predesign, and design for the Onondaga Lake Superfund NPL site in Syracuse, NY involving multiple tributary sites including LCP sites, Ninemile Creek, Geddes Brook, and Harbor Brook; and the remedial investigation for the Richardson Hill Road Landfill Superfund site in Sidney, NY.

- **Consolidated Edison Program**
  QA Officer and Project Chemist of various MGP site characterization and post remedial measure (IRM) sites throughout NY in Manhattan, Brooklyn, White Plains, and Queens.
- **British Petroleum (BP) Program**
  QA Officer and Project Chemist of various pilot studies and quarterly monitoring sites throughout NY such as the former Ekonol facility, Hyde Park facility, and Sanborn facility.
- **FMC Program**
  QA Officer and Project Chemist of East and West Coast portfolios of various quarterly monitoring sites throughout NY, NJ, Massachusetts, North Carolina, and California.
- **NYSDEC Standby Subcontract Program**
  QA Officer and Project Chemist of various NYSDEC sites such as Inactive Landfill Initiative, Ash Road, Pine Ave, Former Cleaners, J&L Steel, Walsh Road, Jamestown, and Benson Mines.
- **U.S. Army Corps of Engineers (USACE)**
  Project Chemist of various remedial investigation, feasibility study, and design sites throughout NY and NJ such as the Seneca Army Depot, Fort Monmouth, Scotia Depot, Binghamton Depot, and Schenectady Depot.

Other Experience

May 1989 – October 1994 **Environmental Chemist, ABB Environmental Services, Inc.**

In role as QA Officer / Project Chemist, responsibilities included project team analytical program development; monitoring subcontracted laboratory performance; providing technical support in assessing contamination; reviewing analytical data according to project requirements; determining data usability and interpreting data utility; preparing QAPPs, monitoring reports, and data summary reports; preparing sampling and analytical schedules in conjunction with coordinating laboratory and field availability; and monitoring and managing budget in relation to scope of services.

In role as Field Operation Leader / Field Chemist, responsibilities included supervising site investigations; coordinating groundwater, surface water, and sediment field activities; managing sampling equipment and supplies; ensuring personnel safety; on-site laboratory analysis screening of VOCs, SVOCs, and pesticides in water and soil using GC and GC/MS instrumentation; and sampling groundwater, surface water, and sediment.

In role as Laboratory Chemist / Data Validator, responsibilities included analyzing pesticides/PCBs using GC instrumentation; extracting SVOC and pesticide/PCB samples; reviewing analytical laboratory data and monitoring regulatory compliance of federal programs and various private clients; validating contract laboratory deliverables in accordance with USEPA Regional guidelines and revisions; evaluating data utilizations; and processing electronic data

APPENDIX F COMMUNITY AIR MONITORING PLAN

COMMUITY AIR MONITORING PLAN

BAUSCH AND LOMB SUNTRU STREET SITE

Prepared For:

1400 N. Goodman Street
Rochester, NY 14609

Prepared By:

301 Plainfield Road, Suite 330
Syracuse, New York 13212

MAY 2023

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LIST OF ACRONYMS

ACRONYM	Definition
CAMP	Community Air Monitoring Plan
μg/m^3	micrograms per cubic meter
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PM_{10}	particulate matter less than 10 micrometers in diameter
ppm	parts per million
TVOCs	total volatile organic compounds
VOC	volatile organic compound

1.0 INTRODUCTION AND BACKGROUND

1.1 Overview

This Community Air Monitoring Plan (CAMP) has been adapted from the New York State Department of Health (NYSDOH) generic CAMP found in DER 10 (NYSDEC 2010) to support the implementation of investigative activities at the Bausch and Lomb Suntru Street Site (the Site).

This CAMP describes the monitoring activities that will be performed during completion of pre-design investigation activities and was developed in accordance with New York State Department of Environmental Conservation's (NYSDEC) DER 10 guidance (NYSDEC 2010).

A 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.

Specific activities related to monitoring for VOCs are described in Section 2 of this CAMP. Requirements for particulate monitoring are presented in Section 3. Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

1.2 Community Air Monitoring Plan

Air monitoring will be conducted on a continuous basis during all dust-generating and/or intrusive work.

"Dust-generating work" means any work with the potential to generate dust. Examples of dust-generating work include, but are not limited to, the following:

- Handling removed material and fill material
- Intrusive work

"Intrusive work" means any work performed below the existing level of the ground surface, or that involves the disturbance of existing earth, regardless of quantity. Examples of ground-intrusive work include, but are not limited to, the following:

- Clearing/grubbing
- Site preparation activities
- Installation of soil borings

Community air monitoring will include real-time monitoring for total volatile organic compounds (TVOCs) and particulate matter less than 10 micrometers in diameter (PM_{10}), and periodic monitoring for odors. The consultant will employ a technician to perform the monitoring work.

Air monitoring stations will be deployed at the start of each workday before any ground-intrusive or dust-generating work is initiated. At a minimum, one air monitoring station will be positioned at the upwind perimeter of the Site and two air monitoring stations will be positioned at the downwind perimeter of the Site (three air monitoring stations total). Upwind and downwind air monitoring stations will be determined based on predominant wind direction, and the nature and location of work to be performed on a given day. As needed or required, additional station(s) will be positioned in the immediate vicinity of excavation/work areas to perform localized air monitoring. Wind direction will be monitored through the day, and locations of air monitoring stations will be adjusted if the wind direction shifts more than 60 degrees from the original upwind direction.

Air monitoring equipment will be calibrated on a daily basis, or other frequency recommended by the manufacturer. All instrument readings, field reference checks, and calibrations will be documented in a dedicated log. During the workday, periodic field checks of monitoring equipment to verify proper function will be performed. The date, day, time, and outcome of each field check will be documented in a dedicated log.

Daily reports and exceedance reports will be submitted in an electronic format to the Owner, NYSDEC, and NYSDOH representatives listed in Table 1.

TABLE 1 CAMP CONTACT LIST

Name	Affiliation	Contact Information
DEC Remediation Manager	NYSDEC	Mackenzie Osypian, P.E.
DEC DOH Lead	NYSDOH	Anthony Perretta
Amy Butler	Bausch and Lomb (Owner)	Office: (585) 338-5699 Mobile: (585) 766-4667 Amy.butler@bausch.com

2.0 VOC MONITORING RESPONSE LEVELS AND ACTIONS

Monitoring for TVOCs will be conducted 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 must be equipped with an audible alarm to indicate exceedance of the action level. The equipment will be capable of calculating 15-minute TWA concentrations, which will be compared to the levels specified below.

1. If the ambient air concentration of TVOCs at one or more downwind air monitoring station(s) exceeds 2.5 parts per million (ppm) above background (upwind) for the 15-minute average, this will serve as an early warning “alert level.” If the alert level is exceeded, the CAMP technician will notify the Contractor, who will identify potential sources of the exceedance, employ additional vapor controls while continuing work, and if necessary and appropriate, evaluate and modify construction techniques.
2. If the ambient air concentration of TVOCs at one or more downwind air monitoring station(s) exceeds 5 ppm above background (upwind) for the 15-minute average, this shall serve as an “action level,” and work activities must be temporarily halted and monitoring continued. If the TVOCs level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring. If TVOCs levels at the downwind perimeter of the work area persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the Owner and NYSDEC project manager must be notified, the source of vapors identified, corrective actions taken to abate emissions, including modifying work techniques if necessary and appropriate, and monitoring continued. After these steps, work activities can resume provided that TVOCs levels have fallen below the action level.
3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shut down, and work shall not resume until authorized by the Owner. All of the above steps detailed for an exceedance of 5 ppm must be taken.
4. All 15-minute readings must be recorded and be available for State (NYSDEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

3.0 PARTICULATE MONITORING RESPONSE LEVELS AND ACTIONS

Monitoring for particulate matter will be conducted using real-time monitoring equipment capable of measuring PM_{10}. 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. The equipment will be capable of calculating 15-minute TWA concentrations, which will be compared to the levels specified below.

1. If the ambient air concentration of PM_{10} at one or more downwind air monitoring station(s) exceeds 100 micrograms per cubic meter (µg/m^3) above background (upwind) for the 15-minute average, or if visible dust is observed leaving the work area, this will serve as an early warning "alert level." If the alert level is exceeded, the CAMP technician will notify the Contractor, who will identify potential sources of the exceedance, employ additional dust controls while continuing work, and if necessary and appropriate, evaluate and modify work techniques.
2. If the ambient air concentration of PM_{10} at one or more downwind air monitoring station(s) exceeds 150 µg/m^3 above background (upwind) for the 15-minute average, this shall serve as an "action level", and work activities must be temporarily halted and monitoring continued. If the PM_{10} level readily decreases (per instantaneous readings) below 150 µg/m^3 over background, work activities can resume with continued monitoring. If PM_{10} levels at the downwind perimeter of the work area persist at levels in excess of 150 µg/m^3 over background, work activities must be halted, the Owner and NYSDEC project manager must be notified, the source of dust identified, corrective actions taken to abate emissions, including modifying work techniques if necessary and appropriate, and monitoring continued. After these steps, work activities can resume provided that PM_{10} levels have fallen below the action level.
3. All 15-minute readings must be recorded and be available for State (NYSDEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

4.0 REFERENCES

NYSDEC. 2010. DER-10 Technical Guidance for Site Investigation and Remediation. May 3.

APPENDIX G HEALTH AND SAFETY PLAN

SAFETY, HEALTH AND ENVIRONMENTAL PLAN

1 Suntru Street Site

Suntru Street, City of Rochester, NY 14604

August 2023

Document Control Sheet

Table Heading	Name/Position	Signature	Date
Prepared by	Anne L Burnham/ Field Project Manager		
SH&E Representative Review	Darrell Pruitt		
Market SH&E Director or Delegate Review			
PM Approval	Anne L Burnham/ Field Project Manager		
Job Number	453347		

Revision #	Date	Description of Changes
0	08/28/23	Initial Release

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LIST OF ATTACHMENTS

1. Scope of Parsons SH&E Management System

Parsons SH&E Management System and all related SH&E policies, procedures, and plans have been developed in consideration of Parsons organizational context and the needs and expectations of the internal and external parties in which it interfaces. Parsons SH&E Management System applies to all Parsons operations and subsidiaries, including joint ventures and similar partnerships managed by Parsons for all activities or services provided.

1.1 Environmental, Safety, Health, and Risk Program (ESHARP)

The ESHARP Management System Procedure is located on Parsons Corporate Policy Center and is used to describe the processes Parsons leaders shall implement to effectively plan for and control Safety, Health, and Environmental (SH&E) risks, and to monitor the effectiveness of these planned SH&E risk controls.

1.2 Project Safety, Health, and Environmental Plan (PSHEP)

The PSHEP identifies the approach for documenting, implementing, and maintaining the overall requirements of Parsons SH&E Management System for project work. When implemented, these requirements help protect project personnel, visitors, the public, and the environment from the effects of SH&E risks. Parsons employees should never perform a task that may endanger their own safety and health, the safety and health of coworkers or the public, or the environment.

The PSHEP will be implemented at operational startup and will be a live document for the entire life cycle of the project. The PSHEP will be amended or revised as activities or conditions change or when supplementary information becomes available. At a minimum, the PSHEP will be updated annually with changes tracked on the document control sheet.

All Parsons employees and contractors shall receive a copy of this PSHEP, understand it, and implement the provisions contained in it.

Parsons contractors shall establish their own SH&E programs for their work and employees. Contract specifications require each Parsons-contractor to accept provisions of the Parsons PSHEP and prepare its own contractor site-specific safety, health, and environmental plan (SSHEP) for work activities for which the contractor is responsible for performing. The PSHEP requirements identified for project personnel (e.g., incident reporting, training, certifications of competence and qualification, substance abuse identification and testing) shall apply to contractor workers, and such provisions shall be included in each contractor's SSHEP.

1.3 Implications of Noncompliance

The consequences of not conforming with Parsons SH&E Management System requirements, including not fulfilling the organization's compliance obligations, can result in adverse effects to the safety and health of its employees and other stakeholders that the organization interfaces with, damage to the environment, and/or regulatory issues with authorities that can have a financial impact on the organization and its capability to operate.

2. Parsons Safety, Health and Environmental Policy

2.1 Corporate Safety, Health and Environmental Policy Statement

As an industry-leading, global technology solutions firm, Parsons is firmly committed to maintaining a safe, healthful, and environmentally sound workplace at all its offices, sites, and project facilities, guided by the following tenets.

- Safety, health, and environmental (SH&E) stewardship is our core value.
- Executive management leads our SH&E stewardship and strives to continually improve our management systems.
- Achieving SH&E performance excellence is a responsibility shared by all.
- SH&E performance is a key business performance indicator.
- Parsons' SH&E performance will be communicated openly.
- Leaders establish and reinforce expectations with employees and stakeholders, and leaders provide employees and stakeholders with the knowledge and skills necessary to perform their work to help ensure they achieve SH&E performance excellence.
- Employees and stakeholders are authorized and expected to stop work when conditions warrant it.
- Our SH&E efforts extend beyond our workplaces to include travel, our homes, and our communities.

To meet our SH&E performance objectives, all employees and stakeholders shall be actively engaged in SH&E issues. This requires the combined efforts of a concerned executive leadership team, responsible and knowledgeable managers and supervisors, and conscientious, well-trained employees and stakeholders.

At regular intervals, the executive leadership team shall monitor and improve the performance of our Environmental Safety, Health, and Risk Program (ESHARP) management system to ensure its continuing suitability, adequacy, and effectiveness in driving our SH&E performance excellence.

Parsons shall meet or exceed legal and other requirements for SH&E and shall strive to conform to the international standards to which we subscribe. Parsons' commitment to SH&E makes the world a better place.

Parsons Safety, Health and Environmental Policy

Parsons' goal is zero incidents. To achieve this, the project team, led by the Project Manager, shall systematically, routinely, and continually identify the safety, health, and environmental (SH&E) risks to project personnel, processes, equipment, the general public, and the environment, and develop effective and reliable control measures to minimize or eliminate these SH&E risks. As the project work changes, the SH&E risks change, and these risks shall be continually assessed, with control measures continually refined as work progresses.

2.2 Own Zero

OWN ZERO is a Parsons SH&E program that focuses on the importance of exposure control by effective implementation of corporate SH&E policies and procedures, ESHARP, pre-task planning, and the use of innovation to help us be more efficient in addressing identified exposures. OWN ZERO is a mindset that all incidents are preventable and none are acceptable.

If we effectively control exposures that have the potential to cause injuries, we are proactively making sure that the necessary controls to prevent injuries are in place before work activities are initiated. Injury prevention is a benefit of these actions.

Parsons is firmly committed to maintaining a safe and healthy environment in each office and project.

Our goal is the pursuit of SH&E performance excellence, leading to an improved quality of life for our employees, contractors, and the local community.

Our SH&E management system is grounded in our OWN ZERO philosophy, which is built on three primary elements: (1) protecting the quality of life, (2) employee ownership, and (3) exposure control.

The intent of the OWN ZERO Program is to:

1. Drive leadership and employee engagement
2. Develop a culture of caring with clear cultural attributes
3. Cultivate an environment where safety and continuous improvement is our norm
4. Build alignment around “we care” about employee, contractor, and public safety
5. Demonstrated safety is “who we are”

2.3 Stop Work Authority

Each Parsons employee and Parsons-contracted person is a critical leader for preventing injuries, illnesses, and adverse environmental impacts, Achieving SH&E excellence requires a personal commitment. Therefore, each employee is authorized to stop work immediately if a safety, health, or environmental concern exists or if the work is not going according to plan. Once work is stopped, each employee is expected to communicate the work stoppage to the other affected stakeholders and further evaluate the condition and adjust the work plan to resolve the safety, health, or environmental concern before restarting the work.

Each employee shall understand that he or she has the authority and the responsibility to stop work at any time when he or she notices an unplanned or unexpected issue that he or she believes will adversely affect the project’s safety, health, or environmental risk. This concept is consistent Parsons SH&E core value.

S.T.O.P.

1. Stop the task you are doing or intervene with a co-worker if appropriate.
2. Take immediate measures to notify any others affected. If there is no imminent danger, notify the appropriate line supervisors and site leaders. This is also a good time to make any other notifications, such as to the client.
3. Offer correction or get help if needed. Keep it positive. Affected parties shall discuss and gain agreement on the resolution of the stop work issue. The initiator of the stop work event shall be thanked for his or her concern.
4. Prepare to resume once the concern has been resolved. If necessary, suspend that task until the adjusted work plan can be reviewed and revised, when needed. When opinions differ regarding the validity of the stop work issue or adequacy of the resolution, the appropriate site leader shall make the final determination, giving full weight to all opinions and views. Positive feedback shall be provided to affected personnel regarding the resolution of the stop work issue.

There is no circumstance where retribution or retaliation may be directed toward our employee who conscientiously exercised his or her stop work authority.

3. Project Summary

3.1 Scope of Work

The property at 1 Suntru Street (Site) is the location of a former glass manufacturing facility located in an industrial/commercial area of Rochester, Monroe County, New York. The property (Tax Parcel No. 106.45-1-32) is currently owned by Bausch and Lomb Corporation (B+L), is approximately 7.8 acres in size, and is bordered to the west by the Genesee River and a New York state-owned parcel (Tax Parcel No. 106.53-1-9), to the north by a railroad bridge, to the east by the Genesee River gorge wall, and to the south by Suntru Street and the former East Station manufactured gas plant (MGP; Tax Parcel No. 106.53-1-10; New York State Department of Environmental Conservation [NYSDEC] Site No. 828204). The property is zoned "M-1 Industrial", and the Site is currently vacant and surface features include the former glass manufacturing facility building footprint and slab, unpaved areas and partially wooded areas.

A series of investigations have been conducted to determine the nature and extent of contamination at the Site. Contaminants of concern identified in soil at concentrations above industrial use Soil Cleanup Objectives (SCOs) presented in 6 New York Codes, Rules and Regulations (NYCRR) Part 375 Environmental Remediation Programs guidance (NYSDEC 2006) include semivolatile organic compounds (SVOCs), specifically polycyclic aromatic hydrocarbons (PAHs); and metals, specifically arsenic, cadmium, copper, lead, mercury and zinc. Contaminants of concern identified in groundwater at concentrations above New York Groundwater Quality Standards include volatile organic compounds (VOCs); SVOCs; and metals, specifically iron, lead, and manganese.

The scope of investigation activities at the site will include soil borings and groundwater investigation, including the collection of samples for shipment to an analytical laboratory.

4. Organizational Structure

The organization structure for the project is as follows. Ms. Anne Burnham will serve as the project manager, reporting to the Avangrid project manager. The Parsons field team lead will be determined prior to mobilization, along with specific subcontractors. Ms. Anne Burnham will function as the project manager for the investigation, with Nathan Kranes as the task manager. Darrell Pruitt and Diana Ceaser will support the work from a health and safety standpoint. The field team will be identified at a later date, along with any subcontractors.

5. Key Project Stakeholders

The personnel (shown in the table below) implement the provisions of this PSHEP. All managers and field team leaders implement and maintain the SH&E program in their work areas and answer worker questions about the SH&E program.

Project Name:	1 Suntru Street
Project Address:	1 Suntru Street, Rochester NY
Responsible Parsons Executive:	**Contact Information**
Heather Philip	Cell Phone: 315-418-0048 Email: heather.philip@parsons.com
Parsons Project Manager:	**Contact Information**
Anne Burnham	Cell Phone: 315-546-5318 Email: anne.burnham@parsons.com
Parsons SH&E Representative:	**Contact Information**
Darrell Pruitt	Cell Phone: 812-605-2108 Email: Darrell.pruitt@parsons.com
Client Point of Contact:	**Contact Information**
Amy Butler	Cell Phone: 585-766-4667 Email: Amy.Butler@bausch.com

6. Legal Compliance

Parsons shall comply with regulatory, legal, and other similar requirements in the jurisdictions where the project performs work. The legal compliance register identifies the SH&E-related laws, regulations, ordinances, and legal obligations that may impact the project. As legal requirements change during the lifecycle of the project, the changes shall be updated in the legal compliance register and their effects considered.

See **Attachment 1** for Legal Compliance Registrar.

7. Risk Register

Parsons shall continually identify project SH&E risks and seek effective and reliable means to control these risks to an acceptable level. From these identified SH&E risks, additional policies, procedures, equipment, compliance programs, or special training required to control the risk of project activities shall be developed, communicated, monitored, and adjusted.

Hazard analysis and risk assessment planning, the basis of the risk register, is an ongoing process occurring throughout the life of the project. Hazard analysis and risk assessment planning should address items such as: routine and non-routine activities; activities of all persons having access to the workplace (including contractors, lower-tier contractors, visitors, and client representatives); any outside hazards that might impact the workplace or the people in the workplace; hazards associated with materials or equipment being used in the workplace; any changes or modifications in design, processes, legal obligations, safety system changes; and any human factor or capability issues.

The Risk Register for the site is included in **Attachment 2**.

7.1 Risk Analysis and Safety Specification Development

The Project Manager will lead an analysis using the pre-bid risk analysis checklist to document existing exposures that may impact the work, surrounding facilities, equipment, workers, or the public at large. The checklist was used in the development of this PSHEP.

Below is a list of potential hazards on the project. An Activity Hazard Analysis (AHA) is provided in **Attachment 3** for each hazard.

- Chemical exposures – contact with site groundwater may result in contact with NAPL/NAPL blebs. This is the main contaminant of concern on the site (and associated VOCs). Field teams will avoid dermal contact with site soils.
- Environmental – cold/heat related illnesses, animals, insects, poisonous plants/vegetation.
- Slips Trips Falls (especially when working at heights greater than six feet if needed)
- Rotating parts
- Fires
- Hazardous material handling
- Noise

7.2 Hazard Control Measures

Site hazards and hazards resulting from investigation and remediation activities are controlled using one or more of the control measures listed below. The order of precedence is as follows:

Engineer/design to eliminate or minimize hazards. A major component of the design phase is to select appropriate features to eliminate a hazard/risk and render it fail-safe or provide redundancy using backup components.

Guard the hazard. Hazards that cannot be eliminated by design must be reduced to an acceptable risk level by guards or isolation devices that render them inactive.

Provide warnings. Hazards or risks that cannot be totally eliminated by design or guarding are controlled through using a warning or alarm device.

Provide special procedures or training. When design, guarding, or warnings cannot eliminate hazards/risks, subcontractors must develop procedures, training, and audits to ensure safe and environmentally compliant completion of work. Training cannot be a substitute for hazard elimination when life-threatening hazards are present.

Provide personal protective equipment (PPE). To protect workers from injury, the last method in the order of precedence is the use of PPE, such as hard hats, gloves, eye protection, life jackets, and other protective equipment with the understanding that bulky, cumbersome, and heavy PPE is often discarded or not used, rendering this method ineffective without proper implementation.

8. Activity Hazard Analysis

An AHA will be prepared for all tasks identified through the risk assessment process as having a residual risk greater than low. An AHA is undertaken before a task can start and is based on previous examples, experience, legal requirements, local conditions, and the identified hazards. Employees and subject matter experts will be asked to review and comment on the AHA as part of the review process. This can be carried out collectively in a meeting or individually online. A record of the review will be maintained.

AHAs relevant to everyone's tasks will be identified on the AHA Assignment and Acknowledgement Matrix. Parsons employees will read and acknowledge with their signature, that all applicable AHAs have been reviewed and understood. AHAs will be made available to all Parsons employees through e-mail, hard copy or a shared drive.

AHAs are included in **Attachment 3.**

9. Take 5 for Safety

Before starting work in the field, Parsons employees will complete a personal risk assessment using a Take 5 for Safety Checklist or similar process. The Take 5 for Safety Checklist enables employees to identify SH&E risks that are present while performing their assignment. The Take 5 Form can be found in **Attachment 4**.

10. Training

Parsons will identify the certifications, qualifications and training required by all levels of Parsons employees and direct hire contractors to carry out operations in a safe and healthy manner without damaging the environment based on the risk exposure for each specific operation. Training and awareness campaigns to develop competencies will consider the employee's exposure to risk, as well as levels of responsibility, capability, language skills, and literacy.

Competencies and required training will be recorded in a Project SH&E Training Matrix included in **Attachment 5**.

Parsons employees and stakeholders must:

1. Be aware of the SH&E risks associated with their tasks and their workplace
2. Possess the necessary knowledge, skills, qualifications, and competencies to perform their work
3. Understand what Parsons expects of them and how the designated SH&E policies and procedures apply to them
4. Understand the consequences of their actions and behaviors relative to the SH&E risks of the work
5. Be aware of the benefits of improving SH&E performance

A training attendance record will be completed for all training delivered. An SH&E training attendance record form can be found in **Attachments 6 and 7**.

10.1 Employee Orientation

Each person assigned to a project team (including new Parsons employees, existing Parsons employees reassigned to the project, contractors, lower-tier contractors, teaming and JV partner employees, suppliers, vendors, client representatives, members of the leadership team, and other stakeholder employees) shall receive an initial project- and site-specific orientation beginning on their first day of work

No worker shall start work on tasks for which he or she does not have the verified knowledge, skills, training, certifications, qualifications, and competencies to complete successfully, consistent with the risk control strategies defined in the risk register and its associated risk assessments.

10.2 Visitor Orientation

Visitors to a project shall receive an orientation briefing appropriate for their visits.

No visitor shall be permitted access to the project site unless he or she has completed visitor orientation and is escorted continually by a knowledgeable member project team.

An acknowledgment form, the appropriate AHAs (if any), and/or a Take 5 will be completed.

Records of completed training for Parsons employees are maintained on the Parsons Sharepoint directly. Copies of Parsons employee training completion records and certificates can be obtained by contacting Anne Burnham (anne.burnham@parsons.com) or Laurie McGinn (Laurie.McGinn@parsons.com).

Records of completed training for employees of subcontractors are also to be maintained in the project files. Copies of subcontractor employee training completion records and certificates can be obtained by contacting Anne Burnham (anne.burnham@parsons.com).

11. Contractor Qualification, Management, and Site-Specific SH&E Plans

All contractors to be engaged in providing field services shall pass a contractor qualification process prior to engagement. The project shall provide the following information to each contractor prior qualifying and selecting the contractor.

- Detailed statement of work
- SH&E hazards and risks
- Parsons minimum SH&E expectations
- To assist with the contractor qualification process, the contractor shall identify the following.
- Types of field activities to be conducted
- Location of work places
- Timing and sequence
- Facilities, tools, and equipment to be used
- Materials and consumables to be used
- In addition, the contractor shall provide as much of the following information as possible.
- Contractor's SH&E policy statement
- A statement or proof that the contractor has an occupational safety and health or environmental management system compliant with standards such as ANSI Z10, OHSAS 18001, ISO 14001, or OSHA's Voluntary Protection Programs
- The names and qualifications of those with SH&E responsibilities for this work (onsite and offsite)
- SH&E training compliance program and copies of training records for contractor employees expected to perform work on this contract
- A copy of the contractor's compliance programs, competent person designations (United States), and other employee-related SH&E compliance certifications and qualifications (e.g., powered industrial truck driver, personal protective equipment user, qualified electrical worker)
- SH&E awards earned
- Occupational injury and illness statistics for the past 3 years
- Explanations for any SH&E enforcement notices issued against the contractor by any SH&E regulator
- Lists of anticipated/preferred lower-tier subcontractors and suppliers
- Its proposed SSHEP and associated site-specific risk assessments or AHAs for the work.

This information shall be evaluated by the project SH&E representative and the PM (or delegate) using the Teaming Partner / Contractor SH&E Qualification Scorecard form and the Contractor Site-specific Safety, Health, and Environmental Plan (SSHEP) Review form.

11.1. Contractor Qualification

All contractors to be engaged in providing field services for Parsons shall be pre-qualified prior to signing an agreement. The pre-qualification can be initiated through Parsons Contractor Safety Evaluation (CSE) platform or using an alternate approved method (e.g., Teaming Partner/Contractor SH&E Qualifications Scorecard).

11.2 Contractor Management

Contractors are accountable and responsible for their employees and work activities. However, the PM shall ensure that contractors' work (and that of their lower-tier subcontractors) is:

- Being performed in compliance with the contracts;
- Being managed consistent with the project's SH&E processes and with the ESHARP Guidebook; and,
- Meeting the project's SH&E expectations.

The PM shall conduct SH&E alignment meetings, kickoff and premobilization meetings, look-ahead meetings, weekly/daily progress meetings, and other routine meetings to gauge the contractors' progress and understanding of the work. Such meetings shall include lower-tier subcontractors, when applicable.

The PM and the SH&E representative shall conduct and document contractor-specific SH&E inspections, SH&E audits, and other engagement activities to validate that the contractors' work meets Parsons' SH&E expectations. Such inspection, audits, and engagement activities shall include lower-tier subcontractors, when applicable.

11.3 Contractor Site-Specific Safety, Health, and Environmental Plans (SSHEPs)

At the time of this document (June 2023) specific subcontractors for the work have not yet been selected. Once selected, Contractor SSHEP's will be included as an appendix to this document.

12. Medical Monitoring and Industrial Hygiene

Comprehensive medical and industrial hygiene monitoring program is not currently anticipated for this project based on the site conceptual model. If conditions change and this becomes necessary, Parsons will work with Avangrid and with their certified safety professionals to develop the appropriate medial and/or industrial hygiene monitoring program.

13. Emergency Preparedness and Response

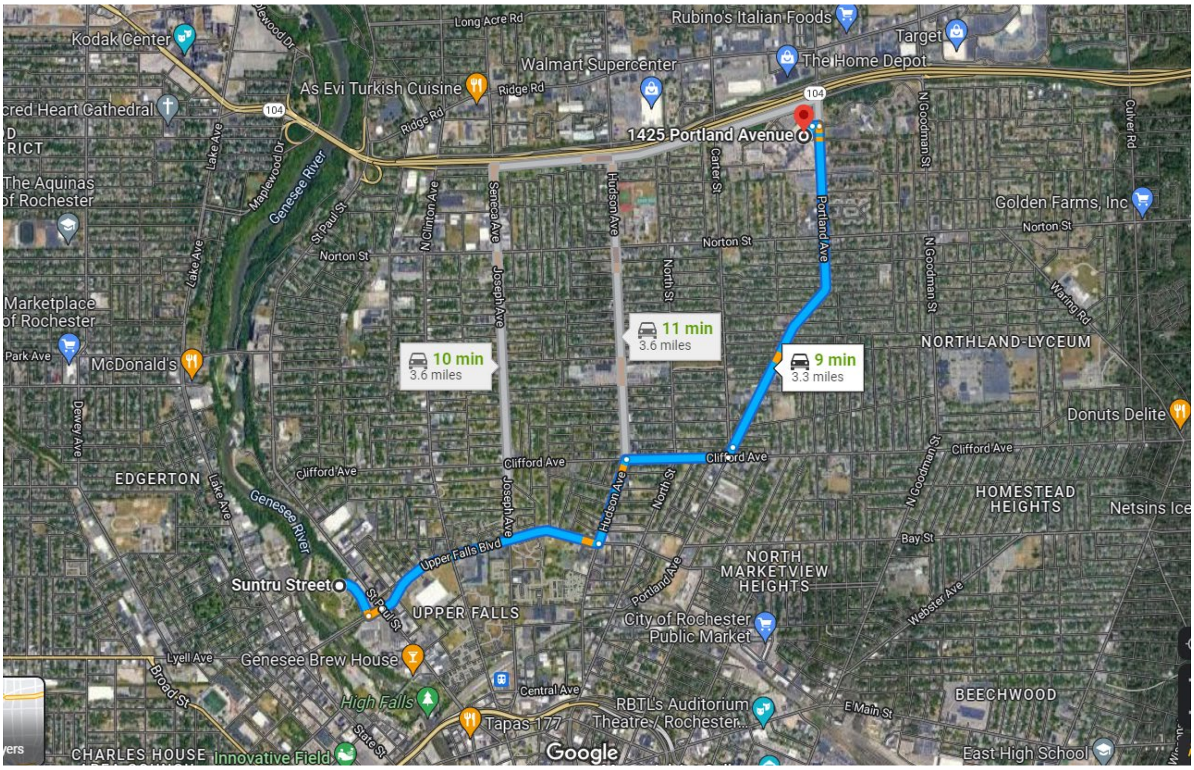
To report any emergency by phone, dial 911, and be prepared to describe the emergency and its location.

The project shall display posters and stickers with the proper emergency number near phones and in common areas.

