FINAL WORK PLAN
REMEDIAL INVESTIGATION AND FEASIBILITY STUDY FOR TONAWANDA COKE SITE
SITE 108
3800 RIVER ROAD
TONAWANDA, NEW YORK

Prepared For:

Honeywell

115 Tabor Road
Morris Plains, NJ 09750

Prepared By:

PARSONS

301 Plainfield Road, Suite 330
Syracuse, New York 13212

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ACRONYM	Definition
BCP	Brownfield Cleanup Program
bml	below mudline
CAMP	Community Air Monitoring Plan
CPP	Community Participation Plan
CSM	Conceptual Site Model
DOT	Department of Transportation
FS	Feasibility Study
FSP	Field Sampling Plan
ft bgs	feet blow surface
GPS	Global Positioning System
HASP	Health and Safety Plan
HRS	Hazard Ranking System Score
IDW	Investigation Derived Waste
IRM	Interim Remedial Measure
IRMPP	Interim Remedial Measure Pilot Project
NAPL	non-aqueous phase liquid
NORM	naturally occurring radioactive material
NWI	National Wetlands Inventory
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PAH	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyls
PFAS	Per- and Polyfluoroalkyl Substances
PID	photoionization detector
POTW	Publicly Owner Treatment Works
PPE	personal protective equipment
QAPP	Quality Assurance Project Plan
QC	Quality Control
RI	Remedial Investigation
RIR	Remedial Investigation Report
RITC	Riverview Innovation & Technology Campus, Inc.
RQD	rock quality designation
SCG	Standards, Criteria, and Guidance
SCO	Soil Cleanup Objective
SGV	Sediment Guidance Value
SPDES	State Pollution Discharge Elimination System
SPLP	synthetic precipitation leaching procedure
SWPPP	Stormwater Pollution Prevention Plan
SVOC	semi-volatile compound
TAL	Target Analyte List
TCC	Tonawanda Coke Corporation
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure
TOC	Total Organic Carbon
USEPA	United States Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
VOC	volatile organic compound

1.0 INTRODUCTION

On behalf of Honeywell, Parsons has prepared this Work Plan to complete a Remedial Investigation (RI) and Feasibility Study (FS) for Site 108 of the Tonawanda Coke Site. Site 108 is a portion of the former Tonawanda Coke Corporation (TCC) facility (**Figure 1**) and is located at 3800 River Road in Tonawanda, Erie County, New York (**Figure 2**).

The TCC facility was an operating coke making and by-products facility for more than 100-years. The Coke making process involves the removal of gasses, liquids (oils) and tar from coal by heating the coal in the absence of oxygen. The resulting carbon material "coke" was used, among other things, in foundries and for the production of steel. The by-products were used in the process or sold for offsite use. TCC filed for bankruptcy protection in 2018 and all manufacturing on the property was ceased at that time. On September 23, 2019 the sale of the property to Riverview Innovation & Technology Campus, Inc. (RITC) was approved by the U.S. Bankruptcy Court. Legacy environmental conditions are being addressed under two separate New York State Department of Environmental Conservation (NYSDEC) programs:

Site 108, which is the subject of this Work Plan, and Sites 109 and 110 make up the Tonawanda Coke Site, listed in the Registry of Inactive Hazardous Waste Disposal Sites in New York State as Site Number 915055 with a Site Classification of 2 pursuant to ECL 27-1305. These three areas are being addressed under the New York State Superfund Program pursuant to the Order on Consent and Administrative Settlement (Index No. B9-85-2-77D) entered into between Honeywell International, Inc. (Honeywell) and the NYSDEC on February 24, 2020. The remainder of the former TCC facility at 3875 River Road is being addressed under the New York State Brownfields Cleanup Program (BCP) pursuant to BCP Agreement (Index No. C915353-02-20) between the NYSDEC and RITC dated February 14, 2020.The Focused RI/FS for Sites 109 and 110 is detailed in a separate Work Plan submitted to NYSDEC by Honeywell. The Focused RI/FS Work Plan was submitted separately and on an expedited schedule to align with the schedule for the portion of the site being addressed under the BCP.

1.1 RI/FS Program Objectives

In 2016, following completion of a RI/FS, TCC and NYSDEC entered into an Order on Consent and Administrative Settlement (Index # B9-85-02-77B) outlining the scope to finalize a FS for Site 108. Additional sampling was performed to allow completion of a FS. Based on the results of additional sampling, an Interim Remedial Measure Pilot Project (IRMPP) was enacted to investigate and remediate coal tar that was identified in isolated locations across the Site. Significant excavation and removal of subsurface coal tar was completed by TCC prior to their declaration of bankruptcy. Subsequent remedial action was completed by Honeywell, including demolition of three large aboveground coal tar storage tanks and removal of impacted soil, pursuant to the Administrative Settlement Agreement and Order on Consent for a Removal Action with the U.S. Environmental Protection Agency (USEPA), Index No. CERCLA-02-2019-2006, dated June 11, 2019.

The intent of the RI/FS activities, as specified in the February 2020 Order on Consent is to determine the nature and extent of the remaining conditions on Site 108 following previous remedial activities. This information will be used to verify the Conceptual Site Model (CSM) and evaluate various potential remedial alternatives, leading to the development of a recommended remedial alternative for Site 108. The RI/FS will include an investigation of off-site impacts including potentially impacted sediments in the Niagara River adjacent to Site 108.

1.2 RI/FS Work Plan Organization

This Work Plan is organized as follows:

- **Section 1** – Introduction: Describes the objectives of the RI/FS and the Work Plan organization.
- **Section 2** – Site Description and History: Provides a summary of relevant background information including site location and surrounding land use, topography, geology, surface water hydrology, wetlands and waterways, and geology. Background information provided in this section is used to inform proposed RI/FS activities.
- **Section 3** – Site Investigation History: Provides a summary of prior site investigations, including activities performed and summary reports prepared for Site 108. Data from previous investigations described in this section are used to inform proposed RI/FS activities.
- **Section 4** – Interim Remedial Measures (IRMs): Describes IRMs completed to date, including a description of contamination that may remain following the IRMs.
- **Section 5** – Initial Conceptual Site Model and Data Gaps: Introduces the initial CSM, which identifies potential sources of contamination, release mechanisms, exposure media, and exposure routes based on current and potential future site use. The CSM presented in this section is preliminary and will be refined based on data from the RI. This section also uses historical data and information to identify data gaps to be addressed in the RI/FS.
- **Section 6** – Remedial Investigation Scope of Work: Describes work to be performed during the RI for Site 108, including characterization of surface soil, subsurface soil, groundwater, surface water, and sediment. Additionally, this section references relevant documents such as the Quality Assurance Project Plan (QAPP), Health and Safety Plan (HASP), and Field Sampling Plan (FSP).
- **Section 7** – Investigation Derived Waste Management Plan: Defines expectations for handling and disposal of all investigation derived waste.
- **Section 8** – Remedial Investigation Report: Describes expectations for the Remedial Investigation Report, including data objectives, applicable standards, criteria, and guidance (SCGs), and proposed report contents.
- **Section 9** – Feasibility Study: Describes the tasks associated with the FS that will assess various remedial action alternatives.
- **Section 10** – Schedule: Outlines the proposed sequence and timing of RI/FS tasks through preparation and submittal of the FS Report.
- **Section 11** – References

1.3 Contacts

A Community Participation Plan (CPP) was approved by NYSDEC in April 2020 (NYSDEC 2020a). The CPP provides details on how information generated on behalf of Honeywell and the NYSDEC will be made available and how Honeywell and NYSDEC will inform and involve the public during the investigation and remediation of the Tonawanda Coke Site.

Key contact information for NYSDEC, New York State Department of Health (NYSDOH), Honeywell, and Parsons is provided below:

NYSDEC

Benjamin McPherson
Division of Environmental Remediation
270 Michigan Ave
Buffalo, NY 14203-2915
Benjamin.mcpherson@dec.ny.gov

Teresa Mucha, Esq.
Office of General Counsel
270 Michigan Ave
Buffalo, NY 14203-2915
Teresa.mucha@dec.ny.gov

NYSDOH

Angela Martin
Bureau of Environmental Exposure Investigation
Corning Tower, Room 1787
Albany, NY 12237
beei@health.ny.gov

Honeywell

Steve Coladonato
Remediation and Redevelopment Group
115 Tabor Road
Morris Plains, NJ 09750
Steven.Coladonato@honeywell.com

Parsons

Edward Glaza
301 Plainfield Road
Suite 350
Syracuse, NY 13212
edward.glaza@parsons.com

2.0 SITE DESCRIPTION AND HISTORY

2.1 Site Background

A metallurgical coke manufacturing and by-products plant was operated at the former Tonawanda Coke facility from 1917 through late 2018. The Buffalo Coke Plant was owned and operated from 1917 through 1947 by Semet-Solvay Company, which was a subsidiary of Allied Chemical and Dye Corporation. In 1947, Semet-Solvay Company was merged into Allied Chemical Corporation, which owned and operated the facility until January 27, 1978, when it was sold to TCC. TCC filed for bankruptcy protection in 2018 and all manufacturing on the property was idled. Between October 2018 and March 2020, the USEPA conducted emergency response activities to remove gases from pipes and tanks, treat wastewater, and manage stormwater. On September 23, 2019 the sale of the property to RITC was approved by the U.S. Bankruptcy Court. RITC purchased the Site in October 2019. The former main plant operational area at 3875 River Road, exclusive of Sites 108, 109 and 110 is the subject of a Brownfield clean-up project (**Figure 2**).

Manufacturing processes used at the plant included by-products coking, light oil distillation, ammonia recovery, and benzene, toluene, and xylene extraction. Allied Chemical was granted permission by the Erie County Health Department in 1973 to establish a new refuse disposal area at what is now Site 108. The area was subsequently filled with refuse, wood, scrap polyethylene, and ceramic saddle packing from refining equipment. The disposal of coke/coal, fly-ash cinders, and coal tar sludge has also been documented. Additionally, Site 108 formerly included a tank farm consisting of three large above ground storage tanks containing waste coal tar and standing water. These tanks were removed as part of a prior IRM. Coal tar excavations were also performed as part of the IRM.

Site 108 was also used for transferring coal and other materials between the Niagara River, where materials were delivered by boat, and the main plant facility via conveyor belts and pipes.

2.2 Site Location and Description

Site 108 of the Tonawanda Coke Site is a portion of the property at 3800 River Road and is located on the west side of River Road in the Town of Tonawanda, Erie County, New York. The former TCC Facility is approximately 0.25 miles west of Interstate 190 (**Figure 1**).

Site 108 occupies the property referenced by Tax Map/Parcel No.: 64.12-4-3 (**Figure 2**). It is an approximately 27-acre rectangular area oriented generally perpendicular to the Niagara River and the west side of River Road. Site 108 is located directly on the Niagara River. It currently contains a water pump station, substation, abandoned conveyor system, and other unused industrial structures. It is overgrown with shrubs and trees in many areas.

Sites 109 and 110, which comprise the remainder of the Tonawanda Coke Site, occupy about 12 acres of the property referenced by Tax Map/Parcel No.: 64.08-1-10, 65.05-2-1 and 65.05-2-2 at 3875 River Road, Tonawanda, NY 14150 (**Figure 2**). Site 109 is an approximately seven-acre rectangular area oriented perpendicular to the east side of River Road, in the southwestern corner of the former TCC Facility property. Site 110 is an approximately five-acre triangular area located in the northeast corner of the former TCC Facility property. Site 109 is approximately 0.3 miles from the Niagara River and Site 110 is approximately one mile from the river. The Focused RI/FS for Sites 109 and 110 is detailed in a separate Work Plan submitted to NYSDEC by Honeywell.

2.2.1 Land Use

Site 108 is currently zoned for industrial use. The surrounding area is a combination of commercial/industrial operations, a landfill, utility right-of-ways, and public water utilities. A residential neighborhood is located approximately 0.30 miles southeast of Site 108, off of River Road to the east. The Erie County Water Authority Van de Water Treatment Plant is located to the south. There are several sites subject to NYSDEC remedial programs in the vicinity. The Tonawanda Plastics site (#915003) is located to the southeast, Roblin Steel (#915056), River Road (#915031), and the Cherry Farm Niagara Mohawk inactive landfill (#915063), are all located to the north along River Road, the C.R. Huntley Fly Ash Landfill (Niagara Mohawk – Huntley Station (#915076)) is located to the northeast, and the C.R. Huntley Steam Station (part of which is in the BCP as the Huntley Power South Parcel (#C915337)) is to the south.

2.3 Topography

Site 108 is about 1,500 feet by 750 feet with an undulating surface in portions of it (**Figure 3**). The property is wider at the road and narrows slightly along the Niagara River. There are several mounds throughout the site, and topography locally dips slightly towards a drainage ditch, which runs northeast to southwest through the Site.

2.4 Geology

Shallow geology at Site 108 has been well characterized during prior site investigations. However, due to the lack of geographically widespread deep borings, the full stratigraphy above bedrock beneath Site 108 is not completely defined. Information from a geotechnical investigation at an industrial site just south of Site 108 provides a framework for considering the geologic conditions at Site 108. This investigation was performed by Goldberg Zoino Associates in 1983 at the C.R. Huntley Steam Station (Goldberg Zoino 1983). The site is located approximately 0.3 miles south of Site 108 and is also located between the Niagara River and River Road. At the Huntley site, a surficial fill unit is underlain by mixed alluvial deposits, which are complexly stratified both horizontally and vertically due to deposition by the Niagara River during multiple stages of development. These alluvial deposits primarily consist of fine sand, silty sand and silt. The deposit becomes thinner moving from west to east across the site. Underlying alluvial deposits on the east side of the site (closer to River Road), are mixed glacial deposits, which primarily consist of a red to brown silty clay. This unit ranges from a thickness of 24 ft adjacent to River Road to being absent adjacent to the river. Thinning of this clay layer towards the river is probably due to erosion by the Niagara River. The entire site is underlain by glacial till deposits, the gradation and thickness of which are highly variable due to several advances and retreats of the glacier. This deposit includes gravelly sands, sandy silts, clayey silts, and silty sands. It is approximately 15 ft thick on the east side of the site and thins to approximately 5 ft thick near the river. Underlying glacial till is bedrock, which consists of Camillus shale, a gray-green to gray-brown dolomitic thinly bedded shale. Rock quality designations (RQDs) indicate that the top of rock is thinly bedded and weathered (Goldberg-Zoino Associates 1983). Bedrock is at approximately 30 to 45 feet below ground surface (ft bgs) (Fluor Daniel GTI 1998).

At Site 108, monitoring well installation logs and test pits indicate similar geologic conditions to those encountered at Huntley Steam Station, though in less detail at depth. Fill material is the uppermost stratigraphic unit over Site 108, varying in thickness from 4 to 14 ft. In addition to various soils, the fill frequently includes silt, coal fines, hardened tar, slag, ash, coke, wood, concrete, plastic, glass, and metal. Underlying the fill on the eastern side of the site is a native glaciolacustrine deposit consisting of red-brown clay with some silt and gravel lenses. On the western portion of the site, adjacent to the Niagara River, fill is underlain by native gray alluvial sand with varying amounts of silt and clay. The boring log from installation of the deep well (MW18D-05) on the west side of the site identifies moist gravelly sands at around 30 ft bgs and auger refusal at approximately 42 ft bgs, indicating that glacial till (similar to what was observed on the Huntley Steam Site) is present at this depth below the alluvial unit.