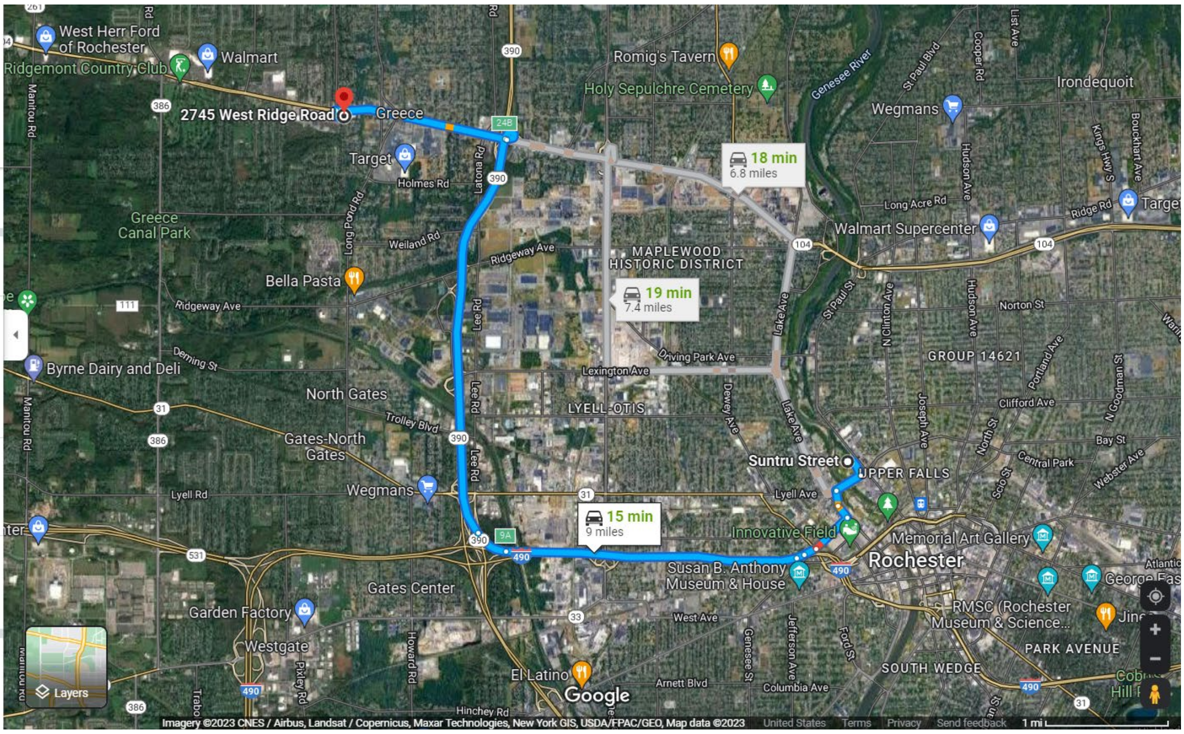
The following are nearby hospitals and occupational clinics.

<u>**Hospital:**</u>

Rochester General Hospital
1425 Portland Avenue
Rochester, NY 14621
(585) 922-4000



<u>Local Occupational Care Center:</u>
Pulse Occupational Medicine of Rochester
2745 W. Ridge Rd.
Greece, NY 14626
(585) 225-5252



Each project stakeholder shall be familiar with the kinds of alarms on their project site and know how to effectively respond when an alarm sounds or when an emergency order is given. In addition, project workers shall be familiar with, and participate in, emergency drills. Project-specific emergency response roles and responsibilities, and emergency drills are described in the site-specific emergency action plan.

14. Incident Management

14.1 Reporting of Incidents

All incidents must be reported immediately to the Project Manager and the SH&E Representative.

For significant work-related injuries, illnesses, environmental incidents, security incidents, or property damage incidents, the PM (or delegate) shall make the above initial incident report telephonically and immediately. This immediate initial incident report is essential as Parsons may have to report the significant incident to one or more regulatory authorities within a few hours of the occurrence of the incident. Examples of significant incidents are those that involve:

- One or more fatalities;
- One or more injuries or illnesses requiring a worker to be treated in an emergency room or requiring in-patient hospitalization;
- An injury to a visitor or member of the public;
- An event that may present adverse media press to Parsons or the project;
- A release of a substance requiring a report to a governmental regulator;
- A criminal injury;
- A law enforcement arrest; or,

- Property loss or damage exceeding an initial estimate of USD $50,000.

After the immediate telephonic notification (for significant incidents), or after determining that an immediate telephonic report is unnecessary (for all other incidents), the PM (or delegate) shall create and submit the initial report of the incident in IndustrySafe within 4 hours of the occurrence of the incident, or as soon as practical. A tutorial covering IndustrySafe incident reporting is located here.

All project team members, including those directly affected by the incident, shall cooperate fully with any related incident investigations and management system process reviews.

14.2 Work-Related Injury or Illness Initial Incident Response

14.2.1 AT THE SITE OF THE INCIDENT

Immediately assess if the work-related incident is serious/life threatening or requires emergency response.

If so, first call 911 or local emergency medical services before contacting your Market SH&E Director, filing the IndustrySafe online incident report, or involving WorkCare.

14.2.2 NEXT STEPS

1. The employee shall immediately report any/all work related injuries/illnesses to their manager. (See section Additional Manager Reporting Responsibilities below.)
2. The manager and employee shall promptly call WorkCare together. If the manager and employee are unable to call WorkCare together, the manager shall direct the employee to call.
3. If WorkCare determines a clinic visit is appropriate or if employee requests a clinic visit, the employee shall be directed to the occupational clinic (or panel of clinics) in the site-specific SH&E plan.
4. The employee's manager shall accompany the injured worker to the designated occupational medical clinic.
    a. In situations where the employee's manager is unable to accompany the injured worker to the clinic, a designated alternate shall be selected for this task.
    b. An injured employee should always be taken to the designated occupational medical clinic rather than a hospital emergency room unless one of the following conditions applies:
        - the injury/illness is life-threatening,
        - the injury/illness is a medical emergency,
        - or, the designated occupational medical clinic is closed and no alternate occupational medical clinic can be identified by WorkCare.
5. The manager or the employee shall inform the treating physician that Parsons accommodates temporary or modified work. The manager or the employee shall request from the physician a work status note that describes what the injured employee is permitted to do rather than what the injured employee cannot do. (The employee shall repeat this process at each follow up medical evaluation.)
6. The employee shall immediately provide a copy of the work status note to their manager and the Parsons Workers Compensation Claims Manager. This is the employee’s responsibility regardless if a medical provider says they will fax it to Parsons.
7. If a clinic visit is not indicated, WorkCare will follow-up with the employee to ensure their recovery.
8. An employee can always contact WorkCare at any time if they have any questions or concerns.

14.2.3 ADDITIONAL MANAGER REPORTING RESPONSIBILITIES

Upon receiving notice of an employee illness/injury, the manager shall:

1. Promptly notify the Market SH&E Director.
2. Complete the IndustrySafe report within (4) hours of knowledge of the incident.

14.2.4 ABOUT WORKCARE

WorkCare's Incident Intervention is available:

- For work-related injuries/illnesses
- For all Parsons employees and agency employees
- 24 hours per day, 7 days a week, and 365 days a year (24/7/365)
- By dialing from North America: (888)449-7787
- By dialing from other international locations: (714)456-2104

14.3 Incident Investigation

The Project Manager shall ensure that significant incidents (including significant near misses) are formally investigated. Incident investigations seek facts, not fault. Incident summaries and any documents associated with incident investigations shall be submitted and retained within the IndustrySafe record associated with the incident.

The investigation process starts as soon as the initial report of the investigation is submitted. The Project Manager (or delegate) shall lead the investigation and shall seek assistance from the project SH&E representative or Market SH&E Director (or delegate) for subject matter expertise and investigation support.

A formal incident investigation report with corrective actions and accountability assignments shall be distributed to the appropriate members of the project team and Parsons leadership team and submitted in IndustrySafe as a part of the IndustrySafe record of the incident.

After the investigation report is submitted, the Project Manager shall ensure that the project team is aware of any findings, lessons learned, and the status of the corrective actions identified in the incident investigation report.

14.4 Proactive Events

Employee proactive event reporting is a key performance indicator for Parsons projects and allows us to identify and address potential SH&E risks before they lead to an incident.

Proactive events fall into three categories:

- Near Miss - an unexpected event that could have resulted in a personal injury, property damage or environmental release, but didn't because of chance or luck.
- Hazard ID - an unsafe condition or behavior.
- Stop Work - when a potential risk is recognized, and work activities are stopped before an incident occurs.

All Parsons employees are expected to actively report proactive events through our Salesforce mobile app.

14.5 Life Changing Events (LCEs)

A life changing event is an event that either actually causes or has the potential to cause a work-related injury or illness. Incidents that do not result in serious injury can fly under the radar, by flagging these incidents we can investigate further. You can categorize incidents as LCE or LCE potential in both IndustrySafe and Salesforce. Proper reporting of LCE and LCE potential events could save a life.

Incidents marked as LCE Potential will prompt a review from the Market SH&E Director who will determine the proper course of action. Examples include:

- Root Cause Analysis
- Executive Incident Review -

- Incident Analysis Report
- Lessons Learned

15. Inspections, Self-Assessments and Audits

15.1 SH&E Inspection

An SH&E inspection is an in-person, on-site verification (by direct observation) that work is being performed, and equipment and infrastructure is being used and maintained, in accordance with the risk register and associated SH&E policies, procedures, regulations, laws, and best practices.

The findings of SH&E inspections and associated non-conformances arising out of the inspections shall be documented and resolved as soon as practical.

SH&E inspections can be routine, focused or compliance related.

Formal SH&E inspections shall be conducted weekly for field-based workplaces and monthly for all other workplace settings. SH&E inspections shall be documented in IndustrySafe.

Contractors shall conduct SH&E inspections weekly for their field-based workplaces associated with Parsons' work and monthly for their other workplace settings associated with Parsons' work. Contractors shall provide their records of these SH&E workplace inspections, audits, findings, corrective actions, and verifications of corrective action resolution to Parsons when requested.

15.2 ESHARP Self-Assessments

An ESHARP self-assessment is a snapshot of how well the project is conforming to the principles in the ESHARP Guidebook. The Project Manager shall complete an ESHARP self-assessment in IndustrySafe once each quarter for projects with a staffed duration lasting 6 months or more, with five or more full-time employees (or 25 or more contractor workers) at a field site.

15.3 ESHARP Audits

An SH&E audit is an internal review of the project's SH&E management systems, including the SH&E management systems of contractors and lower-tier contractors performing project field activities.

SH&E audits shall be conducted once per month during field work. This schedule includes contractor SH&E management systems associated with work over which Parsons has contractual authority.

16. SH&E Key Performance Measurement (KPIs)

No more than three business days after the close of the monthly reporting period, the Project Manager (or delegate) shall report the following information through the project's organizational chain of command and to the GBU SH&E Director (or delegate).

Leading Indicators of SH&E Performance

- Number of focused SH&E inspections performed and documented
- Number of SH&E compliance inspections performed and documented
- Number of near misses reported and investigated
- Number of SH&E-related rewards and recognitions dispensed among project stakeholders
- Number of direct contractors not used due to SH&E disqualification
- Trailing (Lagging) Indicators of SH&E Performance (Parsons Employees)
- Number of hours worked on the project by Parsons employees

- Number of Parsons employee injuries or illnesses leading to lost time
- Number of Parsons employee injuries or illnesses leading to restricted duty or transfer
- Total number of all Parsons employee recordable injuries or illnesses

Trailing (Lagging) Indicators of SH&E Performance (Direct Contractors)

- Number of hours worked on the project by all direct contractor employees
- Number of direct contractor worker injuries or illnesses leading to lost time
- Number of direct contractor worker injuries or illnesses leading to restricted duty or transfer
- Total number of direct contractor worker recordable injuries or illnesses

Safety hour data are to be submitted to the Project Manager at the end of each month.

17. Meetings

Risk communication and planning meetings routinely shall take place on the project. This section of the PSHEP describes these meetings, their structure, their participants, their expected frequency, and whether or not they are to be documented. If these meetings are to be documented, then this section of the PSHEP also describes what is documented and where these documented meeting records are maintained.

Other meetings beyond these listed may be needed to help ensure that project risks are communicated and risk controls are planned adequately.

- Stakeholder SH&E Alignment Meetings
  - Involves relevant members of the project staff and stakeholders to introduce Parsons SH&E expectations to new contractors or other stakeholders performing work on the project
  - These meetings shall be formally documented, with names of attendees, the agenda, meeting minutes, and actions items coming from the meeting. Action items shall be tracked to resolution.
  - The following representatives should attend the meeting: NYSEG Project Manager, Parsons Portfolio Manager, Parsons Project Manager, Subcontractor Project Managers, and key field personnel.
- Project Kickoff and Premobilization Meetings (PM, staff, line supervisors, stakeholders)
  - Establishes initial site conditions, verifies field office and site infrastructure availability, verifies initial supplies, tools, and equipment are available, reinforces work initiation and SH&E expectations among stakeholders
  - Confirms that necessary work instructions, activity hazard analyses, SH&E programs, and SH&E training and qualifications have been completed and have been communicated to the affected personnel
  - Unresolved PSHEP implementation tasks shall be identified and a path to their resolution shall be agreed to
  - Documentation will be stored on the P-drive. The checklist for the Kick-off Meeting is included in **Attachment 8**
  - These meetings shall be formally documented, with names of attendees, the agenda, meeting minutes, and actions items coming from the meeting. Action items shall be tracked to resolution.
- 2-week Look-ahead Meetings (PM, staff, line supervisors)
  - Involves relevant members of the project staff and stakeholders to plan the work over the next 2 or more weeks to ensure adequate SH&E planning is built into the schedule and that the planned risk controls are still valid and consistent with the risk register
  - These meetings shall be formally documented, with names of attendees, the agenda, meeting minutes, and actions items coming from the meeting. Action items shall be tracked to resolution.
  - Documentation will be stored on the P-drive.
  - 2-Week Look-Ahead form can be found in **Attachment 9**

- Daily / Pre-task Briefings (line employees and line supervisors)
  - Conducted by line employees and line supervisors prior to beginning any task
  - Involves the use of an activity hazard analysis or other job-specific risk assessment
  - Documentation will be stored on the P-drive.
- Work Pause / "Take 5" Briefings (line employees and line supervisors)
  - Conducted by line employees and line supervisors when something occurs that was not planned and requires a brief reassessment of the work to continue
  - Involves the use of an activity hazard analysis or other job-specific risk assessment process, with modifications applied as necessary to account for the unplanned event
  - Documentation will be stored on the P-drive.
- Stop Work Meetings (line employees, line supervisors, PM/staff)
  - Conducted by any employee who notices an unsafe condition, act, or behavior that precludes continuing the work as planned.
  - Involves the use of an activity hazard analysis or other job-specific risk assessment process, with modifications applied as necessary to account for the unplanned event
  - May involve a lengthy work stoppage and invoke other reporting requirements to ensure the work is ready to resume
  - These meetings shall be formally documented, with names of attendees, the agenda, meeting minutes, and actions items coming from the meeting. Action items shall be tracked to resolution.
  - Documentation will be stored on the P-drive.
- Toolbox Talks (PM, staff, line supervisors, stakeholders, line employees)
  - Conducted by stakeholders and employees regularly
  - Involves the preparation of a briefing on a SH&E topic relevant to the work group
  - Documentation will be stored on the P-drive.
- All Hands Meetings (all employees and stakeholders)
  - Involves everyone on the project. The PM typically leads these meetings to encourage the project team, to recognize and reward outstanding employees and stakeholders, and to ensure the Parsons SH&E core value is expressed.
  - These meetings shall be formally documented, with names of attendees, the agenda, meeting minutes, and actions items coming from the meeting. Action items shall be tracked to resolution.
  - Documentation will be stored on the P-drive.
- Other Meetings
  - Meetings with building trades councils, unions, guilds, and collective bargaining units
  - Meetings with SH&E regulators
  - These meetings shall be formally documented, with names of attendees, the agenda, meeting minutes, and actions items coming from the meeting. Action items shall be tracked to resolution.
  - Documentation will be stored on the P-drive.

18. SH&E Consultation, Participation and Communication

Employee communications, SH&E consultation and participation, and SH&E awareness campaigns are not limited to written policies and procedures, safe work briefings, orientation, and training sessions. Each Parsons operation must encourage two-way SH&E communications and consultation occur continually throughout the operation, and Parsons employees and stakeholders are actively engaged in this process.

18.1 SH&E Awareness Program

Parsons will implement an SH&E awareness program that will have various elements (e.g., signs, posters, banners, and focused toolbox talks). This program will promote employee awareness of SH&E goals, hazards, and exposures on the project, as well as in the office. In addition to topics selected by Parsons Corporate SH&E Management, the Project SH&E Representative will supplement the SH&E awareness program with information specifically applicable to the scope of work for the assigned project. The SH&E representative will maintain an SH&E bulletin board. This is the primary information point for the project SH&E awareness program.

18.2 SH&E Rewards and Recognition

Parsons is committed to providing positive recognition and meaningful rewards to employees who contribute in promoting the SH&E culture at their workplace. Parsons Management will recognize positive behaviors and contributions to SH&E performance on a quarterly basis with a form of reward or recognition.

The SH&E incentive scheme will be implemented throughout the life cycle of the project and cover all Parsons employees. Actions that can be rewarded and recognized are those that go above and beyond what is expected. Examples of actions that will be considered for reward or recognition include the following:

1. Identifying and reporting hazards within the office or on a project
2. Involvement in SH&E programs (e.g., leading a safety meeting or delivering a Safety Moment at an all-hands meeting)
3. Reporting of Proactive Events
4. Sharing of a Lessons Learned
5. Developing and guiding the contractor in safe work practices
6. Stopping work on the grounds of SH&E
7. Other actions that demonstrate a positive and beneficial influence on the SH&E culture and SH&E performance

On a quarterly basis, all occurrences of the above criteria will be reviewed by the SH&E committee and recommendations made for the award. The award will be based on the level of impact and involvement of the employee.

Project based opportunities for reward and recognition are as follows:

1. Verbal Recognition: A senior manager personally makes contact (i.e., office visit, telephone call) with the employee to thank him/her for effort or accomplishment.
2. Written Recognition: A senior manager provides a letter of commendation to an employee that demonstrates above average safety performance or generates safety improvement ideas that are implemented, which are shared with others in a staff call, posted on ParShare, etc.

18.3 SH&E Committee

This section of the PSHEP describes the constituency and protocols of the project's employee SH&E committees. A properly commissioned employee SH&E committee has a charter, a description of its authority and responsibilities, operating procedures, and committee member roles and responsibilities.

SH&E committee meetings shall be planned in accordance with the scope of work at the workplace. Written records of the minutes, actions, and recommendations of each employee SH&E committee shall be maintained. Meeting minutes shall be posted and a copy uploaded into IndustrySafe.

19. Enforcement and Discipline

The Project Manager has established a fair and consistent project policy for the disciplinary process related to employees and project stakeholders who are unable to abide by the project's SH&E expectations. In general, Parsons employees and contractor workers who intentionally create or contribute to situations that are immediately dangerous to life, health, the environment, or the security of the project are subject to immediate termination. The Project Manager, and the project's assigned Human Resource professionals, shall ensure that enforcement and discipline matters are handled fairly and fully consistently with applicable contracts, collective bargaining agreements, local, regional, and national laws and regulations, and the Parsons SH&E core value.

Continual improvement is an essential aspect of Parsons SH&E core value. The Project Manager, supervisors, and project stakeholders shall identify and immediately address unacceptable actions and behaviors. All members of the project team shall be on the lookout continually for any conditions, actions, or behaviors that increases the risk of injury, illness, property damage, or environmental insult. The first step to addressing at-risk conditions, actions, and behaviors is through personal communication, coaching, or mentoring.

Parsons and its subcontractors enforce all applicable SH&E requirements of regional, federal, municipal, state, local and all other regulation; where applicable by OSHA 1910 and 1926 and Engineering Manual EM 381.1, where applicable. In addition, subcontractors must comply with and enforce Parsons' site requirements.

Parsons and its subcontractors have written progressive disciplinary systems available for review in their Human Resources departments.

20. Substance Abuse Identification and Testing

Parsons is committed to providing a drug-free and healthful work environment. In collaboration with the Human Resource professional assigned to the project, the Project Manager has established a fair and reliable substance abuse and identification and testing program. Parsons Substance Abuse Policy can be found on the Corporate Policy Center on Pweb. Employees and contractors will not be involved with the unlawful manufacture, distribution, dispensation, possession, sale, or use of illegal drugs in the workplace. Violation of these prohibitions can result in disciplinary action up to or including immediate discharge.

Without exception, employees, contractor workers, and other project stakeholders shall be fit for duty while conducting work on behalf of Parsons, while on Parsons worksites, and while driving.

For this project, the client does not require specific drug and/or alcohol testing for subcontractors. All employees will comply with Parsons substance abuse programs.

21. Change Management

The following are examples of change triggers for which SH&E risk will be effectively assessed and managed:

1. New or modified technology, software, equipment, facilities, or work environment is planned
2. New or revised procedures, work instructions, designs, specifications, standards, regulations, or codes are necessary
3. New or different types or grades of raw materials are to be used
4. An addition or change to the project's organizational structure and staffing, including significant change to the project stakeholders, is anticipated
5. New or modified safety, health, and environmental devices and equipment or controls are desired

The type and complexity of the anticipated change determines whether the change management process is formal (i.e., requiring written review and signoffs) or informal. For example, changes associated with chemical processes covered by process safety management regulations require a formal, written process.

However, change that can materially affect the project's SH&E risk must undergo a change management process. Contact the Market SH&E Director SH&E (or delegate) for guidance on whether a change can be managed formally or informally.

Progress meetings and Look-ahead planning provide opportunities for documenting planned changes and initiating relevant actions, such as a review of the change, development of new AHAs, and training or communication regarding the change.

Attachment 1 ESHARP Legal Compliance Register 1 Suntru Street

RG&E-East Station

Content Revision Date: January 2023

NOTE and DISCLAIMER: This "Legal Compliance Register" has not been prepared by, nor reviewed by, nor prepared under the direction of, any Attorney Licensed or Authorized in the Practice of Law in the Jurisdictions for which it is intended to cover, and represents at a minimum Industry Standard Legal Compliance Information with regard to Safety, Health and Environmental regulations within the defined scope of work for the project. Thus, this register may or may not include or represent every possible legal compliance issue.

Description / identity of relevant SH&E risk	Identity / citation of related legal compliance obligation	How does one gain access to the text of this legal compliance obligation?	Remarks
Access to Employee Exposure & Medical Records *The facility components and subsurface itself, some investigation methods, some remediation methods may involve hazardous material, the potential for employee exposure at or above a TLV is reasonable. *Respirator fit testing may be conducted; the medical qualification is an employee medical record.	PART 1910—OCCUPATIONAL SAFETY AND HEALTH STANDARDS Subpart Z—Toxic and Hazardous Substances §1910.1020 Access to employee exposure and medical records.	§1910.1020 Access to employee exposure and medical records.	Employer must provide reasonable access to medical records within 15 working days. Certain records must be maintained for employment plus 30 years. OSHA must be allowed access to records upon employment and annually thereafter, employees must be provided with certain information.
Hazardous Chemical Exposure Chemicals of Concern are present in the groundwater on-site. Contact may occur during sampling.	PART 1910—OCCUPATIONAL SAFETY AND HEALTH STANDARDS Subpart Z—Toxic and Hazardous Substances §1910.1000 Air Contaminants §1910.1052 Methylene chloride §1910.1018 Inorganic arsenic	29 C.F.R. 1910 Subpart Z – Toxic and Hazardous Substances	Monitoring is necessary to determine level of air contaminants in breathing space is within allowable limits. Primary contaminants include methylene chloride, arsenic, ethylene thiourea, ammonia, and trichloroethylene
Bloodborne Pathogens *Parsons provides first aid and emergency transportation to employees who sustain injuries or illnesses on a Parsons' project site. *At least two employees on each shift must be qualified and certified to administer first aid and cardiopulmonary resuscitation (CPR) when a medical facility or physician is not accessible within five minutes of an injury to a group of two or more employees for the treatment of injuries.	PART 1910—OCCUPATIONAL SAFETY AND HEALTH STANDARDS (CONTINUED) Subpart Z—Toxic and Hazardous Substances §1910.1030 Bloodborne pathogens.	29 C.F.R.1910.1030 Bloodborne Pathogens	Establish an exposure control plan. Employers must update the plan annually to reflect changes in tasks, procedures, and positions that affect occupational exposure, and also technological changes that eliminate or reduce occupational exposure; Use labels and signs to communicate hazards; Provide information and training to workers; Maintain worker medical and training records; Implement the use of universal precautions; Identify and use engineering controls; Identify and ensure the use of work practice controls; Provide personal protective equipment (PPE), such as gloves, gowns, eye protection, and masks; Make available hepatitis B vaccinations to all workers with occupational exposure; Make available post-exposure evaluation and follow-up to any occupationally exposed worker who experiences an exposure incident.
Confined Spaces * Confined spaces, and permit required confined spaces exist at the FMC Middleport facility. At a minimum, space evaluation, awareness training and barricade / signage identification are elements which should be considered.	PART 1910—OCCUPATIONAL SAFETY AND HEALTH STANDARDS Subpart J—General Environmental Controls §1910.146 Permit-required confined spaces. PART 1926—SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION Subpart AA—Confined Spaces in Construction	29 C.F.R. 1910.146 Permit-required confined spaces 29 C.F.R. 1926. Subpart AA Confined spaces in construction	Requirements for practices and procedures to protect employees in general industry and construction from the hazards of entry into permit-required confined spaces.

Description / identity of relevant SH&E risk	Identity / citation of related legal compliance obligation	How does one gain access to the text of this legal compliance obligation?	Remarks
	§1926.1201 Scope. §1926.1202 Definitions. §1926.1203 General requirements. §1926.1204 Permit-required confined space program. §1926.1205 Permitting process. §1926.1206 Entry permit. §1926.1207 Training. §1926.1208 Duties of authorized entrants. §1926.1209 Duties of attendants. §1926.1210 Duties of entry supervisors. §1926.1211 Rescue and emergency services. §1926.1212 Employee participation.		
Control of Hazardous Energy * Remediation systems and devices in use at the facility may present hazardous energy situations.	PART 1910—OCCUPATIONAL SAFETY AND HEALTH STANDARDS Subpart J—General Environmental Controls §1910.147 The control of hazardous energy (lockout/tag-out).	29 CFR 1910.147 Lock Out Tag Out	This standard covers the servicing and maintenance of machines and equipment in which the unexpected energization or startup of the machines or equipment, or release of stored energy could cause injury to employees. This standard establishes minimum performance requirements for the control of such hazardous energy.

Description / identity of relevant SH&E risk	Identity / citation of related legal compliance obligation	How does one gain access to the text of this legal compliance obligation?	Remarks
Cranes, Hoists, Lifts (if needed)	§1926.1400 Scope. §1926.1401 Definitions. §1926.1402 Ground conditions. §1926.1407 Power line safety (up to 350 kV)—assembly and disassembly. §1926.1408 Power line safety (up to 350 kV)—equipment operations. §1926.1409 Power line safety (over 350 kV). §1926.1410 Power line safety (all voltages)—equipment operations closer than the Table A zone. §1926.1411 Power line safety—while traveling under or near power lines with no load. §1926.1412 Inspections. §1926.1413 Wire rope—inspection. §1926.1414 Wire rope—selection and installation criteria. §1926.1415 Safety devices. §1926.1416 Operational aids. §1926.1417 Operation. §1926.1418 Authority to stop operation. §1926.1419 Signals—general requirements. §1926.1420 Signals—radio, telephone or other electronic transmission of signals. §1926.1421 Signals—voice signals—additional requirements. §1926.1422 Signals—hand signal chart. §1926.1423 Fall protection. §1926.1424 Work area control. §1926.1425 Keeping clear of the load. §1926.1426 Free fall and controlled load lowering. §1926.1427 Operator qualification and certification. §1926.1428 Signal person qualifications. §1926.1429 Qualifications of maintenance & repair employees. §1926.1430 Training. §1926.1431 Hoisting personnel. §1926.1434 Equipment modifications. §1926.1435 Tower cranes. §1926.1436 Derricks. §1926.1441 Equipment with a rated hoisting/lifting capacity of 2,000 pounds or less. §1926.1442 Severability. Appendix A to Subpart CC of Part 1926—Standard Hand Signals	29 CFR 1926 Subpart CC	This standard applies to power-operated equipment, when used in construction, that can hoist, lower and horizontally move a suspended load. Such equipment includes, but is not limited to: Articulating cranes (such as knuckle-boom cranes); crawler cranes; floating cranes; cranes on barges; locomotive cranes; mobile cranes (such as wheel-mounted, rough-terrain, all-terrain, commercial truck-mounted, and boom truck cranes); multi-purpose machines when configured to hoist and lower (by means of a winch or hook) and horizontally move a suspended load; industrial cranes (such as carry-deck cranes); dedicated pile drivers; service/mechanic trucks with a hoisting device; a crane on a monorail; tower cranes (such as a fixed jib, i.e., “hammerhead boom”), luffing boom and self-erecting); pedestal cranes; portal cranes; overhead and gantry cranes; straddle cranes; sideboom cranes; derricks; and variations of such equipment. However, items listed in paragraph (c) of this section are excluded from the scope of this standard.

Description / identity of relevant SH&E risk	Identity / citation of related legal compliance obligation	How does one gain access to the text of this legal compliance obligation?	Remarks
Electrical Facility systems present electrical hazards, tasks may involve the subcontracting of Electrical contractors.	PART 1910—OCCUPATIONAL SAFETY AND HEALTH STANDARDS Subpart S—Electrical §1910.301 Introduction. §1910.302 Electric utilization systems. §1910.303 General. §1910.304 Wiring design and protection. §1910.305 Wiring methods, components, and equipment for general use. §1910.306 Specific purpose equipment and installations. §1910.307 Hazardous (classified) locations. §1910.308 Special systems. §1910.331 Scope. §1910.332 Training. §1910.333 Selection and use of work practices. §1910.334 Use of equipment. §1910.335 Safeguards for personnel protection.	PART 1910—OCCUPATIONAL SAFETY AND HEALTH STANDARDS Subpart S—Electrical	This subpart addresses electrical safety requirements that are necessary for the practical safeguarding of employees in their workplaces and is divided into four major divisions as follows: (a) Design safety standards for electrical systems. These regulations are contained in §§1910.302 through 1910.330. Sections 1910.302 through 1910.308 contain design safety standards for electric utilization systems. Included in this category are all electric equipment and installations used to provide electric power and light for employee workplaces. Sections 1910.309 through 1910.330 are reserved for possible future design safety standards for other electrical systems. (b) Safety-related work practices. These regulations will be contained in §§1910.331 through 1910.360. (c) Safety-related maintenance requirements. These regulations will be contained in §§1910.361 through 1910.380. (d) Safety requirements for special equipment. These regulations will be contained in §§1910.381 through 1910.398.
Emergency Management	PART 1910—OCCUPATIONAL SAFETY AND HEALTH STANDARDS Subpart E—Exit Routes and Emergency Planning §1910.34 Coverage and definitions. §1910.35 Compliance with alternate exit-route codes. §1910.36 Design and construction requirements for exit routes. §1910.37 Maintenance, safeguards, and operational features for exit routes. §1910.38 Emergency action plans. §1910.39 Fire prevention plans. PART 1926—SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION Subpart C—General Safety and Health Provisions §1926.35 Employee emergency action plans.	Title 29: Labor PART 1910 Subpart E—Exit Routes and Emergency Planning PART 1926—SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION Subpart C—General Safety and Health Provisions [1] §1926.35 Employee emergency action plans.	Parsons employees, supervisors, and managers shall be aware of actions they will take before, during, and after an emergency. Parsons offices and project sites and locations with five or more Parsons' employees shall have written emergency action plans attached to their respective site-specific Office Safety, Health, & Environmental Plan (OSHEP) or site-specific Project Safety, Health, & Environmental Plan (PSHEP). These site-specific emergency actions plans shall be developed consistent with this operating procedure and any GBU- and client-specific requirements, and shall be made available to all employees, subcontractors, and client/owner representatives.
Excavations	PART 1926—SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION Subpart P—Excavations §1926.650 Scope, application, and definitions applicable to this subpart. §1926.651 Specific excavation requirements. §1926.652 Requirements for protective systems. Appendices	PART 1926—SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION Subpart P—Excavations	Excavation and trenching are among the most hazardous construction operations. The Occupational Safety and Health Administration's (OSHA) Excavation standards, 29 Code of Federal Regulations (CFR) Part 1926, Subpart P, contain requirements for excavation and trenching operations

Description / identity of relevant SH&E risk	Identity / citation of related legal compliance obligation	How does one gain access to the text of this legal compliance obligation?	Remarks
Facilities	PART 1910—OCCUPATIONAL SAFETY AND HEALTH STANDARDS Subpart J—General Environmental Controls §1910.141 Sanitation. §1910.142 Temporary labor camps. §1910.160 Fixed extinguishing systems, general. PART 1926—SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION Subpart C—General Safety and Health Provisions §1926.25 Housekeeping. §1926.26 Illumination. §1926.27 Sanitation. Subpart D—Occupational Health and Environmental Controls §1926.51 Sanitation. §1926.56 Illumination.	PART 1910—OCCUPATIONAL SAFETY AND HEALTH STANDARDS Subpart J—General Environmental Controls PART 1926—SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION Subpart C—General Safety and Health Provisions	Standards for permanent and temporary places of employment.

Description / identity of relevant SH&E risk	Identity / citation of related legal compliance obligation	How does one gain access to the text of this legal compliance obligation?	Remarks
Fall Protection	29 CFR PART 1910—OCCUPATIONAL SAFETY AND HEALTH STANDARDS Subpart D—Walking-Working Surfaces §1910.28 Duty to have fall protection and falling object protection. §1910.29 Fall protection systems and falling object protection—criteria and practices. §1910.30 Training requirements. Subpart I—Personal Protective Equipment §1910.140 Personal fall protection systems. PART 1926—SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION Subpart M—Fall Protection §1926.500 Scope, application, and definitions applicable to this subpart. §1926.501 Duty to have fall protection. §1926.502 Fall protection systems criteria and practices. §1926.503 Training requirements.	PART 1910 Subpart D—Walking-Working Surfaces PART 1910 Subpart I—Personal Protective Equipment PART 1926—SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION Subpart M—Fall Protection	This section requires employers to provide protection for each employee exposed to fall and falling object hazards. Unless stated otherwise, the employer must ensure that all fall protection and falling object protection required by this section meet the criteria in §1910.29, except that personal fall protection systems required by this section meet the criteria of §1910.140. Criteria for fall protection in construction workplaces covered under 29 CFR 1926.