2.5 Surface Water Hydrogeology

Surface water hydrology for Site 108 is considered within the context of the site stormwater management program, as detailed below.

Historically, at the time of the bankruptcy, the TCC facility discharged storm water to the Niagara River under State Pollution Discharge Elimination System (SPDES) Permit Number NY0002399 (NYSDEC 2017) through three outfalls[1]:

- **Outfall 001** (Located on Site 109)– Discharge of non-contact cooling water, boiler blowdown and stormwater runoff from the former production area after treatment in two concrete-lined settling/skimming ponds/lagoons located on Site 109.
- **Outfall 002**– Discharge of runoff from the coal and coke yards located on the 3875 River Road property.
- **Outfall 004** – Combined flow from Outfalls 001 and 002. Outfall 004 discharges to a drainage ditch on Site 109 on the east side of River Road where it combines with flows from other industrial properties north and south of Site 109. The combined flow is conveyed through a culvert under River Road, into a drainage ditch on Site 108, and finally to the Niagara River.

TCC turned their SPDES permit in after the bankruptcy and the USEPA assumed management of storm water controls on the BCP Site, Site 108, Site 109, and Site 110. The USEPA continued the program of monthly, quarterly and semi-annual monitoring in general accordance with the former requirements of TCC's SPDES permit through March 2020. Stormwater at the main plant, which is a source of water being discharged to the drainage ditch on Site 108, is currently being managed under RITC's Stormwater Pollution Prevention Plan (SWPPP) (Inventum 2020a), which was approved by NYSDEC in June 2020. The other sources of surface and stormwater contributing to the discharge north and south of Site 109 are not generated by or controlled by RITC.

The drainage ditch that is part of the stormwater management system runs along the southern border of Site 109 and receives surface flow from the BCP Site, Site 109, Site 110 and other properties north and south of the RITC properties. This ditch flows west and drains into the outfall on the east side of River Road, which diverts underneath the road into Site 108. This outfall flows into a ditch that traverses Site 108. Since TCC closure, contribution to the ditch is believed to be predominantly surface water, as process water is no longer being produced at the former TCC plant. It is not known if any of the other offsite properties produce flow other than stormwater. The ditch flows west across the site where it discharges into the Niagara River, which flows north from Lake Erie to Lake Ontario.

1 Outfall 003 was not in use at the time of the bankruptcy and there had been no flow from this outfall since 2008 (TCC 2016).

2.6 Wetlands

According to the U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI), there is a portion of a 1.74-acre Freshwater Emergent Wetland with a classification of PEM1B located on the east side of Site 108, parallel to River Road (**Figure 4**). The drainage ditch running from Site 109 through Site 108 is considered a 2.11-acre riverine habitat with a classification of R4SBC. According to the NYSDEC Environmental Resource Mapper, there are no State Regulated wetlands on or adjacent to Site 108.

2.7 Groundwater

Groundwater flow within the fill is towards the west to the Niagara River. A regional hydrogeologic investigation indicates that the glaciolacustrine clay deposit elsewhere in the area has geometric mean vertical and horizontal hydraulic conductivities of 4.17×10^{-7} and 5.25×10^{-7} cm/sec, respectively (NYSDEC 2007). These relatively low hydraulic conductivities indicate that this layer restricts vertical and horizontal groundwater flow, and that water within fill material is generally perched on top of this confining layer. However, some wells in the area screened entirely within the glaciolacustrine deposit contain water. This is attributed to desiccation cracks within the silty clay, which allow for vertical migration of groundwater from overlying fill. The geometric mean hydraulic conductivity of fractured soil elsewhere in the area is 9.34×10^{-6} cm/sec (NYSDEC 2007). Given the increased hydraulic conductivity in fractured soil, the glaciolacustrine deposit is primarily a confining layer, but allows for some vertical transport of groundwater in cracks.

On the west side of the site where alluvial sand is present beneath fill, these two layers form the uppermost water-bearing unit. The geometric mean horizontal hydraulic conductivity of alluvium from elsewhere in the area is 1.59×10^{-3} cm/sec, indicating that this unit is an aquifer with potential to produce relatively high yields of water (NYSDEC 2007). Groundwater in this area is expected to flow towards the Niagara River and is very shallow, typically occurring within 4 ft bgs.

Glacial till is expected to be present on top of bedrock throughout the site. Given the glaciolacustrine aquitard on the east side of the site, vertical groundwater flow is expected to be limited in this area, although may still occur in desiccation cracks, which could transport water vertically to the glacial till layer. On the west side of the site, the boring log from the deep well indicate the presence of till beneath alluvium, with saturated soil present directly above the till, which was moist. According to data collected elsewhere in the area, glacial till in the region has hydraulic conductivities ranging from 1.00×10^{-3} to 9.10×10^{-9} cm/sec (NYSDEC 2007). The extreme range in hydraulic conductivities is due to the highly heterogenous nature of till throughout the area and suggests that downward migration of groundwater from overlying layers, through till, and into weathered bedrock, may occur in some areas and be restricted in others. The specific hydraulic properties of glacial till beneath Site 108 have not been studied. Therefore, it is possible that shallow groundwater at Site 108 may be hydraulically connected to the bedrock aquifer, predominantly on the west side of the site where glaciolacustrine clay has been eroded and highly permeable alluvial sand extends down to till, however gradients would be expected to be horizontal toward the river rather than downward.

Based on regional hydrogeology, the thinly layered and fractured upper bedrock is water-bearing, with the potential for vertical migration of groundwater through overburden as discussed above. Bedrock groundwater generally flows to the Niagara River.

3.0 SITE INVESTIGATION HISTORY

Several major investigations and other sampling events have been conducted at the former Tonawanda Coke site, focusing primarily on the former disposal areas.

In July 1982 and May 1983, the United States Geological Survey (USGS) performed a study investigating toxic chemical entry into the Niagara River. The study consisted of sampling several inactive hazardous waste disposal sites within an approximately three-mile wide band along the Niagara River. As part of this program, USGS collected one groundwater sample, four soil samples, and one surface water sample from Site 108. Data from these samples were qualified as exceeding analytical holding times and having other quality control (QC) issues that may have compromised the data integrity.

Following the USGS investigation, several major investigations were performed at the Tonawanda Coke site. Investigation results from investigation activities taking place on Site 108 are presented in previously submitted reports and summarized in the table below:

Report	Activities Performed
Tonawanda Coke Corporation, New York State Superfund Phase I Summary Report, November 1983 prepared by Recra Research, Inc.	Reviewed existing data to calculate a USEPA Hazard Ranking System Score (HRS) to assess the relative threat associated with actual or potential release of hazardous substances from the site.
Phase II Site Investigation Tonawanda Coke Site, December 1986 prepared by Malcolm Pirnie, Inc.	• Installation of two overburden groundwater monitoring wells • Collection of four groundwater samples • Excavation of three test pits • Collection of eight surface water samples
Supplemental Site Investigation Tonawanda Coke Corporation, Tonawanda, New York, July 1990 prepared by Conestoga-Rovers & Associates	• Installation of one overburden groundwater monitoring well • Collection of five groundwater samples • Excavation of two test pits • Collection of one composite soil samples from the two test pits • Collection of five surface water samples • Collection of three sediment samples
Additional Site Investigation Tonawanda Coke Corporation, Tonawanda, New York, November 1992 prepared by Conestoga-Rovers & Associates	• Installation of one overburden groundwater monitoring well • Collection of three groundwater samples • Excavation of six test pits • Collection of two samples from the three test pits • Advancement of one borehole
Remedial Investigation Summary Report, Tonawanda Coke Corporation, Tonawanda, New York, May 1997 prepared by Conestoga-Rovers and Associates	• Summary of available information from the previous investigations pertaining to groundwater, surface water, soils, and sediments and discussed their significance regarding potential impacts to human health and the environment.

Report	Activities Performed
Final Supplemental Report Revision 1 and Feasibility Study, Tonawanda Coke Corporation, Tonawanda, New York, January 2008, prepared by Conestoga-Rovers and Associates	• Excavation of three test pits • Collection of three subsurface soil samples from test pits (one sample from each test pit location) • Collection of five surface soil samples • Installation of one groundwater monitoring well • Collection of sediment samples from three locations in the Niagara River
No separate report – Results detailed in Confirmation Investigation Report, by GHD, 2017	• Collection of sediment samples from 11 locations in the Niagara River
Confirmation Investigation Report, Site 108 – Tonawanda Coke Corporation, March 17, 2017, prepared by GHD	• Collection of 15 surface soil samples • Excavation of 15 test trenches • Collection of 14 subsurface soil samples from the test trenches • Collection of 24 sediment samples from the Niagara River embayment (eight sample locations with three sampling intervals at each) • Collection of 16 sediment samples from the drainage ditch (eight sample locations with two sampling intervals at each) • Inspection of above ground storage tanks located in the tank farm, and inspection and analysis of the contents of each tank (threee samples total) • Inspection of bermed areas around the tank farm and collection of three tar samples from within the berm • Excavation of 10 test pits (six outside the bermed area and four in an area of exposed coal/coke/breeze) • Collection of twelve subsurface soil samples from test pits (eight from outside the bermed area and four from the area of exposed coal/coke/breeze)

4.0 INTERIM REMEDIAL MEASURES (IRMs)

Several IRMs have been performed at Site 108 to address surface and subsurface tar, above-ground storage tanks, and general site maintenance. Locations of pertinent IRM activities are shown on **Figure 3**.

4.1 2017-2018 Tar Removal

Tar removal activities were performed by Nue-Velle on behalf of Tonawanda Coke Corporation from June 2017 to October 2018. Activities were performed in connection with the Tar Removal and Tank Demolition Phased Interim Remedial Measure Pilot Project Work Plan (IRM IRMPP) (GHD 2017). IRM tar removal activities involved excavation of six areas, which were identified as containing coal tar during previous investigations. Nue-Velle IRM activities were originally going to include removal of the three above ground storage tanks in the tank farm, but Tonawanda Coke Corporation halted all work at the Site prior to tank removal. Neu-Velle tar removal activities are summarized in *Site 108 Remediation Activities Summary Report (*Neu-Ville 2019*),* which is included as **Appendix A**. The *Site 108 Remediation Activities Summary Report* was not submitted to the Department for review and approval prior to it being finalized, and therefore the statements in this report have not been approved by the Department.

Per the Summary Report, tar was excavated, and excavations were deemed complete by the NYSDEC on-site representative when there was no longer visible tar. Excavations deemed complete by NYSDEC occurred at TP-4, B-6, B-6A, and B-6B. Residual tar remained after tar removal activities at TP-7 and SD-2. The depth of residual tar was marked by a layer of orange construction fencing during backfill. At Tank Farm 1 (T-1) secondary containment area, tar impacts were observed continuing below the tank foundation on the northeast side. With NYSDEC approval, these materials were temporarily left in place awaiting tank demolition and removal of tar impacts. Tar also remained at the secondary containment areas for Tanks 2 and 3, which were not addressed during the 2017-2018 IRM. Areas where the Summary Report identified remaining tar are presented on **Figure 6**.

Removed material was sorted on-site based on grain size to remove tar and other debris so that soil could potentially be re-used, pending the results of analytical sampling. Tar and debris were transferred to an on-site storage area for material separation or off-site disposal. Soil was stockpiled and sampled. Results from soil samples did not meet industrial soil cleanup objectives (SCOs). Therefore, the material was deemed unacceptable for reuse on-site. Work for the project was halted before these materials could be transferred elsewhere, so multiple soil stockpiles remained on-site after tar removal activities. A breeze pile was also generated during IRM activities. Regulatory determinations regarding the fate of the breeze pile were deferred until the final remedy for the site was selected, so the pile remains on-site.

To access SD-2 and TP-7 for tar removal, the drainage ditch that ran across the site was diverted. The new ditch was diverted to the northwest of the old ditch bank and is approximately 20 ft wide and 380 ft long. The diverted section is lined with imported clay and gravel. Steel sheet piling was installed along the south-eastern bank. This sheet piling was intended to be temporary but was left in place when work was stopped.

4.2 2018-2019 IRMs

During a site walk in 2018 performed by Parsons on behalf of Honeywell, several conditions were noted at the site. These conditions included:

- Holes in the bottom and sidewalls of Tank 3;
- Partial excavation, breaching, and disturbance of secondary containment berms;
- Several soil piles; and
- Pipes cut from Tank 2 laying inside the containment area, as well as a black material floating on the surface of water within this area.

To address these site conditions, several IRMs were completed by Parsons on behalf of Honeywell in 2018 and 2019, as summarized in *Interim Measures Construction Summary Report* (Parsons 2019). IRMs included:

- Berm repair and water management: Berm stabilization and repair was performed by raising the height of damaged berms around the tank farm using imported clay. After repairs, water level within the berms was monitored to ensure that a rise in water level due to precipitation would not cause water to overtop the berms.
- Soil pile erosion control: Existing soil piles were covered with plastic sheeting and secured with sandbags to prevent erosion. Filter socks were also installed downgradient of the soil piles to provide additional control of run-off from piles.
- Asbestos inspection: In anticipation of future removal, an asbestos inspection was conducted for pipe insulation and building material associated with the adjacent pump building. Pipe insulation and multiple building materials were confirmed to be asbestos containing.
- Access road repairs: Repairs were made to the site access road by placing gravel and grading low areas.

4.3 2019-2020 Tank Removal

From September 2019 to February 2020, three above-ground storage tanks, tank contents (tar and water) and associated piping were removed from Site 108 by Parsons on behalf of Honeywell. Tank removal and associated activities were completed in accordance with a Tank Removal Work Plan submitted in April 2019.

The bermed areas around the tanks were cleared of vegetation and water within them was pumped to an on-site treatment system prior to being discharged to the Town of Tonawanda Publicly Owned Treatment Works (POTW) sewer system. Standing water within tanks (from precipitation) was also treated on-site and discharged to the POTW sewer.

During tank demolition, tar was cleaned from the piping to the tanks. Asbestos was removed from the pipes by a certified asbestos contractor. The tops and walls of the steel tanks were cut down to allow access to the remaining contents. The steel pieces were decontaminated and sent off-site for recycling. Tar within the tanks was mixed with a stabilizer and disposed off-site. The remainder of the tank was then cleaned, cut up, and sent off-site for recycling. After tank cleaning and demolition, concrete tank pads were broken up and the concrete was sent off-site for disposal.

Pockets of tar were excavated from beneath the tank pads. Tar excavations were advanced down to native soil. Beneath Tank Pad 3, tar seams were present within cracks in the native material and within the excavation sidewalls. Given the presence of tar in native material and in the sidewalls of the Tank Pad 3 excavation, residual tar remains in this area. Additionally, tar was observed entering the excavation from the sidewalls at Tank Pad 2, indicating that tar remains in the subsurface at this location as well. Little evidence of residual tar was observed at the Tank Pad 1 excavation. Pockets of tar were also encountered within the berms. .

During tank removal mobilization, soil piles located in the southern portion of the site remaining from Nue-Ville's tar removal activities were shipped off-site for disposal. The EPA on-site representative inspected the soil pile removal area and requested removal of additional small pockets of tar. Additional areas were removed at EPA direction and disposed off-site.