Description / identity of relevant SH&E risk	Identity / citation of related legal compliance obligation	How does one gain access to the text of this legal compliance obligation?	Remarks
Fire Prevention	29 CFR PART 1910—OCCUPATIONAL SAFETY AND HEALTH STANDARDS Subpart L- Fire Protection §1910.155 Scope, application and definitions applicable to this subpart. §1910.156 Fire brigades. §1910.157 Portable fire extinguishers. §1910.158 Standpipe and hose systems. §1910.159 Automatic sprinkler systems. §1910.160 Fixed extinguishing systems, general. §1910.161 Fixed extinguishing systems, dry chemical. §1910.162 Fixed extinguishing systems, gaseous agent. §1910.163 Fixed extinguishing systems, water spray and foam. §1910.164 Fire detection systems. §1910.165 Employee alarm systems. Subpart E—Exit Routes and Emergency Planning §1910.35 Compliance with alternate exit-route codes. §1910.36 Design and construction requirements for exit routes. §1910.37 Maintenance, safeguards, and operational features for exit routes. §1910.38 Emergency action plans. §1910.39 Fire prevention plans. Appendix to Subpart E of Part 1910—Exit Routes, Emergency Action Plans, and Fire Prevention Plans PART 1926—SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION Subpart C—General Safety and Health Provisions §1926.24 Fire protection and prevention. Subpart F—Fire Protection and Prevention §1926.150 Fire protection. §1926.151 Fire prevention. §1926.152 Flammable liquids. §1926.153 Liquefied petroleum gas (LP-Gas). §1926.154 Temporary heating devices. §1926.155 Definitions applicable to this subpart.	29 CFR PART 1910—OCCUPATIONAL SAFETY AND HEALTH STANDARDS Subpart L- Fire Protection Subpart E—Exit Routes and Emergency Planning PART 1926—SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION Subpart C—General Safety and Health Provisions PART 1926—SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION Subpart F—Fire Protection and Prevention	The employer shall be responsible for the development of a fire protection program to be followed throughout all phases of the construction and demolition work, and he shall provide for the firefighting equipment as specified in this subpart. As fire hazards occur, there shall be no delay in providing the necessary equipment.

Description / identity of relevant SH&E risk	Identity / citation of related legal compliance obligation	How does one gain access to the text of this legal compliance obligation?	Remarks
First Aid	Title 29: Labor PART 1910—OCCUPATIONAL SAFETY AND HEALTH STANDARDS Subpart K—Medical and First Aid	PART 1910—OCCUPATIONAL SAFETY AND HEALTH STANDARDS Subpart K—Medical and First Aid	(a) The employer shall ensure the ready availability of medical personnel for advice and consultation on matters of plant health. (b) In the absence of an infirmary, clinic, or hospital in near proximity to the workplace which is used for the treatment of all injured employees, a person or persons shall be adequately trained to render first aid. Adequate first aid supplies shall be readily available.
Hazard Communication	Title 29: Labor PART 1910—OCCUPATIONAL SAFETY AND HEALTH STANDARDS (CONTINUED) Subpart Z—Toxic and Hazardous Substances §1910.1200 Hazard communication.	PART 1910—OCCUPATIONAL SAFETY AND HEALTH STANDARDS (CONTINUED) §1910.1200 Hazard communication.	(1) Requires chemical manufacturers or importers to classify the hazards of chemicals which they produce or import, and all employers to provide information to their employees about the hazardous chemicals to which they are exposed, by means of a hazard communication program, labels and other forms of warning, safety data sheets, and information and training. In addition, this section requires distributors to transmit the required information to employers. (Employers who do not produce or import chemicals need only focus on those parts of this rule that deal with establishing a workplace program and communicating information to their workers.)
Hazardous Material Transportation, Storage & Disposal	Title 49: Transportation Subchapter C Hazardous Material Regulations	Title 49: Transportation Subchapter C Hazardous Material Regulations	
Hazardous Waste Operations	Title 29: Labor PART 1910—OCCUPATIONAL SAFETY AND HEALTH STANDARDS Subpart H—Hazardous Materials [1] §1910.120 Hazardous waste operations and emergency response. PART 1926—SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION Subpart D—Occupational Health and Environmental Controls [2] §1926.65 Hazardous waste operations and emergency response.	PART 1910— §1910.120 Hazardous waste operations and emergency response. PART 1926— §1926.65 Hazardous waste operations and emergency response.	
Hearing Conservation	Title 29: Labor PART 1926—SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION §1926.52 Occupational noise exposure. §1926.101 Hearing protection.	PART 1926—SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION §1926.101 Hearing protection. §1926.52 Occupational noise exposure.	Wherever it is not feasible to reduce the noise levels or duration of exposures to those specified in, in §1926.52, ear protective devices shall be provided and used. (b) Ear protective devices inserted in the ear shall be fitted or determined individually by competent persons. (c) Plain cotton is not an acceptable protective device.
Motor Vehicles	Title 29: Labor PART 1926—SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION	PART 1926—	

Description / identity of relevant SH&E risk	Identity / citation of related legal compliance obligation	How does one gain access to the text of this legal compliance obligation?	Remarks
	Subpart O—Motor Vehicles, Mechanized Equipment, and Marine Operations	Subpart O—Motor Vehicles, Mechanized Equipment, and Marine Operations	
Personal Protective Equipment	29 CFR PART 1926—SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION Subpart C—General Safety and Health Provisions §1926.28 Personal protective equipment. 29 CFR PART 1910—OCCUPATIONAL SAFETY AND HEALTH STANDARDS Subpart H—Hazardous Materials §1910.120 Hazardous waste operations and emergency response. Subpart I—Personal Protective Equipment §1910.132 General requirements. §1910.133 Eye and face protection. §1910.134 Respiratory protection. §1910.135 Head protection. §1910.136 Foot protection. §1910.137 Electrical protective equipment. §1910.138 Hand protection §1910.140 Personal fall protection systems.	Subpart C—General Safety and Health Provisions §1926.28 Personal protective equipment. 29 CFR PART 1910 Subpart H—Hazardous Materials 29 CFR Part 1910 Subpart I—Personal Protective Equipment	The PSHEM (Project Safety, Health, and Environmental Manager) leads the development of, and assists the Project Manager (PM) in implementing, a site-specific Personal Protective Equipment (PPE) plan. The PPE plan is included in the Project Safety, Health, and Environmental Plan (PSHEP) in accordance with Parsons' ESHARP Manual. The PSHEM may refer to the Sample PPE Plan (Exhibit 8.1), which includes the PPE plan requirements.
Recordkeeping * Work occurring at the facility falls under Part 1904	29 CFR PART 1904—RECORDING AND REPORTING OCCUPATIONAL INJURIES AND ILLNESSES Sections of interest (incomplete) : §1904.4 Recording criteria. §1904.5 Determination of work-relatedness. §1904.6 Determination of new cases. §1904.7 General recording criteria. §1904.8 Recording criteria for needlestick and sharps injuries. §1904.9 Recording criteria for cases involving medical removal under OSHA standards. §1904.10 Recording criteria for cases involving occupational hearing loss. §1904.11 Recording criteria for work-related tuberculosis cases. §1904.29 Forms. §1904.39 Reporting fatalities, hospitalizations, amputations, and losses of an eye as a result of work-related incidents to OSHA. §1904.40 Providing records to government representatives. §1904.41 Electronic submission of injury and illness records to OSHA. §1904.42 Requests from the Bureau of Labor Statistics for data. 29 CFR 1913	PART 1904—RECORDING AND REPORTING OCCUPATIONAL INJURIES AND ILLNESSES	The purpose of this rule (Part 1904) is to require employers to record and report work-related fatalities, injuries and illnesses.

Description / identity of relevant SH&E risk	Identity / citation of related legal compliance obligation	How does one gain access to the text of this legal compliance obligation?	Remarks
Respiratory Protection * Conditions at the facility and proposed work tasks, as well as services provided to the client may necessitate the use of respiratory protection while conducting operations or instituting controls	PART 1926—SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION Subpart E—Personal Protective and Life Saving Equipment §1926.103 Respiratory protection	29 CFR §1926.103 Respiratory protection	Respiratory Protection Standards for Construction
Respiratory Protection * Conditions at the facility and proposed work tasks, as well as services provided to the client may necessitate the use of respiratory protection while conducting operations or instituting controls Scaffolds * Use of scaffolds during operations may be necessitated given the client policies regarding ladders.	PART 1910—OCCUPATIONAL SAFETY AND HEALTH STANDARDS Subpart I—Personal Protective Equipment §1910.134 Respiratory protection.	29 CFR §1910.134 Respiratory protection.	When effective engineering controls are not feasible, or while they are being instituted, appropriate respirators shall be used.
	29 CFR 1926, Subpart L – Scaffolds §1926.450 Scope, application and definitions applicable to this subpart. §1926.451 General requirements. §1926.452 Additional requirements applicable to specific types of scaffolds. §1926.453 Aerial lifts. §1926.454 Training requirements.	29 CFR 1926, Subpart L – Scaffolds	Construction standard subpart that applies to all scaffolds used in workplaces covered by this part. It does not apply to crane or derrick suspended personnel platforms.
Scaffolds * Use of scaffolds during operations may be necessitated given the client policies regarding ladders. Signs, Signals & Barricades * Dynamic work areas, work areas with employee exposure to vehicular traffic, exclusion zones, contamination reduction zones, controlled access zones all may require appropriate signs, signals and barricades.	29 CFR 1910 Subpart D, Walking Working Surfaces §1910.28 Safety requirements for scaffolding. §1910.29 Manually propelled mobile ladder stands and scaffolds (towers). 32.§1910.29 Fall protection systems and falling object protection—criteria and practices	29 CFR 1910 Subpart D—Walking-Working Surfaces	General Industry subpart applies to scaffolds used in workplaces covered by this part.
	29 CFR 1926, Subpart G §1926.200 Accident prevention signs and tags. §1926.201 Signaling. §1926.202 Barricades. §1926.203 Definitions applicable to this subpart.	29 CFR 1926, Subpart G Signs, Signals, Barricades	Construction standards on Signs, Signal, Barricades, including incorporation by reference of the MUTCD.
Signs, Signals & Barricades * Dynamic work areas, work areas with employee exposure to vehicular traffic, exclusion zones, contamination reduction zones, controlled access zones all may require appropriate signs, signals and barricades. Temperature Extremes	§1910.144 Safety color code for marking physical hazards. §1910.145 Specifications for accident prevention signs and tags §1910.335 Safeguards for personnel protection §1910.1201 Retention of DOT markings, placards and labels	29 CFR Part 1910	General Industry Standards
	Part VI of the Manual on Uniform Traffic Control Devices	Manual on Uniform Traffic Control Devices (MUTCD)	
	29 CFR 1910. §1910.120 Hazardous waste operations and emergency response.		
Tools * Work may involve various hand and or power tools.	29 CFR 1926 Subpart I, Tools, Hand and Power §1926.300 General requirements. §1926.301 Hand tools. §1926.302 Power-operated hand tools. §1926.303 Abrasive wheels and tools. §1926.304 Woodworking tools.	29 CFR 1926 Subpart I, Tools, Hand and Power	Construction standard requirements for condition, guarding, maintenance and inspection as well as general standards.

Description / identity of relevant SH&E risk	Identity / citation of related legal compliance obligation	How does one gain access to the text of this legal compliance obligation?	Remarks
	§1926.305 Jacks—lever and ratchet, screw, and hydraulic. §1926.306 Air receivers. §1926.307 Mechanical power-transmission apparatus.		
Tools * Work may involve various hand and or power tools. Ventilation * The need for air monitoring and the use of calibration gasses, environmental sampling and remediation systems may allow conditions to develop for which proper ventilation is required.	§1910.241 Definitions. §1910.242 Hand and portable powered tools and equipment, general. §1910.243 Guarding of portable powered tools. §1910.244 Other portable tools and equipment.	29 CFR 1910 Subpart P, Tools, Hand and Power	General Industry standard requirements for condition, guarding, maintenance and inspection as well as general standards.
	29 CFR 1926 Subpart D, Occupational Health and Environmental Controls §1926.57 Ventilation §1926.55 Gases, vapors, fumes, dusts, and mists.	29 CFR 1926 Subpart D, Occupational Health and Environmental Controls	Requirements for ventilation systems, as well as Threshold limit values of airborne contaminants for construction
Walking / Working Surfaces * Parsons may not have control over some of the conditions in the facility. Conditions may also include field operations involving rough terrain.	29 CFR 1910 Subpart D, Walking Working Surfaces §1910.21 Definitions. §1910.22 General requirements. §1910.23 Guarding floor and wall openings and holes. §1910.24 Fixed industrial stairs. §1910.25 Portable wood ladders. §1910.26 Portable metal ladders. §1910.27 Fixed ladders. §1910.28 Safety requirements for scaffolding. §1910.29 Manually propelled mobile ladder stands and scaffolds (towers). §1910.30 Other working surfaces.	29 CFR 1910 Subpart D–Walking-Working Surfaces	Requirements for general industry walking and working
Welding, Cutting, Brazing	29 CFR 1926 Subpart J, Welding and cutting §1926.350 Gas welding and cutting. §1926.351 Arc welding and cutting. §1926.352 Fire prevention. §1926.353 Ventilation and protection in welding, cutting, and heating. §1926.354 Welding, cutting, and heating in way of preservative coatings.	29 CFR 1926 Subpart J, Welding and cutting	Gas welding and cutting; Arc welding and cutting; Fire prevention; Ventilation and protection in welding, cutting, and heating; Welding, cutting, and heating in way of preservative coatings
Welding, Cutting, Brazing	29 CFR 1926 Subpart Z, Toxic and Hazardous Substances	29 CFR 1926 Toxic & Hazardous Substances	Chromium, Cadmium
	29 CFR 1910 Subpart I		Personal Protective Equipment
	29 CFR 1910 Appendix B		Non Mandatory – hazard assessment & personal protective equipment

Description / identity of relevant SH&E risk	Identity / citation of related legal compliance obligation	How does one gain access to the text of this legal compliance obligation?	Remarks
	29 CFR 1910 Subpart Q §1910.251 Definitions. §1910.252 General requirements. §1910.253 Oxygen-fuel gas welding and cutting. §1910.254 Arc welding and cutting. §1910.255 Resistance welding.	29 CFR 1910 Subpart Q– Welding, Cutting and Brazing	Welding, cutting, and brazing;
	29 CFR 1910 Subpart Z Toxic and Hazardous Substances	29 CFR 1910 Subpart Z Toxic & Hazardous Substances	Chromium (VI)

Attachment 2 Risk Register 1 Suntru Street

PARSONS

Attachment 2 - Risk Register
Suntru Street RI

SEVERITY		PROBABILITY				
	Ca	E	E	H	H	M
	Cr	E	H	H	M	L
	M	H	M	M	L	L
	N	M	L	L	L	L
		F	L	O	S	U

SEVERITY		PROBABILITY				
	Ca	E	E	H	H	M
	Cr	E	H	H	M	L
	M	H	M	M	L	L
	N	M	L	L	L	L
		F	L	O	S	U

Activity	HOC Confirmation	Hazard Identification	At Risk	Pre-Risk Mgt Evaluation Matrix			Pre-Risk Mgt Treatment	Risk Management & Control -- Safety & Health		Risk Management & Control -- Environmental			Responsible Person	Cost Contingency	Post-Risk Mgt Evaluation Matrix			Residual Risk Action	PM or Office Manager Approval	Post-Risk Mgt Treatment (Residual Risk)
				Probability	Severity	RAC (Pre-Risk)		Engineering/ Administrative Controls	PPE	Waste Management	Engineering/ Administrative Controls	Site Condition Controls			Probability	Severity	RAC (Post-Risk)			
General Driving	Yes	Caught between/in, Motion, Mechanical	Environment , Equipment, Public/Others, Site personnel	Seldom	Marginal	LOW	Accept	Activity Hazard Analysis, Checklists/ Audits, Instructions, Permits, Procedures, Training/ Education	Level D - Modified	Avoidance/ Source Reduction	Checklists/ audits, Instructions, Procedures, Training/ education, Warning signs/ devices	Spill Kit on site	Field Team Leader		Unlikely	Marginal	LOW	NA		Accept
Vehicle Refueling	Yes	Mechanical, Gravity, Fall, Slip/Trip, Biological, Commodity contamination - Environmental, Chemical, Contact with	Site personnel, Environment	Unlikely	Negligible	LOW	Accept	Activity Hazard Analysis, Checklists/ Audits, Instructions, Procedures, Training/ Education, Real Time Air Monitoring, Controlled Access	Level D - Modified	Avoidance/ Source Reduction, Containment	Procedures, Regulatory requirements, Training/ education, Warning signs/ devices	Spill Kit on site	Task Leader		Unlikely	Negligible	LOW	NA		Accept
Site Walk	Yes	Motion, Struck by, Fall, Slip/Trip, Chemical, Inhalation	Site personnel	Unlikely	Negligible	LOW	Accept	Activity Hazard Analysis, Checklists/ Audits, Instructions, Procedures, Training/ Education, Real Time Air Monitoring, Controlled Access	Level D - Modified	Avoidance/ Source Reduction	Permits, Procedures, Training/ education, Warning signs/ devices	Spill Kit on site	Field Team Leader		Unlikely	Negligible	LOW	NA		Accept
Air Monitor Equipment Calibation	Yes	Chemical, Inhalation, Contact with , Slip/Trip, Pressure	Site personnel	Unlikely	Negligible	LOW	Accept	Activity Hazard Analysis, Checklists/ Audits, Instructions, Permits, Procedures, Training/ Education	Eye/face protection-safety gl	Avoidance/ Source Reduction	Procedures, Training/ education	Spill Kit on site	Task Leader		Unlikely	Negligible	LOW	NA		Accept
Drilling PreClearance Oversight	Yes	Motion, Gravity, Fall, Slip/Trip, Chemical, Mechanical, Inhalation, Pressure, Sound	Site personnel	Unlikely	Marginal	LOW	Accept	Activity Hazard Analysis, Checklists/ Audits, Instructions, Permits, Procedures, Training/ Education, Real Time Air Monitoring, Controlled Access	Level D - Modified, Hearing Protection	Avoidance/ Source Reduction	Permits, Procedures, Training/ education, Warning signs/ devices	Spill Kit on site	Field Team Leader		Unlikely	Marginal	LOW	NA		Accept
Drilling Oversight, Bedrock coring	Yes	Motion, Gravity, Slip/Trip, Chemical, Inhalation, Sound, Struck by, Fall	Site personnel, Environment	Occasional	Marginal	MODERATE	Reduce	Activity Hazard Analysis, Checklists/ Audits, Instructions, Permits, Procedures, Training/ Education, Real Time Air Monitoring, Controlled Access	Level D - Modified, Hearing Protection	Avoidance/ Source Reduction, Containment, Disposal	Permits, Procedures, Training/ education, Warning signs/ devices, Regulatory requirements	Spill Kit on site	Field Team Leader		Unlikely	Negligible	LOW	NA		Accept
Taking Photos	Yes	Motion, Struck by, Fall, Slip/Trip, Chemical, Inhalation	Site personnel	Unlikely	Negligible	LOW	Accept	Activity Hazard Analysis, Checklists/ Audits, Instructions, Procedures, Training/ Education, Real Time Air Monitoring, Controlled Access	Level D - Modified	Avoidance/ Source Reduction	Permits, Procedures, Checklists/ audits, Training/ education, Warning signs/ devices	Spill Kit on site	Task Leader		Unlikely	Negligible	LOW	NA		Accept
Contractor Oversight Delivery of Materials	Yes	Motion, Chemical, Contact with , Commodity contamination - Environmental, Inhalation, Gravity, Struck by	Environment , Site personnel	Unlikely	Marginal	LOW	Accept	Activity Hazard Analysis, Checklists/ Audits, Instructions, Permits, Procedures, Training/ Education, Real Time Air Monitoring, Controlled Access	Level D - Modified	Avoidance/ Source Reduction, Containment, Disposal	Permits, Procedures, Regulatory requirements, Training/ education, Warning signs/ devices	Spill Kit on site	Field Team Leader		Unlikely	Critical	LOW	NA		Accept
Geophysical Survey Oversight	Yes	Chemical, Contact with , Inhalation, Motion, Slip/Trip, Fall	Site personnel	Unlikely	Critical	LOW	Accept	Activity Hazard Analysis, Checklists/ Audits, Instructions, Procedures, Training/ Education, Real Time Air Monitoring, Controlled Access	Level D - Modified	Avoidance/ Source Reduction	Permits, Procedures, Regulatory requirements, Training/ education, Warning signs/ devices	Spill Kit on site	Field Team Leader		Unlikely	Negligible	LOW	NA		Accept

PARSONS

Attachment 2 - Risk Register
Suntru Street RI

SEVERITY	PROBABILITY				
Ca	E	E	H	H	M
Cr	E	H	H	M	L
M	H	M	M	L	L
N	M	L	L	L	L
	F	L	O	S	U

SEVERITY	PROBABILITY				
Ca	E	E	H	H	M
Cr	E	H	H	M	L
M	H	M	M	L	L
N	M	L	L	L	L
	F	L	O	S	U

Activity	HOC Confirmation	Hazard Identification	At Risk	Pre-Risk Mgt Evaluation Matrix			Pre-Risk Mgt Treatment	Risk Management & Control -- Safety & Health		Risk Management & Control -- Environmental			Responsible Person	Cost Contingency	Post-Risk Mgt Evaluation Matrix			Residual Risk Action	PM or Office Manager Approval	Post-Risk Mgt Treatment (Residual Risk)
				Probability	Severity	RAC (Pre-Risk)		Engineering/ Administrative Controls	PPE	Waste Management	Engineering/ Administrative Controls	Site Condition Controls			Probability	Severity	RAC (Post-Risk)			
Oversight For Excavation Activities	Yes	Motion, Gravity, Slip/Trip, Fall, Struck by, Chemical, Inhalation, Sound	Site personnel	Seldom	Critical	MODERATE	Reduce	Activity Hazard Analysis, Checklists/ Audits, Instructions, Procedures, Training/ Education, Real Time Air Monitoring, Controlled Access	Level D - Modified, Hearing Protection	Avoidance/ Source Reduction	Permits, Procedures, Regulatory requirements, Training/ education, Warning signs/ devices	Spill Kit on site	Task Leader		Unlikely	Critical	LOW	NA		Accept
Fire Extinguisher Inspection	Yes	Motion, Chemical, Contact with	Site personnel	Unlikely	Marginal	LOW	Accept	Activity Hazard Analysis, Checklists/ Audits, Instructions, Procedures, Training/ Education, Real Time Air Monitoring, Controlled Access	Level D - Modified	Avoidance/ Source Reduction	Permits, Procedures, Regulatory requirements, Training/ education, Warning signs/ devices	Spill Kit on site	Task Leader		Unlikely	Negligible	LOW	NA		Accept
Drum and Rolloff Inspection	Yes	Motion, Chemical, Inhalation, Biological, Gravity	Site personnel	Unlikely	Negligible	LOW	Accept	Activity Hazard Analysis, Checklists/ Audits, Instructions, Procedures, Training/ Education, Real Time Air Monitoring, Controlled Access	Level D - Modified	Avoidance/ Source Reduction	Permits, Procedures, Regulatory requirements, Training/ education, Warning signs/ devices	Spill Kit on site	Task Leader		Unlikely	Negligible	LOW	NA		Accept

Attachment 3 Activity Hazards Analysis

Activity/Work Task: General Field Activities	Overall Risk Assessment Code (RAC) (Use highest code): **M**
Project Location: East Station, Rochester NY	
Project Number: 453121	
Date Prepared: 1/27/2023	
Prepared by (Name): Sara Weishaupt	
Reviewed by (Name): Darrell Pruitt	
Employer / GBU: Parsons	

Risk Assessment Code (RAC) Matrix

Severity	Probability: Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	**E**	**E**	**H**	**H**	**M**
Critical	**E**	**H**	**H**	**M**	**L**
Marginal		**M**	**M**	**L**	**L**
Negligible	**M**	**L**	**L**	**L**	**L**

Notes: (Field Notes, Review Comments, etc.)
References:
PSHEP, ESHARP Manual, DASH Card

Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above).
The RAC is developed after correctly identifying all of the hazards and fully implementing all controls.

	RAC Chart
"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.	
"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible	**E = Extremely High Risk** **H = High Risk**
Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.	**M = Moderate Risk** **L = Low Risk**

Job Steps	Hazards	Controls	P	S	RAC
Outdoor, Indoor, Physical Activity	Heat Stress ▪ Prickly Heat (Heat rash) ▪ Heat Cramps ▪ Heat Exhaustion ▪ Heat Fatigue ▪ Heat Collapse ▪ Heat Stroke	▪ Adjust work schedules. ▪ Mandate work slowdowns as needed. ▪ Perform work during cooler hours of the day if possible or at night if adequate lighting can be provided. ▪ Provide shelter (air-conditioned, if possible) or shaded areas to protect personnel during rest periods. ▪ Maintain worker's body fluids at normal levels. ▪ Train workers to recognize the symptoms of heat related illness. ▪ Monitor workers physical conditions ▪ Monitor outside temperature versus worker activity. ▪ The SSO will implement the cold/heat stress control program as appropriate to conditions.	S	Cr	M

	Cold Related Injuries Frostbite Hypothermia	▪ Educate workers to recognize the symptoms of frostbite and hypothermia ▪ Have appropriate PPE for the conditions, including jackets, gloves/mittens, winter boots and hat ▪ Identify and limit known risk factors: ▪ Assure the availability of enclosed, heated environment on or adjacent to the site. ▪ Assure the availability of dry changes of clothing. ▪ Assure the availability of warm drinks. ▪ Start (oral) temperature recording at the job site: ▪ At the Field Team Leader's discretion when suspicion is based on changes in a worker's performance or mental status. ▪ At a worker's request. ▪ As a screening measure, two times per shift, under unusually hazardous conditions (e.g., wind-chill less than 20oF, or wind-chill less than 30oF with precipitation). ▪ As a screening measure whenever anyone worker on the site develops hypothermia. ▪ The SSO will implement the cold/heat stress control program as appropriate to conditions.	S	Cr	M
	Slips, Trips, Falls	▪ Workers will be aware of potentially slippery surfaces and tripping hazards. Keep all areas dry, clean and free of debris to deter any unnecessary trips and falls. ▪ Avoid, remove, communication, and mark (if possible) hazards. ▪ Do not talk or text on cellphone or look at documents while walking, focus on task. ▪ Don't walk with hands in pocket. They can be used to catch you in the event of a slip, trip or fall. ▪ Work slowly during transit. Jumping, running, and horseplay are prohibited. ▪ Wear ankle high safety shoes fully laced with good tread, keep hands out of pocket in case of fall. Do not carry more than 50 lbs by yourself, and plan your route. ▪ Clean up all spills immediately and dispose properly. ▪ Avoid working at dusk, dawn, or at night. Utilize adequate lighting when indoors. ▪ Personnel will notify the SSO of any unsafe conditions.	O	M	M
	Rain	▪ Have proper PPE (i.e. rain gear, footwear, etc) available. Be aware of slip hazards, puddles, etc.	O	M	M
	Sunshine	▪ Have sunscreen available for ultraviolet protection. Have water for dehydration.	S	N	L
	Snow	▪ Have warm clothes available for cold temperatures.	O	N	L
	Lightning	▪ Do not begin or continue work until lightning subsides for 30 minutes. ▪ Check weather forecast; reschedule if there is a severe weather warning.	O	M	M
	High winds, dust storm	▪ Wear goggles if dust/debris is visible. ▪ Stop work if vision is significantly impaired or creates unsafe conditions.	S	N	L

	Pollen	▪ Take medication (i.e. antihistamine) to minimize allergic reaction to pollen. Wear dust mask, if necessary.	O	N	L
	Working Near Water/Drowning Protection	▪ Parsons selects personal flotation devices (PFDs) and requires employees to wear them when work is conducted in areas where the danger of drowning exists. ▪ Don PFD when working within 10 feet of water. ▪ Have a throwable rescue device with 75' rescue line readily available ▪ Buddy system required when working near water	U	Cr	L
	Walking on uneven or wet terrain (i.e. slopes, leaves, covered objects, holes, etc)	▪ Wear steel toe rubber boots versus over-the-shoe rubber boots. Use walking stick or other object for additional support/balance and to check for animal burrows/holes.	O	M	M
	Biological Hazards - insects, rodents, animals, etc.	▪ Wear appropriate clothing (hat, long-sleeve shirt, long pants, gloves, boots, Tyvek, etc.). ▪ Apply bug repellant spray or lotion to exposed skin. ▪ Personnel will be aware of potential exposure to biological hazards. ▪ Perform a tick check throughout and at the end of the day. If a tick is embedded review the Workcare Tick guidance and safely remove as soon as possible. Save tick if possible. If symptoms develop or tick is embedded more than 12 hours call Workcare for guidance.	U	M	L
	Vegetation	▪ Create a clear path or route with mechanical equipment, whenever possible. Wear appropriate PPE for the vegetation (i.e. leather gloves, Carhartt coveralls and face shield for vegetation that could cause cuts/punctures and/or is higher than waist level.	U	M	L
	Traffic (Including Pedestrians)	▪ Use cones, flags, and other traffic control devices to delineate work zone ▪ Don proper PPE, including reflective vest. ▪ Look both ways before exiting vehicle, have an emergency kit in the vehicle. ▪ Refer to AHA 018: Traffic Management.	O	M	M
	Site Hazards Material Exposure	▪ Training and safety awareness of potential exposure to contaminates at the site. ▪ Training of all personnel decontamination procedures (if appropriate to visit). Provide adequate hygiene and decontamination supplies. Refer to AHA 003: Personal Decontamination, and AHA 004: Decontamination of Tools and Equipment. ▪ Practice contamination avoidance work upwind if feasible, limit contact to the extent possible, do not eat in areas with COC's, keep drink containers covered. ▪ Appropriate PPE will be worn dependent on site conditions and actions levels. (if appropriate to visit) ▪ Must sign off on health and safety plan. ▪ Visitor will be escorted around site by an individual with current 40-hour HAZWOPER training, unless cleared with the SSO.	S	M	L

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
PPE (Level D) - Long pants, safety glasses, hard hat (in presence of heavy equipment), high-visibility vest/clothing, steel-toed boots, gloves, goggles. Depending on environment at project site: blanket, sunscreen, cold/hot drink, extra clothing, traffic warning signage, cones, hi-vis markers, etc, fire extinguisher, insect repellent.	All personnel engaged in hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards shall receive appropriate training as required by 29 CFR 1910.120(e), including, but not limited to, initial 40-hour, 8-hour Supervisor and annual 8-hour refresher. Medical qualification, training and fit-testing must be received on an annual basis for individuals that wear a respirator. If an individual wears a respirator more than 30 days per year, or they are exposed at or above the Permissible Exposure Limit (PEL) of a chemical for more than 30 days in a year, then they must participate in a Medical Surveillance Program as required by 29 CFR 1910.120(f). All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity and review it with their Supervisor during their Daily Safety Huddle. All personnel performing work onsite must have received the site specific orientation. Competent FA / CPR / AED responder will be onsite while all work is occurring at all times. STOP WORK AUTHORITY Right, Obligation and Responsibility Every single employee has the responsibility and the authority to STOP WORK at any time necessary to protect the safety or health of themselves, others, and the environment. Anyone can execute this responsibility without repercussions. We believe that the GOAL OF ZERO is possible with everyone's support and commitment.	Ongoing environmental condition inspection (weather, wind, heat, cold). Ongoing personnel inspection (buddy system) Inspection of work area for general hazards as covered under this AHA prior to beginning any task. Take 5 Card when appropriate Equipment inspection as necessary, recorded in field book.

ACTIVITY HAZARDS ANALYSIS TRAINING ACKNOWLEDGEMENT AND SIGN OFF

Read Carefully Before Signing Below

This is to acknowledge that I have had a chance to review a copy **AHA 001 General Field Activities** and have been trained on its contents. I understand a copy will be provided to me upon request. I will read and abide by all requirements of the aforementioned AHA and any additional rules and regulations of my job. I understand that working safely, complying with and obeying any and all Company safety rules, regulations or standards is a condition of my employment. Should I not comply with Company safety rules, regulations or standards, I am subject to disciplinary action including removal from the site and possible termination of employment.

NAME	SIGNATURE	COMPANY	DATE	CRAFT	TRAINER	TRAINER SIGNATURE
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Activity/Work Task: Operation of Motor Vehicle	Overall Risk Assessment Code (RAC) (Use highest code)						**M**
Project Location: East Station, Rochester NY	**Risk Assessment Code (RAC) Matrix**						
Project Number: 453121	**Severity**	**Probability**					
Date Prepared: 1/27/2023		Frequent	Likely	Occasional	Seldom	Unlikely	
Prepared by (Name): Sara Weishaupt	Catastrophic	**E**	**E**	**H**	**H**	**M**	
	Critical	**E**	**H**	**H**	**M**	**L**	
Reviewed by (Name): Darrell Pruitt	Marginal	**H**	**M**	**M**	**L**	**L**	
Employer / GBU: Parsons	Negligible	**M**	**L**	**L**	**L**	**L**	

Notes: (Field Notes, Review Comments, etc.)
References:
PSHEP, ESHARP Manual, DASH Card

Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above).
The RAC is developed after correctly identifying all of the hazards and fully implementing all controls.

	RAC Chart
"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.	
"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible	**E = Extremely High Risk** **H = High Risk**
Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.	**M = Moderate Risk** **L = Low Risk**

Job Steps	Hazards	Controls	P	S	RAC
Driving to and from the job site	Vehicle Accident	▪ All employees shall complete the ParsonsU safety module on Defensive Driving. ▪ Plan your travel route and check maps for directions or discuss with colleagues. ▪ Complete a Vehicle Inspection Report before driving and check for proper equipment/supplies. ▪ Clean windows and mirrors as needed throughout the trip. ▪ Have sunglasses available to reduce sun glare and wear as needed. ▪ Follow vehicle maintenance schedule to reduce possibilities of breakdown while driving. ▪ Use Defensive Driving Techniques; avoid following too closely 3-4 second distance, drive within speed limit or as conditions allow, focus on task do not eat or use phone or electronic devices while driving, Get Out And Look (GOAL) before	S	Cr	M

		backing, use a spotter as needed for backing and maneuvering Inspection Requirements Inspect all fluid level, air pressure in tires, adjust mirrors and seat positions appropriately, watch fuel level and fill up when level is low.			
	Environmental Release – fire when fueling, fire in area	▪ Look for gas station in safe area, avoid if heavily congested or in unsafe neighborhood ▪ Do not fuel if others in area are smoking or on cell phones ▪ Do not overfill, stop after pump turns off. ▪ Do not park warm vehicle in tall grass or vegetation ▪ Have a fire extinguisher in the vehicle	U	Cr	L
	Distraction while driving	▪ Stop driving a vehicle, regardless of the speed (i.e. even 5 mph) or location (i.e. private road), when the potential of being distracted by conversation exists.	S	Cr	M
	Fatigue/Falling asleep	▪ Get adequate rest prior to driving. Take a break every 2 hours, do not work and drive more than 12 hours in one day.	S	Cr	M
	Weather /Road conditions	▪ Check road and weather conditions prior to driving. Reschedule trip if advisories are issued or severe weather is forecast	O	M	M
	Theft/Crime of parked vehicle	▪ Lock the vehicle when leaving the area ▪ Store valuables in secure area and cover ▪ Avoid parking in unlit or unsecured areas	U	M	L

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
Wear seat belt at all times; make sure that clothing will not interfere with driving.	All personnel engaged in hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards shall receive appropriate training as required by 29 CFR 1910.120(e), including, but not limited to, initial 40-hour, 8-hour Supervisor and annual 8-hour refresher. Medical qualification, training and fit-testing must be received on an annual basis for individuals that wear a respirator. If an individual wears a respirator more than 30 days per year, or they are exposed at or above the Permissible Exposure Limit (PEL) of a chemical for more than 30 days in a year, then they must participate in a Medical Surveillance Program as required by 29 CFR 1910.120(f). All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity and review it with their Supervisor during their Daily Safety Huddle. All personnel performing work onsite must have received the site specific orientation. Competent FA / CPR / AED responder will be onsite while all work is occurring at all times. STOP WORK AUTHORITY Right, Obligation and Responsibility Every single employee has the responsibility and the authority to STOP WORK at any time necessary to protect the safety or health of themselves, others, and the environment. Anyone can execute this responsibility without repercussions. We believe that the GOAL OF ZERO is possible with everyone's support and commitment.	Vehicle inspection checklist

ACTIVITY HAZARDS ANALYSIS TRAINING ACKNOWLEDGEMENT AND SIGN OFF

Read Carefully Before Signing Below

This is to acknowledge that I have had a chance to review a copy **AHA 002 Operation of Motor Vehicle** and have been trained on its contents. I understand a copy will be provided to me upon request. I will read and abide by all requirements of the aforementioned AHA and any additional rules and regulations of my job. I understand that working safely, complying with and obeying any and all Company safety rules, regulations or standards is a condition of my employment. Should I not comply with Company safety rules, regulations or standards, I am subject to disciplinary action including removal from the site and possible termination of employment.

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<table>
<tr><td>Activity/Work Task: Personnel Decontamination</td><td colspan="5">Overall Risk Assessment Code (RAC) (Use highest code)</td><td>M</td></tr>
<tr><td>Project Location: East Station, Rochester NY</td><td colspan="6">Risk Assessment Code (RAC) Matrix</td></tr>
<tr><td>Project Number: 453121</td><td rowspan="2">Severity</td><td colspan="5">Probability</td></tr>
<tr><td>Date Prepared: 1/27/2023</td><td>Frequent</td><td>Likely</td><td>Occasional</td><td>Seldom</td><td>Unlikely</td></tr>
<tr><td rowspan="2">Prepared by (Name): Sara Weishaupt</td><td>Catastrophic</td><td>E</td><td>E</td><td>H</td><td>H</td><td>M</td></tr>
<tr><td>Critical</td><td>E</td><td>H</td><td>H</td><td>M</td><td>L</td></tr>
<tr><td>Reviewed by (Name): Darrell Pruitt</td><td>Marginal</td><td>H</td><td>M</td><td>M</td><td>L</td><td>L</td></tr>
<tr><td>Employer / GBU: Parsons</td><td>Negligible</td><td>M</td><td>L</td><td>L</td><td>L</td><td>L</td></tr>
<tr><td rowspan="4">Notes: (Field Notes, Review Comments, etc.)
References:
PSHEP, ESHARP Manual, DASH Card</td><td colspan="6">Step 1: Review each “Hazard” with identified safety “Controls” and determine RAC (See above).
The RAC is developed after correctly identifying all of the hazards and fully implementing all controls.</td></tr>
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L = Low Risk</td></tr>
</table>

Job Steps	Hazards	Controls	P	S	RAC
Decontaminate personnel exiting from the Exclusion zone	General	▪ Personnel should dress in suitable safety equipment to reduce exposure. ▪ Collect rinse water and dispose of per appropriate standard operating procedures. ▪ Follow decontamination procedures.	S	M	L
	Site Hazardous Material Exposure	▪ Training and safety awareness of potential exposure to chemicals of concern at the site and decontamination procedure. Review chemicals of concern. ▪ Training of all personnel decontamination procedures (if appropriate to visit). Provide adequate hygiene and decontamination supplies. ▪ Practice contamination avoidance, work upwind if feasible, limit contact to the extent possible, do not eat in areas with COC’s, keep drink containers covered.	S	M	L

		▪ Appropriate PPE will be worn (e.g. tyvek, nitrile gloves, safety glass…). Workers should decontaminate PPE at the end of each work day or when leaving the site (e.g., boot wash station). ▪ Monitor breathing zone using PID. Refer to PSHEP for action levels. ▪ Must sign off on health and safety plan. ▪ Visitor will be escorted around site by an individual with current 40 hour			
	Heat/Cold Stress Biological Hazards Adverse Weather Uneven/Wet Terrain	▪ Refer to AHA 001: General Site Activities	S	M	M
	Traffic (Including Pedestrians)	▪ Use cones, flags, and other traffic control devices to delineate work zone ▪ Don proper PPE, including reflective vest. ▪ Look both ways before exiting vehicle, have an emergency kit in the vehicle. ▪ Review AHA 018: Traffic Management for further controls measurements and hazards.	O	M	M

Activity/Work Task: Personnel Decontamination		Overall Risk Assessment Code (RAC) (Use highest code)			
Job Steps	**Hazards**	**Controls**	**P**	**S**	**RAC**
Decontaminate personnel exiting from the Exclusion zone (Contd)	Slips, Trips, Falls	▪ Workers will be aware of potentially slippery surfaces and tripping hazards. Workers will keep all areas clean and free of debris and dry to deter any unnecessary trips and falls. ▪ Avoid, remove, communication, and mark (if possible) hazards. ▪ Do not talk or text on cellphone or look at documents while walking, focus on task. ▪ Don't walk with hands in pocket. They can be used to catch you in the event of a slip, trip or fall. ▪ Work slowly during transit. Jumping, running, and horseplay are prohibited. ▪ Wear ankle high safety shoes fully laced with good tread, keep hands out of pocket in case of fall. Do not carry more than 50 lbs by yourself and plan your route. ▪ Avoid working at dusk, dawn, or at night. Utilize adequate lighting when indoors. ▪ Clean up all spills immediately. ▪ Personnel will notify the SSO of any unsafe conditions.	O	M	M
	Spill/leakage	▪ Workers will have berms or spill absorbent pads nearby to prevent the spread of contaminated water. ▪ Conduct decon activities in flat areas with impervious surfaces (concrete, asphalt, etc) and away from bare ground, surface water, and catch basins. ▪ Decontamination area will be designed to minimize exposure and maintain spill containment.	U	Cr	L
	Splash Hazards/Eye Injury	▪ PPE (safety glasses, splash goggles) will be worn.	S	Cr	M
IDW Management	Refer to AHA 014: IDW Management and Sampling		S	Cr	M

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
Depending on environment at project site: blanket, sunscreen, cold/hot drink, extra clothing, traffic warning signage, cones, hi-vis markers, etc, fire extinguisher, insect repellent. Decontamination equipment – bucket, brush, alconox, water PPE (Level D) - Long pants, safety glasses, hard hat (in presence of heavy equipment), high-visibility vest/clothing, steel-toed boots, gloves, goggles.	All personnel engaged in hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards shall receive appropriate training as required by 29 CFR 1910.120(e), including, but not limited to, initial 40-hour, 8-hour Supervisor and annual 8-hour refresher. Medical qualification, training and fit-testing must be received on an annual basis for individuals that wear a respirator. If an individual wears a respirator more than 30 days per year, or they are exposed at or above the Permissible Exposure Limit (PEL) of a chemical for more than 30 days in a year, then they must participate in a Medical Surveillance Program as required by 29 CFR 1910.120(f). All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity and review it with their Supervisor during their Daily Safety Huddle. All personnel performing work onsite must have received the site specific orientation. Competent FA / CPR / AED responder will be onsite while all work is occurring at all times. STOP WORK AUTHORITY Right, Obligation and Responsibility Every single employee has the responsibility and the authority to STOP WORK at any time necessary to protect the safety or health of themselves, others, and the environment. Anyone can execute this responsibility without repercussions. We believe that the GOAL OF ZERO is possible with everyone's support and commitment.	Ongoing environmental condition inspection (weather, wind, heat, cold). Ongoing personnel inspection (buddy system) Inspection of work area for general hazards as covered under this AHA prior to beginning any task. Take 5 Card when appropriate Get Out and Look (GOAL) Equipment inspection as necessary, recorded in field book. Complete daily PID calibration and monthly fire extinguisher inspections.

ACTIVITY HAZARDS ANALYSIS TRAINING ACKNOWLEDGEMENT AND SIGN OFF

Read Carefully Before Signing Below

This is to acknowledge that I have had a chance to review a copy **AHA 003 Personnel Decontamination** and have been trained on its contents. I understand a copy will be provided to me upon request. I will read and abide by all requirements of the aforementioned AHA and any additional rules and regulations of my job. I understand that working safely, complying with and obeying any and all Company and Honeywell safety rules, regulations or standards is a condition of my employment. Should I not comply with Company and/or Honeywell safety rules, regulations or standards, I am subject to disciplinary action including removal from the site and possible termination of employment.

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Activity/Work Task: Decontamination of Tools and Equipment	Overall Risk Assessment Code (RAC) (Use highest code)						**M**		
Project Location: East Station, Rochester NY	**Risk Assessment Code (RAC) Matrix**								
Project Number: 453121	**Severity**	**Probability**							
Date Prepared: 01/27/2023		Frequent	Likely	Occasional	Seldom	Unlikely			
Prepared by (Name): Sara Weishaupt	Catastrophic	**E**	**E**	**H**	**H**	**M**			
	Critical	**E**	**H**	**H**	**M**	**L**			
Reviewed by (Name): Darrell Pruitt	Marginal	**H**	**M**	**M**	**L**	**L**			
Employer / GBU: Parsons	Negligible	**M**	**L**	**L**	**L**	**L**			

Notes: (Field Notes, Review Comments, etc.) **References:** PSHEP, ESHARP Manual, DASH Card	**Step 1:** Review each "Hazard" with identified safety "Controls" and determine RAC (See above). **The RAC is developed after correctly identifying all of the hazards and fully implementing all controls.**	
	"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.	**RAC Chart**
	"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible	**E = Extremely High Risk** **H = High Risk**
	Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.	**M = Moderate Risk** **L = Low Risk**

Job Steps	Hazards	Controls	P	S	RAC
General/Work Area (Applies to All Job Steps)	General	▪ Personnel should dress in suitable safety equipment to reduce exposure. ▪ Collect rinse water and dispose of per appropriate standard operating procedures. ▪ Follow decontamination procedures. Refer to AHA-001	S	M	L
	Site Hazardous Material Exposure	▪ Training and safety awareness of potential exposure to contaminates at the site and decontamination procedures. ▪ Training of all personnel decontamination procedures (if appropriate to visit). Provide adequate hygiene and decontamination supplies. ▪ Practice contamination avoidance work upwind if feasible, limit contact to the extent possible, do not eat in areas with COC's, keep drink containers covered.	S	M	L

		▪ Appropriate PPE will be worn (e.g., gloves, splash goggles, Tyvek, etc.). ▪ Must sign off on health and safety plan. ▪ Monitor breathing zone using PID. In addition, use multi-gas meter if using gas-powered equipment or exhaust fumes present. Refer to PSHEP for action levels. ▪ Visitor will be escorted around site by an individual with current 40 hour ▪ Personnel will follow decontamination procedures.			
	Slips, Trips, and Falls	▪ Workers will be aware of potentially slippery surfaces and tripping hazards. Keep all areas dry, clean and free of debris to deter any unnecessary trips and falls. ▪ Avoid, remove, communication, and mark (if possible) hazards. ▪ Do not talk or text on cellphone or look at documents while walking, focus on task. ▪ Don't walk with hands in pocket. They can be used to catch you in the event of a slip, trip or fall. ▪ Work slowly during transit. Jumping, running, and horseplay are prohibited. ▪ Wear ankle high safety shoes fully laced with good tread, keep hands out of pocket in case of fall. Do not carry more than 50 lbs by yourself and plan your route. ▪ Clean up all spills immediately and dispose properly. ▪ Avoid working at dusk, dawn, or at night. ▪ Personnel will notify the SSO of any unsafe conditions.	O	M	M
	Heat/Cold Stress Biological Hazards Adverse Weather Uneven/Wet Terrain	▪ Refer to AHA 001: General Site Activities	O	M	M
	Traffic (Including Pedestrians)	▪ Use cones, flags, and other traffic control devices to delineate work zone ▪ Don proper PPE, including reflective vest. ▪ Look both ways before exiting vehicle, have an emergency kit in the vehicle. ▪ Review AHA 018: Traffic Management for further controls measurements and	O	M	M

		hazards.			
Handling of Equipment	Pinch Points, Hand Injuries, Ergonomics	▪ Always use two persons for movement of heavy equipment (>50 lbs.). Use correct body positioning and posture while heavy. ▪ Wear leather gloves during handling of equipment. Keep hands and feet clear of crush/pinch areas during loading and unloading of equipment	S	M	L
	Foot Injuries	▪ Safety-toed boots should be worn when moving/handling equipment. ▪ Work in teams to move, life, or handle equipment > 50 lbs.	S	M	L
Remove gross contamination with brush.	Damaging equipment or tools Slip or Fall	▪ To clean instrumentation: follow manufacturer's instructions. ▪ Provide a chair or something to hold onto when removing PPE (boots)	O	N	L
	Eye/Face Injuries	▪ Workers shall wear proper PPE (safety glasses or safety shield)	S	M	L
Cleaning/Rinsing with Wash Solution and Water	Spill/leakage	▪ Workers will have berms or spill absorbent pads nearby to prevent the spread of contaminated water. ▪ Conduct decon activities in flat areas with impervious surfaces (concrete, asphalt, etc) and away from bare ground, surface water, and catch basins. ▪ Decontamination area will be designed to minimize exposure and maintain spill containment.	U	Cr	L
	Damaging equipment or tools	▪ Follow manufacturer's instructions. Check that wash solution will not damage instrument.	O	N	L
	Chemical reaction and exposure to wash solution	▪ A Type ABC, 20-lb, fully charged fire extinguisher will be in an accessible area on-site. ▪ Review the chemicals of concern and use appropriate wash solution. ▪ Maintain Safety Data Sheet onsite for wash chemical used. ▪ Wear proper PPE when mixing wash solution and rinsing equipment with solution (safety goggles, nitrile gloves).	U	Cr	L
	Contamination remains	▪ Personnel will repeat proper decontamination procedure.	U	M	L
Use of Pressure Washer	Eye/Face Injuries	▪ Ensure individuals are trained on the proper operation of the pressure washer and understand hazards associated with the pressurized equipment. ▪ Stand/work with back to the wind, if possible.	S	Cr	M

		▪ Keep out of line of fire of pressure washer. Make sure that all workers and bystanders are cleared from area before operating. ▪ Turn off valves when not in use. ▪ Workers shall wear proper PPE (safety glasses with side shields + a face shield) Set-up wastewater collection area, containerize water for proper disposal			
	Slips, Trips, and Falls	▪ Refer to control measures listed above in General/Work Area job steps for slips, trips, and falls. ▪ Be aware of location of hosing at all times. Mark with cones.	O	M	M
Refueling of Generator	Fire/Explosion	▪ A Type ABC, 20-lb, fully charged fire extinguisher will be in an accessible area on-site. ▪ Prohibit storage of fuel in plastic containers. Store in well ventilated areas and keep away from combustible materials. ▪ Turn off generator before refueling. ▪ No smoking while onsite and when refueling. ▪ Store fuel and generator away from heat sources.	U	Ca	M
	Spill/Release	▪ Have spill absorbent pads nearby to prevent the spread of spilled materials. ▪ Inspect safety gas can for defects (e.g., lid doesn't completely close) before usage, refilling, and during transport. ▪ Conduct refueling activities in flat areas with impervious surfaces (concrete, asphalt, etc) and away from bare ground, surface water, and catch basins. ▪ Keep generator and gas can in secure area when not in use. Properly secure so as to prevent movement during transport.	S	Cr	M
IDW Management	Refer to AHA 014: IDW Management and Sampling		S	Cr	M

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
PPE (Level D) - Long pants, safety glasses, hard hat (in presence of heavy equipment), high-visibility vest/clothing, steel-toed boots, gloves, goggles. Depending on environment at project site: blanket, sunscreen, cold/hot drink, extra clothing, traffic warning signage, cones, hi-vis markers, etc, fire extinguisher, insect repellent.	All personnel engaged in hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards shall receive appropriate training as required by 29 CFR 1910.120(e), including, but not limited to, initial 40-hour, 8-hour Supervisor and annual 8-hour refresher. Medical qualification, training and fit-testing must be received on an annual basis for individuals that wear a respirator. If an individual wears a respirator more than 30 days per year, or they are exposed at or above the Permissible Exposure Limit (PEL) of a chemical for more than 30 days in a year, then they must participate in a Medical Surveillance Program as required by 29 CFR 1910.120(f). All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity and review it with their Supervisor during their Daily Safety Huddle. All personnel performing work onsite must have received the site specific orientation. Competent FA / CPR / AED responder will be onsite while all work is occurring at all times. STOP WORK AUTHORITY Right, Obligation and Responsibility Every single employee has the responsibility and the authority to STOP WORK at any time necessary to protect the safety or health of themselves, others, and the environment. Anyone can execute this responsibility without repercussions. We believe that the GOAL OF ZERO is possible with everyone's support and commitment.	Ongoing environmental condition inspection (weather, wind, heat, cold). Ongoing personnel inspection (buddy system) Inspection of work area for general hazards as covered under this AHA prior to beginning any task. Take 5 Card when appropriate Get Out and Look (GOAL) Equipment inspection as necessary, recorded in field book. Inspect pressure washer and generator for defects before use. Complete daily calibration of PID and weekly calibration of Multi-gas meter. Conduct monthly fire extinguisher inspections. Inspect that tools have been properly cleaned after use and that contamination does not remain.

ACTIVITY HAZARDS ANALYSIS TRAINING ACKNOWLEDGEMENT AND SIGN OFF

Read Carefully Before Signing Below

This is to acknowledge that I have had a chance to review a copy **AHA 004 Decontamination of Tools and Equipment** and have been trained on its contents. I understand a copy will be provided to me upon request. I will read and abide by all requirements of the aforementioned AHA and any additional rules and regulations of my job. I understand that working safely, complying with and obeying any and all Company safety rules, regulations or standards is a condition of my employment. Should I not comply with Company safety rules, regulations or standards, I am subject to disciplinary action including removal from the site and possible termination of employment.

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Activity/Work Task: CAMP Operations	Overall Risk Assessment Code (RAC) (Use highest code)						M
Project Location: East Station, Rochester NY	**Risk Assessment Code (RAC) Matrix**						
Project Number: 453121	**Severity**	**Probability**					
Date Prepared: 1/27/2023		Frequent	Likely	Occasional	Seldom	Unlikely	
Prepared by (Name): Sara Weishaupt	Catastrophic	E	E	H	H	M	
	Critical	E	H	H	M	L	
Reviewed by (Name): Darrell Pruitt	Marginal	H	M	M	L	L	
Employer / GBU: Parsons	Negligible	M	L	L	L	L	

Notes: (Field Notes, Review Comments, etc.) **References:** PSHEP, ESHARP Manual, DASH Card	**Step 1:** Review each "Hazard" with identified safety "Controls" and determine RAC (See above). **The RAC is developed after correctly identifying all of the hazards and fully implementing all controls.**	
	"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.	**RAC Chart**
	"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible	**E = Extremely High Risk** **H = High Risk**
	Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.	**M = Moderate Risk** **L = Low Risk**

Job Steps	Hazards	Controls	P	S	RAC
CAMP Operations / Ambient Monitoring	Vapors (Including Site COCs and calibration gasses), particulates	▪ Approach area where vapors are suspected from upwind direction and stay upwind/crosswind of potential sources of vapors. (Use flagging to indicate wind direction). Fill calibration gas in a well-ventilated area, preferably outdoors. ▪ Inspection Requirements ○ Use a PM-10 aerosol and a mini RAE 3000 PID to monitor upwind and down-wind locations during drilling activities. Refer to PSHEP for action levels. ○ Use a multi-gas meter (multi-RAE) to monitor worker breathing zone during drilling activities. Refer to the PSHEP for action levels. ○ Regularly inspect cal gas regulator, tedlar bag, and canister. ○ Monitor workers breathing zone at a minimum of once every 30 minutes.	S	M	L

	Transport, Movement, and Use of Compressed Gasses	▪ Properly secure canisters within vehicle when transporting. ▪ Inspect canisters for signs of leaks and corrosion. ▪ Carefully transport canister to sampling area. ▪ Keep canisters away from ignition or heat sources. ▪ Detach regulator from canister when not in use. ▪ Slowly open values during operation.	S	Cr	M
	Working in Vicinity of Indoor/Outdoor Vehicle Traffic/Active Equipment Operation	▪ Keep out of travel paths of vehicles and roadways, where possible. ▪ Set up traffic cones and flagging to secure work area ▪ Wear Level D PPE and reflective safety vest ▪ Maintain eye contact/communication with facility equipment/vehicle operators. ▪ Review AHA 018: Traffic Management for further controls measurements and hazards.	S	Cr	M
	Heat/Cold Stress Biological Hazards Adverse Weather Uneven/Wet Terrain	▪ Refer to AHA 001: General Site Activities	S	Cr	M
	Slips, Trips, Falls	▪ Workers will be aware of potentially slippery surfaces and tripping hazards. Keep all areas dry, clean and free of debris to deter any unnecessary trips and falls. ▪ Avoid, remove, communication, and mark (if possible) hazards. ▪ Do not talk or text on cellphone or look at documents while walking, focus on task. ▪ Don't walk with hands in pocket. They can be used to catch you in the event of a slip, trip or fall. ▪ Work slowly during transit. Jumping, running, and horseplay are prohibited. ▪ Wear ankle high safety shoes fully laced with good tread, keep hands out of pocket in case of fall. Do not carry more than 50 lbs by yourself and plan your route. ▪ Clean up all spills immediately and dispose properly. ▪ Avoid working at dusk, dawn, or at night. Utilize adequate lighting when indoors. ▪ Personnel will notify the SSO of any unsafe conditions.	O	M	M

	Manual Lifting/Ergonomic Hazards	• When lifting objects, lift using knees not back. For repetitive lifting tasks, the use of lifting braces/supports should be considered. • Plan storage and staging to minimize lifting or carrying distances. • Have someone assist with the lift— especially for heavy (> 50lbs.) or awkward loads. (Note: If employee is not capable of carrying 50 lbs. or less, seek assistance.). • Make sure the path of travel is clear prior to the lift. • Use hand carts to move large, awkward loads ▪ Avoid carrying heavy objects above shoulder level.	S	M	L
	Pinch Points	▪ Be aware of potential pinch points. ▪ Utilize leather palmed gloves for all material handling.	S	M	L

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
▪ Depending on environment at project site: blanket, sunscreen, cold/hot drink, extra clothing, traffic warning signage, cones, hi-vis markers, etc, fire extinguisher, insect repellent. ▪ Level D PPE - Long pants, safety glasses, hard hat (in presence of heavy equipment), high-visibility vest/clothing, steel-toed boots, gloves, goggles. ▪ Equipment: Particulate monitor, PID, calibration gasses, tripod.	All personnel engaged in hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards shall receive appropriate training as required by 29 CFR 1910.120(e), including, but not limited to, initial 40-hour, 8-hour Supervisor and annual 8-hour refresher. Medical qualification, training and fit-testing must be received on an annual basis for individuals that wear a respirator. If an individual wears a respirator more than 30 days per year, or they are exposed at or above the Permissible Exposure Limit (PEL) of a chemical for more than 30 days in a year, then they must participate in a Medical Surveillance Program as required by 29 CFR 1910.120(f). All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity and review it with their Supervisor during their Daily Safety Huddle. All personnel performing work onsite must have received the site specific orientation. Competent FA / CPR / AED responder will be onsite while all work is occurring at all times. STOP WORK AUTHORITY Right, Obligation and Responsibility Every single employee has the responsibility and the authority to STOP WORK at any time necessary to protect the safety or health of themselves, others, and the environment. Anyone can execute this responsibility without repercussions. We believe that the GOAL OF ZERO is possible with everyone's support and commitment.	▪ Ongoing environmental condition inspection (weather, wind, heat, cold). ▪ Ongoing personnel inspection (buddy system) ▪ Inspection of work area for general hazards as covered under this AHA prior to beginning any task. ▪ Take 5 Card when appropriate ▪ Get Out and Look (GOAL) ▪ Equipment inspection as necessary, recorded in field book. Inspection condition of CAMP equipment daily. Complete daily calibration of PID, weekly calibration of Multi-gas meter, and monthly inspection of fire extinguishers.

ACTIVITY HAZARDS ANALYSIS TRAINING ACKNOWLEDGEMENT AND SIGN OFF

Read Carefully Before Signing Below

This is to acknowledge that I have had a chance to review a copy **AHA 005 CAMP Operations** and have been trained on its contents. I understand a copy will be provided to me upon request. I will read and abide by all requirements of the aforementioned AHA and any additional rules and regulations of my job. I understand that working safely, complying with and obeying any and all Company safety rules, regulations or standards is a condition of my employment. Should I not comply with Company safety rules, regulations or standards, I am subject to disciplinary action including removal from the site and possible termination of employment.

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Activity/Work Task: Underground Utility Clearance	Overall Risk Assessment Code (RAC) (Use highest code)					**M**
Project Location: East Station, Rochester NY	**Risk Assessment Code (RAC) Matrix**					
Project Number: 453121	**Severity**	**Probability**				
Date Prepared: 1/27/2023		Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name): Sara Weishaupt	Catastrophic	**E**	**E**	**H**	**H**	**M**
	Critical	**E**	**H**	**H**	**M**	**L**
Reviewed by (Name): Darrell Pruitt	Marginal	**H**	**M**	**M**	**L**	**L**
Employer / GBU: Parsons	Negligible	**M**	**L**	**L**	**L**	**L**

Notes: (Field Notes, Review Comments, etc.)		
References: PSHEP, ESHARP Manual, DASH Card	**Step 1:** Review each "Hazard" with identified safety "Controls" and determine RAC (See above). **The RAC is developed after correctly identifying all of the hazards and fully implementing all controls.**	
	"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.	**RAC Chart**
	"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible	**E = Extremely High Risk** **H = High Risk**
	Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.	**M = Moderate Risk** **L = Low Risk**

Job Steps	**Hazards**	**Controls**	**P**	**S**	**RAC**
Underground Utility Clearance	Slips, Trips, Falls	▪ Workers will be aware of potentially slippery surfaces and tripping hazards. Keep all areas dry, clean and free of debris to deter any unnecessary trips and falls. ▪ Avoid, remove, communication, and mark (if possible) hazards. ▪ Do not talk or text on cellphone or look at documents while walking, focus on task. ▪ Don't walk with hands in pocket. They can be used to catch you in the event of a slip, trip or fall. ▪ Work slowly during transit. Jumping, running, and horseplay are prohibited. ▪ Wear ankle high safety shoes fully laced with good tread, keep hands out of pocket in case of fall. Do not carry more than 50 lbs by yourself, and plan your route. ▪ Clean up all spills immediately and dispose properly.	O	M	M

		▪ Avoid working at dusk, dawn, or at night. Utilize adequate lighting when indoors. ▪ Personnel will notify the SSO of any unsafe conditions.			
	General/Access	▪ Use the buddy system ▪ Alert property owner of presence before enter building. Display proper identification (ID badges, business cards, etc). ▪ Avoid moving or touching household items/ personal property without talking to tenants first. ▪ Report any unsafe conditions. Use stop work authority if feeling unsafe	O	M	M
	Chemical – vapors	▪ Monitor area for %O2, %LEL, H2S, CO & VOCs prior to and during work as specified in PSHEP. ▪ Review action levels in the PSHEP.	S	Cr	M
	Manual Lifting/Ergonomic Hazards	▪ When lifting objects, lift using knees not back. For repetitive lifting tasks, the use of lifting braces/supports should be considered. ▪ Plan storage and staging to minimize lifting or carrying distances. ▪ Split heavy loads into smaller loads. Rotate high demand tasks, take breaks as needed ▪ Have someone assist with the lift— especially for heavy (> 50lbs.) or awkward loads. (Note: If employee is not capable of carrying 50 lbs. or less, seek assistance.). ▪ Make sure the path of travel is clear prior to the lift. ▪ Do not lift manhole covers, open/lift hatches or other access points to vessels, tanks or subsurface structures without proper authorization to do so, proper tools and proper personnel protective equipment. ▪ Obey sensible lifting limits (50 lb. Maximum per person manual lifting) ▪ Use hand carts to move large, awkward loads ▪ Avoid carrying heavy objects above shoulder level.	S	M	L
	Sharp Objects/Hand Injuries	▪ Utilize Leather Gloves with Standard PPE ▪ Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects ▪ Use self retracing knifes if needed. ▪ Cut away from the body and never towards another worker. • Maintain all hand and power tools in a safe condition..	O	M	M

Underground Utility Clearance (Cont'd)	Pinch Points	▪ Be aware of potential pinch points. ▪ Utilize leather palmed gloves for all material handling. ▪ Use proper tools, not hands, to open up manholes and covers for utility conduits	S	M	L
	Eye/Foot and Hand Hazards	▪ Eye/Face Protection – Safety glasses with side shields (ANZI Z87.1) ▪ Appropriate safety toed footwear is required ▪ Use sturdy leather work, or specialty gloves as required ▪ Use proper tools (e.g., crowbars) to open up utility conduits and manholes. Keep feet clear of area. ▪ Keep hands, feet and body out of pinch points and hazardous areas ▪ Be aware of surrounding and proximity of other people when handling stakes and other equipment	S	Cr	M
	Electrical Hazards	▪ Where electrical cords are used, use a GFCI in-line cable or extension cord. Check for any frays in the wire and that all 3 prongs are intact. Damaged cords should be taken out of service. ▪ Ensure area is free of standing water and work is completed greater than 5 feet away from water. Inspect extension cords prior to use.	U	Ca	M
	Working in Vicinity of Indoor/Outdoor Vehicle Traffic/Active Equipment Operation	▪ Keep out of travel paths of vehicles and roadways, where possible. ▪ Set up traffic cones and flagging to secure work area ▪ Wear Level D PPE and reflective safety vest ▪ Maintain eye contact/communication with facility equipment/vehicle operators ▪ Refer to AHA 018: Traffic Management.	S	Cr	M
	Confined Space	▪ Monitor air when in vicinity of confined spaces of near potential hazardous atmospheres for %O2, %LEL, H2S, CO & VOCs prior to and during work as specified in PSHEP. ▪ Always use the buddy system. ▪ Be aware of locations of any confined spaces present inside of the facility buiding(s). Consult with knowleagable facility personnel. ▪ Do not enter a confined space unless given a Parsons confined space entry Permit. ▪ Practice safe confined space entry procedure as specified in PSHEP and Confined Space Activity Hazard Analysis.	U	Ca	M

	Heat/Cold Stress Biological Hazards Adverse Weather Uneven/Wet Terrain	▪ Refer to AHA 001: General Site Activities	S	Cr	M

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
Depending on environment at project site: blanket, sunscreen, cold/hot drink, extra clothing, traffic warning signage, cones, hi-vis markers, etc, fire extinguisher, insect repellent. Level D PPE - Long pants, safety glasses, hard hat (in presence of heavy equipment), high-visibility vest/clothing, steel-toed boots, gloves, goggles. Equipment: Various Utility Clearing Equipment, Hand Tools, PID, MultiRAE (depending on location)	All personnel engaged in hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards shall receive appropriate training as required by 29 CFR 1910.120(e), including, but not limited to, initial 40-hour, 8-hour Supervisor and annual 8-hour refresher. Medical qualification, training and fit-testing must be received on an annual basis for individuals that wear a respirator. If an individual wears a respirator more than 30 days per year, or they are exposed at or above the Permissible Exposure Limit (PEL) of a chemical for more than 30 days in a year, then they must participate in a Medical Surveillance Program as required by 29 CFR 1910.120(f). All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity and review it with their Supervisor during their Daily Safety Huddle. All personnel performing work onsite must have received the site specific orientation. Competent FA / CPR / AED responder will be onsite while all work is occurring at all times. STOP WORK AUTHORITY Right, Obligation and Responsibility Every single employee has the responsibility and the authority to STOP WORK at any time necessary to protect the safety or health of themselves, others, and the environment. Anyone can execute this responsibility without repercussions. We believe that the GOAL OF ZERO is possible with everyone's support and commitment.	Ongoing environmental condition inspection (weather, wind, heat, cold). Ongoing personnel inspection (buddy system) Inspection of work area for general hazards as covered under this AHA prior to beginning any task. Take 5 Card when appropriate Equipment inspection as necessary, recorded in field book.