5.0 INITIAL CONCEPTUAL SITE MODEL AND DATA GAPS

5.1 Conceptual Site Model (CSM)

An initial CSM has been developed for Site 108 based on data from previous investigations. The CSM defines potential sources of contamination, release mechanisms, exposure media, and exposure routes based on current and potential future land use. The CSM is preliminary and will be refined based on data collected in the RI. The initial CSM is illustrated in **Figure 5**.

Results from previous investigations indicate that various chemical constituents have impacted soil, groundwater, surface water, and sediment at the former Site 108. These environmental media could potentially serve as exposure media. The CSM presents a qualitative assessment of potential exposure via each medium for various types of receptors.

The source category of the initial CSM indicates potential sources of contamination originating from the former TCC facility. Contaminated soil/fill on Sites 108 have been identified as sources of contamination.

Contamination release mechanism refers to the process by which contamination could be transferred from source(s) to exposure media, which are environmental media with potential to be impacted by contamination. Contamination release mechanisms considered as part of the CSM are described below.

- Volatilization: volatile organic compounds (VOCs) from soil being released into air;
- Fugitive dust: mobilization of potentially contaminated surface dust via wind;
- Leaching: mobilization of contamination from soil via leaching of surface water through soil into groundwater; and
- Erosion/runoff: mobilization and transport of potentially contaminated surface water and sediment to waterways.

Potential exposure describes the mechanism (exposure route) that may expose receptors to contamination during current site use, which is defined as industrial, and potential future site use, which is anticipated to be passive recreational and/or commercial. Direct contact, ingestion, inhalation, and vapor intrusion/exposure are all exposure routes that could potentially impact receptors. Receptors under current site use are identified as site workers. Receptors under potential future site use are identified as site employees, site workers and passive recreational users.

5.2 Data Gaps

Based on historic data, Site 108 environmental media including surface soil, subsurface soil, groundwater, surface water, and sediment have been impacted from activities at Site 108. Analysis of historic data reveals the need for additional data to characterize current site conditions, as detailed below.

5.2.1 Surface Soil

A total of 20 surface soil samples have been collected at Site 108 during historic investigations. Samples collected in 2005 were analyzed for VOCs, semi-volatile organic compounds (SVOCs), metals, and cyanide.

Samples collected in 2016 were analyzed for VOCs, SVOCs, and metals. A subset of 2016 samples were also analyzed for pesticides, polychlorinated biphenyls (PCBs), and cyanide. The concentrations of nine SVOCs exceeded the NYSDEC industrial and/or commercial Soil Cleanup Objectives (SCOs) in those samples. SVOC exceedances occurred in 17 of 20 samples. Concentrations of five metals (arsenic, cadmium, lead, mercury, and nickel) exceeded industrial and/or commercial SCOs. Metals exceedances occurred in samples from five locations. Concentrations of VOCs, pesticides, PCBs, and cyanide were below industrial and commercial SCOs in all samples.

An above-ground pipeline exists along the northern boundary of the site, and there is the possibility for surface soil contamination from historic spills underneath this pipeline. Surface soils in this area have not previously been investigated.

In general, surface soil conditions have been well characterized during prior investigations. However, minor gaps in spatial coverage are present. Additional surface soil samples will be collected during the RI to characterize current surface soil conditions and support alternative development and evaluation during the FS.

5.2.2 Subsurface Soil

Over the course of several previous investigations, a total of 32 subsurface soil samples have been collected from Site 108 (in 1989, 1992, 2005, and 2016). Samples were collected from test pits/trenches and were typically analyzed for SVOCs, VOCs, metals, and cyanide. Select samples were analyzed for pesticides and PCBs. In total, 15 SVOCs exceeded industrial and/or commercial SCOs. SVOC exceedances occurred in 16 samples. A total of eight metals exceeded industrial and/or commercial SCOs and metals exceedances occurred in eight samples. Only one VOC (benzene) sample concentration exceeded the commercial SCO. No other VOCs have exceeded industrial/commercial SCOs in subsurface soil. The concentration of cyanide exceeded the commercial SCO in two samples. Sample concentrations for pesticide and PCB have been below the commercial and industrial SCOs. Figure 3 shows the locations of prior subsurface sample locations.

In general, subsurface soil has been well characterized given the geographic spread, depth, and sampling density of historic test pit locations. However, minor gaps in spatial coverage are present. Additionally, as discussed in Section 4, several IRMs have been completed to address coal tar and soil contamination. However, residual tar likely remains in the subsurface adjacent to the areas excavated by the prior removal IRMs. Additional data is needed to delineate the horizontal and vertical extent of residual tar in the subsurface and to characterize soil conditions in these areas.

5.2.3 Groundwater

Five monitoring wells were installed at Site 108 during previous investigations (Figure 7). All monitoring wells were installed in the fill layer, aside from MW18D-05, which was installed in the underlying alluvial sand. MW-6 was sampled four times, MW-7 was sampled six times, MW8-89 was sampled once, MW18-91 was sampled three times, and MW18D-05 was sampled once. In general, samples were analyzed for VOCs, SVOCs, metals, cyanide, and oil and grease.

Five VOCs were detected in exceedance of Class GA Standards/Guidance Values during historic investigations. Exceedances occurred in samples collected from MW8-89, MW18-91, and MW-7. Five metals were detected in exceedance of standards, and were limited to common metals (iron, magnesium, manganese, and sodium) plus beryllium. Metals exceedances occurred in samples collected from MW-7, MW-8-89, MW-18-91, and MW-18D-05. Cyanide was detected in exceedance of Class GA standards in samples collected from MW-6 and MW8-89. One SVOC (naphthalene) was detected in exceedance of the Class GA standard in the sample collected from

MW8-89. In the sample from MW18D-05, the well installed to characterize the deeper groundwater flow regime, the only exceedances were metals.

Wells at the site have not been sampled since 2005 and most of the wells are no longer available to be sampled. Only one sample has ever been collected from the deeper groundwater flow regime. Therefore, data gaps exist regarding current groundwater conditions at the site, especially the quality of deeper groundwater. To address data gaps, additional monitoring wells will be installed, and groundwater samples will be collected to characterize current groundwater conditions.

An additional data gap exists regarding the potential for preferential groundwater pathways around historic underground utilities. There is a water pipe that runs through Site 108, presumably east to west. However, the exact location of the pipe and direction that it is routed across the site is not known. It is possible that pipe bedding could create a preferential flow pathway for groundwater and thus groundwater contaminants. The pipe location, path through the site, and bedding material will be investigated during the RI to fill the data gap regarding this potential preferential flow pathway.

There is also potential for a preferential flow pathway within the former Rattlesnake Creek channel, which was a channel of the Niagara River that separated Rattlesnake Island from the main shore. The island and creek can be observed on historic topographic maps up until the early to mid-1900s, at which time the creek was reportedly filled. Based on historic topographic maps, the former creek passed through the eastern side of Site 108 (**Figure 3**). The potential exists for preferential groundwater flow through the former creek, depending on the nature of fill material. Eight test pits have been performed within the former creek during previous investigations. Observed fill material was consistent with that observed elsewhere throughout the site and did not appear to be highly permeable. However, historic test pits were mainly performed on the eastern side of the channel. During the RI, additional test pits will be performed within the former creek channel to provide improved geographic coverage of fill material data. Additionally, groundwater monitoring wells have not been installed within the former creek channel to determine the potential impact of channel fill on groundwater quality and flow characteristics. To address this data gap, a monitoring well will be installed within the former creek.

Lastly, the relationship between groundwater and surface water, including the on-site drainage ditch, ponded areas, and the Niagara River, is not known. Data regarding groundwater and surface water elevations will be collected during the RI to better characterize groundwater-surface water interactions.

5.2.4 Surface Water

During previous investigations, ten surface water samples were collected from six locations on Site 108 and analyzed for various combinations of VOCs, SVOCs, cyanide, metals, oil and grease, and hexavalent chromium. Five metals, four VOCs, and cyanide concentrations exceeded the Class C Water Quality Standards and/or Guidance Values. Where Class C Standards/Guidance Values were not established, data were compared to Class A Standards/Guidance Values. Exceedances of Class C and/or Class A occurred at five sampling locations. Surface water sampling data from one location (SW-7) was not available for review in any previous reports.

Surface water coming into Site 108 consists of flow through a drainage ditch which is directed to Site 108 through a culvert under River Road. Surface water flowing through this culvert originates within the former Tonawanda Coke stormwater conveyance system. Historically, surface water received by the Site 108 drainage ditch was both storm water and process water from the Tonawanda Coke Plant. Previous investigations sampled upstream locations and determined that elevated concentrations at Site 108 were due to input from the Tonawanda Coke Plant and other off-site sources, and did not originate at Site 108 (CRA 1997). Since the closure of the plant, the Site 108 drainage ditch still receives storm water runoff from the Tonawanda Coke Facility, but no longer receives process water. Surface water at Site 108 has not been sampled since plant closure, and therefore, the current characteristics of any contribution from Site 108 to surface water quality represents a data gap that will be addressed during the RI.

5.2.5 Wetland Characterization

Sediment samples have not previously been collected from the Freshwater Emergent Wetland located on Site 108. Furthermore, the exact boundary of the wetland is not known because wetland delineations were not conducted during historic investigations. Therefore, there is a data gap regarding the exact boundaries of the wetland as well as the extent to which wetland sediment has been impacted. if at all. Data will be collected during the RI to address these gaps.

5.2.6 Drainage Ditch

5.2.6.1 Drainage Ditch Sediment

Nineteen sediment samples have been collected from the drainage ditch that runs through Site 108 during previous investigations in 1989 and 2016. Three samples were collected from three locations in 1989 and analyzed for VOCs, SVOCs, cyanide, hexavalent chromium and oil & grease. These samples were collected prior to the 2017-2018 IRM to evaluate surface water exceedances at SW-6; therefore, sediment was collected at SW-6 and from one upgradient (off-site) and one downgradient location. Six SVOCs at SW-6 exceeded NYSDEC Class A Sediment Guidance Values (SGVs). No other analytes exceeded SGVs during this sampling event.

Sixteen samples were collected during a 2016 sampling event and analyzed for SVOCs, metals, and Total Organic Carbon (TOC). Two samples were also analyzed for pesticides, PCBs, VOCs, and cyanide, none of which exceeded Class A SGVs in analytical results. Several metals exceeded Class A and Class C SGVs. Metals exceedances occurred in all sixteen samples. Several individual PAHs exceeded Class A SGVs at nearly all depth intervals at all locations. SD-7 was the only location without any individual PAH exceeding SGVs, and SD-8 only had exceedances in the uppermost depth interval. Total PAH concentrations exceeded SGVs at both depth intervals from every sampled location, with those exceedances being above Class C SGVs for all samples except for the 1-1.5 ft depth interval of SD-7.

Sediment samples collected during previous investigations were collected to a maximum depth of 1.5 ft bgs, and exceedances of SGVs were pervasive throughout nearly all collected samples. A data gap exists regarding the quality of deeper ditch sediment/soils. This data gap will be addressed during the RI by additional collection of sediment samples from the drainage ditch.

5.2.6.2 Drainage Ditch Conditions

A reconnaissance of the drainage ditch was performed by NYSDEC's Fish and Wildlife Group on January 26, 2011. The inspection, as detailed in the Confirmation Investigation Report (GHD 2017), concluded that the volume of flow through the ditch was substantial. However, the majority of flow through the ditch at that time was cooling water discharged from the TCC facility. The TCC facility is no longer in operation and is thus no longer discharging cooling water to the ditch. A reconnaissance has not been performed on the ditch since closure of the former TCC facility. The reconnaissance also concluded that the ditch serves as a substantial habitat with a variety of vegetation and an abundance of logs and branches to create a very attractive setting for wildlife. Evidence of a wide variety of wildlife was noted along the ditch including beavers, otters, blue heron, ducks, mice, mink, and rabbits. Given that a ditch reconnaissance has not been performed since closure of the former TCC plant and rerouting of the drainage ditch during IRMs, the current condition of the ditch and its suitability as a habitat and ecological resource will be evaluated during the RI.

5.2.7 Niagara River

5.2.7.1 Niagara River Sediment

A total of 55 sediment samples have been collected from the embayment in the Niagara River adjacent to the on-site drainage ditch outfall. This area receives flow from the drainage ditch and the industrial property south of the site. Beyond the limits of this embayment, the river velocity is expected to be too high to allow for sediment deposit and accumulation.

Four sediment samples, for which data are available, were collected near the drainage ditch outfall in 1993. Samples were analyzed for VOCs, SVOCs, and cyanide. There were no exceedances for VOCs. All four samples had exceedances of Class A and Class C SGVs for individual PAHs. All four samples also exceeded the Class C SGV for total PAHs.

In 2005, three samples were collected from three locations (one near the outfall and two further upstream) and analyzed for SVOCs. Seven SVOCs at the location closest to the outfall exceeded Class A SGVs. Total PAHs at that same location exceeded Class C SGVs. There were no exceedances at the other two locations.

During a 2009 sediment investigation, 24 samples were collected from various depth intervals at 11 locations and analyzed for SVOCs. Concentrations for most samples exceeded Class A SGVs for individual PAHs. Total polycyclic aromatic hydrocarbons (PAH) concentrations exceeded the SGV in 21 out of 41 samples, with total PAH concentrations exceeding the Class A SGV in six samples and the Class C SGV in 15 samples.

In 2016, 24 sediment samples were collected from eight locations with three sampling depth intervals per location. Samples were analyzed for SVOCs, metals, and TOC. A subset was also analyzed for pesticides, PCBs, VOCs, and cyanide. There were no exceedances of Class A SGVs for PCBs, pesticides, and cyanide. Several metals including silver, lead, and zinc exceeded Class C SGVs. These exceedances occurred at three locations. One VOC (toluene) exceeded Class A SGVs in one sample. Several individual PAHs exceeded Class A SGVs. Total PAHs exceeded the Class A SGV in 12 samples and Class C SGV in eight samples.

Data from previous investigations indicates that highest contaminant concentrations were from sampling locations closer to the outfall of the drainage ditch. The extent of potential impact in Niagara River sediments is a data gap for the following reasons: the extent of contamination in embayment sediments has not been defined vertically and laterally; the boundary between fine-grained depositional sediments and coarse-grained river channel sediments that would be unaffected by sediment deposition from Site 108 has not been defined, and; no sediment samples have been collected outside of the embayment.

During the RI, sediment samples will be collected over a wider area and from deeper depth intervals to address these data gaps. Sediment data collected during the RI will be used to assist with analysis of potential impacts and if necessary remedial alternatives in the FS.

5.2.7.2 Niagara River Shoreline Conditions

During historic operations at the former TCC facility, materials were transferred to and from the property via boats on the Niagara River. This exchange was done along the Site 108 shoreline. The presence and condition of remaining infrastructure from these operations (i.e., bulkheads, sheet piling, etc.) is largely unknown. Soil samples have never been collected from the portion of the shoreline, which is exposed above water, so the extent of contamination, if any, in shoreline soil is unknown. The soil characteristics present data gaps that will be addressed during the RI to assist with analysis of potential impacts and if necessary remedial alternatives in the FS.