ACTIVITY HAZARDS ANALYSIS TRAINING ACKNOWLEDGEMENT AND SIGN OFF

Read Carefully Before Signing Below

This is to acknowledge that I have had a chance to review a copy **AHA 006 Underground Utility Clearance** and have been trained on its contents. I understand a copy will be provided to me upon request. I will read and abide by all requirements of the aforementioned AHA and any additional rules and regulations of my job. I understand that working safely, complying with and obeying any and all Company safety rules, regulations or standards is a condition of my employment. Should I not comply with Company safety rules, regulations or standards, I am subject to disciplinary action including removal from the site and possible termination of employment.

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Activity/Work Task: Hand Auger, Air Knife, and Vac Operations	Overall Risk Assessment Code (RAC) (Use highest code)						M
Project Location: East Station, Rochester NY	**Risk Assessment Code (RAC) Matrix**						
Project Number: 453121	**Severity**	**Probability**					
Date Prepared: 1/27/2023		Frequent	Likely	Occasional	Seldom	Unlikely	
Prepared by (Name): Sara Weishaupt	Catastrophic	E	E	H	H	M	
	Critical	E	H	H	M	L	
Reviewed by (Name): Darrell Pruitt	Marginal	H	M	M	L	L	
Employer / GBU: Parsons	Negligible	M	L	L	L	L	

Notes: (Field Notes, Review Comments, etc.) **References:** PSHEP, ESHARP Manual, DASH Card	**Step 1:** Review each "Hazard" with identified safety "Controls" and determine RAC (See above). **The RAC is developed after correctly identifying all of the hazards and fully implementing all controls.**	
	"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.	**RAC Chart**
	"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible	**E = Extremely High Risk** **H = High Risk**
	Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.	**M = Moderate Risk** **L = Low Risk**

Job Steps	Hazards	Controls	P	S	RAC
General/Work Area	Slips, Trips, Falls	▪ Use designated walkways whenever possible ▪ Avoid or remove all trip hazards by keeping materials/objects organized and out of walkways. ▪ Keep work surfaces dry ▪ Practice good housekeeping and keep work areas free of debris ▪ When entering residential and commercial buildings, be extra vigilant for hazards, particularly slipping hazards. Do not talk or text on cellphone or look at documents while walking, focus on task. ▪ Avoid, remove, communicate and mark (if possible) hazards. ▪ Utilize adequate lighting ▪ Work slowly during transit. Jumping, running, and horseplay are prohibited.	S	Cr	M

		▪ Don't walk with hands in pocket. They can be used to catch you in the event of a slip, trip or fall. ▪ Wear ankle high safety shoes fully laced with good tread, keep hands out of pocket in case of fall. Do not carry more than 50 lbs by yourself and plan your route. ▪ Clean up all spills immediately and dispose properly. ▪ Personnel will notify the SSO of any unsafe conditions.			
	Open Borehole – Fall Hazard	▪ Large-diameter borehole (6-inchs minimum) will require even larger diameter hole to hand clear. ▪ Do not leave open hole overnight, if at all possible. ▪ Cover-up pre-cleared hole with wood or steel surface plate, affix sufficient barricades, and place signage during non-working hours. State measures to be taken in traffic control plan and alert proper agencies of need to block off sidewalk. ▪ Wear protective foot gear (i.e., steel-toed boots). ▪ Stay sufficient distance from borehole when open.	S	Cr	M
	Working in Vicinity of Indoor/Outdoor Vehicle Traffic/Active Equipment Operation	▪ Keep out of travel paths of vehicles and roadways, where possible. ▪ Set up traffic cones and flagging to secure work area ▪ Wear Level D PPE and reflective safety vest ▪ Maintain eye contact/communication with facility equipment/vehicle operators. ▪ Review AHA 018: Traffic Management for further controls measurements and hazards.	S	Cr	M
	Site Hazards Material Exposure	▪ Training and safety awareness of potential exposure to contaminates at the site. ▪ Training of all personnel decontamination procedures (if appropriate to visit). Provide adequate hygiene and decontamination supplies. Refer to AHA 003: Personal Decontamination, and AHA 004: Decontamination of Tools and Equipment. ▪ Practice contamination avoidance work upwind if feasible, limit contact to the extent possible, do not eat in areas with COC's, keep drink containers covered. ▪ Appropriate PPE will be worn dependent on site conditions and actions levels. Tychem coveralls may be required based on potential for skin contact ▪ Monitoring breathing zone with PID and/or MultiRAE (see AHA-005 CAMP Operations and PSHEP for action levels) ▪ Must sign off on health and safety plan. ▪ Visitor will be escorted around site by an individual with current 40-hour HAZWOPER training, unless cleared with the SSO.	S	M	L

	Theft of Equipment/Vehicles	▪ Where possible, leave equipment within fenced-in area. ▪ Where equipment or vehicles need to remain overnight outside of fence or if temporarily leaving site with items unattended, ensure that vehicle is locked and values removed to the extent practical. ▪ Be aware of surrounding and keep lookout. ▪ Alert authorities of suspicious activities.	U	M	L
	Heat/Cold Stress Biological Hazards Adverse Weather Uneven/Wet Terrain	▪ Refer to AHA 001: General Site Activities	S	M	L
Tool Handling/Lifting	Back Injury, Strains, Sprains	▪ Use proper lifting techniques. Keep back straight, bend the knees, and lift with the legs. Use two people if load is heavier than 50 lbs. or awkward to handle. ▪ Use correct body mechanics while spinning the auger bucket up and down. Keep back straight, knees slightly bent, and only submerge the bucket to a depth equal to the length of the bucket. Never bury the bucket and try to pull it out. Suction from wet soil will make it difficult to remove the bucket from the hole. Take a little bit at a time. Keep all employees clear of the travel path used by the handle on the hand auger. ▪ Take breaks frequently and rotate staff. ▪ Protect your knees with knee pads or other disposable padded material while kneeling on the ground. ▪ Make sure the path of travel is clear prior to the lift. ▪ Maintain clean work zones.	S	M	L
Hand Auger Use	Pinch Points, Lacerations	▪ Keep fingers clear of the metal to metal contact pinch point when connecting the handle to the extensions and auger bucket. ▪ Wear gloves and keep hands and fingers clear of areas that have hinges, articulation, moving parts, and lift gate guide track. Load and unload heavy tools (i.e. jackhammer, air lance, hoses) carefully, keep fingers clear of the point of contact between the tools and the toolbox or storage rack. ▪ Wear proper PPE (leather gloves).	S	M	L
Soft dig - Air Soil Cutting (High Pressure Air for Loosening Soil)	Struck By Flying Debris, Eye Hazards	▪ Do not point air lance at yourself or others. Use two hands to operate air nozzle. Shut off the air lance at the source if it will not be used for a period of 5 minutes or longer. ▪ Check that all mechanical hose connections are secure. Make sure all manual connections	O	M	M

		are "positive locked" and have safety cables (otherwise known as chokers, hose anchors or whip checks) properly attached. Slowly open valves when charging air pressure to lines in preparation for soft dig air operations. ▪ Wear safety glasses and face shield. Use ground cover over excavation, as needed, to further prevent flying debris. A traffic cone with the air lance pushed down the center through the hole will help contain flying debris. ▪ Ensure individuals are trained on the proper operation of the air lance/vac equipment and understand hazards associated with the pressurized equipment.			
	Hearing Damage	▪ Wear hearing protection if sound over 85 DBA, and double hearing protection if noise levels are greater than 90 dBA. Hearing conservation program in place. Hearing Protection – Ear Plugs, either in custom molded, formable, and pre-molded or earmuffs.	S	M	L
	Damage to Underground Utilities from Tool Contact	▪ Do not force tools into the ground to loosen soil and hard objects. Allow compressed air to loosen soil and stones. ▪ Verify underground features have been marked and points are 5' or greater from identified features or variance is approved and onsite. ▪ Ensure that DigSafe notification has been completed and all utilities are marked-out. ▪ Check site blueprints/drawings and contact knowledgeable personnel to verify locations of additional utilities and subsurface conduits. ▪ Have emergency telephone number available	S	M	L
	Slips, Trips, and Falls	▪ Refer to General/Work Area job step above. ▪ Be aware of location of hosing at all times. Mark with cones.	S	Cr	M
IDW Management	Refer to AHA 014: IDW Management and Sampling		S	Cr	M

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
Depending on environment at project site: blanket, sunscreen, cold/hot drink, extra clothing, traffic warning signage, cones, hi-vis markers, etc, fire extinguisher, insect repellent. Level D PPE - Long pants, safety glasses/face shield, hard hat (in presence of heavy equipment), high-visibility vest/clothing, steel-toed boots, gloves, goggles. Equipment: PID, hand tools, vac truck	All personnel engaged in hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards shall receive appropriate training as required by 29 CFR 1910.120(e), including, but not limited to, initial 40-hour, 8-hour Supervisor and annual 8-hour refresher. Medical qualification, training and fit-testing must be received on an annual basis for individuals that wear a respirator. If an individual wears a respirator more than 30 days per year, or they are exposed at or above the Permissible Exposure Limit (PEL) of a chemical for more than 30 days in a year, then they must participate in a Medical Surveillance Program as required by 29 CFR 1910.120(f). All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity and review it with their Supervisor during their Daily Safety Huddle. All personnel performing work onsite must have received the site specific orientation. Competent FA / CPR / AED responder will be onsite while all work is occurring at all times. STOP WORK AUTHORITY Right, Obligation and Responsibility Every single employee has the responsibility and the authority to STOP WORK at any time necessary to protect the safety or health of themselves, others, and the environment. Anyone can execute this responsibility without repercussions. We believe that the GOAL OF ZERO is possible with everyone's support and commitment.	Ongoing environmental condition inspection (weather, wind, heat, cold). Ongoing personnel inspection (buddy system) Inspection of work area for general hazards as covered under this AHA prior to beginning any task. Take 5 Card when appropriate Ensure all mechanical hose connections are secure. Make sure all manual connections are "positive locked" and have safety cables (otherwise known as chokers, hose anchors or whip checks) properly attached. Confirm Digsafe NY, One Call or other appropriate locaters have been called (verify utility clearance form from Project Manager) and have responded to mark-out requests.

ACTIVITY HAZARDS ANALYSIS TRAINING ACKNOWLEDGEMENT AND SIGN OFF

Read Carefully Before Signing Below

This is to acknowledge that I have had a chance to review a copy **AHA 007 Hand Auger, Air Knife, and Vac Operations** and have been trained on its contents. I understand a copy will be provided to me upon request. I will read and abide by all requirements of the aforementioned AHA and any additional rules and regulations of my job. I understand that working safely, complying with and obeying any and all Company safety rules, regulations or standards is a condition of my employment. Should I not comply with Company safety rules, regulations or standards, I am subject to disciplinary action including removal from the site and possible termination of employment.

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Activity Hazards Analysis - Drilling Activities and Sample Collection

Activity/Work Task: Drilling Activities and Sample Collection	**Overall Risk Assessment Code (RAC) (Use highest code)**					**M**
Project Location: East Station, Rochester NY	**Risk Assessment Code (RAC) Matrix**					
Project Number: 453121	**Severity**	**Probability**				
Date Prepared: 1/27/2023		**Frequent**	**Likely**	**Occasional**	**Seldom**	**Unlikely**
Prepared by (Name/Title): Sara Weishaupt	**Catastrophic**	E	E	H	H	M
	Critical	E	H	H	M	L
Reviewed by (Name/Title): Darrell Pruitt	**Marginal**	H	M	M	L	L
	Negligible	M	L	L	L	L
Employer/GBU: Parsons/INF	**Step 1:** Review each "Hazard" with identified safety "Controls" and determine RAC (See above). **The RAC is developed after correctly identifying all the hazards and fully implementing all controls.**					

Notes: (Field Notes, Review Comments, etc.)
Level D: Hard hats, safety glasses, steel-toed boots (or equivalent), high visibility vest, gloves, ear plugs/muffs Tyvek as needed for bio or general contact hazards.
Upgrade to Level C not anticipated. If air monitoring indicates work cannot be conducted in Level D, work will stop, contact HS.
PSHEP, ESHARP Manual, DASH Card

P "Probability"	is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.	**RAC Chart**
S "Severity"	is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible	E = Extremely High Risk H = High Risk M = Moderate Risk
Step 2:	Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.	L = Low Risk

Job Steps	Hazards	Controls	P	S	RAC
General Drilling Activities (i.e. maneuvering drilling equipment at the site, drilling, handling soil cuttings, heavy equipment use)	General Chemical Exposure	• Monitor breathing zone with multi-gas meter according to action levels in the PSHEP. • Follow proper decontamination procedures when leaving the work area and "exclusion zone" Establish a demarcated work area with cones and tape as needed to keep pedestrians and personnel that are not trained and qualified out of the work area.	S	M	L
Mobilize and Set-up Drilling Equipment and Compressor	Equipment Operation	• Verify air compressor vessel is approved and inspected before use • Inspect compressed air lines and connections – use Whip Checks on all connections	S	C	M

		• Hearing Protection required when working in proximity to loud equipment (if it is difficult to communicate in normal voice) • Only qualified operators will be allowed to operate heavy equipment, per safe work guidelines included in the OSHA General Industry (29 CFR 1910) and Construction Industry (29 CFR 1926) standards. • Conduct daily pre-use inspection of drill rig and equipment • Personnel will never walk directly behind or to the side of operating equipment without the operator's knowledge. • Do not wear loose-fitting clothing or other items such as rings or watches that could get caught in moving parts. Long hair will be restrained. • Maintain eye contact and exercise hand signals prior to maneuvering equipment. • No cell phone use while operating equipment • Stand clear of rotating objects (i.e. spinning augers)			
Material handling	Proper lifting techniques	• Bend from the knees when lifting objects from the ground up • Ask for help in lifting sand bags, augers, or other tools and equipment. Do not lift over 50 lbs with single person lift • Rotate high demand tasks among staff, take breaks as needed	S	M	**L**
Moving around site	Slip, trips, falls	• Monitor work area for any potential holes, steps or other trip hazards. • Keep work areas clear of debris or tools • Close all well boxes when not in use. Open well boxes pose a trip and fall hazard. • Clean all surfaces of any bentonite residues. Wet bentonite may pose a slip and fall hazard • Wear safety boots fully laced in good condition with adequate tread	S	C	**M**
Drilling, handling augers and other equipment	Pinch points, rotating objects	• Identify all pinch points prior to start of work • Only trained qualified rig operator to work in hazard area • Instruct all not to touch rotating augers, stand clear • Inspect emergency shut-off switches on the vehicles.	S	C	**M**

Vehicle Traffic	Damage to property Struck by/against	• All vehicles used at the site, including personal and rental vehicles, must be inspected daily • Use proper traffic control (cones, advance warning signs) when blocking traffic lanes or shoulders • Follow all posted signs and speed limits. • Drive defensively do not talk on cell phone or use electronic device while driving • Use a spotter when backing or for tight maneuvers • Wear an orange traffic safety vest when working around heavy equipment or near vehicular traffic.	U	M	**L**

Equipment to be Used	Training Requirements/Competent or Qualified Personnel	Inspection Requirements
Direct push drill rig (Geoprobe), Hollow Stem Augers, hand tools, power tools	All personnel engaged in hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards shall receive appropriate training as required by 29 CFR 1910.120(e), including, but not limited to, initial 40-hour, 8-hour Supervisor and annual 8-hour refresher training.	1. Daily equipment inspection (i.e. hydraulic and compressed air lines, fire extinguishers, shut-off switches, back up sirens, tools) 2. Check PPE for abnormal wear and tear, rips, etc. 3. Look for objects that could pose potential trip hazards. 4. Survey work area for overhead hazards, flying debris/particulates or splashes, vehicle traffic or heavy equipment operation, loud noises, etc.

ACTIVITY HAZARDS ANALYSIS TRAINING ACKNOWLEDGEMENT AND SIGN OFF

Read Carefully Before Signing Below

This is to acknowledge that I have had a chance to review a copy **AHA 008 Drilling Activities and Sample Collection** and have been trained on its contents. I understand a copy will be provided to me upon request. I will read and abide by all requirements of the aforementioned AHA and any additional rules and regulations of my job. I understand that working safely, complying with and obeying any and all Company safety rules, regulations or standards is a condition of my employment. Should I not comply with Company safety rules, regulations or standards, I am subject to disciplinary action including removal from the site and possible termination of employment.

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Activity/Work Task: Monitoring Well Gauging, Slug Testing, and Sampling	Overall Risk Assessment Code (RAC) (Use highest code)	**M**

Project Location: East Station, Rochester NY	**Risk Assessment Code (RAC) Matrix**					
Project Number: 453121	**Severity**	**Probability**				
Date Prepared: 1/27/2023		Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name): Sara Weishaupt	Catastrophic	**E**	**E**	**H**	**H**	**M**
	Critical	**E**	**H**	**H**	**M**	**L**
Reviewed by (Name/Title): Darrell Pruitt	Marginal	**H**	**M**	**M**	**L**	**L**
Employer / GBU: Parsons	Negligible	**M**	**L**	**L**	**L**	**L**

Notes: (Field Notes, Review Comments, etc.) **References:** PSHEP, EHSARP Manual, DASH Card	**Step 1:** Review each "Hazard" with identified safety "Controls" and determine RAC (See above). **The RAC is developed after correctly identifying all of the hazards and fully implementing all controls.**	
	"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.	**RAC Chart**
	"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible	**E = Extremely High Risk** **H = High Risk**
	Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.	**M = Moderate Risk** **L = Low Risk**

Job Steps	Hazards	Controls	P	S	RAC
General/Work Area	Slips, Trips, Falls	▪ Use designated walkways whenever possible ▪ Avoid or remove all trip hazards by keeping materials/objects organized and out of walkways. ▪ Keep work surfaces dry ▪ Practice good housekeeping and keep work areas free of debris ▪ Do not talk or text on cellphone or look at documents while walking, focus on task. ▪ Avoid, remove, communicate and mark (if possible) hazards. ▪ Utilize adequate lighting ▪ Work slowly during transit. Jumping, running, and horseplay are prohibited. ▪ Don't walk with hands in pocket. They can be used to catch you in the event of a slip, trip or fall.	S	M	L

		▪ Wear ankle high safety shoes fully laced with good tread, keep hands out of pocket in case of fall. Do not carry more than 50 lbs by yourself, and plan your route. ▪ Clean up all spills immediately, and dispose properly. ▪ Personnel will notify the SSO of any unsafe conditions.			
	Working in Vicinity of Indoor/Outdoor Vehicle Traffic/Active Equipment Operation	▪ Keep out of travel paths of vehicles and roadways, where possible. ▪ Set up traffic cones and flagging to secure work area ▪ Wear Level D PPE and reflective safety vest ▪ Maintain eye contact/communication with facility and subcontractor's equipment/vehicle operators. ▪ Review AHA 018: Traffic Management for further controls measurements and hazards.	S	Cr	M
	Site Hazards Material Exposure	▪ Training and safety awareness of potential exposure to contaminants at the site. ▪ Training of all personnel decontamination procedures. Provide adequate hygiene and decontamination supplies. ▪ Practice contamination avoidance, work upwind if feasible, limit contact to the extent possible, do not eat in areas with COC's, keep drink containers covered. ▪ Appropriate PPE will be worn dependent on-site conditions and actions levels. ▪ Monitoring breathing zone with PID and/or Multi-gas meter. ▪ Keep Safety Data Sheets for chemicals on site ▪ Must sign off on health and safety plan. ▪ Keep all sampling supplies and bottles upwind or crosswind. ▪ Visitor will be escorted around site by an individual with current 40 hour HAZWOPER training, unless cleared with the SSO.	S	M	L
	Theft of Equipment/Vehicles	▪ Do not leave equipment unattended. Place equipment in vehicle when not in use and ensure that vehicle is locked. ▪ Be aware of surrounding and keep lookout. ▪ Alert authorities of suspicious activities.	U	M	L
	Heat/Cold Stress Biological Hazards Adverse Weather Uneven/Wet Terrain	▪ Refer to AHA 001: General Site Activities	S	M	M
	Slips, Trips, and Falls	▪ Refer to General/Work Area above.	S	M	L

Mobilization / Staging	Back Injury, Strains, Sprains, Foot Injuries	▪ Observe proper lifting techniques – lift with legs, elbows in, and keep back straight. ▪ Team lift large/awkward loads. ▪ Use mechanical means to lift if the weight is awkward or the weight is greater than 50 pounds individually or 80 pounds for team lifting. ▪ Use mechanical devices (e.g., wagon, sled) to transport equipment over long distances. ▪ Take breaks frequently and rotate staff. ▪ Protect your knees with knee pads or other disposable padded material while kneeling on the ground. ▪ Keep equipment secure until needed. And avoid stacking Wear steel-toed boots.	S	M	L
Open Monitoring Well and Obtain Depth Measurements	Pinch Points	▪ Don proper PPE (work gloves and nitrile gloves) and unlock/open well. Use appropriate tools (socket wrench, pry bar) to assist with opening flush mount wells, do not use bare hands.	S	M	L
	Back Injury, Strains, Sprains	▪ Protect your knees with knee pads or other disposable padded material while kneeling on the ground. ▪ Use proper lifting techniques. Keep back straight, bend the knees, and lift with the legs. Use two people if load is heavier than 50 lbs. or awkward to handle.	S	M	L
	Site Hazards Material Exposure, Vapors, Splash Hazards	▪ Review above measures for General/Work Area. ▪ Stand upwind when opening well and obtaining depth measurements. ▪ Obtain PID and/or Mulit-gas readings of well inner casing prior to and immediately after removing inner cap. Record measurements on field log. ▪ Monitor breathing zone with PID and/or Multi-gas meter. Review Action Level Criteria in the PSHEP. If elevated readings persist for greater than 5 minutes, close-up/cap well, stop work, and leave the area. ▪ Use appropriate decontamination procedures. Refer to AHA 003: Personal Decontamination, and AHA 004: Decontamination of Tools and Equipment. ▪ Wear safety glasses and nitrile gloves. ▪ Reel-up water level monitoring device slowly.	S	M	L
Groundwater Sampling and Slug Testing	Sharp Objects (Tubing Cutter, Lab Glassware), Pinch Points	▪ Wear cut-resistant gloves when cutting tubing, rope, or twine. ▪ Close and safely store cutters when not in use. ▪ Visually inspect cooler upon opening for signs of damaged bottleware and broken glass. Wear cut-resistant and nitrile gloves. ▪ Be aware of the potential presence of pinch points when handling equipment (e.g., opening and closing equipment cases, metal-to-metal contact). ▪ Use nitrile and work gloves when attaching affixing tubing to pump. For motorized pump, keep hands clear of moving parts.	O	M	M

	Exposure to Contaminants and/or Preservatives	▪ Wear nitrile gloves when handling all environmental media and bottleware. ▪ Visually inspect cooler upon opening for signs of damaged or improperly capped bottleware which may have leaked preservatives.			
	Back Injury, Strains, Sprains	▪ Protect your knees with knee pads or other disposable padded material while kneeling on the ground. ▪ Use proper lifting techniques. Keep back straight, bend the knees, and lift with the legs. Use two people if load is heavier than 50 lbs. or awkward to handle.	S	M	L
	Site Hazards Material Exposure, Vapors, Splash Hazards	▪ Review above measures for General/Work Area. ▪ Stand upwind of well location. Establish exclusion zone around monitoring well/sampling area. ▪ Monitor breathing zone continuously with PID and/or Multi-gas readings. Obtain periodic headspace measurements from well casing and from purge container. ▪ Use appropriate decontamination procedures. Refer to AHA 003: Personal Decontamination, and AHA 004: Decontamination of Tools and Equipment. ▪ Wear nitrile gloves and safety glasses at all times while purging, handling bottleware, sampling, and containerizing groundwater. Ensure that purge water containers are properly sealed before moving/transporting, and use proper hazard communication. ▪ Lower and remove pump, tubing, and other equipment from well slowly.	S	M	L
	Electrical Hazards	▪ Inspect extension cords for pump and related devices prior to use. Check for any frays in the wire. Damaged cords should be taken out of service or replacement equipment should be obtained. ▪ If a car or marine battery is used as electrical source, check for signs of corrosion. Attach and tighten each cable one at a time (posited/red first, black/negative second). Avoid placing near water. ▪ Avoid working in heavy precipitation. Shut off or remove power sources to any electronic equipment and move to dry area.	U	Ca	M
	Slips, Trips, and Falls	▪ Review above measures for General/Work Area. ▪ Be aware of the location of tubing and electrical cords at all times. Places cones on top as appropriate.	S	M	L
Packing Sample Coolers	Pinch points, Cuts from Glassware, Exposure to Preservatives	▪ Maintain awareness of procedures and be attentive while handling glassware ▪ Use care and do not rush. Coolers can be heavy. Cooler lids and bottles can be pinch points. ▪ Watch trunk/tailgate as coolers are placed in field vehicles to ship samples. ▪ When packing coolers, inspect the sample containers for damage using a combination of cut-resistant and nitrile gloves. ▪ Visually inspect coolers before placing hands inside. ▪ Always cut away from body and hands.	O	M	M

	Back Injury, Strains, Sprains	▪ Use proper lifting techniques. Keep back straight, bend the knees, and lift with the legs. Use two people if load is heavier than 50 lbs. or awkward to handle. ▪ Use mechanical means (e.g., sled, wagon, hand cart) to move and transport sample coolers.	S	M	L
Decontamination	Refer to AHA 004: Decontamination of Tools and Equipment		S	M	M
IDW Management	Refer to AHA 014: IDW Management and Sampling		S	M	M

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
Modified Level D- Long pants, safety glasses, hard hat (when required), steel-toed boots, nitrile outer gloves, cut proof inner gloves, safety glasses or goggles, high-visibility vest/clothing. Equipment: peristaltic pump, bladder pump, pump accessories (e.g., control box, air supply), marine battery, tubing, tubing cutters, water level meter, water quality meter, slug, water level transducers, sample bottleware, coolers, bags of ice. Depending on environment at project site: blanket, sunscreen, cold/hot drink, extra clothing, traffic warning signage, cones, hi-vis markers, etc., fire extinguisher, insect repellent.	All personnel engaged in hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards shall receive appropriate training as required by 29 CFR 1910.120(e), including, but not limited to, initial 40-hour, 8-hour Supervisor and annual 8-hour refresher. All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity and review it with their Supervisor during their Daily Safety Huddle. All personnel performing work onsite must have received the site specific orientation. Competent FA / CPR / AED responder will be onsite while all work is occurring at all times. STOP WORK AUTHORITY Right, Obligation and Responsibility Every single employee has the responsibility and the authority to STOP WORK at any time necessary to protect the safety or health of themselves, others, and the environment. Anyone can execute this responsibility without repercussions. We believe that the GOAL OF ZERO is possible with everyone's support and commitment.	Ongoing environmental condition inspection (weather, wind, heat, cold). Ongoing personnel inspection (buddy system). Inspection of work area for general hazards as covered under this AHA prior to beginning any task. Take 5 Card when appropriate. Get Out and Look (GOAL) Equipment inspection as necessary, recorded in field book. Complete daily calibration of PID, weekly calibration of Multi-gas meter, and monthly inspection of fire extinguishers.

ACTIVITY HAZARDS ANALYSIS TRAINING ACKNOWLEDGEMENT AND SIGN OFF

Read Carefully Before Signing Below

This is to acknowledge that I have had a chance to review a copy **AHA 009 Monitoring Well Gauging, Slug Testing, and Sampling** and have been trained on its contents. I understand a copy will be provided to me upon request. I will read and abide by all requirements of the aforementioned AHA and any additional rules and regulations of my job. I understand that working safely, complying with and obeying any and all Company safety rules, regulations or standards is a condition of my employment. Should I not comply with Company safety rules, regulations or standards, I am subject to disciplinary action including removal from the site and possible termination of employment.

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<tr><td>Activity/Work Task: Roll-off or Conex Delivery</td><td colspan="5">Overall Risk Assessment Code (RAC) (Use highest code)</td><td>M</td></tr>
<tr><td>Project Location: East Station, Rochester NY</td><td colspan="6">Risk Assessment Code (RAC) Matrix</td></tr>
<tr><td>Project Number: 453121</td><td rowspan="2">Severity</td><td colspan="5">Probability</td></tr>
<tr><td>Date Prepared: 1/27/2023</td><td>Frequent</td><td>Likely</td><td>Occasional</td><td>Seldom</td><td>Unlikely</td></tr>
<tr><td rowspan="2">Prepared by (Name): Sara Weishaupt</td><td>Catastrophic</td><td>E</td><td>E</td><td>H</td><td>H</td><td>M</td></tr>
<tr><td>Critical</td><td>E</td><td>H</td><td>H</td><td>M</td><td>L</td></tr>
<tr><td>Reviewed by (Name): Darrell Pruitt</td><td>Marginal</td><td>H</td><td>M</td><td>M</td><td>L</td><td>L</td></tr>
<tr><td>Employer / GBU: Parsons</td><td>Negligible</td><td>M</td><td>L</td><td>L</td><td>L</td><td>L</td></tr>
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Job Steps	Hazards	Controls	P	S	RAC
General/Work Area	Heat/Cold Stress Biological Hazards Adverse Weather Uneven/Wet Terrain Slips, Trips, and Falls	▪ Refer to AHA 001: General Site Activities	S	M	M
Motorized Equipment Operation	Equipment Maintenance	▪ The equipment must be maintained in a proper functioning condition. ▪ All motors must be shut off. Electrical, mechanical and hydraulic components locked when making repairs. ▪ Safety shut-off systems must be tested daily and not disabled. ▪ Bleed off pressure on hydraulic lines before undoing fittings. ▪ Do not leave tools or parts loose on equipment after maintenance has been performed.	U	Ca	M

	General Use	▪ All equipment must be inspected daily prior to use. ▪ Equipment must be operated and maintained in accordance to manufacture's guidelines. ▪ Any equipment that is unattended must be immobilized and secured against accidental movement. ▪ All heavy equipment will have a backing up alarm.	U	Cr	L
	Fire Hazard	▪ All motors must be shut off during refueling. ▪ An A-B-C fire extinguisher must be maintained on the equipment. ▪ A-B-C fire extinguishers must be inspected and functional. ▪ Fuel will be stored in UL approved safety containers with contents clearly labeled.	U	Cr	L
Roll Off or CONEX Container Deliveries	Operation of Motorized Equipment	▪ Operators of motorized equipment will be trained in the proper operation of that apparatus. ▪ All container deliveries will be completed by using at least one spotter. Roll off delivery drivers will have ground assistance at all time. ▪ Be sure that container is not frozen to the ground and free to move prior to loading	U	Ca	M
	Tip Over	▪ All nearby persons must steer clear of the container while it is being lowered/placed to prevent being crushed. ▪ The delivery site will be checked to ensure safe delivery/placement of the roll off container. ▪ The delivery location will be checked for any overhead utilities, tree limbs, signage, etc. that could come in contact with the roll off box during delivery.	U	Ca	M
	Struck By Pinch Points	▪ All personnel will be aware of moving machinery and parts and wear appropriate PPE when near machinery (e.g., hard had, safety glasses, etc.) ▪ Stay away from area fully clear of swing area and truck when hoisting	S	N	L
	Noise Exposure	▪ Hearing protection will be worn in hazardous noise areas or working around heavy machinery or equipment. ▪ Wear earplugs when noise level from equipment exceeds 90 decibels (dBA) averaged over an eight-hour day.	O	N	L

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
PPE (Level D) - Long pants, safety glasses, hard hat (in presence of heavy equipment), high-visibility vest/clothing, steel-toed boots, gloves, goggles. Depending on environment at project site: blanket, sunscreen, cold/hot drink, extra clothing, traffic warning signage, cones, hi-vis markers, etc, fire extinguisher, insect repellent.	All personnel engaged in hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards shall receive appropriate training as required by 29 CFR 1910.120(e), including, but not limited to, initial 40-hour, 8-hour Supervisor and annual 8-hour refresher. Medical qualification, training and fit-testing must be received on an annual basis for individuals that wear a respirator. If an individual wears a respirator more than 30 days per year, or they are exposed at or above the Permissible Exposure Limit (PEL) of a chemical for more than 30 days in a year, then they must participate in a Medical Surveillance Program as required by 29 CFR 1910.120(f). All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity and review it with their Supervisor during their Daily Safety Huddle. All personnel performing work onsite must have received the site-specific orientation. Competent FA / CPR / AED responder will be onsite while all work is occurring at all times. STOP WORK AUTHORITY Right, Obligation and Responsibility Every single employee has the responsibility and the authority to STOP WORK at any time necessary to protect the safety or health of themselves, others, and the environment. Anyone can execute this responsibility without repercussions. We believe that the GOAL OF ZERO is possible with everyone's support and commitment.	Ongoing environmental condition inspection (weather, wind, heat, cold). Ongoing personnel inspection (buddy system) Inspection of work area for general hazards as covered under this AHA prior to beginning any task. Take 5 Card when appropriate Get Out and Look (GOAL) Equipment inspection as necessary, recorded in field book. Calibrate PID daily, and fire extinguisher monthly.