5.2.8 Breeze Stockpile

During the tar removal IRM completed by Nue-Ville, a layer of breeze was excavated from the surface to facilitate removal of subsurface tar. Breeze was stockpiled on-site for future use as backfill, upon approval from NYSDEC. One composite sample was collected to characterize the breeze for future on-site reuse. The sample was analyzed for TCV VOCs, TCL SVOCs, PCBs, pesticides, herbicides, and metals. Based on analytical results, one PAH (indeno(1,2,3-cd)pyrene) exceeded the commercial SCO and two PAHs (benzo(a)pyrene and benzo(b)fluoranthene) exceeded commercial and industrial SCOs. One metal (mercury) exceeded the commercial SCO and one metal (arsenic) exceeded commercial and industrial SCOs. Results did not exceed commercial or industrial SCOs for VOCs, PCBs, pesticides, or herbicides. When work was stopped at the site during the tar removal IRM, the breeze stockpile remained and has been inspected during subsequent visits. The current location of the breeze pile is shown in **Figure 3**. Based on topographic survey data, the estimated volume of the breeze stockpile is approximately 10,000 yd^3. Additional sampling of the stockpile will be performed during the RI to verify the results of Nue-Ville sampling and characterize the pile for future onsite beneficial reuse and other management options.

6.0 REMEDIAL INVESTIGATION SCOPE OF WORK

The RI will be conducted in accordance with NYSDEC's "DER-10 - Technical Guidance for Site Investigation and Remediation", the project Field Sampling Plan (**Appendix B**), Quality Assurance Project Plan (which includes data quality objectives and criteria, data acquisition, data management, analytical procedures, quality control measures, data validation, and assessment and oversight details, provided as **Appendix C**), Health and Safety Plan (**Appendix D**) and Community Air Monitoring Plan (CAMP) (**Appendix E**). The CAMP will be implemented during all ground intrusive activities to provide protection for the downwind community (i.e., off-site receptors) from potential airborne contaminant releases as a direct result of investigative activities. The CAMP requires continuous monitoring for VOCs and particulate matter and establishes action level concentrations and responses to action levels.

As discussed in **Section 5**, in some portions of Site 108, surface and subsurface concentrations have been shown to exceed industrial and commercial SCOs. Although significant data has been gathered regarding contaminant levels in surface and subsurface soils and fill, data gaps have been identified. There are insufficient groundwater data to adequately assess groundwater quality. Sediment concentrations exceed SGVs from both on-site and in Niagara River sediment samples, but the vertical and horizontal extent of sediment contamination has not been adequately delineated. The scope of the RI at Site 108 has been designed to fill the data gaps identified in **Section 5**. The scope includes a surface and subsurface soil investigation, a groundwater quality and preferential flow pathway investigation, a wetland assessment, an investigation of the on-site drainage ditch, an investigation of the Niagara River embayment and shoreline, and additional sampling of the breeze stockpile.

6.1 Surface and Subsurface Soil Investigation

6.1.1 Test Pit and Soil Boring Installation and Sampling

To address surface and subsurface soil data gaps, a series of test pits and soil borings will be installed throughout Site 108, as shown on **Figure 6**. The purpose of most of the subsurface soil investigation locations is to determine the extent of subsurface tar remaining after IRMs via visual observations, as well as to characterize subsurface soil proximate to any remaining tar. This will be achieved by excavating test pits adjacent to previous excavation and removal areas completed during IRMs (TP-18-2020 through TP-27-2020). In the area along the abandoned portion of the drainage ditch, where the shallow water table prohibits subsurface observations and sampling via test pitting, subsurface soil conditions will be addressed via installation of three boreholes. The remaining four subsurface soil investigation locations (TP-16-2020, TP-17-2020, TP-28-2020, and TP-29-2020) will be excavated via test pitting to address the physical and chemical nature of subsurface fill/soil in these portions of the site, which have not been thoroughly characterized during previous investigations. TP-28-2020 and TP-29-2020 are being installed specifically to address data gaps regarding the nature of fill within the former Rattlesnake Creek.

The areas to be investigated using test pits are shown by the lines on **Figure 6**. Prior to test pitting, a private utility locating company will mark out utilities in the vicinity of proposed test pits. Test pits will be excavated to the top of the native soil layer, anticipated to be four to ten feet below ground surface. As the test pits are excavated, the soil and fill materials will be visually assessed, photographed, screened with a Photoionization Detector (PID) and observations will be documented in a field log. Test pits will be excavated until native soil is encountered. If native soil shows signs of contamination such as staining, odor, or elevated PID readings, excavation will continue until soil appears free of signs of contamination for at least 2 feet. Once the native soil layer has been identified or native soil appears free of significant contamination, the test pit will be backfilled by replacing the materials in the reverse order in which they were removed. Care will be taken to not leave significant amounts of subsurface fill on the ground surface.

The lines on **Figure 6** are not intended to represent continuous trenches, but rather general areas where test pits will be excavated. The actual test pit locations will be determined in the field in consultation with NYSDEC. Multiple test pits may be excavated in an area, if necessary, to provide confidence that the extent of remaining tar has been identified and/or that subsurface materials have been adequately characterized.

Soil borings will be advanced as shown on **Figure 6**. Soil borings will be drilled using direct-push methods, or similar, and will be installed to the top of native material. As soil borings are advanced, soil and fill materials will be visually assessed, photographed, screened with a PID, and observations will be documented in a field log. Borings will be backfilled with soil cuttings.

Analytical samples will be collected at each test pit and at one of the three soil boring locations. Surface soil samples will be collected from 0 to 2 inches and 2 to 12 inches below grade. An additional sample will be collected in the 1-ft interval beneath tar, if present. If tar is not present, a sample will be collected from elsewhere in the test pit/boring that exhibits staining, odor, or elevated PID readings. If signs of contamination are present in native soil, a sample will be collected from each depth exhibiting staining, odor, or elevated PID readings. Samples of native soil exhibiting signs of contamination will be collected in intervals based on the thickness of apparent contamination, with a maximum sampling interval of 1-ft. A sample will also be collected in the 1-ft interval below the deepest identified sign of contamination. If test pit depth does not allow for collection of deeper samples, the deeper samples may be collected adjacent to the test pit using a drill rig. Samples from most locations will be analyzed for SVOCs and TOC. A subset of sampling locations (TP-16-2020, TP-17-2020, TP-18-2020, and TP-26-2020) will be analyzed for the full suite of analyses, including Target Compound List (TCL) VOCs, SVOCs, pesticide/PCBs, Target Analyte List (TAL) metals, cyanide, and per- and polyfluoroalkyl substances (PFAS). PFAS sampling and analysis will follow guidance provided in NYSDEC's "Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs" (NYSDEC 2020b).

It is possible that naturally occurring radioactive material (NORM) may be present in slag that is present within the fill at the Site. An approved radiological contractor will be available if needed during test pitting and soil boring installation. If slag is visually identified, material will be screened to determine if sampling and laboratory analysis for NORM is necessary.

The locations and elevations of the ground surface at test pits and soil borings will be surveyed and incorporated into the site geographic database.

6.1.2 Pipeline Surface Soil Inspection

Surface soil beneath the above-ground pipeline that runs along the northern side of the site will be inspected to determine if there is visual evidence of historic leaks that may have impacted surface soil. If visual evidence is identified, representative samples will be collected from the 0 to 2-inch and 2- to 12-inch intervals and analyzed for TCL VOCs, SVOCs, pesticide/PCBs, TAL metals, and cyanide. Visual evidence includes surficial tar, staining, sheen, discoloration, etc. Evidence of asbestos containing material that may have fallen from the pipeline will also be documented and sampled in a representative fashion in consultation with NYSDEC. Documentation will include detailed field notes, photos, and GPS coordinates.

6.2 Groundwater Investigation

6.2.1 Groundwater Monitoring Well Installation and Sampling

Eight to nine groundwater monitoring wells will be installed at Site 108 as shown on **Figure 7** to assess groundwater quality within the overburden aquifer. Three wells (MW-9-2020, MW-10-2020, and MW-13-2020) will have screens located within the fill layer. The other wells will be installed in pairs at three locations (including the MW18-91/MW18D-05 location discussed below) along the Niagara River where alluvial sand underlies the fill layer, with one well from each pair screened in fill and the other screened at the bottom of alluvium. This will allow for characterization of groundwater within the upper and lower portions of the water-bearing zone.

There is currently a well in the western portion of the site, but it is unknown if this well is MW18-91 or MW18D-05. The current condition of the well, including its viability for sampling, is not known. This well will be inspected and the total well depth will be measured. If the well is suitable for sampling, one additional well will be installed adjacent to it (either shallow or deep, depending on if the existing well is determined to be shallow or deep). If the well is not suitable for sampling, a new well pair will be installed at this location. The maximum count of nine wells to be installed as discussed above is inclusive of replacing both wells at this location. If the existing well is suitable for sampling, the total number of wells to be installed may drop to eight.

Prior to drilling, a private utility locating company will mark out utilities in the vicinity of proposed monitoring well locations. The new well borings will be drilled using a drilling rig and hollow stem augers. During drilling, soil and fill materials will be visually assessed, photographed, screened with a PID, and documented in a field log. At the three inland well borings and at one well boring for each paired well location, a series of soil/fill samples will be collected for chemical analysis. Soil samples will be collected at 0 to 2 inches and 2 to 12 inches below grade. An additional sample will be collected in the 1-foot interval beneath tar, if present. If tar is not present, a sample will be collected from elsewhere in the test pit/boring that exhibits signs of contamination (i.e. staining, elevated PID reading, etc.). All samples will be analyzed for SVOCs and TOC. Samples from a subset of locations (MW-10-2020 and MW-11S-2020) will be analyzed for the full suite of analyses including TCL VOCs, SVOCs, and pesticide/PCBs, TAL metals, cyanide, and PFAS.

Where the clay layer is present (anticipated to be at the three inland wells, (MW-9-2020, MW-10-2020, and MW-13-2020), well screens will be installed on top of the clay layer, within the fill. This is estimated to be approximately 6 ft bgs,12 ft bgs, and 8 ft bgs at MW-9-2020, MW-10-2020 and MW-13-2020, respectively. For installation of the shallow well at paired well locations, well screens will be installed within fill and/or alluvial sand, so that the well is screened above and below the water table, which is estimated to be at approximately 4 ft bgs. For installation of the deeper well at paired well locations, well screens will be installed entirely in the alluvial sand layer, at the base of the water-bearing zone, which is estimated to be at approximately 40 ft bgs. Depending on the thickness of the saturated zone, 5- or 10-ft well screens will be chosen in the field to provide the most effective coverage of the saturated zone, while isolating the top (in the case of shallow wells) and bottom (in the case of deep wells) of the saturated zone. If necessary, a sump may be added to the bottom of the well to allow the well to be drilled deeper. Exact well design will be based on the conditions present, including the depth to the water table and thickness of fill.

The new monitoring wells will be surveyed to determine the horizontal locations and vertical elevations. Water level measurements will be taken over several dates to determine the groundwater flow direction.

Each of the nine wells will be sampled and analyzed for TCL VOCs, SVOCs, and pesticide/PCBs, TAL metals, and cyanide. The six shallow wells will also be sampled for PFAS and 1,4-dioxane.

6.2.2 Assessment of Potential Preferential Flow Pathways

An additional data gap regarding groundwater is the possibility of a preferential groundwater flow pathway along bedding material for a water line that presumably runs west to east across the site. A geophysical investigation will be completed to attempt to locate the water line and assess its subsurface path. Based on the location of the pipe and possibility that it runs through portions of the site that are contaminated with tar or impacted groundwater, additional subsurface activities may be completed to assess the likelihood of bedding creating a preferential flow pathway. An air knife or similar hand methods may be used to dig down to the pipe in order to observe the type and condition of bedding material.

There is also potential for a preferential flow pathway to exist within the former Rattlesnake Creek channel. As described in Section 6.1.1, additional test pits will be installed within the former creek to further assess the nature of fill material. A groundwater monitoring well (MW-13-2020) will be installed within the fill to assess groundwater quality and, together with groundwater elevations elsewhere on the site, determine if a preferential flow pathway exists within the former creek fill. MW-13-2020 will be installed as described in Section 6.2.1.

6.2.3 Assessment of Groundwater-Surface Water Interactions

The relationship between surface water bodies and groundwater, if any, is unknown. Water level measurements will be taken from all monitoring wells to determine groundwater elevation. Staff gauges will be installed in surface water bodies to obtain surface water elevations. Three will be installed in the drainage ditch, one will be installed in each of the two ponded areas, and two will be installed in the Niagara River as shown on **Figure 7**. Specific locations may change based on field conditions.

Staff gauges will be mechanically driven into stream/river bottoms by hand methods and surveyed for elevation at the top of the staff gauge. Each staff gauge will be photographed for future reference to assess any movement or disturbance, and re-leveled for elevation, as necessary. Stream elevation will be measured from the top of the staff gauge using a water level indicator, tape measure, or folding ruler. Groundwater and surface water elevation measurements will be collected on the same day(s).

6.3 Drainage Ditch Investigation

6.3.1 Drainage Ditch Visual Assessment

A visual assessment of the drainage ditch will be performed to characterize the physical condition of the ditch, including to identify flow characteristics, unique habitat features, evidence of wildlife, and other conditions that may exist within and around the ditch. The inspection will take place from the shoreline and will include written observations of notable features and photos taken every 25 to 50 ft. Global Positioning System (GPS) locations (including positioning and orientation of the photograph) will be recorded for each photo location so that a photo log can be compiled displaying drainage ditch conditions.

6.3.2 Surface Water Sampling

To address surface water data gaps, five surface water samples will be collected from the drainage ditch that runs through the site. One sample will be collected from the outfall where the drainage ditch enters to site, one will be collected from the outfall where the drainage ditch discharges into the Niagara River, and three will be collected from ponded areas along the ditch, as shown in **Figure 8**.

To collect surface water samples, sample bottles or a dedicated HDPE sampler will be held at the water surface until the container is filled. Each surface water sample will be analyzed for TCL VOCs, SVOCs, pesticide/PCBs, TAL metals, cyanide. Samples from SW-1-2020 and SW-5-2020 will also be analyzed for PFAS and 1,4-dioxane. After sampling, the location of each surface water sample location will be surveyed.

6.3.3 Deep Sediment Sampling

To address drainage ditch data gaps, sediment and soil samples will be collected from nine locations along the drainage ditch and in ponded areas, as shown on **Figure 8**. All samples will be collected from the same locations as shallow sediment samples from previous investigations; however, samples will be collected from deeper in the soil column to delineate concentrations vertically. One previously sampled location will not be repopulated because it is located within the section of drainage ditch which has been relocated.

Sample collection methods will be determined based on field conditions and sample location accessibility, and may vary between locations. Collection methods may include collection of a core using a slide hammer and macrocore Lexan liner. A tripod or excavator may be used to pull the sampler out of the subsurface after sample collection. Shallow sediment samples may also be collected using a hand auger, trowel, or similar. Alternative methods may also be considered, such as using an ATV-mounted vibracore unit.

Samples will be collected in 6-inch intervals up to 1 ft bgs, and in 1-foot intervals from 1 to 5 ft bgs or until native material is encountered, whichever comes first. If native material is encountered, a sample will be collected from the top 1 ft. of native material. Samples will be visually assessed, photographed, screened with a PID and observations will be documented in a field log. Samples will be analyzed for TCL SVOCs (including the 34 PAHs necessary for comparison to SGVs as specified in NYSDEC's *Screening and Assessment of Contaminated Sediment* (NYSDEC 2014), TAL metals, and TOC. After sampling, the location of each sample location will be surveyed.

6.4 Niagara River Embayment and Shoreline Investigation

6.4.1 Bathymetric Survey

A bathymetric survey will be performed along the shoreline of Site 108 and within the embayment area in order to identify potential depositional (shallow water) areas of the Niagara River adjacent to the site, as well as to establish a baseline sediment elevation to be used in assessment of remedial alternatives during the FS. This survey will be completed and a bathymetric map will be produced prior to completion of the sediment sampling described below. The elevations of the bathymetric map will be tied to the same datum as the site topographic mapping. This will help guide the determination of sediment sampling locations.

6.4.2 Embayment Sediment Sampling

Sediment samples will be collected from six locations within the previously sampled embayment area as shown on **Figure 9** in order to determine the depth of contamination in this area. Sediment samples will be collected from proposed locations in 6-inch intervals from 0 to 1 ft below mudline (bml), and in 12-inch intervals from 1 to 5 ft bml or until native material is encountered, whichever comes first. If native material is encountered, a sample will be collected from the top 1 ft. of native material.

Sediment cores will be collected using a boat-mounted vibracore head and Lexan core barrel. Cores will be processed at a centralized on-shore location. Sediment will be visually assessed, photographed, screened with a PID and documented in a field log. Samples will be collected from the intervals prescribed above and analyzed for TCL SVOCs (including the 34 PAHs specified in NYSDEC 2014), TAL metals, and TOC. A subset of sediment samples will be submitted for grain-size testing via hydrometer (ASTM D7928) and/or sieve analysis (ASTM D6913). Sample locations will be surveyed during collection using GPS.

6.4.3 Shoreline Probing Transects and Sediment Sampling

Probing will be performed along 13 proposed transects as shown on **Figure 9** in order to evaluate substrate physical conditions and differentiate between fine depositional sediment and coarser-grained river bottom substrate that is unlikely impacted by depositional sediment.

Approximately 20 sediment sampling locations are proposed along probing transects as shown on **Figure 9**. One sediment sample will be collected from a near-shore location at each transect and an additional sample will be collected at an off-shore location at every other transect. The goal of the off-shore sampling locations is to be just beyond the extent of near shore depositional sediments that may be impacted in order to document the extent of contamination. Proposed sampling locations will be evaluated and may be adjusted based on the results of bathymetry survey and probing results.

Sediment samples will be collected in 6-inch intervals from 0 to 1 ft bml, and in 12-inch intervals from 1 to 5 ft bml or until native material is encountered, whichever comes first. It is anticipated that native materials may be relatively shallow in these areas, so it is unlikely that sampling will extend to 5 feet. If native material is encountered, a sample will be collected from the top 1 ft. of native material. Samples will be collected using a boat-mounted vibracore head to advance a Lexan core barrel to the target depth. Sediment will be visually assessed, photographed, screened with a PID and observations will be documented in a field log. Sediment samples collected along probing transects will be analyzed for TCL SVOCs (including the 34 PAHs specified in NYSDEC 2014), metals, and TOC. A subset of transect sediment samples will be submitted for grain-size testing via hydrometer (ASTM D7928) and/or sieve analysis (ASTM D6913). Sample locations will be surveyed during collection using GPS.

6.4.4 Shoreline Soil Sampling

In order to assess the Niagara River shoreline surface soils eight soil samples will be collected above water along the shoreline, spaced approximately 125 ft apart, as shown on **Figure 9**. Actual sample locations will be determined in the field in consultation with NYSDEC based on visual observations of the shoreline area. Samples will be collected from 0 to 6 inches at each sample location using a hand auger or similar hand methods. Soil will be visually assessed, photographed, screened with a PID and observations will be documented in a field log. Samples will be analyzed for TCL SVOCs, TAL metals, and TOC.

6.4.5 Shoreline Visual Assessment

Features along the Niagara River shoreline will be identified through a shoreline inspection. During the inspection, the shoreline will be observed from land and notable features will be recorded, such as bulkheads, outfalls or other infrastructure from historic Site activities, vegetation, habitats, and wildlife or evidence of wildlife. The shoreline inspection will be documented in written observations throughout the inspection and photos taken every 25 to 50 ft. GPS locations (including positioning and orientation of the photograph) will be recorded for each photo location so that a photo log can be compiled displaying Niagara River shoreline conditions at specific locations.

6.5 Wetland Assessment

6.5.1 Wetland Delineation

A wetland delineation will be conducted in order to define the precise boundary of the wetland. The wetland boundaries will be delineated in accordance with state and federal criteria for delineating wetlands (NYSDEC 1995, Environmental Laboratory 1987, USACE 2012, Lichvar et al. 2016, and USDA NRCS 2017). Data on vegetation, soils, and hydrology will be collected in plots along the wetland boundaries. Plot data will be recorded on wetland determination data forms designed to follow the requirements in USACE (2012). Representative photographs of each plot and each wetland area will be taken. Survey ribbon will be placed along the wetland/waters boundaries. Each wetland flag will be labeled with a letter identifier of the wetland and numbered consecutively. Flagged wetland boundaries will be surveyed.

6.5.2 Wetland Sediment Sampling

Sediment and underlying soil sampling will be completed at three locations within the wetland as shown on **Figure 8.** Samples will be collected using a slide hammer and macrocore Lexan liner to a maximum of 5 ft bgs or until native material is encountered. Sampling methods, locations, and total depths are subject to change based on an inspection of the current conditions at sampling locations.

Samples will be collected in 6-inch intervals up to 1 ft bgs, and in 1-foot intervals from 1 to 5 ft bgs or until native material is encountered, whichever comes first. If native material is encountered, a sample will be collected from the top 1 ft. Cores will be visually assessed, photographed, screened with a PID, and observations will be documented in a field log. Samples will be analyzed for TCL VOCs, SVOCs (including the 34 PAHs specified in NYSDEC 2014), pesticide/PCBs, TAL metals, cyanide, TOC, and PFAS. After sampling, the location of each sample location will be surveyed.

6.6 Breeze Stockpile Sampling

The breeze stockpile will be sampled to characterize it for future management options. Four test pits will be excavated to approximately 5 ft below the surface of the stockpile as shown on **Figure 6**. One sample will be collected from each test pit and analyzed for TCL VOCs, SVOCs, pesticide/PCBs, TAL metals, and cyanide; toxicity characteristics including TCLP VOCs, SVOCs, and metals, PCBs, flash point and paint filter test, pH, reactive cyanide, and reactive sulfide; and synthetic precipitation leaching procedure (SPLP) PFAS. Each sample for all analytes other than VOCs, will consist of material from three to five discrete sampling locations within the test pit. Material will be homogenized and combined into one composite sample for analysis. For VOC sample collection, one discrete location from each test pit will be selected from those used for the composite sample, and a grab sample will be collected to minimize VOC loss that may result from compositing and homogenizing.

7.0 INVESTIGATION DERIVED WASTE MANAGEMENT PLAN

The following Investigation Derived Waste (IDW) management procedures will be followed during the RI.

7.1 Soils

Soils excavated from test pits that do not exhibit any gross contamination will be placed back into the cavity after completion of the test pit. Fill will be segregated from clay excavated from a test pit and the clay will be replaced in the bottom of the cavity. Gross contamination is defined for these purposes as soils exhibiting the presence of mobile tar and/or free oils.

Soils from test pits that exhibit gross contamination will be stockpiled in an IDW Storage Area that will be established at the start of field work. Grossly contaminated soils will be stockpiled and staged on plastic sheeting (10 mil min) and covered with 6 mil. minimum plastic sheeting to protect against precipitation, or alternatively, containerized in a double-lined (10 mil min.) roll-off container. Stockpile volumes on plastic sheeting shall not exceed 100 cubic yards. Stockpiles may be used to segregate clearly grossly contaminated material of different characteristics. One waste characterization sample will be collected for every 100 cubic yards of stockpiled material. Waste characterization sample analysis shall include the full suite of toxicity characteristics:

- TCLP, VOCs, SVOCs, and Metals
- PCBs
- Flash Point and Paint Filter Test
- pH
- Reactivity, Cyanide
- Reactivity, Sulfide

A record of which test pit soil is in each stockpile, where they are stockpiled, and which waste characterization results represent that material will be kept in the field notebook.

Soils from borings conducted for monitoring well installations will be stockpiled, staged, and sampled as described above. Soil that is characterized as non-hazardous based on analytical results and that is free of signs of gross contamination, waste, non-aqueous phase liquid (NAPL), etc. will be evenly spread and graded on non-paved areas of the ground on-site. Soil that is characterized as hazardous and/or contains signs of gross contamination, NAPL, etc. will be containerized in Department of Transportation (DOT)-compliant 55-gallon open-topped steel drums or containerized in a double-lined (10-mil min) roll-off container, stored in the IDW Storage Location, and disposed of in accordance with 6 NYCRR Parts 360, 364 and the 370 series.

7.2 Water

Monitoring well purge water and equipment decontamination water will be containerized and discharged to the Town of Tonawanda POTW under RITC's Industrial Sewer Connection Permit No. 331 which allows for up to 2,000 gallons per day for equipment decontamination water from investigations on the property.

7.3 Personal Protective and Disposable Sampling Equipment

Personal Protective 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 RI will be containerized in 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.

PPE and disposable sampling equipment that comes in contact with grossly contaminated material (containing mobile tar and/or free oils) will be containerized separately. The disposal requirements for these wastes will be determined based on the results of waste characterization sampling of the corresponding grossly contaminated material.

8.0 FISH AND WILDLIFE RESOURCE IMPACT ANALYSIS (FWRIA)

Part 1 (Resource Characterization) of an FWRIA will be conducted to meet the requirements of DER-10, **Section 3.10.1**. This will involve a qualitative evaluation of actual or potential impacts to fish and wildlife resources from Site-related constituents. The evaluation will include the identification and description of the ecological resources located on and within 0.5-miles of the Site. Available information and the resource descriptions developed from the office review and Site evaluation will be used to characterize the exposure setting, identify the constituents of potential ecological concern, constituent migration pathways, and evaluate potential Site-related effects to local fish and wildlife resources. The findings of the Part 1 FWRIA will be presented in the Remedial Investigation Report (RIR) and will be used to evaluate the need to advance to Part 2 (Ecological Impact Assessment), which will be included in the RIR if warranted based on the findings from Part 1 of the FWRIA.

9.0 REMEDIAL INVESTIGATION REPORT

A Remedial Investigation Report (RIR) will be prepared consistent with NYSDEC DER-10 and will include, at minimum, the following components:

- Introduction
- Site Description and History
- Site Physical Characteristics
- RI Scope of Work and Results Summary
- FWRIA Part 1 Findings
- Implemented IRM Summary
- Data Validation and Usability
- Nature and Extent of Contamination
- Contaminant Fate and Transport
- Qualitative Exposure Assessment
- Cleanup Objectives
- Summary and Conclusions

The RIR will include a discussion of the RI results compared to applicable SCOs under 6 NYCRR Part 375, Class GA water quality standards (for groundwater) and Class C water quality standards (for surface water) under 6 NYCRR Part 703.6, and applicable SGVs. The discussion in the RIR on the nature and extent of soil contamination will be focused on exceedances of applicable Commercial or Industrial Use SCOs.

10.0 FEASIBILITY STUDY

As specified in the February 2020 Order on Consent, the purpose of the RI/FS is to determine the nature and extent of the remaining contamination associated with Site 108 following previous IRM activities, including tank removal. RI/FS activities are to include an investigation of off-site impacts including potentially impacted sediments in the Niagara River adjacent to Site 108.

The FS will be prepared based on the results of the RI. FS documentation will be prepared as warranted in accordance with DER-10. Remedial alternatives to be assessed are anticipated to include no action, source area excavation, and installation of a cover system. Quantitative soil and groundwater cleanup objectives as defined in 6 NYCRR Subpart 375 will be identified and assessed.

The FS report will include cost estimates with a level of detail appropriate for a feasibility study (not construction contractor cost estimates). Recommendations for follow-up investigation work prior to remediation, if any, will also be included.

11.0 SCHEDULE

A draft schedule for completion of the RI/FS is provided below. Proposed durations for investigation activities and report preparation are presented. The start date of these activities is dependent upon approval of this work plan by NYSDEC.

Activity	Proposed Schedule
Field Investigation	Mobilization within 90 days of Work Plan approval and duration of approximately 60 days
Data Analysis and Validation	Within 60 days after completion of all field investigation activities
RI Draft Report	Within 90 days after completion of data validation
FS Draft Report	Within 180 days after approval of RI Report.

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TABLES

TABLE 1 REMEDIAL INVESTIGATION SAMPLING PLAN

Sample ID	Media	Depth	TCL VOCs	TCL SVOCs[1]	TCL Pesticide/ PCBs	TAL Metals	Cyanide	TOC	PFAS	1,4- dioxane[2]	Hazardous Waste Characterization
TP-16-2020	Soil	0-2”; 2-12”; TBD	3	3	3	3	3	3	3	3	
TP-17-2020	Soil	0-2”; 2-12”; TBD	3	3	3	3	3	3	3	3	
TP-18-2020	Soil	0-2”; 2-12”; TBD	3	3	3	3	3	3	3	3	
TP-19-2020	Soil	0-2”; 2-12”; TBD		3				3		3	
TP-20-2020	Soil	0-2”; 2-12”; TBD		3				3		3	
TP-21-2020	Soil	0-2”; 2-12”; TBD		3				3		3	
TP-22-2020	Soil	0-2”; 2-12”; TBD		3				3		3	
TP-23-2020	Soil	0-2”; 2-12”; TBD		3				3		3	
TP-24-2020	Soil	0-2”; 2-12”; TBD		3				3		3	
TP-25-2020	Soil	0-2”; 2-12”; TBD		3				3		3	
TP-26-2020	Soil	0-2”; 2-12”; TBD	3	3	3	3	3	3	3	3	
TP-27-2020	Soil	0-2”; 2-12”; TBD		3				3		3	
TP-28-2020	Soil	0-2”; 2-12”; TBD		3				3		3	
TP-29-2020	Soil	0-2”; 2-12”; TBD		3				3		3	
SB-02-2020	Soil	0-2”; 2-12”; TBD		3				3		3	
MW-9-2020	Soil	0-2”; 2-12”; TBD		3				3		3	
MW-10-2020	Soil	0-2”; 2-12”; TBD	3	3	3	3	3	3	3	3	
MW-11S-2020	Soil	0-2”; 2-12”; TBD	3	3	3	3	3	3	3	3	
MW-12S-2020	Soil	0-2”; 2-12”; TBD		3				3		3	
MW-13-2020	Soil	0-2" ; 2-12" ; TBD		3				3		3	
MW-9-2020	Groundwater	TBD	1	1	1	1	1		1	1	
MW-10-2020	Groundwater	TBD	1	1	1	1	1		1	1	
MW-11S-2020	Groundwater	TBD	1	1	1	1	1		1	1	
MW-11D-2020	Groundwater	TBD	1	1	1	1	1				

[1] For all sediment samples, SVOC analysis will include analysis for the 34 PAHs necessary for comparison to Sediment Guidance Values (SGVs), as specified in *Screening and Assessment of Contaminated Sediment* (NYSDEC 2014).
[2] For all soil and sediment samples, 1,4-dioxane is included in SVOC analysis via EPA Method 8270D.