ACTIVITY HAZARDS ANALYSIS TRAINING ACKNOWLEDGEMENT AND SIGN OFF

Read Carefully Before Signing Below

This is to acknowledge that I have had a chance to review a copy **AHA 010 Roll-off or Conex Delivery** and have been trained on its contents. I understand a copy will be provided to me upon request. I will read and abide by all requirements of the aforementioned AHA and any additional rules and regulations of my job. I understand that working safely, complying with and obeying any and all Company safety rules, regulations or standards is a condition of my employment. Should I not comply with Company safety rules, regulations or standards, I am subject to disciplinary action including removal from the site and possible termination of employment.

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Project Location: East Station, Rochester NY	**Risk Assessment Code (RAC) Matrix**						
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Date Prepared: 1/27/2023		Frequent	Likely	Occasional	Seldom	Unlikely	
Prepared by (Name): Sara Weishaupt	Catastrophic	E	E	H	H	M	
	Critical	E	H	H	M	L	
Reviewed by (Name): Darrell Pruitt	Marginal	H	M	M	L	L	
Employer / GBU: Parsons	Negligible	M	L	L	L	L	

Notes: (Field Notes, Review Comments, etc.) **References:** PSHEP, ESHARP Manual, DASH Card	**Step 1:** Review each "Hazard" with identified safety "Controls" and determine RAC (See above). **The RAC is developed after correctly identifying all of the hazards and fully implementing all controls.**	
	"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.	**RAC Chart**
	"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible	**E = Extremely High Risk** **H = High Risk**
	Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.	**M = Moderate Risk** **L = Low Risk**

Job Steps	Hazards	Controls	P	S	RAC
General Activities/Work Zone	Working in Vicinity of Indoor/Outdoor Vehicle Traffic/Active Equipment Operation	▪ Keep out of travel paths of vehicles and roadways, where possible. ▪ Set up traffic cones and flagging to secure work area ▪ Wear Level D PPE and reflective safety vest ▪ Maintain eye contact/communication with facility and subcontractor's equipment/vehicle operators	S	Cr	M
	Slips, Trips, Falls	▪ Use designated walkways whenever possible ▪ Avoid or remove all trip hazards by keeping materials/objects organized and out of walkways. ▪ Keep work surfaces dry ▪ Practice good housekeeping and keep work areas free of debris ▪ When entering residential and commercial buildings, be extra viligant for hazards, particularly slipping hazards. Do not talk or text on cellphone or look at documents while walking, focus on task. ▪ Avoid, remove, communicate and mark (if possible) hazards. ▪ Utilize adequate lighting	S	Cr	M

		▪ Work slowly during transit. Jumping, running, and horseplay are prohibited. ▪ Don't walk with hands in pocket. They can be used to catch you in the event of a slip, trip or fall. ▪ Wear ankle high safety shoes fully laced with good tread, keep hands out of pocket in case of fall. Do not carry more than 50 lbs by yourself, and plan your route. ▪ Clean up all spills immediately, and dispose properly. ▪ Personnel will notify the SSO of any unsafe conditions.			
	Site Hazards Material Exposure	▪ Training and safety awareness of potential exposure to contaminates at the site. ▪ Training of all personnel decontamination procedures (if appropriate to visit). Provide adequate hygiene and decontamination supplies. ▪ Practice contamination avoidance, work upwind if feasible, limit contact to the extent possible, do not eat in areas with COC's, keep drink containers covered. ▪ Appropriate PPE will be worn dependent on-site conditions and actions levels. ▪ Monitoring breathing zone with PID and/or MultiRAE. ▪ Have support personnel remain upwind of the work area ▪ Keep Safety Data Sheets for chemicals on site ▪ Must sign off on health and safety plan. ▪ Keep all sampling supplies and bottles upwind or crosswind. ▪ Visitor will be escorted around site by an individual with current 40 hour HAZWOPER training, unless cleared with the SSO.	S	M	L
	Heat/Cold Stress Biological Hazards Adverse Weather Uneven/Wet Terrain	▪ Refer to AHA-001:General Activities	S	M	M
Unloading, Loading, Movement, and Transport of Drums/Totes	Slips, Trips, and Falls	▪ Refer to general slips, trips, and falls hazards in General/Work Area job step above. ▪ Be aware of footing at all times. Clear areas of obstacles before moving through.	S	Cr	M
	Falling/Sliding Items	▪ Secure drums/totes in truck bed prior to transport, in particular, if empty. Position items in front of truck bed opposed to back, as braking hard could cause them to slide forward and crash into cab of truck. ▪ Wear proper PPE when lifting and moving empty drums and totes – hard hat, safet glasses, steel toed boots, and heavy work gloves.	S	Cr	M
	Hand Injury and Pinch Points	▪ Be aware of potential pinch points. ▪ Used thick gloves for all material handling.	S	M	L
	Foot Injury	▪ While moving and transporting drums/totes, keep feet clear of drums. ▪ Safety-toed boots should be worn when moving and transporting drums.	S	M	L
	Ergonomics/Back Strains	▪ Use mechanical means (hand carts, trucks) to lift if the weight is awkward or the weight is greater	O	M	M

		than 50 pounds individually or 80 pounds for team lifting. ▪ Where possible, avoid lifting drum or totes with filled contents. Transfer contents to staging area containers using sump/trans pump. ▪ Avoid performing the same strenuous activity for extended periods.			
	Environmental Release	▪ Inspect Spill Kit supplies & locate spill kits prior to performing maintenance. ▪ Properly secure drums and totes during transport.	U	M	L
Opening, Closing, and Filling Drums/Totes (Solid or Liquid Contents)	Pinch Points/Hand Injury	▪ Be aware of potential pinch points. Use proper tools for opening/closing lids. ▪ Use thick work gloves.	U	M	L
	Liquid Spills and Splashes, Environmental Release	▪ Care will be taken that the liquid being placed in the drum does not spill onto the top of the drum or the ground. Use a drum funnel to assist in the task. Do not overfill the funnel. Secondary containment will be used for added protection, such as a spill pallet or plastic sheeting contained by berms. ▪ If a pump is used fill drum/tote, ensure that pump hosing is sufficient secured inside of tank or drum, using clamps where necessary. Do not turn on pump until hosing is secured into drum/tote. Turn off pump when not in use. ▪ Secondary containment will be used for added protection, such as a spill pallet or plastic sheeting contained by berms. ▪ Wear safety glasses when filling drums/totes.	U	M	L
	Electrical Hazards	▪ Inspect extension cords for equipment prior to use. Check for any frays in the wire. Damaged cords should be taken out of service. ▪ If a car or marine battery is used as electrical source for pump, check for signs of corrosion. Attach and tighten each cable one at a time (posited/red first, black/negative second). Avoid placing near water.	U	Ca	M
	Ergonomics/Back Strains, Eye Injury	▪ Personnel will use caution when shoveling dirt into a drum to avoid spraying rocks or dirt. If possible, only one worker will fill a drum at a time and take turns shoveling. ▪ Wear safety glasses when filling drums/totes.	U	M	L
	Site Hazards Material Exposure/Vapors	▪ Wear appropriate PPE when opening drums (nitrile and work gloves, steel toed boots, safety glasses, hard hat). ▪ Screen headspace below drum/tote lid or cover with PID and/or MultiRAE upon opening to assess for the presence of strong vapors. Upon opening lid and filling contents, continuously monitoring breathing zone with PID and/or MultiRAE.	S	M	L
Oversee Delivery/Pick-up of Frac Tank	Refer to AHA 014: Roll-off Delivery		S	M	M
Transfer Liquid Waste to Frac Tank via Sump Pump, Frac Tank Hatch Access	▪ Pinch Points, Hand Injury, and Moving Parts	▪ Be aware of potential pinch points. Use proper tools for opening/closing drum/tote lids and for opening frac tank hatch. ▪ Use thick work gloves when handling drums, totes, pump/hosing, generator, and when opening/closing hatch for frac tank.	U	Cr	M
	▪ Electrical Hazards	▪ Inspect extension cords for equipment prior to use. Check for any frays in the wire. Damaged cords should be taken out of service.	U	Ca	M

		▪ If a car or marine battery is used as electrical source for pump, check for signs of corrosion. Attach and tighten each cable one at a time (posited/red first, black/negative second). Avoid placing near water.			
	▪ Refueling – Fire/Explosion Hazards, Environmental Release	▪ A Type ABC, 20-lb, fully charged fire extinguisher will be in an accessible area on-site. ▪ Prohibit storage of fuel in plastic containers. Store fuel can and generator in well ventilated areas and keep away from combustible materials and heat sources. Keep fuel can and generator in secure area when not in use and properly secure during transport. ▪ Turn off generator before refueling. ▪ No smoking while onsite and when refueling. ▪ Have spill absorbent pads nearby to prevent the spread of spilled materials. ▪ Inspect safety gas can for defects (e.g., lid doesn't completely close) before usage, refilling, and during transport. ▪ Conduct refueling activities in flat areas with impervious surfaces (concrete, asphalt, etc) and away from bare ground, surface water, and catch basins.	S	Cr	M
	▪ Ergonomics/Back Strains	▪ Use mechanical means (hand carts, trucks) to lift equipment if the weight is awkward or the weight is greater than 50 pounds individually or 80 pounds for team lifting. ▪ Avoid performing the same strenuous activity for extended periods.	U	M	L
	▪ Splash Hazards, Environmental Release	▪ Ensure that pump hosing is sufficient secured inside of frac tank, using clamps where necessary and hatch lid to secure. Do not turn on pump until hosing is secured. Turn off pump when not in use. ▪ Secondary containment will be used for added protection, such as a spill pallet or plastic sheeting contained by berms. ▪ Wear safety glasses during pumping operations	U	M	L
	▪ Slips, Trips, and Falls	▪ Refer to control measures listed above in General/Work Area job steps for general slips, trips, and falls. ▪ Be aware of location of hosing at all times. Mark with cones. ▪ Keep work surfaces dry when possible or wear non-slip rubber boots. ▪ Be aware of uneven footing. ▪ Maintain 3 points of contact when walking up/down stairs to access top of frac tank. Only rent frac tank that is equipped with sufficient hand rails on stairs and on top.	U	Ca	M
	▪ Site Hazards Material Exposure/Vapors	▪ Wear appropriate PPE when opening drums (nitrile and work gloves, steel toed boots, safety glasses, hard hat) and when opening frac tank hatch. ▪ Screen headspace of drum/tote and below hatch of frac tank before fully opening with PID and MultiRAE upon opening to assess for the presence of strong vapors or hazardous atmospheres. Continuously monitoring breathing zone with PID and MultiRAE during waste transfer process. ▪ If possible, position bodt upwind of hatch opening.	O	M	M
Waste Characterization Sampling (Drums,	▪ Site Hazards Material Exposure/Vapors	▪ Wear appropriate PPE when opening drums (nitrile and work gloves, steel toed boots, safety glasses, hard hat) and when opening frac tank hatch.	O	M	M

Totes, and/or Frac Tank)		▪ Screen headspace of drum/tote and below hatch of frac tank before fully opening with PID and/or MultiRAE upon opening to assess for the presence of strong vapors or hazardous atmospheres. Continuously monitoring breathing zone with PID and/or MultiRAE during sampling activities and when drums/tote/frac tank are open. ▪ If possible, position body upwind of drum, tote, or frac tank hatch.			
	▪ Pinch Points and Cuts from Glassware, Exposure to Preservatives	▪ Wear appropriate gloves (nitrile and cut-resistant gloves) and safety glasses when opening cooler and when handling bottlewear that is either glass, or contains preservatives. ▪ Visually inspect cooler upon opening and while packaging for signs of damaged bottleware and broken glass. ▪	O	M	M
	▪ Slips, Trips, and Falls	▪ Refer to control measures listed above in General/Work Area job steps for general slips, trips, and falls. ▪ Position bottleware, coolers, and sampling apparatus so as not to create a trip hazard. ▪ Keep work surfaces dry when possible or wear non-slip rubber boots. ▪ Be aware of uneven footing. ▪ Maintain 3 points of contact when walking up/down stairs to access top of frac tank. Only rent frac tank that is equipped with sufficient hand rails on stairs and on top.	S	Ca	H
	▪ Splash Hazards, Environmental Release	▪ Secondary containment will be used for added protection, such as a spill pallet or plastic sheeting contained by berms. ▪ Wear safety glasses and nitrile gloves. ▪ Inspect Spill Kit supplies & locate spill kits prior to performing maintenance. ▪ Secure and close drums/totes when not in use.	U	M	L
Oversight of Pick-up/Transportation of Filled Drums and Totes	▪ Pinch Points, Hand Injury	▪ Be aware of potential pinch points. ▪ Used thick gloves for all opening and closing drums.	S	M	L
	▪ Ergonomics/Back Strains	▪ Do not attempt to move drums unless with appropriate mechanical means (e.g., drum dolly). ▪ Do not attempt to lift drums into truck manually. Subcontractor shall provide lift gate on truck.	S	M	L
	▪ Vehicle and heavy equipment traffic in work area	▪ Be mindful of surroundings. ▪ Keep out of travel paths of vehicles and roadways, where possible. ▪ Set up traffic cones and flagging to secure work area ▪ Wear Level D PPE and reflective safety vest ▪ Maintain eye contact/communication with facility and subcontractor's equipment/vehicle operators	S	Cr	M
Oversight of Vac Truck Operations (Removal of Frac Tank Contents)	▪ Vehicle and heavy equipment traffic in work area	▪ Be mindful of surroundings. ▪ Keep out of travel paths of vehicles and roadways, where possible. ▪ Set up traffic cones and flagging to secure work area ▪ Wear Level D PPE and reflective safety vest ▪ Use a spotter. Have one person conduct ground assistance at all times. ▪ Maintain eye contact/communication with facility and subcontractor's equipment/vehicle operators	S	Cr	M
	▪ Noise	▪ Hearing protection will be worn in hazardous noise areas or working around heavy machinery or	S	M	L

		equipment. ▪ Wear earplugs when noise level from equipment exceeds 90 decibels (dBA) averaged over an eight-hour day.			
	▪ Slips, Trips, and Falls	▪ Refer to control measures listed above in General/Work Area job steps for general slips, trips, and falls. ▪ Be aware of location of hosing at all times. Mark with cones. ▪ Keep work surfaces dry when possible or wear non-slip rubber boots. ▪ Be aware of uneven footing. ▪ If access to top of frac tank needed, maintain 3 points of contact when walking up/down stairs to access top of frac tank. Only rent frac tank that is equipped with sufficient hand rails on stairs and on top	U	Ca	M
	▪ Pressure Bursts / Struck By	▪ Beware of joints and weak points in the hose during pump operations. Avoid stepping over hose as much as possible. If burst were to occur, stay away from the breach in the hose and turn off pump immediately. ▪ Check that all mechanical hose connections are secure. Make sure all manual connections are "positive locked" and have safety cables (otherwise known as chokers, hose anchors or whip checks) properly attached. Slowly open valves. ▪ Wear proper PPE – safety glasses, hard hat, and steel-toed boots. ▪ Ensure individuals are trained on the proper operation of the vac truck equipment.	S	Cr	M
	▪ Environmental Release, Splash Hazards ▪ Compliance with DOT Shipping regulations	▪ Secondary containment will be used for added protection, such as a spill pallet or plastic sheeting contained by berms. ▪ Wear safety glasses and nitrile gloves. ▪ Inspect Spill Kit supplies & locate spill kits prior to performing activities. ▪ Inspect hoses prior to use for signs of ▪ Assess material to ensure it does not meet hazardous material shipping requirements, if designated as HAZMAT use a trained and authorized shipper with proper paperwork and approved shipper	U	M	L
	▪ Site Hazards Material Exposure/Vapors	▪ Wear appropriate PPE (nitrile and work gloves, steel toed boots, safety glasses, hard hat) during oversight ▪ Continuously monitoring breathing zone with PID and/or MultiRAE during vac truck operations . ▪ If possible, position body upwind of work zone.	O	M	M
Oversight of Frac Tank Clean-Out	▪ Use of Pressure Washer – Slips, Trips, Fall, Eye-Face Injuries	▪ Ensure individuals are trained on the proper operation of the pressure washer and understand hazards associated with the pressurized equipment. ▪ Keep out of line of fire of pressure washer. Make sure that all workers and bystanders are cleared from area before operating. ▪ Workers shall wear proper PPE (safety glasses with side shields + a face shield) ▪ Turn off valves when not in use. ▪ Be aware of location of hosing at all times. Mark with cones. ▪ Keep work surface area dry and wear slip resistant boots.	S	Cr	M

	▪ Site Hazards Material Exposure/Vapors, Confinsed Space	▪ Make sure workers are properly trained with the task and are aware of site chemical hazards in advance of the work. Workers entering into frac tank shall possess HAZWOPER and confined space training. Subcontractor shall complete necessary confined space paperwork and supply to Parsons in advance. Parsons shall document that confined space entry procedures are being followed by subcontractor (presence of attendant, proper PPE, decontamination procedures, air monitoring, etc). ▪ Practice contamination avoidance. Have support personnel remain upwind of the work area ▪ Wear Level D PPE. Workers completing the cleanout may require more stringent PPE. ▪ Monitoring breathing zone with PID and/or MultiRAE. Workers completing the cleanout shall also complete monitoring while inside of tank.	S	Cr	M
Equipment Decontamination	Refer to AHA 004: Decontamination of Tools and Equipment		S	M	M

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
Depending on environment at project site: blanket, sunscreen, cold/hot drink, extra clothing, traffic warning signage, cones, hi-vis markers, etc, fire extinguisher, insect repellent. Level D PPE - Long pants, safety glasses, hard hat (in presence of heavy equipment), high-visibility vest/clothing, steel-toed boots, gloves, goggles.	All personnel engaged in hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards shall receive appropriate training as required by 29 CFR 1910.120(e), including, but not limited to, initial 40-hour, 8-hour Supervisor and annual 8-hour refresher. Medical qualification, training and fit-testing must be received on an annual basis for individuals that wear a respirator. If an individual wears a respirator more than 30 days per year, or they are exposed at or above the Permissible Exposure Limit (PEL) of a chemical for more than 30 days in a year, then they must participate in a Medical Surveillance Program as required by 29 CFR 1910.120(f). All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity and review it with their Supervisor during their Daily Safety Huddle. All personnel performing work onsite must have received the site specific orientation. Competent FA / CPR / AED responder will be onsite while all work is occurring at all times. STOP WORK AUTHORITY Right, Obligation and Responsibility Every single employee has the responsibility and the authority to STOP WORK at any time necessary to protect the safety or health of themselves, others, and the environment. Anyone can execute this responsibility without repercussions. We believe that the GOAL OF ZERO is possible with everyone's support and commitment.	Ongoing environmental condition inspection (weather, wind, heat, cold). Ongoing personnel inspection (buddy system) Inspection of work area for general hazards as covered under this AHA prior to beginning any task. Inspect drugs and totes for any signs of bulging daily. Inspect conditions of frac tank (rails and steps) Take 5 Card when appropriate Get Out and Look (GOAL) Equipment inspection as necessary, recorded in field book. Complete daily calibration of PID, weekly calibration of Multi-gas meter, and monthly inspection of fire extinguishers.

ACTIVITY HAZARDS ANALYSIS TRAINING ACKNOWLEDGEMENT AND SIGN OFF

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Activity Hazard Analysis (AHA) 012

Activity/Work Task: Site Surveying	Overall Risk Assessment Code (RAC) (Use highest code)						M
Project Location: East Station, Rochester NY	**Risk Assessment Code (RAC) Matrix**						
Project Number: 453121	**Severity**	**Probability**					
Date Prepared: 1/27/2023		Frequent	Likely	Occasional	Seldom	Unlikely	
Prepared by (Name): Sara Weishaupt	Catastrophic	E	E	H	H	M	
	Critical	E	H	H	M	L	
Reviewed by (Name): Darrell Pruitt	Marginal	H	M	M	L	L	
Employer / GBU: Parsons	Negligible	M	L	L	L	L	

Notes: (Field Notes, Review Comments, etc.)
References:
PSHEP, ESHARP Manual, DASH Cards

Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above).
The RAC is developed after correctly identifying all of the hazards and fully implementing all controls.

	RAC Chart
"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.	
"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible	**E = Extremely High Risk** **H = High Risk**
Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.	**M = Moderate Risk** **L = Low Risk**

Job Steps	Hazards	Controls	P	S	RAC
Perform Survey	Pinch Points/Cuts	▪ Be aware of hands/fingers while setting up tripods. Be aware of pinch point locations. Wear leather gloves when handling equipment/supplies. Watch hand position when opening/closing hinged lids/gates (i.e. tailgates, utility boxes, doors, etc.).	S	M	L
	Ergonomics	▪ Use proper lifting techniques. Use buddy lift when weight of object exceeds 49 lbs or is difficult to handle.	S	M	L
	Working in Vicinity of Indoor/Outdoor Vehicle Traffic/Active Equipment Operation	▪ Keep out of travel paths of vehicles and roadways, where possible. ▪ Set up traffic cones and flagging to secure work area ▪ Wear Level D PPE and reflective safety vest ▪ Maintain eye contact/communication with facility equipment/vehicle operators. ▪ Refer to AHA 018: Traffic Management.	S	Cr	M
	lips, Trips, and Falls	▪ Use designated walkways whenever possible ▪ Avoid or remove all trip hazards by keeping materials/objects organized and out of	S	Cr	M

		walkways. ▪ Keep work surfaces dry ▪ Practice good housekeeping and keep work areas free of debris ▪ Do not talk or text on cellphone or look at documents while walking, focus on task. ▪ Avoid, remove, communicate and mark (if possible) hazards. ▪ Work in adequate illumination. ▪ Work slowly during transit. Jumping, running, and horseplay are prohibited. ▪ Don't walk with hands in pocket. They can be used to catch you in the event of a slip, trip or fall. ▪ Wear ankle high safety shoes fully laced with good tread, keep hands out of pocket in case of fall. Do not carry more than 50 lbs by yourself and plan your route. ▪ Clean up all spills immediately and dispose properly. ▪ Personnel will notify the SSO of any unsafe conditions.			
	Heat/Cold Stress Biological Hazards Adverse Weather Uneven/Wet Terrain	▪ Refer to AHA 001: General Site Activities	S	M	M
	Marking Locations - Inhalation of spray paint fumes	▪ Utilize spray paint extension wand and spray marking paint downwind of your location. Wear nitrile gloves to avoid dermal contact and safety glasses.	S	M	L
	Motion – Struck by Hammer	▪ Ensure hammer head is secure on handle. Ensure other personnel are not in swing path or in location where they could be struck by hammer.	S	M	L
	Mechanical – Hand injury while installing survey stakes	▪ Be aware of hand/finger locations when driving stakes. Wear leather palmed gloves while driving stakes. Consider using an extension tool to hold stake while driving so hands are not in an at-risk location.	S	M	L

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
Depending on environment at project site: blanket, sunscreen, cold/hot drink, extra clothing, traffic warning signage, cones, hi-vis markers, etc, fire extinguisher, insect repellent. Level D PPE - Long pants, safety glasses, hard hat (in presence of heavy equipment), high-visibility vest/clothing, steel-toed boots, gloves, goggles.	All personnel engaged in hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards shall receive appropriate training as required by 29 CFR 1910.120(e), including, but not limited to, initial 40-hour, 8-hour Supervisor and annual 8-hour refresher. Medical qualification, training and fit testing must be received on an annual basis for individuals that wear a respirator. If an individual wears a respirator more than 30 days per year, or they are exposed at or above the Permissible Exposure Limit (PEL) of a chemical for more than 30 days in a year, then they must participate in a Medical Surveillance Program as required by 29 CFR 1910.120(f). All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity and review it with their Supervisor during their Daily Safety Huddle. All personnel performing work onsite must have received the site-specific orientation. Competent FA / CPR / AED responder will be onsite while all work is occurring at all times. STOP WORK AUTHORITY Right, Obligation and Responsibility Every single employee has the responsibility and the authority to STOP WORK at any time necessary to protect the safety or health of themselves, others, and the environment. Anyone can execute this responsibility without repercussions. We believe that the GOAL OF ZERO is possible with everyone's support and commitment.	Ongoing environmental condition inspection (weather, wind, heat, cold). Ongoing personnel inspection (buddy system) Inspection of work area for general hazards as covered under this AHA prior to beginning any task. Inspect that signage is set up appropriately and visible for all vehicles passing the work area. Take 5 Card when appropriate Get Out and Look (GOAL)

ACTIVITY HAZARDS ANALYSIS TRAINING ACKNOWLEDGEMENT AND SIGN OFF

Read Carefully Before Signing Below

This is to acknowledge that I have had a chance to review a copy **AHA 012 Site Surveying** and have been trained on its contents. I understand a copy will be provided to me upon request. I will read and abide by all requirements of the aforementioned AHA and any additional rules and regulations of my job. I understand that working safely, complying with and obeying any and all Company safety rules, regulations or standards is a condition of my employment. Should I not comply with Company safety rules, regulations or standards, I am subject to disciplinary action including removal from the site and possible termination of employment.

NAME	SIGNATURE	COMPANY	DATE	CRAFT	TRAINER	TRAINER SIGNATURE
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Activity/Work Task: Activities - Barge or Boat	Overall Risk Assessment Code (RAC) (Use highest code): **M**
Project Location: East Station, Rochester NY	
Project Number: 453121	
Date Prepared: 1/27/2023	
Prepared by (Name): Sara Weishaupt	
Reviewed by (Name): Darrell Pruitt	
Employer / GBU: Parsons	

Risk Assessment Code (RAC) Matrix

Severity	Probability				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal		M	M	L	L
Negligible	M	L	L	L	L

Notes: (Field Notes, Review Comments, etc.)
References:
PSHEP, ESHARP Manual, DASH Card

Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above).
The RAC is developed after correctly identifying all of the hazards and fully implementing all controls.

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

- **E = Extremely High Risk**
- **H = High Risk**
- **M = Moderate Risk**
- **L = Low Risk**

Job Steps	Hazards	Controls	P	S	RAC
Load equipment onto vessel	General	▪ Be cautious when boarding vessel. With one hand on the boat, quickly lower straight down into the center of the craft. Never jump into or onto a vessel. ▪ If others are boarding, have them step along the fore-and aft centerline of the boat while the boat is held in place along the pier. ▪ Avoid directly carrying anything aboard. Load the items off the pier or have someone hand them to you one by one. ▪ Never overload the vessel. ▪ Keep weight toward center of the boat and center of gravity as low as possible. ▪ Distribute equipment evenly on vessel.	S	M	M
	Slips, Trips, Falls	▪ Workers will be aware of potentially slippery surfaces and tripping hazards. ▪ Wear personal floatation device when working on or near water.	S	M	M

		▪ Wear footwear that has sufficient traction to reduce risk of slipping. ▪ Workers will keep all areas clean and free of debris to deter any unnecessary trips and falls. ▪ Clean up all spills immediately. ▪ Be aware of obstacles on deck. ▪ Proceed carefully on floating docks and ramps. ▪ Use designated walkways whenever possible ▪ Avoid or remove all trip hazards by keeping materials/objects organized and out of walkways. ▪ Keep work surfaces dry ▪ Practice good housekeeping and keep work areas free of debris ▪ Do not talk or text on cellphone or look at documents while walking, focus on task. ▪ Avoid, remove, communicate and mark (if possible) hazards. ▪ Utilize adequate lighting ▪ Work slowly during transit. Jumping, running, and horseplay are prohibited. ▪ Don't walk with hands in pocket. They can be used to catch you in the event of a slip, trip or fall. ▪ Wear ankle high safety shoes fully laced with good tread, keep hands out of pocket in case of fall. Do not carry more than 50 lbs by yourself and plan your route. ▪ Clean up all spills immediately and dispose properly. ▪ Personnel will notify the SSO of any unsafe conditions.			
	Muscle strain/injuries from improper lifting	▪ Personnel will utilize proper lifting techniques or ask for assistance with moving/lifting objects. ▪ Observe proper lifting techniques – lift with legs, elbows in, and keep back straight. ▪ Team lift large/awkward loads. ▪ Use mechanical means to lift if the weight is awkward or the weight is greater than 50 pounds individually or 80 pounds for team lifting. ▪ Use mechanical devices (e.g., wagon, sled) to transport equipment and samples over long distances. ▪ Take breaks frequently and rotate staff. ▪ Keep equipment secure until needed. And avoid stacking Wear steel-toed boots.	S	M	M
	Marine Operation Hazards	▪ Verify that water craft operator has operator certifications. ▪ Make sure not to overload boat. Do not exceed maximum weight limit for water craft. ▪ Wear a exposure suit, dry suit, or insulated neoprene wet suit when the combined air and water temperature is below 85 degrees ▪ Follow all posted waterway speed limits. ▪ Operator will be aware of all buoys, shoal markers and other indications of potentially dangerous locations. ▪ Vessel will be equipped with all USCG and project required safety equipment. (flares, flags, fire extinguisher)	S	M	M

Unloading equipment	Slip, Trips and Falls	▪ Secure boat. ▪ Step carefully off boat. ▪ Use rails or assistance from someone on the dock. ▪ Avoid carrying anything off the boat. ▪ Use designated walkways whenever possible ▪ Avoid or remove all trip hazards by keeping materials/objects organized and out of walkways. ▪ Keep work surfaces dry ▪ Practice good housekeeping and keep work areas free of debris ▪ Do not talk or text on cellphone or look at documents while walking, focus on task. ▪ Avoid, remove, communicate and mark (if possible) hazards. ▪ Utilize adequate lighting ▪ Work slowly during transit. Jumping, running, and horseplay are prohibited. ▪ Don't walk with hands in pocket. They can be used to catch you in the event of a slip, trip or fall. ▪ Wear ankle high safety shoes fully laced with good tread, keep hands out of pocket in case of fall. Do not carry more than 50 lbs by yourself and plan your route. ▪ Clean up all spills immediately and dispose properly. ▪ Personnel will notify the SSO of any unsafe conditions.	S	M	M
	Muscle strain/injuries from improper lifting	▪ Load items off from the boat or have someone hand them to you one by one. ▪ Personnel will utilize proper lifting techniques or ask for assistance with moving/lifting objects. ▪ Observe proper lifting techniques – lift with legs, elbows in, and keep back straight. ▪ Team lift large/awkward loads. ▪ Use mechanical means to lift if the weight is awkward or the weight is greater than 50 pounds individually or 80 pounds for team lifting. ▪ Use mechanical devices (e.g., wagon, sled) to transport equipment and samples over long distances. ▪ Take breaks frequently and rotate staff. ▪ Keep equipment secure until needed. And avoid stacking Wear steel-toed boots.	S	M	M
	Fatigue	▪ Do not let fatigue or tiredness associated with the day's activity compromise attention to proper health and safety. ▪ Get adequate rest, if you are not Fit for Duty, use Stop Work authority	S	M	M

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
Modified Level D- Long pants, safety glasses, hard hat (when required), steel-toed boots, nitrile outer gloves, cut proof inner gloves, high visibility personal floatation device. Equipment: water quality meter, water sampling device (e.g., dipper sampler), sample bottleware, coolers, bags of ice. Depending on environment at project site: blanket, sunscreen, cold/hot drink, extra clothing, traffic warning signage, cones, hi-vis markers, etc, fire extinguisher, insect repellent.	All personnel engaged in hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards shall receive appropriate training as required by 29 CFR 1910.120(e), including, but not limited to, initial 40-hour, 8-hour Supervisor and annual 8-hour refresher. All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity and review it with their Supervisor during their Daily Safety Huddle. All personnel performing work onsite must have received the site-specific orientation. Competent FA / CPR / AED responder will be onsite while all work is occurring at all times. STOP WORK AUTHORITY Right, Obligation and Responsibility Every single employee has the responsibility and the authority to STOP WORK at any time necessary to protect the safety or health of themselves, others, and the environment. Anyone can execute this responsibility without repercussions. We believe that the GOAL OF ZERO is possible with everyone's support and commitment.	Ongoing environmental condition inspection (weather, wind, heat, cold). Ongoing personnel inspection (buddy system). Inspection of work area for general hazards as covered under this AHA prior to beginning any task. Take 5 Card when appropriate. Get Out and Look (GOAL) Equipment inspection as necessary, recorded in field book. Calibrate PID daily, and fire extinguisher monthly.

ACTIVITY HAZARDS ANALYSIS TRAINING ACKNOWLEDGEMENT AND SIGN OFF

Read Carefully Before Signing Below

This is to acknowledge that I have had a chance to review a copy **AHA 013 Activities-Barge or Boat** and have been trained on its contents. I understand a copy will be provided to me upon request. I will read and abide by all requirements of the aforementioned AHA and any additional rules and regulations of my job. I understand that working safely, complying with and obeying any and all Company safety rules, regulations or standards is a condition of my employment. Should I not comply with Company safety rules, regulations or standards, I am subject to disciplinary action including removal from the site and possible termination of employment.

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Activity/Work Task: Operation-of Barge or Boat	Overall Risk Assessment Code (RAC) (Use highest code): **M**
Project Location: East Station, Rochester NY	
Project Number: 453121	
Date Prepared: 1/27/2023	
Prepared by (Name): Sara Weishaupt	
Reviewed by (Name): Darrell Pruitt	
Employer / GBU: Parsons	

Risk Assessment Code (RAC) Matrix

Severity	Probability				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	**E**	**E**	**H**	**H**	**M**
Critical	**E**	**H**	**H**	**M**	**L**
Marginal		**M**	**M**	**L**	**L**
Negligible	**M**	**L**	**L**	**L**	**L**

Notes: (Field Notes, Review Comments, etc.)
References:
PSHEP, ESHARP Manual, DASH Card

Step 1: Review each “Hazard” with identified safety “Controls” and determine RAC (See above).
The RAC is developed after correctly identifying all of the hazards and fully implementing all controls.