Sample ID	Media	Depth	TCL VOCs	TCL SVOCs[1]	TCL Pesticide/ PCBs	TAL Metals	Cyanide	TOC	PFAS	1,4- dioxane[2]	Hazardous Waste Characterization
MW-12S-2020	Groundwater	TBD	1	1	1	1	1		1	1	
MW-12D-2020	Groundwater	TBD	1	1	1	1	1				
MW-13-2020	Groundwater	TBD	1	1	1	1	1		1	1	
TBD (MW18-91 or MW18D-05 and/or MW-13S/D-2020	Groundwater	TBD	2	2	2	2	2		1	1	
SW-1-2020	Surface Water	0-2"	1	1	1	1	1		1	1	
SW-2-2020	Surface Water	0-2"	1	1	1	1	1				
SW-3-2020	Surface Water	0-2"	1	1	1	1	1				
SW-4-2020	Surface Water	0-2"	1	1	1	1	1				
SW-5-2020	Surface Water	0-2"	1	1	1	1	1		1	1	
SD-1-2020	Soil	0-6" ; 6-12" ; 12-24" ; 24-36" ; 36-48" ; 48-60"		6		6		6		6	
SD-2-2020	Soil	0-6" ; 6-12" ; 12-24" ; 24-36" ; 36-48" ; 48-60"		6		6		6		6	
SD-3-2020	Soil	0-6" ; 6-12" ; 12-24" ; 24-36" ; 36-48" ; 48-60"		6		6		6		6	
SD-4-2020	Soil	0-6" ; 6-12" ; 12-24" ; 24-36" ; 36-48" ; 48-60"		6		6		6		6	
SD-5-2020	Soil	0-6" ; 6-12" ; 12-24" ; 24-36" ; 36-48" ; 48-60"		6		6		6		6	
SD-6-2020	Soil	0-6" ; 6-12" ; 12-24" ; 24-36" ; 36-48" ; 48-60"		6		6		6		6	
SD-7-2020	Soil	0-6" ; 6-12" ; 12-24" ; 24-36" ; 36-48" ; 48-60"		6		6		6		6	
SD-8-2020	Soil	0-6" ; 6-12" ; 12-24" ; 24-36" ; 36-48" ; 48-60"		6		6		6		6	
SD-9-2020	Soil	0-6" ; 6-12" ; 12-24" ; 24-36" ; 36-48" ; 48-60"		6		6		6		6	

Sample ID	Media	Depth	TCL VOCs	TCL SVOCs[1]	TCL Pesticide/ PCBs	TAL Metals	Cyanide	TOC	PFAS	1,4- dioxane[2]	Hazardous Waste Characterization
SD-10-2020	Soil	0-6" ; 6-12" ; 12-24" ; 24-36" ; 36-48" ; 48-60"	6	6	6	6	6	6	6	6	
SD-11-2020	Soil	0-6" ; 6-12" ; 12-24" ; 24-36" ; 36-48" ; 48-60"	6	6	6	6	6	6	6	6	
SD-12-2020	Soil	0-6" ; 6-12" ; 12-24" ; 24-36" ; 36-48" ; 48-60"	6	6	6	6	6	6	6	6	
PSED-01	Sediment	0-6" ; 6-12" ; 12-24" ; 24-36" ; 36-48" ; 48-60"		6		6		6		6	
PSED-02	Sediment	0-6" ; 6-12" ; 12-24" ; 24-36" ; 36-48" ; 48-60"		6		6		6		6	
PSED-03	Sediment	0-6" ; 6-12" ; 12-24" ; 24-36" ; 36-48" ; 48-60"		6		6		6		6	
PSED-04	Sediment	0-6" ; 6-12" ; 12-24" ; 24-36" ; 36-48" ; 48-60"		6		6		6		6	
PSED-05	Sediment	0-6" ; 6-12" ; 12-24" ; 24-36" ; 36-48" ; 48-60"		6		6		6		6	
PSED-06	Sediment	0-6" ; 6-12" ; 12-24" ; 24-36" ; 36-48" ; 48-60"		6		6		6		6	
T-01-E	Sediment	0-6" ; 6-12" ; 12-24" ; 24-36" ; 36-48" ; 48-60"		6		6		6		6	
T-01-W	Sediment	0-6" ; 6-12" ; 12-24" ; 24-36" ; 36-48" ; 48-60"		6		6		6		6	
T-02-E	Sediment	0-6" ; 6-12" ; 12-24" ; 24-36" ; 36-48" ; 48-60"		6		6		6		6	
T-03-E	Sediment	0-6" ; 6-12" ; 12-24" ; 24-36" ; 36-48" ; 48-60"		6		6		6		6	
T-03-W	Sediment	0-6" ; 6-12" ; 12-24" ; 24-36" ; 36-48" ; 48-60"		6		6		6		6	
T-04-E	Sediment	0-6" ; 6-12" ; 12-24" ; 24-36" ; 36-48" ; 48-60"		6		6		6		6	
T-05-E	Sediment	0-6" ; 6-12" ; 12-24" ; 24-36" ; 36-48" ; 48-60"		6		6		6		6	

Sample ID	Media	Depth	TCL VOCs	TCL SVOCs[1]	TCL Pesticide/ PCBs	TAL Metals	Cyanide	TOC	PFAS	1,4- dioxane[2]	Hazardous Waste Characterization
T-05-W	Sediment	0-6" ; 6-12" ; 12-24" ; 24-36" ; 36-48" ; 48-60"		6		6		6		6	
T-06-E	Sediment	0-6" ; 6-12" ; 12-24" ; 24-36" ; 36-48" ; 48-60"		6		6		6		6	
T-07-E	Sediment	0-6" ; 6-12" ; 12-24" ; 24-36" ; 36-48" ; 48-60"		6		6		6		6	
T-07-W	Sediment	0-6" ; 6-12" ; 12-24" ; 24-36" ; 36-48" ; 48-60"		6		6		6		6	
T-08-E	Sediment	0-6" ; 6-12" ; 12-24" ; 24-36" ; 36-48" ; 48-60"		6		6		6		6	
T-09-E	Sediment	0-6" ; 6-12" ; 12-24" ; 24-36" ; 36-48" ; 48-60"		6		6		6		6	
T-09-W	Sediment	0-6" ; 6-12" ; 12-24" ; 24-36" ; 36-48" ; 48-60"		6		6		6		6	
T-10-E	Sediment	0-6" ; 6-12" ; 12-24" ; 24-36" ; 36-48" ; 48-60"		6		6		6		6	
T-11-E	Sediment	0-6" ; 6-12" ; 12-24" ; 24-36" ; 36-48" ; 48-60"		6		6		6		6	
T-11-W	Sediment	0-6" ; 6-12" ; 12-24" ; 24-36" ; 36-48" ; 48-60"		6		6		6		6	
T-12-E	Sediment	0-6" ; 6-12" ; 12-24" ; 24-36" ; 36-48" ; 48-60"		6		6		6		6	
T-13-E	Sediment	0-6" ; 6-12" ; 12-24" ; 24-36" ; 36-48" ; 48-60"		6		6		6		6	
T-13-W	Sediment	0-6" ; 6-12" ; 12-24" ; 24-36" ; 36-48" ; 48-60"		6		6		6		6	
SS-01-2020	Soil	0-6"		1		1		1		1	
SS-02-2020	Soil	0-6"		1		1		1		1	
SS-03-2020	Soil	0-6"		1		1		1		1	
SS-04-2020	Soil	0-6"		1		1		1		1	
SS-05-2020	Soil	0-6"		1		1		1		1	

Sample ID	Media	Depth	TCL VOCs	TCL SVOCs[1]	TCL Pesticide/ PCBs	TAL Metals	Cyanide	TOC	PFAS	1,4- dioxane[2]	Hazardous Waste Characterization
SS-06-2020	Soil	0-6"		1		1		1		1	
SS-07-2020	Soil	0-6"		1		1		1		1	
SS-08-2020	Soil	0-6"		1		1		1		1	
BP-01-2020	Soil (Breeze Pile Composite)	~5'	1	1	1	1	1	1	1	1	1
BP-02-2020	Soil (Breeze Pile Composite)	~5'	1	1	1	1	1	1	1	1	1
BP-03-2020	Soil (Breeze Pile Composite)	~5'	1	1	1	1	1	1	1	1	1
BP-04-2020	Soil (Breeze Pile Composite)	~5'	1	1	1	1	1	1	1	1	1

FIGURES

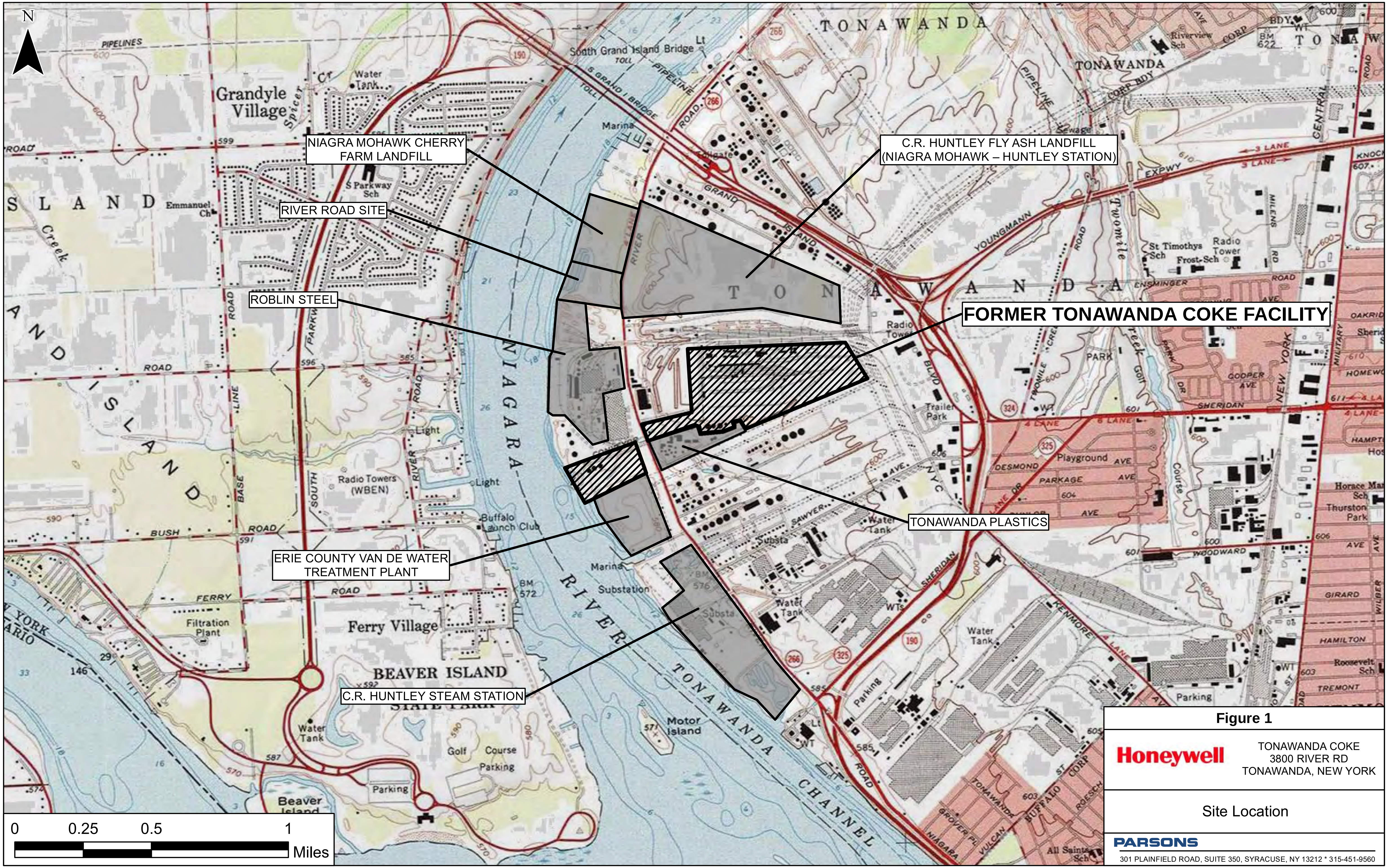


Figure 1

Honeywell

TONAWANDA COKE
3800 RIVER RD
TONAWANDA, NEW YORK

Site Location

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

Plotted By: Sisson, Evan

Plot Date: 5/21/2020

Document Path: Q:\GIS\Hon_Syracuse\Tonawanda Coke\Tonawanda Site 108 Fig 1 EBS.mxd

Figure 2

Honeywell

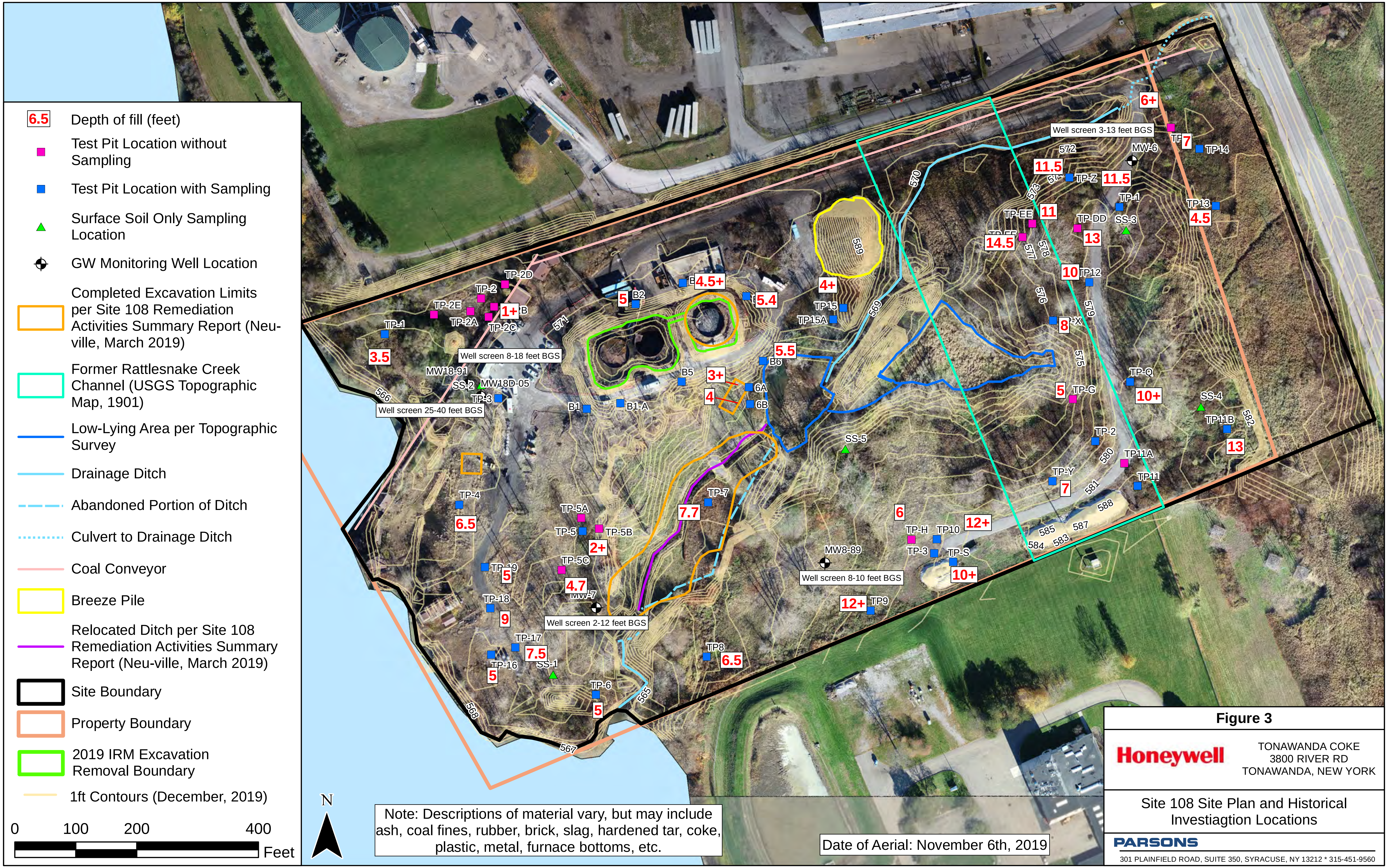
TONAWANDA COKE
3800 RIVER RD
TONAWANDA, NEW YORK

Locations of Sites 108, 109, and 110

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

Plot Date: 5/19/2020 Plotted By: CS

Document Path: Q:\GIS\Hon_Syracuse\Tonawanda Coke\Tonawanda Site 108 Fig 2.mxd



Plotted By: CS

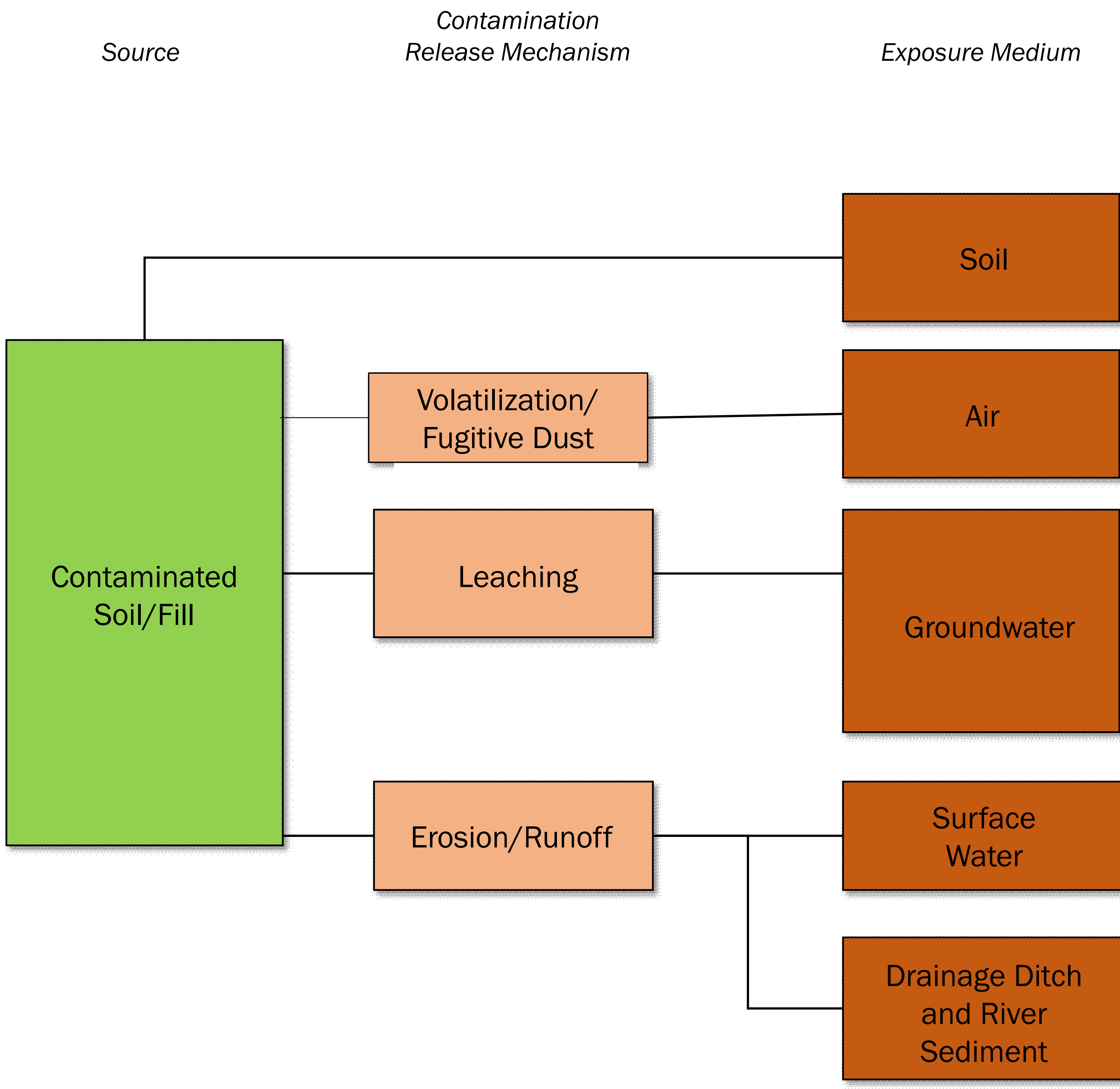
Plot Date: 9/8/2020

Document Path: Q:\GIS\Hon_Syracuse\Tonawanda Coke\Tonawanda Site 108 Historical Data.mxd

Plot Date: 5/5/2020 Plotted By: CS

Document Path: Q:\GIS\Hon_Syracuse\Tonawanda Coke\Tonawanda Site 108 Wetlands.mxd

INTERACTION



Potential Exposure

	Current Use	Potential Future Use		
Exposure Route	***Site Worker***	***Office Employee***	***Site Worker***	***Passive Recreational User***
Direct Contact	*		*	*
Ingestion	O		O	O
Inhalation	*	*	*	*
Direct Contact	O		O	
Ingestion				
Vapor Intrusion/ Exposure	O	*	O	
Direct Contact	*		*	O
Ingestion				
Direct Contact	*		*	O
Ingestion				

O Low Potential Pathway

* Potentially Complete Pathway

Figure 5

Honeywell

TONAWANDA COKE
3800 RIVER RD
TONAWANDA, NEW YORK

Site 108
Former Tonawanda Coke Site

Initial Conceptual Site Model

PARSONS

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

Test Pit with Sampling for Full Suite of Analytes

Test Pit with Sampling for SVOCs Only

Breeze Pile Test Pit with Composite Sample

Soil Boring with Sampling

Soil Boring without Sampling

Culvert to Drainage Ditch

Drainage Ditch

Former Rattlesnake Creek Channel (USGS Topographic Map, 1901)

Completed Excavation Limits per Site 108 Remediation Activities Summary Report (Neu-ville, March 2019)

Location of Remaining Subsurface Tar per Site 108 Remediation Activities Summary Report (Neu-ville, March 2019)

Low-Lying Area per Topographic Survey

Abandoned Portion of Ditch

Coal Conveyor

Breeze Pile Location

Relocated Ditch per Site 108 Remediation Activities Summary Report (Neu-ville, March 2019)

Site Boundary

Property Boundary

0 100 200 400 Feet

Plotted By: CS

Plot Date: 9/8/2020

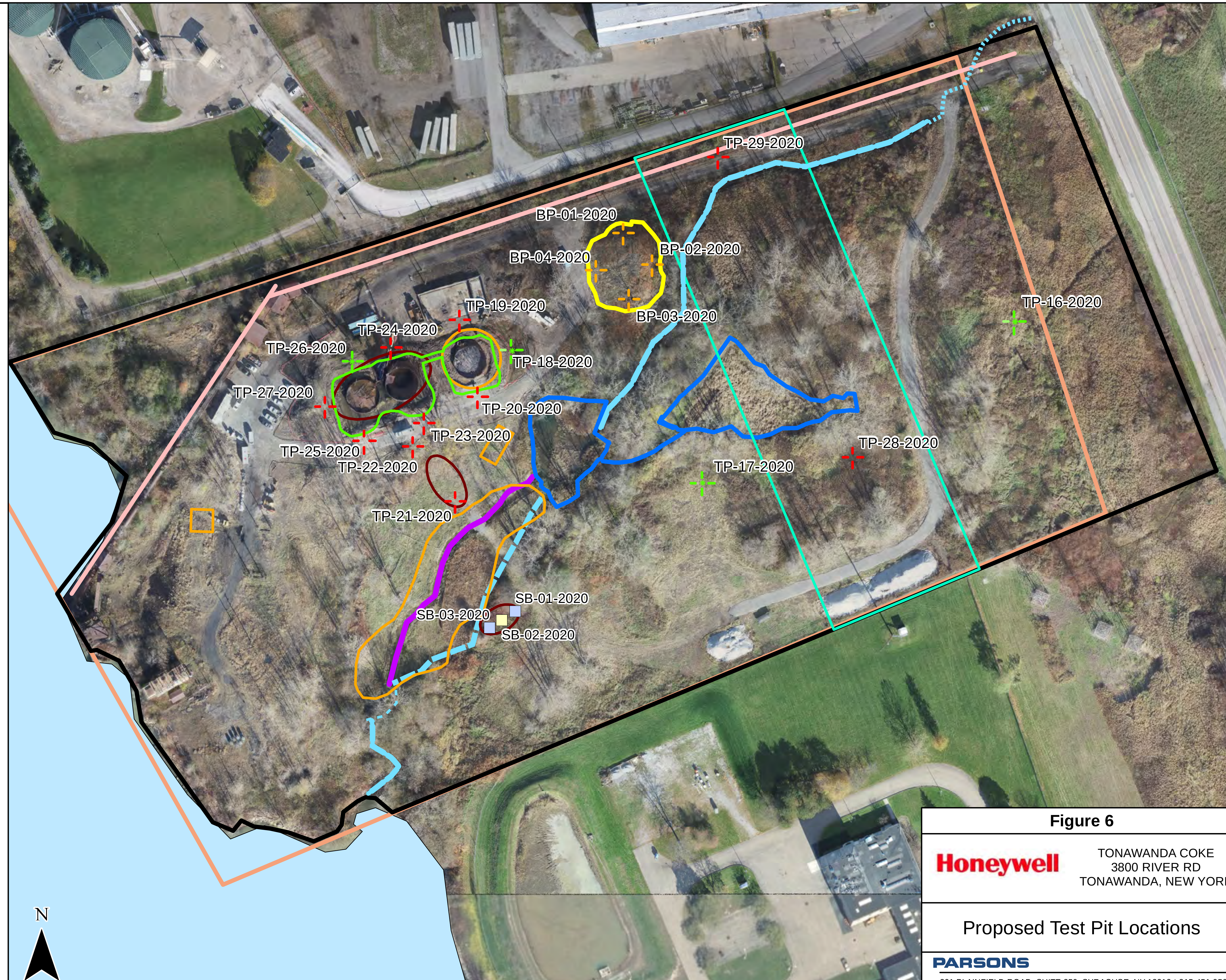


Figure 6

Honeywell

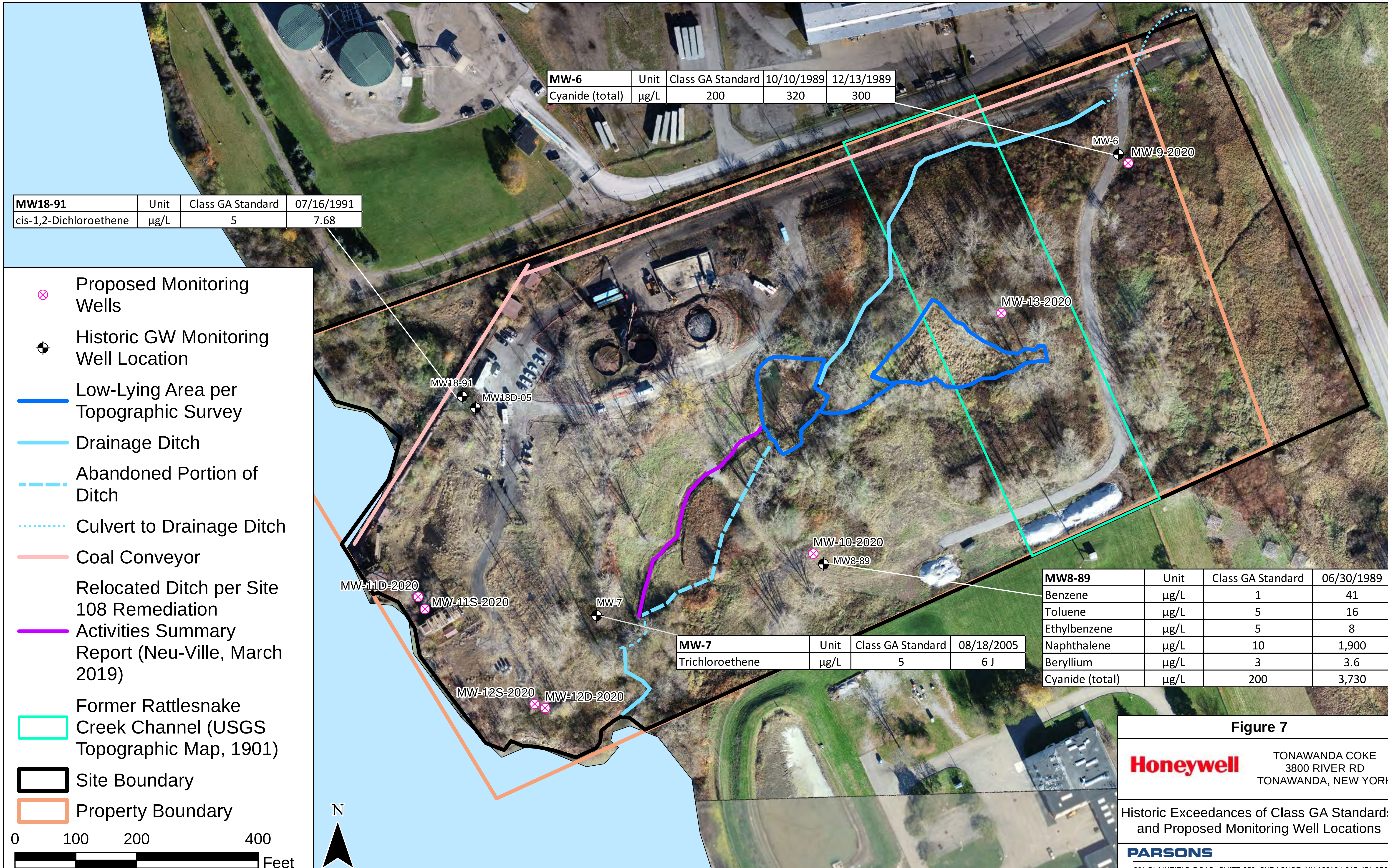
TONAWANDA COKE
3800 RIVER RD
TONAWANDA, NEW YORK

Proposed Test Pit Locations

PARSONS

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

Document Path: Q:\GIS\Hon_Syracuse\Tonawanda Coke\Tonawanda Site 108 Proposed TP.mxd



MW-6	Unit	Class GA Standard	10/10/1989	12/13/1989
Cyanide (total)	µg/L	200	320	300

MW18-91	Unit	Class GA Standard	07/16/1991
cis-1,2-Dichloroethene	µg/L	5	7.68

MW8-89	Unit	Class GA Standard	06/30/1989
Benzene	µg/L	1	41
Toluene	µg/L	5	16
Ethylbenzene	µg/L	5	8
Naphthalene	µg/L	10	1,900
Beryllium	µg/L	3	3.6
Cyanide (total)	µg/L	200	3,730