	RAC Chart
“Probability” is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.	
“Severity” is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible	**E = Extremely High Risk** **H = High Risk**
Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each “Hazard” on AHA. Annotate the overall highest RAC at the top of AHA.	**M = Moderate Risk** **L = Low Risk**

Job Steps	Hazards	Controls	P	S	RAC
Boarding and Deboarding Boat	Slips, Trips, and Falls	▪ Use proper footing and handrails for boarding and deboarding of boat. Be aware of any objects on the boat and dock that may present a tripping hazard. ▪ Assure that boat is firmly grounded before attempting to exit boat. Assure ground is firm before stepping out of boat. ▪ Check for wet or icy surfaces before stepping into or out of boat. ▪ Maintain three points of contact when boarding or deboarding boat. ▪ Do not board or deboard boat while carrying a load. Always transfer loads from barge or boat. Do not exceed rated load capacity of the boat, place load so boat remains levels and oriented properly ▪ Always place foot on flat, stable surfaces when boarding or deboarding. Step to center of boat when entering Never step on sidewalls.	S	M	M

Man Overboard		▪ If a person falls in the water, use flotation device and retrieval rope to assist the person. Once onboard, move person to shore immediately and allow to dry off and warm up. Stand by to assist the victim and observe for signs of hypothermia. ▪ If air temperature is below 50 deg F and water temperature is below 50 deg F, either don survival suits or conduct activities close to shore where victim can easily be transported to support area within 15 minutes. Steps, ladder or other retrieval device must be readily available	S	M	M
Navigate	Boat traffic and obstructions	▪ Check weather forecast and monitor throughout trip. Reschedule trip if severe weather is forecast, monitor USCG advisories ▪ Maintain a safe operating distance from shoreline, other vessels, shallow water, obstructions, etc. ▪ Operator must have USCG Boating Course or equivalent training. For Commercial Boats, license as per USCG requirements ▪ Complete and file Float Plan as needed for work on navigable water ways ▪ Establish call-in system at set-times	S	M	M
	Marine Operation Hazards	▪ Follow all posted waterway speed limits. ▪ Operator will be aware of all buoys, shoal markers and other indications of potentially dangerous locations. ▪ Vessel will be equipped with all USCG and project required safety equipment. (flares, flags, fire extinguisher) ▪ Verify that water craft operator has operator certifications. ▪ Make sure not to overload boat. Do not exceed maximum weight limit for water craft. ▪ Wear a exposure suit, dry suit, or insulated neoprene wet suit when the combined air and water temperature is below 85 degrees	S	M	M
	Anchor Lights	▪ Power-driven vessels and sailing vessels at anchor must display anchor lights. An anchor light for a vessel less than 50 meters in length is an all-around white light visible for 2 miles exhibited where it can best be seen and 2 all-round white lights for greater than 50 meters. During daytime hours, Vessels at anchor shall exhibit forward where best seen, a ball shape. ▪ More direction can be found at : http://www.auxetrain.org/lights2.html	S	M	M
	Heat and Cold Stress	▪ Implement the cold/heat stress control program as appropriate to conditions. ▪ Workers will wear appropriate clothing to protect against cold or heat.	S	M	M
	Slips, Trips, Falls-	▪ Workers will be aware of potentially slippery surfaces and tripping hazards. ▪ Wear personal floatation device. ▪ Workers will keep all areas clean and free of debris to deter any unnecessary trips and falls. ▪ Clean up all spills immediately. ▪ Be aware of obstacles on deck. ▪ Personnel will notify the SSO of any unsafe conditions	S	M	M

	Waves, surges, currents.	▪ Be aware of sudden surges caused by incoming waves, unstable waters, and currents.	S	M	M
	Rain	▪ Have proper PPE (i.e. rain gear, footwear, etc) available. Be aware of slip hazards, puddles, etc.	S	M	M
	Sunshine	▪ Have sunscreen available for ultraviolet protection. Have water for dehydration.	S	M	M
	Snow or cold air temperatures	▪ Have warm, dry clothes available for cold temperatures.	S	M	M
	Severe Weather	▪ A weather radio must be available for severe weather alerts ▪ Weather reports must be checked prior to work each day	S	M	M
	Lightning	▪ Do not begin or continue work until lightning subsides for 30 minutes.	S	M	M
	High winds, dust storm	▪ Wear goggles if dust/debris is visible. ▪ Consider alteration or termination of activities if high winds are forecasted or suddenly appear.	S	M	M
	Pollen	▪ Take medication to minimize allergic reaction to pollen. Care should be taken if using medication that may cause drowsiness. ▪ Wear dust mask, if necessary.	S	M	M
Position vessel over sample location	Boat traffic	▪ Maintain a safe operating distance from shoreline, other vessels, shallow water, obstructions, debris, etc.	S	M	M
	Waves, surges, currents.	▪ Be aware of sudden surges caused by incoming waves, unstable waters, and currents.	S	M	M
	Slips, Trips, Falls-fall off boat	▪ Wear footwear that has sufficient traction to reduce risk of slipping. ▪ Wear personal flotation device, fastened shut, at all times onboard. ▪ Be aware of any obstacles on deck.	S	M	M

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
Modified Level D- Long pants, safety glasses, hard hat (when required), steel-toed boots, nitrile outer gloves, cut proof inner gloves, high visibility personal floatation device. Equipment: water quality meter, water sampling device (e.g., dipper sampler), sample bottleware, coolers, bags of ice. Depending on environment at project site: blanket, sunscreen, cold/hot drink, extra clothing, traffic warning signage, cones, hi-vis markers, etc, fire extinguisher, insect repellent.	All personnel engaged in hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards shall receive appropriate training as required by 29 CFR 1910.120(e), including, but not limited to, initial 40-hour, 8-hour Supervisor and annual 8-hour refresher. All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity and review it with their Supervisor during their Daily Safety Huddle. All personnel performing work onsite must have received the site-specific orientation. Competent FA / CPR / AED responder will be onsite while all work is occurring at all times. STOP WORK AUTHORITY Right, Obligation and Responsibility Every single employee has the responsibility and the authority to STOP WORK at any time necessary to protect the safety or health of themselves, others, and the environment. Anyone can execute this responsibility without repercussions. We believe that the GOAL OF ZERO is possible with everyone's support and commitment.	Ongoing environmental condition inspection (weather, wind, heat, cold). Ongoing personnel inspection (buddy system). Inspection of work area for general hazards as covered under this AHA prior to beginning any task. Take 5 Card when appropriate. Get Out and Look (GOAL) Equipment inspection as necessary, recorded in field book. Calibrate PID daily, and fire extinguisher monthly.

ACTIVITY HAZARDS ANALYSIS TRAINING ACKNOWLEDGEMENT AND SIGN OFF

Read Carefully Before Signing Below

This is to acknowledge that I have had a chance to review a copy **AHA 014 Operation Barge or Boat** and have been trained on its contents. I understand a copy will be provided to me upon request. I will read and abide by all requirements of the aforementioned AHA and any additional rules and regulations of my job. I understand that working safely, complying with and obeying any and all Company safety rules, regulations or standards is a condition of my employment. Should I not comply with Company safety rules, regulations or standards, I am subject to disciplinary action including removal from the site and possible termination of employment.

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Activity Hazard Analysis (AHA) 015

Activity/Work Task: Vibracore Operation	Overall Risk Assessment Code (RAC) (Use highest code)						M
Project Location: East Station, Rochester NY	**Risk Assessment Code (RAC) Matrix**						
Project Number: 453121	**Severity**	**Probability**					
Date Prepared: 1/27/2023		Frequent	Likely	Occasional	Seldom	Unlikely	
Prepared by (Name): Sara Weishaupt	Catastrophic	E	E	H	H	M	
	Critical	E	H	H	M	L	
Reviewed by (Name): Darrell Pruitt	Marginal		M	M	L	L	
Employer / GBU: Parsons	Negligible	M	L	L	L	L	

Notes: (Field Notes, Review Comments, etc.) **References:** PSHEP, ESHARP Manual, DASH Card	**Step 1:** Review each "Hazard" with identified safety "Controls" and determine RAC (See above). **The RAC is developed after correctly identifying all of the hazards and fully implementing all controls.**	
	"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.	**RAC Chart**
	"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible	**E = Extremely High Risk** **H = High Risk**
	Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.	**M = Moderate Risk** **L = Low Risk**

Job Steps	Hazards	Controls	P	S	RAC
Drive Vibracore into sediment and collect data	Lack of Communication Equipment Malfunction	▪ Prior to commencement of daily activities, the methods of communication will be discussed. ▪ Personnel will have access to a cell phone or other means of communication. ▪ The activities for the day will be discussed and understood prior to daily start up with review of safety issues. ▪ Batteries will be checked and recharged prior to start of days work. ▪ Conduct daily pre-use inspection of equipment. If defects or safety issues are observed remove from service	S	M	M
	Inhalation of contaminated dust Inhalation of volatile contaminants Ingestion of contaminants	▪ If exposure to contaminated materials occurs, promptly wash contaminated skin using soap or mild detergent and water. ▪ Wash eyes with large amounts of water. ▪ If a person breathes in a large amount of organic vapor, move the exposed person to fresh air. Perform	S	M	M

	Skin/eye contact with contaminated materials	artificial respiration if breathing stops.
		▪ Keep the affected person warm and at rest. Obtain medical treatment for all of these situations as required.
		▪ Wear appropriate safety equipment (i.e., goggles, gloves, boots) as appropriate for reducing risk of contamination.
		▪ When transferring equipment and samples to land, follow procedures for demobilization.
		    ▪ Plan route.
		    ▪ Maintain good housekeeping.
		    ▪ Avoid lifting over 50 lbs. Use team lift. Lift using knees, not back.
		    ▪ Decontaminate equipment.			

	Pinch Points/Overhead equipment	▪ Maintain awareness of procedures underway and be attentive of vibracore operations. Keep hands and body parts out of the point of operation and hazard areas, mark with warning tape or signs if feasible ▪ Wear hard hats when around machinery and equipment. ▪ Keep observers back from active operations. Get operators attention before approaching.	S	M	M
	Muscle strain/injuries from improper lifting	▪ Personnel will utilize proper lifting techniques or ask for assistance with moving/lifting objects. ▪ Observe proper lifting techniques – lift with legs, elbows in, and keep back straight. ▪ Team lift large/awkward loads. ▪ Use mechanical means to lift if the weight is awkward or the weight is greater than 50 pounds individually or 80 pounds for team lifting. ▪ Use mechanical devices (e.g., wagon, sled) to transport equipment and samples over long distances. ▪ Take breaks frequently and rotate staff. ▪ Keep equipment secure until needed. And avoid stacking Wear steel-toed boots.	S	M	M
	Working on the Lake-trip, slip, fall off boat Drowning	▪ Wear footwear that has sufficient traction to reduce risk of slipping. ▪ Wear personal flotation device. ▪ Be aware of any obstacles on deck.	S	M	L
	Noise exposure	▪ Hearing protection will be worn in hazardous noise areas or working around heavy machinery or equipment. ▪ Wear earplugs when noise level from equipment exceeds 90 decibels (dBA) averaged over an eight-hour day.	S	M	L

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
Modified Level D- Long pants, safety glasses, hard hat (when required), steel-toed boots, nitrile outer gloves, cut proof inner gloves, high visibility personal floatation device. Equipment: water quality meter, water sampling device (e.g., dipper sampler), sample bottleware, coolers, bags of ice. Depending on environment at project site: blanket, sunscreen, cold/hot drink, extra clothing, traffic warning signage, cones, hi-vis markers, etc, fire extinguisher, insect repellent.	All personnel engaged in hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards shall receive appropriate training as required by 29 CFR 1910.120(e), including, but not limited to, initial 40-hour, 8-hour Supervisor and annual 8-hour refresher. All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity and review it with their Supervisor during their Daily Safety Huddle. All personnel performing work onsite must have received the site-specific orientation. Competent FA / CPR / AED responder will be onsite while all work is occurring at all times. STOP WORK AUTHORITY Right, Obligation and Responsibility Every single employee has the responsibility and the authority to STOP WORK at any time necessary to protect the safety or health of themselves, others, and the environment. Anyone can execute this responsibility without repercussions. We believe that the GOAL OF ZERO is possible with everyone's support and commitment.	Ongoing environmental condition inspection (weather, wind, heat, cold). Ongoing personnel inspection (buddy system). Inspection of work area for general hazards as covered under this AHA prior to beginning any task. Take 5 Card when appropriate. Get Out and Look (GOAL) Equipment inspection as necessary, recorded in field book. Calibrate PID daily, and fire extinguisher monthly.

ACTIVITY HAZARDS ANALYSIS TRAINING ACKNOWLEDGEMENT AND SIGN OFF

Read Carefully Before Signing Below

This is to acknowledge that I have had a chance to review a copy **AHA 015 Vibracore Operation** and have been trained on its contents. I understand a copy will be provided to me upon request. I will read and abide by all requirements of the aforementioned AHA and any additional rules and regulations of my job. I understand that working safely, complying with and obeying any and all Company safety rules, regulations or standards is a condition of my employment. Should I not comply with Company safety rules, regulations or standards, I am subject to disciplinary action including removal from the site and possible termination of employment.

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Activity/Work Task: Sediment Sampling	Overall Risk Assessment Code (RAC) (Use highest code): **M**
Project Location: East Station, Rochester NY	
Project Number: 453121	
Date Prepared: 1/27/2023	
Prepared by (Name): Sara Weishaupt	
Reviewed by (Name): Darrell Pruitt	
Employer / GBU: Parsons	

Risk Assessment Code (RAC) Matrix

Severity	Probability: Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	**E**	**E**	**H**	**H**	**M**
Critical	**E**	**H**	**H**	**M**	**L**
Marginal		**M**	**M**	**L**	**L**
Negligible	**M**	**L**	**L**	**L**	**L**

Notes: (Field Notes, Review Comments, etc.)
References:
PSHEP, ESHARP Manual, DASH Card

Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above).
The RAC is developed after correctly identifying all of the hazards and fully implementing all controls.

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

- **E = Extremely High Risk**
- **H = High Risk**
- **M = Moderate Risk**
- **L = Low Risk**

Job Steps	Hazards	Controls	P	S	RAC
Sediment Sampling	Marine Operation Hazards	▪ Check and monitor weather ▪ Use trained and authorized operator, refer to Boat Operation AHA	S	M	M
	Inhalation of contaminated dust Inhalation of volatile contaminants Ingestion of contaminants Skin/eye contact with contaminated materials	▪ If exposure to contaminated materials occurs, promptly wash contaminated skin using soap or mild detergent and water. ▪ Wash eyes with large amounts of water. ▪ If a person breathes in a large amount of organic vapor, move the exposed person to fresh air. Perform artificial respiration if breathing stops. ▪ Keep the affected person warm and at rest. Obtain medical treatment for all of these situations as required. ▪ Wear appropriate safety equipment (i.e., goggles, gloves, boots) as appropriate for reducing risk of contamination.	S	M	M

	Pinch Points/Overhead equipment	▪ Maintain awareness of procedures underway and be attentive of vibracore operations. Keep hands out of pinch points. Mark or label key hazard areas to the extent possible ▪ Communicate plans with others and be aware of surroundings at all times ▪ Wear hard hats when around machinery and equipment. ▪ Keep observers back from active operations. Get operators attention before approaching.	S	M	M
	Noise Exposure	▪ Hearing protection will be worn in hazardous noise areas or working around heavy machinery or equipment. ▪ Wear earplugs when noise level from equipment exceeds 90 decibels (dBA) averaged over an eight-hour day.	S	M	M

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
Modified Level D- Long pants, safety glasses, hard hat (when required), steel-toed boots, nitrile outer gloves, cut proof inner gloves, high visibility personal floatation device. Equipment: water quality meter, water sampling device (e.g., dipper sampler), sample bottleware, coolers, bags of ice. Depending on environment at project site: blanket, sunscreen, cold/hot drink, extra clothing, traffic warning signage, cones, hi-vis markers, etc, fire extinguisher, insect repellent.	All personnel engaged in hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards shall receive appropriate training as required by 29 CFR 1910.120(e), including, but not limited to, initial 40-hour, 8-hour Supervisor and annual 8-hour refresher. All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity and review it with their Supervisor during their Daily Safety Huddle. All personnel performing work onsite must have received the site-specific orientation. Competent FA / CPR / AED responder will be onsite while all work is occurring at all times. STOP WORK AUTHORITY Right, Obligation and Responsibility Every single employee has the responsibility and the authority to STOP WORK at any time necessary to protect the safety or health of themselves, others, and the environment. Anyone can execute this responsibility without repercussions. We believe that the GOAL OF ZERO is possible with everyone's support and commitment.	Ongoing environmental condition inspection (weather, wind, heat, cold). Ongoing personnel inspection (buddy system). Inspection of work area for general hazards as covered under this AHA prior to beginning any task. Take 5 Card when appropriate. Get Out and Look (GOAL) Equipment inspection as necessary, recorded in field book. Calibrate PID daily, and fire extinguisher monthly.

ACTIVITY HAZARDS ANALYSIS TRAINING ACKNOWLEDGEMENT AND SIGN OFF

Read Carefully Before Signing Below

This is to acknowledge that I have had a chance to review a copy **AHA 016 Sediment Sampling** and have been trained on its contents. I understand a copy will be provided to me upon request. I will read and abide by all requirements of the aforementioned AHA and any additional rules and regulations of my job. I understand that working safely, complying with and obeying any and all Company safety rules, regulations or standards is a condition of my employment. Should I not comply with Company safety rules, regulations or standards, I am subject to disciplinary action including removal from the site and possible termination of employment.

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Activity/Work Task: Sample Processing	Overall Risk Assessment Code (RAC) (Use highest code): **M**
Project Location: East Station, Rochester NY	
Project Number: 453121	
Date Prepared: 1/27/2023	
Prepared by (Name): Sara Weishaupt	
Reviewed by (Name): Darrell Pruitt	
Employer / GBU: Parsons	

Risk Assessment Code (RAC) Matrix

Severity	**Probability**				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	**E**	**E**	**H**	**H**	**M**
Critical	**E**	**H**	**H**	**M**	**L**
Marginal		**M**	**M**	**L**	**L**
Negligible	**M**	**L**	**L**	**L**	**L**

Notes: (Field Notes, Review Comments, etc.)
References:
PSHEP, ESHARP Manual, DASH Card

Step 1: Review each “Hazard” with identified safety “Controls” and determine RAC (See above).
The RAC is developed after correctly identifying all of the hazards and fully implementing all controls.

	RAC Chart
“Probability” is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.	
“Severity” is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible	**E = Extremely High Risk** **H = High Risk**
Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each “Hazard” on AHA. Annotate the overall highest RAC at the top of AHA.	**M = Moderate Risk** **L = Low Risk**

Job Steps	**Hazards**	**Controls**	**P**	**S**	**RAC**
Packing sample for off-site shipment to lab	Accidental breakage of glass bottles	▪ Keep work area clean and clutter free. Use tables or other stable work surface at proper height to pack samples and cooler. ▪ Wear cut-resistant gloves during packaging of glass bottles. ▪ Immediate clean-up of spills.	S	M	M
	Back Injury, muscle strain/stress	▪ Personnel will utilize proper lifting techniques or ask for help with moving/lifting objects. ▪ Protect your knees with knee pads or other disposable padded material while kneeling on the ground. ▪ Use proper lifting techniques. Keep back straight, bend the knees, and lift with the legs. Use two people if load is heavier than 50 lbs. or awkward to handle.	S	M	M
	Hazardous Material Exposure	▪ Training and safety awareness of potential exposure to contaminates at the site and decontamination procedure.	S	M	M

		▪ Appropriate PPE will be worn (e.g., safety glasses, gloves, etc.). ▪ Personnel will follow decontamination procedure. ▪ Screen for COCs with PID and mercury meter analyzer over samples and in workers breathing zone. Refer PSHEP for action levels. ▪ Ventilate work area with fans or vents			
	Slips, Trips, Falls	▪ Workers will be aware of potentially slippery surfaces and tripping hazards. Keep all areas dry, clean and free of debris to deter any unnecessary trips and falls. ▪ Avoid, remove, communication, and mark (if possible) hazards. ▪ Do not talk or text on cellphone or look at documents while walking, focus on task. ▪ Don't walk with hands in pocket. They can be used to catch you in the event of a slip, trip or fall. ▪ Work slowly during transit. Jumping, running, and horseplay are prohibited. ▪ Wear ankle high safety shoes fully laced with good tread, keep hands out of pocket in case of fall. Do not carry more than 50 lbs by yourself and plan your route. ▪ Clean up all spills immediately and dispose properly. ▪ Avoid working at dusk, dawn, or at night. Utilize adequate lighting when indoors. ▪ Personnel will notify the SSO of any unsafe conditions.	S	M	M
	Heat and Cold Stress	▪ The SSO will implement the cold/heat stress control program as appropriate to conditions. ▪ SSO will monitor workers for heat/cold stress symptoms. ▪ Provided heated or cool break areas ▪ Use buddy system and self-monitor ▪ Hydrate ▪ Wear PPE appropriate for the conditions	S	M	M
	Eye Injury	▪ Avoid splashing, pour slowly in a controlled manner, use funnel or proper equipment ▪ PPE (safety glasses, etc.) will be worn.	S	M	M

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
Modified Level D- Long pants, safety glasses, hard hat (when required), steel-toed boots, nitrile outer gloves, cut proof inner gloves. Depending on environment at project site: blanket, sunscreen, cold/hot drink, extra clothing, traffic warning signage, cones, hi-vis markers, etc, fire extinguisher, insect repellent.	All personnel engaged in hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards shall receive appropriate training as required by 29 CFR 1910.120(e), including, but not limited to, initial 40-hour, 8-hour Supervisor and annual 8-hour refresher. All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity and review it with their Supervisor during their Daily Safety Huddle. All personnel performing work onsite must have received the site-specific orientation. Competent FA / CPR / AED responder will be onsite while all work is occurring at all times. STOP WORK AUTHORITY Right, Obligation and Responsibility Every single employee has the responsibility and the authority to STOP WORK at any time necessary to protect the safety or health of themselves, others, and the environment. Anyone can execute this responsibility without repercussions. We believe that the GOAL OF ZERO is possible with everyone's support and commitment.	Ongoing environmental condition inspection (weather, wind, heat, cold). Ongoing personnel inspection (buddy system). Inspection of work area for general hazards as covered under this AHA prior to beginning any task. Take 5 Card when appropriate. Get Out and Look (GOAL) Equipment inspection as necessary, recorded in field book. Calibrate PID daily, and fire extinguisher monthly.

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This is to acknowledge that I have had a chance to review a copy **AHA 017 Sampling-Processing** and have been trained on its contents. I understand a copy will be provided to me upon request. I will read and abide by all requirements of the aforementioned AHA and any additional rules and regulations of my job. I understand that working safely, complying with and obeying any and all Company safety rules, regulations or standards is a condition of my employment. Should I not comply with Company safety rules, regulations or standards, I am subject to disciplinary action including removal from the site and possible termination of employment.

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Activity/Work Task: Site Visit or Site Walk with Ticks and Bio Hazards	Overall Risk Assessment Code (RAC) (Use highest code): **M**
Project Location: East Station, Rochester NY	
Project Number: 453121	
Date Prepared: 1/27/2023	
Prepared by: Sara Weishaupt	
Reviewed by (Name/Title): Darrell Pruitt	
Employer / BU: Parsons / INF	

Risk Assessment Code (RAC) Matrix

Severity	Probability				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	**E**	**E**	**H**	**H**	**M**
Critical	**E**	**H**	**H**	**M**	**L**
Marginal		**M**	**M**	**L**	**L**
Negligible	**M**	**L**	**L**	**L**	**L**

Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above).
The RAC is developed after correctly identifying all of the hazards and fully implementing all controls.

	RAC Chart
"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.	
"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible	**E = Extremely High Risk** **H = High Risk**
Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.	**M = Moderate Risk** **L = Low Risk**

Notes: (Field Notes, Review Comments, etc.)
References:
PSHEP, ESHARP Manual. Workcare and CDC guidance, DASH Card

Workcare #: 1-888-449-7787

Place in your cell phone

Ticks **Bio hazards**	Biological Hazards (ticks, bees, mosquitoes, snakes, etc.)	▪ Personnel will be aware of potential exposure to biological hazards ▪ If feasible have the area pre-cleared with mechanical means (brush hog, etc) ▪ Wear appropriate clothing – long sleeves and pants with DEET based insect repellant applied to exposed skin. (Deet on the exposed skin, Permetherin on clothes) Use Tyvek taped at ankles and wrist if working in vegetation or high-risk areas. ▪ Wear Rynoskin under clothing in high risk areas ▪ Do a thorough buddy and self ick check throughout the day and before getting into vehicle. ▪ If you discover an embedded tick remove with tweezers as soon as feasible and save tick if possible. ▪ If a tick embeds report to your Supervisor and call Workcare # 1-888-449-7787 for guidance	S	Cr	M

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
PPE (Level D) - Long pants, safety glasses, hard hat (in presence of heavy equipment), high-visibility vest/clothing, steel-toed boots, gloves, goggles. Depending on environment at project site: blanket, sunscreen, cold/hot drink, extra clothing, traffic warning signage, cones, hi-vis markers, etc, fire extinguisher, insect repellent.	All personnel engaged in hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards shall receive appropriate training as required by 29 CFR 1910.120(e), including, but not limited to, initial 40-hour, 8-hour Supervisor and annual 8-hour refresher. Medical qualification, training and fit testing must be received on an annual basis for individuals that wear a respirator. If an individual wears a respirator more than 30 days per year, or they are exposed at or above the Permissible Exposure Limit (PEL) of a chemical for more than 30 days in a year, then they must participate in a Medical Surveillance Program as required by 29 CFR 1910.120(f). All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity and review it with their Supervisor during their Daily Safety Huddle. All personnel performing work onsite must have received the site-specific orientation. Competent FA / CPR / AED responder will be onsite while all work is occurring at all times. STOP WORK AUTHORITY Right, Obligation and Responsibility Every single employee has the responsibility and the authority to STOP WORK at any time necessary to protect the safety or health of themselves, others, and the environment. Anyone can execute this responsibility without repercussions. We believe that the GOAL OF ZERO is possible with everyone's support and commitment.	Ongoing environmental condition inspection (weather, wind, heat, cold). Ongoing personnel inspection (buddy system) Inspection of work area for general hazards as covered under this AHA prior to beginning any task. Take 5 Card when appropriate Equipment inspection as necessary, recorded in field book.

ACTIVITY HAZARDS ANALYSIS TRAINING ACKNOWLEDGEMENT AND SIGN OFF

Read Carefully Before Signing Below

This is to acknowledge that I have had a chance to review a copy **AHA 018 Site Visit or Site Walk with Ticks and Bio Hazards – Orphan Well** and have been trained on its contents. I understand a copy will be provided to me upon request. I will read and abide by all requirements of the aforementioned AHA and any additional rules and regulations of my job. I understand that working safely, complying with and obeying any and all Company safety rules, regulations or standards is a condition of my employment. Should I not comply with Company safety rules, regulations or standards, I am subject to disciplinary action including removal from the site and possible termination of employment.

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Work Activity/Task: Working near water or on boat on water	**Overall AHA Risk Assessment (Highest RAC)**					**M**
Project Location: East Station, Rochester NY	**Risk Matrix**					
Project Number: 453121	**Severity**	**Probability**				
Date Prepared: 1/27/2023		**Frequent (F)**	**Likely (L)**	**Occasional (O)**	**Seldom (S)**	**Unlikely (U)**
Prepared by (Name/Title): Sara Weishaupt	**Catastrophic (Ca)**	E	E	H	H	M
	Critical (Cr)	E	H	H	M	L
Reviewed by (Name/Title): Darrell Pruitt	**Marginal (Ma)**	H	M	M	L	L
	Negligible (Ne)	M	L	L	L	L

Employer / GBU: Parsons	**Step 1**	Assign a probability and severity code for each hazard identified, and a corresponding code after implementing controls.	**Risk Assessment Code (RAC)**
	Step 2	Assign a RAC using the risk matrix (E, H, M, or L) after implementing controls. Low Risk is the desired target, but Moderate Risk is acceptable. If the risk is High or Extremely High, then use different controls.	**E = Extremely High Risk (Unacceptable)**
Field Notes, Comments, References, etc.: PSHEP, ESHARP Manual, DASH Card	**Step 3**	Annotate the overall highest RAC and color at the top of AHA.	**H = High Risk (Unacceptable)**
	Probability is the likelihood to cause an incident, near miss, or accident and identified as: Frequent (F), Likely (L), Occasional (O), Seldom (S) or Unlikely (U).		**M = Moderate Risk (Acceptable)**
	Severity is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic (Ca), Critical (Cr), Marginal (Ma), or Negligible (Ne).		**L = Low Risk (Target)**

Job Steps (copy/paste more rows if necessary)	Hazards	Controls	P	S	RAC
Check weather	Heavy rain, snow, hail, high winds impeding safe work practices	Do not work in inclement weather. Reschedule in the case of heavy rains, snow, sleet, hail or high winds. Monitor conditions throughout the day and stop work as necessary.	O	Ne	**L**
Traffic / Driving to Site	Vehicle accident	Inspect vehicles prior to trip. Plan your route and make sure you are rested and focused on driving. Fall all posted speed limits and signs, drive defensively; keep 3 seconds of following distance. Avoid distractions, do not use cell phone or electronic device.	O	Ma	**M**

Job Steps (copy/paste more rows if necessary)	Hazards	Controls	P	S	RAC
Unloading Equipment and working within 3 feet fo the waters edge.	Slip, Trip, and Fall	Ensure the use of appropriate foot wear and keep shoe laces tied. Ensure that the area is free from waste/scrap material. Avoid muddy ground where possible. Plan your route and take the safest path, Do not talk on cell phone or look at documents while walking. Wear chest waders while near or over water, as necessary. If water enters wader, take off wader to remove water. Wear a life jacket while 3 ft from waters edge. Wear Mustang Survival suit when working from boat in winter when water and air temperature are 85 or below Maintain safe distance from edge of water when possible and be aware of edge of lake at all times. Always wear a life jacket while working on water. Freezing cold temperatures. Self and buddy monitor, where cold weather clothes, gloves and Mustang suit when working in boat. Have a warm break area and stay hydrated.	S	Ma	L
	Drowning	Always wear a life jacket while working on water. Ensure that rescue/ emergency procedures are in place. Always use buddy system while working on water and have a throwable rescue device with 90 feet of line readily available..	U	Ca	M
	Ergonomic/lifting injuries Pinch points	Ensure proper lifting techniques are used. Stand close to the load with feet spread to shoulder width apart, and bend at the knees to pick up heavy objects. Get a firm grip before lifting, and lift with your legs. Keep your hands out of hazard areas/pinch points, wear work glovles Use two person carries for large or heavy equipment such as boats. Plan your route and carrying method. Check area for hazards in the pathway to be used for carrying equipment prior to lifting or carrying.	O	Ma	M
Pushing boat or boats into the water	Slips, trips, and falls	Position boat to allow stable entrance from shore, and shove off, use a pole or paddle to push off and minimize need to stand in water.	S	Ma	L
Marking or surveying sample locations – working on just one boat	Pinch points	Push stake into soft sediment without hammer first to minimize hammering and ensure a more stable surface. Wear work gloves when using a stake and hammer	S	Ma	L
	Tip and fall from leaning over the edge of the boat	Two people should be in the boat, and the second person should be acting as a counterweight when one person is leaning over the water. Avoid over reaching and awkard postures. Work from knees and try to stay low to avoid falls.	S	Ma	L
	Hypothermia	Wear an exposure suit or dry suit when the combined air and water temperature is below 85 degrees	U	Ca	M
	Drowning	Always wear a USCG approved life jacket or exposure suit while working on water.	U	Ca	M

Job Steps (copy/paste more rows if necessary)	Hazards	Controls	P	S	RAC
Launching boats	Pinch points	Wear work gloves when attaching boats with clamps and rods. Be aware of hand placement and keep hands out of hazard areas. Plan the task and communicate among work crew.	S	Ma	L
	Slips, trips, and falls	Ensure the use of appropriate foot wear and keep shoe laces tied. Ensure that the area is free from waste/scrap material. Avoid muddy ground where possible. Plan your route and take the safest path, Do not talk on cell phone or look at documents while walking. Wear chest waders while near or over water, as necessary. If water enters wader, take off wader to remove water. Wear a life jacket while 3 ft from waters edge. Maintain safe distance from edge of water when possible and be aware of edge of lake at all times. Always wear a life jacket while working on water. Freezing temperatures. Wear Mustang survival suit when working from boats.	S	Ma	L
	Ergonomic/lifting injuries	Ensure proper lifting techniques are used. Stand close to the load with feet spread to shoulder width apart, and bend at the knees to pick up heavy objects. Get a firm grip before lifting, and lift with your legs. Use two person carries for large or heavy equipment such as boats. Plan your route and carrying method. Check area for hazards in the pathway to be used for carrying equipment prior to lifting or carrying.	O	Ma	M
Anchor/Tow line set up	Splash Hazards	Minimize throwing distance for sending rope to opposite shore. Wear gloves for throwing catching, and any on water work.	S	Ne	L
	Incompetent anchor points	Anchor first at the shore near the location of entering the water. From the potential boring location, row in a straight line to the opposite shore, and throw rope to a person on the shore. Choose adequate anchor points such as live trees and jersey barriers. Keep oars on boat as a back up method to move boat around.	U	Ne	L
	Tips and falls	Two people should be in the boat, and the second person should be acting as a counterweight when one person is leaning over the water. Avoid awkward postures and over reaching.	S	Ma	L
Working on boat to install casing, hand auger, drivable geoprobe (slide hammer) 2-3 ft samplers acetate liners	Injured from slapping branches	When the boat is ready to be put on the lake from the trailer prior start of probing activities, cut any branches and obstacle that are in the way.	S	Ma	L
	Pinch or crushed fingers	Wear leather gloves when getting the boat off the trailer and into the water Use handles on boat, and keep hands away from areas where boat contacts the trailer rails. Slide hammer	S	Ma	L
	Ergonomics/Exertion	Kneeling in the boat, minimize standing, if standing work toward center, maintain 3 points of contact while moving to a standing position, maker sure there is a plywood center between 2 boats Limit time while working on hand augering or slide hammer use. Work in short spurts, rotate high demand tasks, take breaks as needed.	S	M	L

Job Steps (copy/paste more rows if necessary)	Hazards	Controls	P	S	RAC
	Slip, Trip, and Fall	Ensure the use of appropriate foot wear and keep shoe laces tied. When working off the side of the boat communicate with buddy and have them off-set the weight on the other side of the boat. Keep boat equipment neat and in good order. Don't leave unnecessary equipment where it will be a tripping hazard. Ensure that the area is free from waste/ scrap material. Always wear a life jacket while working on water. Be aware of edge of boat at all times.	S	Ma	L
	Rods getting stuck	Use a pipe wrench to rotate, then hammer again			
	Hypothermia	Wear a exposure suit, dry suit, or insulated neoprene wet suit when the combined air and water temperature is below 85 degrees	U	Ca	M
	Drowning	Always wear a life jacket while working on water. Always use buddy system while working on water. Have a throwable rescue ring with line readily available and use the buddy system when working near water.	U	Ca	M
Handing off Samples	Slips trips, passing samples forward	Minimize trips (maximize samples , buddy system passing of samples, check clamps when on shore	U	Ca	M

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
Personal Protective Equipment.and boat USCG approved lifejacket or buoyant work vest or Mustang buoyant exposure suits waders if needed PPE (Level D) - Long pants, safety glasses, hard hat (in presence of heavy equipment), high-visibility vest/clothing, steel-toed boots, gloves, goggles. Depending on environment at project site: blanket, sunscreen, cold/hot drink, extra clothing, traffic warning signage, cones, hi-vis markers, etc, fire extinguisher, insect repellent.	All personnel engaged in hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards shall receive appropriate training as required by 29 CFR 1910.120(e), including, but not limited to, initial 40-hour, 8-hour Supervisor and annual 8-hour refresher. Medical qualification, training and fit-testing must be received on an annual basis for individuals that wear a respirator. If an individual wears a respirator more than 30 days per year, or they are exposed at or above the Permissible Exposure Limit (PEL) of a chemical for more than 30 days in a year, then they must participate in a Medical Surveillance Program as required by 29 CFR 1910.120(f). All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity and review it with their Supervisor during their Daily Safety Huddle. All personnel performing work onsite must have received the site specific orientation. Competent FA / CPR / AED responder will be onsite while all work is occurring at all times. STOP WORK AUTHORITY Right, Obligation and Responsibility Every single employee has the responsibility and the authority to STOP WORK at any time necessary to protect the safety or health of themselves, others, and the environment. Anyone can execute this responsibility without repercussions. We believe that the GOAL OF ZERO is possible with everyone's support and commitment.	PPE and boat to be inspected prio to and after each use Ongoing environmental condition inspection (weather, wind, heat, cold). Ongoing personnel inspection (buddy system) Inspection of work area for general hazards as covered under this AHA prior to beginning any task. Take 5 Card when appropriate Equipment inspection as necessary, recorded in field book.

ACTIVITY HAZARDS ANALYSIS TRAINING ACKNOWLEDGEMENT AND SIGN OFF

Read Carefully Before Signing Below

This is to acknowledge that I have had a chance to review a copy **AHA 019 Working Near Or On Boat On Water** and have been trained on its contents. I understand a copy will be provided to me upon request. I will read and abide by all requirements of the aforementioned AHA and any additional rules and regulations of my job. I understand that working safely, complying with and obeying any and all Company safety rules, regulations or standards is a condition of my employment. Should I not comply with Company safety rules, regulations or standards, I am subject to disciplinary action including removal from the site and possible termination of employment.

NAME	SIGNATURE	COMPANY	DATE	CRAFT	TRAINER	TRAINER SIGNATURE
1.						
2.						
3.						
4.						
5.						
6.						
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19.						
20.						

Attachment 4 Take 5 for Safety Checklist Form

Date: ______________________

Project/Task: ______________________

Your Name: ______________________

Before you begin any new task, pause for 5 minutes and ask yourself the following questions. Take corrective actions as necessary prior to beginning work.

☐ Do I know exactly what I am doing?
☐ Have I reviewed the AHA for this task?
☐ Do I have all the right people involved?
☐ Is there any potential that I or my coworkers could get hurt?
☐ Are there any questions I should be asking fellow employees?
☐ Should I talk to my supervisor?
☐ Have I read the work plan and fully understand the procedures relating to this job?
☐ Am I using the proper tools?
☐ Do I have the proper PPE?
☐ Will I be working as safely as I know how?
☐ Do I see anything that just doesn't look quite right?
☐ Am I in a hurry? Would I be safer if I slowed down?

You must honestly and completely answer "YES" to each of these questions before you begin your work. No task in Parsons is so important that you must jeopardize your safety. You can stop or pause any work activity if you need to.

Job Hazards? (List the hazards of the task and how you will be protected from them.)

1. Hazards: ______________________

   Protection: ______________________

2. Hazards: ______________________

   Protection: ______________________

3. Hazards: ______________________

   Protection: ______________________

Work Area	**Yes**	**No**
Work area clean?	☐	☐
Permits obtained?	☐	☐
Standard PPE being used *(hard hat, vest, eye protection, gloves, safety boots)?*	☐	☐
Any additional PPE needed? List it here and then go get it if you don't have it with you.		

Briefly review the hazards and protection again after taking a break.

Attachment 5 Training Matrix Sample Standard

	START	eSHARP	Site Specific Orientation (General S&H, IIPP)	Site HAZCOM Plan	Site Emergency Action Plan	PARSONS U - Select LMS Safety Modules	Safety and Health Trainer	PARSONS Fleet driver training	Gases, Vapors, Dusts & Mists	Barricades	Waste Disposal	Site Illumination & Requirements	Comressed Air	Batteries, Battery Charging Equipment	Hand and Power Tools	Stairways and Ladders	Compressed Gases and Cylinders	Radiation Exposure & Protection	Health Hazards in Construction	Struck By, Caught Between	Personal Protective Equipment	Fire Protection & Prevention (+Annual Extinguisher)	Assured Grounding & GFCIs	Noise Exposure	Gas & Arc Welding / Cutting	Lock Out Tag Out	Electrical Hazards in Construction	General Respiratory Protection	Confined Spaces & Permit System	Fall Protection	Scaffolding ①	Aerial Lifts ①	Cranes, Derricks, Hoists, Elevators, Conveyors	General Excavation Requirements	Excavations and Permit System ①	Line Breaking ①	Concrete & Masonary Construction ①	Underground Construction ①	Caissons ①	Cofferdams ①	Demolition ①	Steel Erection	Powered Industrial Truck and 3 Yr. Recertification ①	Certified Crane Operator and 5yr. Recertification ①	Critical Lifts and Permit System ①	Qualified Rigger I, II ①	Certified Signalperson ①	Site Specific Lock Out Tag Out Plan	Air Monitoring Equipment Specific ①	Arc Flash NFPA 70e and Arc Flash PPE	Working On or Near Water ①	Fall Protection Equipment Specific Training	Scaffolding Competent Person ①	Equipment Specific Aerial Lift Competent person ①	Competent Excavation Person ①	Fall Protection Competent Person ①	Steel Erection Competent Person ①	Concrete and Masonry Competent Person ①	Equipment Specific APR Training ①	Equipment Specific SAR, SCBA ①	Bloodborne Pathogens	Basic First Aid, CPR, AED	Certified First Responder	IS 100- Intro to Incident Command Systems (ICS)	IS 200 ICS for Single Resources and Initial Action Incidents	IS 700 National Incident Management System (NIMS)	HAZWOPER Supervisor	40 hr. HAZWOPER, 8hr. Annual Refresher	Technical Rescue (Confined Space, Excavation, Etc.)
ADMINISTRATIVE ASSISTANT																																																																					
CARPENTER APPRENTICE																																																																					
CARPENER JOURNEYMAN																																																																					
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PROJECT MANAGER, DEPUTY																																																																					
PROJECT MANAGER																																																																					
SURVEYOR - ROD/CHAIN TECHNICIAN																																																																					
SURVEYOR, EQUIPMENT TECHNICIAN																																																																					
SURVEYOR, PARTY CHIEF																																																																					
SAFETY SPECIALIST																																																																					
SAFETY SPC, SR.																																																																					
SAFETY MANAGER																																																																					
TEAMSTER, APPR																																																																					
TEAMSTER, JOURNEYMAN																																																																				
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ERT - TEAM MEMBER																																																																					
ERT - TEAM LEADER																																																																					
ERT - INCIDENT COMMANDER																																																																					

① Training is only required when it is applicable by order, regulation or standard to the tasks to be performed.

② Training is required when personnel are required to operate a Parsons Owned or Leased vehicle on public roadways

③ Training is only required when the response time or the capabilities of local responders is insufficient to address site specific hazards

Indicates a competent / qualified person is required to be designated with regard to the subject matter.

GREEN Indicates non-specialized training. This type of training is typically covered under OSHA outreach classes, i.e. OSHA 10hr. or 30hr. Construction Classes. May be completed onsite from Superintendant, Safety Manager. Must be completed prior to performing the relevant work.

YELLOW Indicates either employer, site or equipment specific training. Typically completed onsite or with the equipment to be utilized in the field.

BLUE indcates the employer responsibility to designate competent persons. Typically competent persons require additional or specialized training as well as employer or jobsite evaluation of competency.

GREY Indicates specialized training and qualifications or certifications related to heavy equipment, lifting or crane operations.

PINK Indicates specialized training typically for first responders. Requirements for training may be dependant upon job function, distance to medical facilities or capabilities of local (3rd party) responder staff.

Attachment 6 SHE Training Attendance Record

SH&E Training Attendance Record

Project:	Enter	Meeting Date:	Enter	Duration:	Enter
Training Course:	Enter	Meeting Host:	Enter		

Attendees

Name	Company	Responsibility	Employee ID #	Signature

Attachment 7 SHE Visitor Orientation Checklist

PARSONS

SH&E ORIENTATION CHECKLIST FOR VISITORS

The Orientator (Site Supervisor or designate) must review the following items with all visitors prior to entering the work site to ensure they are informed of site-specific safety, health and environmental requirements and safe working procedures. The following items should be checked yes if applicable. Additional items reviewed shall be noted on the back of this form. The Visitor(s) and Site Supervisor/Orientator will sign this form upon completion.

SITE / PROJECT NAME:

	ITEM	Yes	N/A
1	Review site map		
2	Review hospital location		
3	Review emergency response plan (ERP) including: · Location of muster point and exits · Location of first aid and fire extinguishers · Identify emergency signals used onsite		
4	Review emergency contact information (name and numbers)		
5	Does the visitor have all required PPE? · Hard hat, safety boots, safety glasses, long pants, gloves, high-visibility vest · Long sleeves (if required) · Hearing protection (if required)		
6	Review AHAs or hazards applicable to non-worker		
7	Has visitor signed into visitor log/AHA sign-in sheet?		
8	Specific hazards identified in working area of visitor?		
9	Does visitor understand 'proactive event' and incident reporting?		
10	Review WorkCare contact information in case of job injury/incident (if visitor is Parsons' staff)		
11	Does visitor understand Parsons' drug and alcohol policy?		
12	Does visitor have any allergies? **If yes**, list allergies: ___________________________		
13	Is the visitor "fit for duty"? Do they have any conditions that the supervisor may need to be aware of (e.g. bad knee, heart condition)? Note that this information is confidential, and the visitor may choose not to disclose.		
14	Does the visitor have any questions after reviewing this information?		

Orientator:	Date:
Site Visitor:	Date:
Site Visitor:	Date:
Site Visitor:	Date:
Site Visitor:	Date:

Attachment 8 Items to Discuss During Construction Mobilization Meeting

Date:	**Project/Location:**
Parsons Representative:	**Contractor Representative:**

The following project site safety, health, security, and environmental requirements, procedures, and hazards have been identified and reviewed with the contractor:

Mark with "X"	Item	Mark with "X"	Item	Mark with "X"	Item
☐	Air Pollution and Emissions	☐	Fall Protection, Guardrails, and/or Scaffolding	☐	Personal Protective Equipment
☐	Asbestos			☐	Process Safety Management (PSM)
☐	Buried Items	☐	Fire Protection		
☐	Competent / Qualified Person	☐	Hazardous Materials and Wastes	☐	Protected Ecological and Cultural Resources
☐	Confined Spaces (Permit / Non-Permit)	☐	Hot Work, Welding, and/or Cutting	☐	Resource Conservation and Sustainability
☐	Cranes / Hoists / Annual Inspection Certificate(s)	☐	Ladders	☐	Site Security, Visitor Control, and Public Exposure
☐	Demolition	☐	Lead Paint	☐	Specific Reports (Required by Environmental Regulation) on Toxic or Hazardous Chemicals Usage and Storage
☐	Drinking Water	☐	Lockout / Tagout		
☐	Electrical	☐	Management of Hazardous Materials and Hazardous Solid Wastes		
☐	Emergency Response to Spills and Releases			☐	SSHEP, Emergency Mgmt. and Response Plan
☐	Environmental Assessments	☐	Overhead Power Lines	☐	Wastewater Discharges
☐	Excavations and Trenches	☐	Permits (Excavations, Scaffolding, Demolition, Traffic, Confined Spaces, etc.)	☐	Vehicle and Heavy Equipment
				☐	Other:

Protection of the Public:

Additional Project Concerns:

Attendees:

Name	Title	Company

Attachment 9 Two-Week Look Ahead Form

PARSONS

SH&E Risk Mitigation 2-Week Look-Ahead Form

SH&E Plan for Week Ending:		**Subcontractor:**	
Project/ Location:		**Meeting Date:**	
Plan Prepared by:		**Dated:**	

Next Two Weeks Scope of Work:

Identified SH&E Risks/Exposures/Hazards Issues:

Identify Tasks requiring permitting (e.g., dewatering permit) or involving environmental regulatory issues (e.g., generation of new, uncharacterized waste):

_____

Tasks with environmental risk of significant spills or releases:

_____

Control Measures:

_____

Additional Activity Hazards Analysis Required:

_____

Subcontractors Mobilizing/Demobilizing:

_____

Audit/Inspections Scheduled:

_____

Competent Person Changes:

_____

Planned Orientation/Training:

_____

Recommendations/Comments/Concerns:

_____

Note: This information should be incorporated into the meeting minutes.

APPENDIX H AMERIPHYSICS U.S. NUCLEAR REGULATORY COMMISSION LICENSE AND CREDENTIALS

Tom Hansen, Jr., PhD, CHP, RRPT
President and Senior Health Physicist

AMERIPHYSICS

SUMMARY OF QUALIFICATIONS AND EXPERIENCE

Tom Hansen, Jr. is a results-oriented professional with a successful record of accomplishments in the nuclear decommissioning industry. His experience includes radiation health-physics, transportation, safety, and waste management with emphasis in executive level management and compliance. He possesses more than 30 years of nuclear field experience including 13 years involvement as the Corporate Radiation Safety Officer on radioactive material licenses authorized by the U.S. Nuclear Regulatory Commission and more than a dozen agreement states.

Dr. Hansen is the President of Ameriphysics, LLC - a U.S. Nuclear Regulatory Commission licensed decommissioning and waste management firm that he founded in 2008. He has personally planned, managed, or overseen radiological projects at more than 60 sites, most of which were surveyed and released according to the process described in the Multi-Agency Radiation Survey and Site Investigation Manual. He has authored more than 60 reports and other technical documents in areas pertaining to his expertise and has offered more than 80 presentations at national and international symposiums on topics relevant to the decommissioning process. He is widely regarded as an expert on decommissioning and waste management processes – a statement which is verifiable through expert status sponsored by the U.S. Department of Energy and U.S. Nuclear Regulatory Commission and granted by the International Atomic Energy Agency.

Dr. Hansen is also the Executive Director of the Southeast Interstate Low-Level Radioactive Waste Management Compact. As the Compact's chief executive, he collaborates with governor-appointed Commissioners from the member states of Alabama, Florida, Georgia, Mississippi, Tennessee, and Virginia to promote the safe and responsible management of the region's low-level radioactive waste. He implements the Compact's strategic plan, manages relationships with stakeholders including operators of the region's 24 commercial nuclear power plants, and makes a comprehensive annual report of the activities of the Commission during the preceding year.

EDUCATION, TRAINING, AND CERTIFICATIONS

- Doctor of Philosophy, Public Health Concentration, University of Tennessee, Knoxville
- Master of Health Physics, Oregon State University
- Bachelor of Science, Applied Science and Technology, Radiation Protection Major, Thomas Edison State College
- American Board of Health Physics Certified Health Physicist (CHP)

- National Registry of Radiation Protection Technologists (RRPT)
- Project Management Institute Project Management Professional (PMP)
- U.S. Navy Nuclear Power School, Nuclear Power Training Unit, and Machinist Mate “A” School
- Advanced Hazardous Materials Transportation and Packaging (49CFR172, Subpart H)
- HAZWOPER and HAZWOPER Supervisor (29CFR1910.120)
- Implementing the MARSSIM Survey Approach
- RESRAD Dose- and Risk-Modeling Codes Workshop (RESRAD, RESRAD-OFFSITE, and RESRAD-BUILD)
- Visual Sampling Plan Workshop

PROFESSIONAL ACCOMPLISHMENTS

Decontamination and Decommissioning

Recognized nationally and internationally as an expert in the field of decommissioning. Personally planned, managed, and/or overseen more than 60 decommissioning projects involving radioactive material. Managed a staff comprised of similarly qualified experts with decontamination and decommissioning experience at 13 nuclear reactors, 40 particle accelerators, 7 national laboratories, and a countless number of hospitals, universities, research and production facilities, and contaminated soil sites.

Remediated radiologically impacted buildings at 36 sites since 2011 using virtually every commercially available decontamination, hammering, and cutting technology. Experience remediating outdoor areas, including characterizing and removing soils impacted by uranium, thorium, radium, and other naturally occurring radionuclides at sites that handled ores, by activation products at reactor and accelerator facilities, and by tritium and other hard to detect radionuclides.

Corporate Radiation Safety

Administered radioactive materials licenses, directed environmental and occupational monitoring, managed personnel dosimetry programs, performed ALARA reviews, coordinated project pre-planning meetings, wrote job-specific radiation survey and safety plans, and worked with state regulators as necessary. Proficient with a variety of radiological counting systems, techniques, and technologies.

Provided a variety of professional health-physics services including radiological procedure writing, shielding calculations, dose modeling and assessment, licensing, and auditing. Served as a compliance resource for a variety of customers and facilities.

Project Management

Responsible for all facets of planning, organizing, and managing activities involving radioactive materials and other safety concerns. Provided managerial oversight during license terminations, environmental restoration projects, and cyclotron removals. Responsibilities included initiating and maintaining communications with regulatory agencies; writing comprehensive proposals, cost estimates, and work plans; and directing daily activities.

Radioactive and Hazardous Waste Management

Possesses a comprehensive understanding of hazardous material transportation and disposal regulations. Experience related to these regulations includes shipments to virtually every major waste processor and disposal facility. Routinely provided clients with counsel regarding the waste acceptance criteria of these organizations and works to incorporate packaging and transportation strategies consistent with their specific requirements. Has personally characterized and shipped more than 100 million pounds of radioactive material for disposal.

Papers and Public Presentations

Instructor with Argonne National Laboratory's Decommissioning of Nuclear Facilities course and International Atomic Energy Agency sponsored Decommissioning Skills Workshop. Presented dozens of papers at public and professional society meetings on a variety of topics including MARSSIM survey methodology, regulatory compliance, project management, waste management, and decommissioning case studies. Trained more than 1,000 regulators, managers, and field personnel from 24 countries on topics related to his expertise.

PROFESSIONAL ASSOCIATIONS

- Executive Director, Southeast Interstate Low-Level Radioactive Waste Compact Commission
- Board of Directors, Low-Level Radioactive Waste Forum (former Chairman)
- Chairman, ANSI/HPS N13.59 Working Group, *Characterization in Support of Decommissioning Using the Data Quality Objectives Process*
- Board of Directors and Exam Panel, National Registry of Radiation Protection Technologists
- Member, Nuclear Energy Agency Working Party on Technical, Environmental, and Safety Aspects of Decommissioning and Legacy Management (WPTES)
- Member & U.S. National Delegate, Nuclear Energy Agency Expert Group on Innovative Technologies and Techniques to Support Characterization and Decommissioning of Complex and Legacy Sites (EGTDC)
- Member, Interstate Technology Regulatory Council
- Member, Program Advisory Committee, Waste Management Symposia
- Member, Health Physics Society

- Member, East Tennessee Chapter of the Health Physics Society (Past-President)
- Part II Exam Panel, American Board of Health Physicists (previous - term ended 2018)

EMPLOYMENT HISTORY

- Ameriphysics, LLC, President, 2008 – Present
- Chase Environmental Group, Inc., General Manager and Corporate Radiation Safety Officer, 1998 - 2008
- US Ecology, Inc., Project Manager and Hazardous Materials Broker, 1996 - 1998
- Rust Federal Services (formerly Chem Nuclear), Radiation Health-Physics Technician and Assistant Hazardous Materials Broker, 1994-1996
- U.S. Navy, Nuclear Propulsion Plant Mechanical Operator, Submarines, 1986 – 1994

NRC FORM 374

Amendment No. 3
Corrected Copy

U.S. NUCLEAR REGULATORY COMMISSION

MATERIALS LICENSE

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974 (Public Law 93-438), and Title 10, Code of Federal Regulations, Chapter I, Parts 30, 31, 32, 33, 34, 35, 36, 37, 39, 40, 70 and 71, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s). This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations, and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

Licensee

1. Ameriphysics, LLC

2. 9111 Cross Park Drive
Suite D200
Knoxville, TN 37923

In accordance with letter dated January 31, 2022,

3. License No.: 41-35264-01 is amended in its entirety to read as follows:

4. Expiration Date: October 31, 2025

5. Docket No.: 030-38862
Reference No.:

6. Byproduct, source, and/or special nuclear material	7. Chemical and/or physical form	8. Maximum amount that licensee may possess at any one time under this license	9. Authorized use
A. Any byproduct material with Atomic Numbers 1 through 83	A. Any	A. 50 curies per radionuclide and 50 curies total	A. For receipt, storage, use and/or possession incident to the following activities: (1) Decontamination, decommissioning, and remediation of facilities and grounds, equipment, and containers; (2) Site characterization; (3)Packaging for transport; (4) Transport in packages or containers approved for use under the provisions of 10 CFR Part 71, for transfers to licensees authorized to receive the materials, in accordance with the terms and conditions of licenses issued by the NRC or Agreement States; and (5) Radiation Protection or health physics training and instruction.

MATERIALS LICENSE SUPPLEMENTARY SHEET	License No.: 41-35264-01	Docket or Reference No.: 030-38862
	Amendment No. 3 (Corrected Copy)	

6. Byproduct, source, and/or special nuclear material	7. Chemical and/or physical form	8. Maximum amount that licensee may possess at any one time under this license	9. Authorized use
B. Any byproduct material with Atomic Numbers 84 through 103	B. Any	B. 2 curies total	B. For receipt, storage, use and/or possession incident to the following activities: (1) Decontamination, decommissioning, and remediation of facilities and grounds, equipment, and containers; (2) Site characterization; (3)Packaging for transport; (4) Transport in packages or containers approved for use under the provisions of 10 CFR Part 71, for transfers to licensees authorized to receive the materials, in accordance with the terms and conditions of licenses issued by the NRC or Agreement States; and (5) Radiation Protection or health physics training and instruction.
C. Any Source Material	C. Any	C. 10000 kilograms total	C. For receipt, storage, use and/or possession incident to the following activities: (1) Decontamination, decommissioning, and remediation of facilities and grounds, equipment, and containers; (2) Site characterization; (3)Packaging for transport; (4) Transport in packages or containers approved for use under the provisions of 10 CFR Part 71, for transfers to licensees authorized to receive the materials, in accordance with the terms and conditions of licenses issued by the NRC or Agreement States; and (5) Radiation Protection or health physics training and instruction.

MATERIALS LICENSE SUPPLEMENTARY SHEET

License No.: 41-35264-01

Amendment No. 3 (Corrected Copy)

Docket or Reference No.: 030-38862

6. Byproduct, source, and/or special nuclear material	7. Chemical and/or physical form	8. Maximum amount that licensee may possess at any one time under this license	9. Authorized use
D. Any Special Nuclear Material	D. Any	D. 200 grams uranium 233, or 350 grams uranium 235, or 200 grams plutonium, or any combination of these provided the sum of the ratios does not exceed unity	D. For receipt, storage, use and/or possession incident to the following activities: (1) Decontamination, decommissioning, and remediation of facilities and grounds, equipment, and containers; (2) Site characterization; (3)Packaging for transport; (4) Transport in packages or containers approved for use under the provisions of 10 CFR Part 71, for transfers to licensees authorized to receive the materials, in accordance with the terms and conditions of licenses issued by the NRC or Agreement States; and (5) Radiation Protection or health physics training and instruction.

MATERIALS LICENSE SUPPLEMENTARY SHEET	License No.: 41-35264-01	Docket or Reference No.: 030-38862
	Amendment No. 3 (Corrected Copy)	

CONDITIONS

10. Licensed material may be used only at temporary job sites of the licensee anywhere in the United States where the U.S. Nuclear Regulatory Commission maintains jurisdiction for regulating the use of licensed material, including areas of exclusive Federal jurisdiction within Agreement States.

    If the jurisdiction status of a Federal facility within an Agreement State is unknown, the licensee should contact the Federal agency controlling the job site in question to determine whether the proposed job site is an area of exclusive Federal jurisdiction. Authorization for use of radioactive materials at job sites in Agreement States not under exclusive Federal jurisdiction shall be obtained from the appropriate state regulatory agency.

11. Licensed material shall be used by, or under the supervision of, Robert Hansen, and by individuals who have received the training described in the letter dated July 31, 2015. The licensee shall maintain records of individuals designated as users for 3 years following the last use of licensed material by the individual.

12. The Radiation Safety Officer for this license is Robert Hansen.

13. Except for calibration sources and reference standards, possession of licensed material at each temporary job site shall be limited to material originating from each site. This material must either be transferred to an authorized recipient or remain at the site after activities authorized by this license are completed.

14. This license does not authorize the use of licensed material at temporary job sites for uses already specifically authorized by the customer's license. If a customer also holds a license issued by the NRC or an Agreement State, the licensee shall establish a written agreement between the licensee and the customer specifying which licensed activities shall be performed under the customer's license and supervision, and which licensed activities shall be performed under the licensee's supervision pursuant to this license. The agreement shall include a commitment by the licensee and customer to ensure safety, and any commitments by the licensee to help the customer clean up the temporary job site if there is an accident. A copy of this agreement shall be included in the notification required by Condition 18.A. of this license.

MATERIALS LICENSE SUPPLEMENTARY SHEET	License No.: 41-35264-01	Docket or Reference No.: 030-38862
	Amendment No. 3 (Corrected Copy)	

15. Pursuant to 10 CFR Parts 30.11, 40.14, 70.14, and Conditions 10 and 13 of this license, the licensee is exempted from the requirements of 10 CFR Parts 30.35, 40.36 and 70.25 to establish decommissioning financial assurance.

16. Notwithstanding the requirement in 10 CFR Parts 30.32(i), 40.31(j), and 70.22(i), the licensee is not required to establish an emergency plan. Before taking possession of licensed material at a temporary job site in quantities requiring an emergency plan, the license shall either:

    (1) Obtain NRC approval of an evaluation demonstrating that an emergency plan is not required pursuant to 10 CFR Parts 30.32(i), 40.31(j), and 70.22(i); or

    (2) Submit written confirmation to the Regional Administrator, U.S. Nuclear Regulatory Commission, at the Region I Office, referenced in Appendix D of 10 CFR Part 20, that the licensee personnel have been trained and will follow the provisions of an existing emergency plan approved by the NRC or an Agreement State for the temporary job site.

17. If approved by the Radiation Safety Officer specifically identified in this license, the licensee may take reasonable action in an emergency that departs from conditions in this license when action is immediately needed to protect public health and safety and no action consistent with all license conditions that can provide adequate or equivalent protection is immediately apparent. The licensee shall notify the U.S. Nuclear Regulatory Commission before, if practicable, and in any case, immediately after taking such emergency action using reporting procedure specified in 10 CFR Part 30.50(c).

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18. A. At least 14 days before initiating activities at a temporary job site, the licensee shall notify, in writing, the Regional Administrator, U.S. Nuclear Regulatory Commission, at the Region I Office referenced in Appendix D of 10 CFR Part 20. The notification shall include the following information:

    (1) Estimated type, quantity, and physical/chemical form(s) of material;
    (2) Specification of site location;
    (3) Description of project activities including waste management and disposition;
    (4) Estimated project start date and duration; and
    (5) Identification of, and information on how to contact, key project personnel.

    B. Within 30 days of completing activities at each job site location, the licensee shall notify, in writing, to the Regional Administrator, U.S. Nuclear Regulatory Commission, at the Region I Office referenced in Appendix D of 10 CFR Part 20, of the temporary job site status and disposition of any licensed material used.

19. The licensee shall maintain records of information important to decommissioning each temporary job site at the applicable job site pursuant to 10 CFR Parts 30.35(g), 40.36(f), and 70.25(g). The records shall be made available to the customer upon request. At the completion of activities at a temporary job site, the licensee shall transfer these records to the customer for retention.

20. The licensee shall not use licensed material in or on human beings.

21. A. Sealed sources shall be tested for leakage and/or contamination at intervals not to exceed six months or at the intervals specified in the certificate of registration issued by the U.S. Nuclear Regulatory Commission under 10 CFR 32.210 or under equivalent regulations of an Agreement State.

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B. Notwithstanding Paragraph A of this Condition, sealed sources designed to primarily emit alpha particles shall be tested for leakage and/or contamination at intervals not to exceed 3 months.

C. In the absence of a certificate from a transferor indicating that a leak test has been made within the intervals specified in the certificate of registration issued by the U.S. Nuclear Regulatory Commission under 10 CFR 32.210 or under equivalent regulations of an Agreement State, prior to the transfer, a sealed source received from another person shall not be put into use until tested and the test results received.

D. Sealed sources need not be tested if they contain only hydrogen 3; or they contain only a radioactive gas; or the half-life of the isotope is 30 days or less; or they contain not more than 100 microcuries of beta- and/or gamma-emitting material or not more than 10 microcuries of alpha emitting material.

E. Sealed sources need not be tested if they are in storage and are not being used; however, when they are removed from storage for use or transferred to another person and have not been tested within the required leak test interval, they shall be tested before use or transfer. No sealed source shall be stored for a period of more than 10 years without being tested for leakage and/or contamination.

F. The leak test shall be capable of detecting the presence of 0.005 microcurie (185 becquerels) of radioactive material on the test sample. If the test reveals the presence of 0.005 microcurie (185 becquerels) or more of removable contamination, a report shall be filed with the U.S. Nuclear Regulatory Commission in accordance with 10 CFR 30.50(c)(2), and the source shall be removed immediately from service and decontaminated, repaired, or disposed of in accordance with Commission regulations.

G. Tests for leakage and/or contamination, limited to leak test sample collection, shall be performed by the licensee or by other persons specifically licensed by the U.S. Nuclear Regulatory Commission or an Agreement State to perform such services. The licensee is not authorized to perform the analysis; analysis of leak test samples must be performed by persons specifically licensed by U.S. Nuclear Regulatory Commission or an Agreement State to perform such services.

H. Records of leak test results shall be kept in units of microcuries and shall be maintained for 5 years.

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22. Sealed sources or detector cells containing licensed material shall not be opened or sources removed from source holders by the licensee.

23. The licensee shall conduct a physical inventory every six months, or at other intervals approved by the U.S. Nuclear Regulatory Commission, to account for all sources and/or devices received and possessed under the license. Records of inventories shall be maintained for 5 years from the date of each inventory and shall include the radionuclides, quantities, manufacturer's name and model numbers, and the date of the inventory.

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24. Except as specifically provided otherwise in this license, the licensee shall conduct its program in accordance with the statements, representations, and procedures contained in the documents, including any enclosures, listed below. The U.S. Nuclear Regulatory Commission's regulations shall govern unless the statements, representations, and procedures in the licensee's application and correspondence are more restrictive than the regulations.
    A. Letter dated July 31, 2015 (ML15231A610)
    B. Application dated October 16, 2015 (ML15307A250)
    C. Application dated February 8, 2016 (ML16048A394)

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Date: March 16, 2022

By: Elizabeth Ullrich Digitally signed by Elizabeth Ullrich Date: 2022.09.15 13:18:30 -04'00'

Elizabeth Ullrich
Region 1