MW-7	Unit	Class GA Standard	08/18/2005
Trichloroethene	µg/L	5	6 J

Figure 7

Honeywell

TONAWANDA COKE
3800 RIVER RD
TONAWANDA, NEW YORK

Historic Exceedances of Class GA Standards and Proposed Monitoring Well Locations

PARSONS

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

Plotted By: CS

Plot Date: 9/8/2020

Document Path: Q:\GIS\Hon_Syracuse\Tonawanda Coke\Tonawanda Site 108 Proposed GW.mxd

Plotted By: CS
Plot Date: 9/8/2020

Document Path: Q:\GIS\Hon_Syracuse\Tonawanda Coke\Tonawanda Site 108 Proposed Ditch sample.mxd

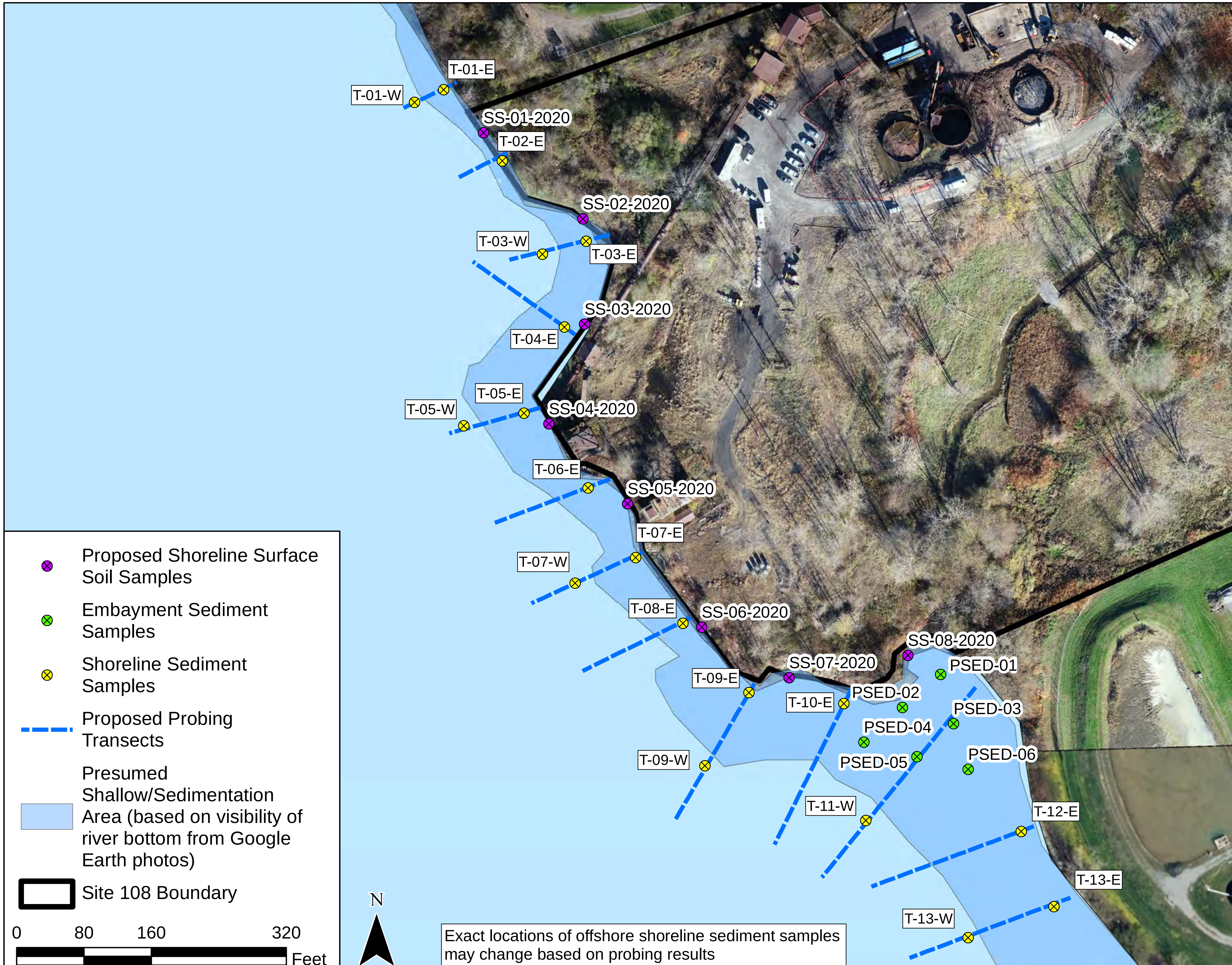


Figure 9

Honeywell

TONAWANDA COKE
3800 RIVER RD
TONAWANDA, NEW YORK

Proposed Niagara River Sediment and Shoreline Surface Soil Sampling Locations

PARSONS

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

Plot Date: 5/7/2020

Document Path: Q:\GIS\Hon_Syracuse\Tonawanda Coke\Site 108 Fig 9 River.mxd

APPENDIX A SITE 108 REMEDIATION ACTIVITIES SUMMARY REPORT

APPENDIX B – FIELD SAMPLING PLAN

FIELD SAMPLING PLAN (FSP)
TONAWANDA COKE SITE
SITE 108
3800 RIVER ROAD
TONAWANDA, NEW YORK

Prepared For:

Honeywell

115 Tabor Road
Morris Plains, NJ 09750

Prepared By:

PARSONS

301 Plainfield Road, Suite 330
Syracuse, New York 13212

OCTOBER 2020

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LIST OF ACRONYMS

ACRONYM	Definition
ASTM	American Society for Testing and Materials
bml	below mudline
COC	Chain of Custody
EDD	electronic data deliverable
EIM	Enterprise Information Management
ELAP	Environmental Laboratory Approved Program
FSP	Field Sampling Plan
ft	foot/feet
ft bgs	feet below ground surface
GPS	Global Positioning System
HASP	Health and Safety Plan
HDPE	high-density polyethylene
ID	inner diameter
IDW	Investigation Derived Waste
LIMS	laboratory information system
MS/MSD	Matrix Spike/Matrix Spike Duplicates
NTU	nephelometric turbidity unit
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
ORP	oxidation-reduction potential
PFAS	Per- and Polyfluoroalkyl Substances
PFOA	perflourooctanoic acid
PFOS	perfluorooctanesulfonic acid
PID	photoionization detector
POTW	Publicly Owned Treatment Works
PPE	personal protective equipment
PSHEP	Project Safety, Health, and Environmental Plan
PVC	polyvinyl chloride
QAPP	Quality Assurance Project Plan
RI	Remedial Investigation
SPT	Standard Penetration Test
TCC	Tonawanda Coke Corporation
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound

1.0 PROJECT DESCRIPTION

1.1 Introduction

This Field Sampling Plan (FSP) has been prepared for the Honeywell field operations at the Tonawanda Coke Site 108, located at 3800 River Road, Tonawanda, New York. This FSP covers installation of groundwater monitoring wells, groundwater sampling, surface and subsurface soil sampling, sediment sampling, surface water sampling, surveying, and test pitting and is intended to be amended as needed to address subsequent site activities.

The objective of this FSP is to outline methods and procedures that will allow consistency in investigatory field activities across a potentially broad range of specific project goals and objectives. The methods and procedures described in this FSP have been prepared in accordance with the most recent and applicable New York State Department of Environmental Conservation (NYSDEC) and New York State Department of Health (NYSDOH) regulatory guidances and requirements. Health and safety considerations and emergency procedures associated with this project are documented in the site Project Safety, Health, and Environment Plan (PSHEP).

The anticipated scope is described in detail in **Section 2** and includes:

- Test pitting
- Groundwater sampling
- Surface soil sampling
- Subsurface soil sampling
- Well installation
- Surface water sampling
- Sediment sampling
- Shoreline probing
- Drainage ditch and shoreline visual assessment
- Surveying (topographic and bathymetric)

One of the contaminants that will be analyzed for, Per- and Polyfluoroalkyl Substances (PFAS), can be found in many standard environmental sampling materials, including: Fluoropolymer bailer/tubing, some decontamination solutions, and pump bladders/valves. Two of the principal target analytes, perflourooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS), have been broadly utilized in the production of various everyday items such as: waterproof/stain-resistant clothing, non-stick cookware, and many commonly used plastics. The field activities and methods herein have been appropriately modified to prevent cross-contamination, and to avoid the introduction of external contaminant sources. **Table 1** includes a summary of prohibited and acceptable items for PFAS sampling. **Appendix A** provides NYSDEC's Part 375 Remedial Programs Guidelines for Sampling and Analysis of PFAS (January 2020).

2.0 ANTICIPATED FIELD ACTIVITIES

Various field activities will be conducted during execution of the remedial investigation scope of work. Detailed descriptions of procedures and methods for each field activity are provided in **Sections 2.2** through **2.9**. Field activities that are anticipated are summarized below.

Monitoring Well Installation: Up to nine groundwater monitoring wells will be installed at Site 108. Three wells will have screens located within the fill layer. The other wells will be installed in pairs at three locations along the Niagara River where alluvial sand underlies the fill layer, with one well from each pair screened in fill and the other screened at the bottom of alluvium. During drilling for well installation, soil samples (0 to 2 and 2 to 12 inches below grade; 1-foot (ft) interval beneath coal tar (if present) or the interval displaying signs of contamination) will be collected from each boring. Soil samples will be collected using direct push methods and a 3-inch (or similar) macrocore sampler.

Groundwater Samples: Groundwater samples will be collected from multiple newly-installed monitoring wells as well as potentially one existing well using low-flow methods. PFAS sampling and analysis will follow guidance provided in NYSDEC's "Guidelines for Sampling and Analysis of PFAS."

Staff Gauge Installation and Measurement: Seven staff gauges will be installed throughout the site, including within the drainage ditch, ponded areas, and the Niagara River. Staff gauges will be mechanically driven into stream/river bottoms by hand methods and surveyed for elevation at the top of the staff gauge. Each staff gauge will be photographed for future reference to assess any movement or disturbance, and re-leveled for elevation, as necessary. Stream elevation will be measured from the top of the staff gauge using a water level indicator, tape measure, or folding ruler. Groundwater and surface water elevation measurements will be collected on the same day(s).

Test Pits: A series of test pits will be excavated throughout Site 108. Test pits will be excavated using an excavator to the top of native soil (4 to 10-ft below ground surface [ft bgs]) and soil and fill materials will be visually assessed. If native soil shows signs of contamination such as staining, odor, or elevated PID readings, excavation will continue until soil appears free of signs of contamination for at least 2 feet. Soil/fill samples will be collected for chemical analysis from the following intervals at each test pit: 0 to 2 inches bgs, 2 to 12 inches bgs, and the 1-ft interval directly beneath visible coal tar (if present) or the interval displaying signs of contamination. If signs of contamination are present in native soil, a sample will be collected from each depth exhibiting staining, odor, or elevated PID readings. Samples of native soil exhibiting signs of contamination will be collected in intervals based on the thickness of apparent contamination, with a maximum sampling interval of 1-ft. A sample will also be collected in the 1-ft interval below the deepest identified sign of contamination. Four additional test pits will also be excavated within the breeze stockpile to approximately 5-ft below the surface of the stockpile and one composite sample will be collected from each test pit.

Soil Borings: In an area of the site adjacent to the relocated drainage ditch, the shallow water table prohibits excavation and sampling of test pits. Therefore, three soil borings will be installed approximately 20-ft apart in order to assess subsurface conditions in this area. Soil borings will be installed to the top of native soil using direct push methods and a 3-inch (or similar) macrocore sampler. All three soil borings will be visually assessed and one will be sampled for chemical analysis from the following intervals: 0 to 2 inches bgs, 2 to 12 inches bgs, and 1-ft interval directly beneath visible coal tar (if present) or interval displaying signs of contamination.

Surface Water Sampling: Five surface water samples will be collected from the drainage ditch that runs through the site and from ponded areas adjacent to the ditch. Surface water samples will be collected by hand using sample bottle or a designated high-density polyethylene (HDPE) sampler. PFAS sampling and analysis will follow guidance provided in NYSDEC's "Guidelines for Sampling and Analysis of PFAS."

Drainage Ditch Deep Soil Sampling: Soil samples will be collected from nine locations within the on-site drainage ditch and within ponded areas. Samples are anticipated to be collected using a slide hammer and macrocore Lexan liner. Samples will be collected to 5-ft bgs or native material, whichever is shallower, and soil will be visually assessed. Analytical samples will be collected in 6-inch intervals to 1-ft bgs and 1-ft intervals to 5-ft bgs. If native material is encountered, a sample will be collected from the top 1-ft of native material. Sampling methods, sample locations, and total sample depths may change based on site conditions at proposed sampling locations.

Embayment Sediment Sampling: Sediment samples will be collected from six locations within the embayment area. Samples will be collected using a boat-mounted vibracore and Lexan core barrel. Cores will be collected to 5-ft below mudline (bml) or until native material is encountered, whichever comes first. Cores will be visually assessed and analytical samples will be collected in 6-inch intervals from 0 to 1-ft bml and in 12-inch intervals from 1-5-ft bml. If native material is encountered, a sample will be collected from the top 1-ft. of native material

Shoreline Probing: Probing will be performed along 13 east-west trending transects, perpendicular to the shoreline of Site 108. Probing will be performed from a slow-moving boat, using a rod to poke the sediment surface and determine if it is fine or coarse grained.

Shoreline Sediment Sampling: Sediment samples will be collected from along probing transects. One sediment sample will be collected at a near-shore location on every transect and one sediment sample will be collected at an off-shore location every other transect, provided that probing indicates coarse grained material at locations not to be sampled. As such, exact sediment locations may change based on the results of probing. Near shore sample locations are expected to be relatively shallow and may be collected using hand-auger and/or tripod-drilling methods. Off-shore sample locations will be collected using a boat-mounted vibracore head to advance a leaner core barrel. Cores will be collected to 5-ft bml or until native material is encountered, whichever comes first. Samples in 6-inch intervals from 0 to 1-ft bml, and in 12-inch intervals from 1 to 5-ft bml. If native material is encountered, a sample will be collected from the top 1-ft. of native material. Sampling methods, sample locations, and total sample depths may change based on site conditions at proposed sampling locations.

Shoreline Surface Soil Sampling: Surface soil samples will be collected from approximately eight locations along the Niagara River shoreline (above water). Samples will be collected from 0 to 6 inches bgs using a hand auger or similar hand methods. Samples will be visually assessed and submitted for chemical analysis.

Drainage Ditch and Shoreline Visual Inspection: An inspection of the drainage ditch and Niagara River shoreline will be performed. Both shorelines will be walked and notable features (historic infrastructure, flow characteristics, vegetation, habitats, evidence of wildlife, etc.) will be recorded. Photos will be taken every 25 ft and the Global Positioning System (GPS) location (including positioning and orientation of the photograph) will be recorded.

Wetland Delineation: A wetland delineation will be conducted in order to define the precise boundary of the wetland. The wetland boundaries will be delineated in accordance with state and federal criteria for delineating wetlands (NYSDEC 1995, Environmental Laboratory 1987, USACE 2012, Lichvar et al. 2016, and USDA NRCS 2017). Flagged wetland boundaries will be surveyed.

Wetland Sediment Sampling: Three sediment samples will be collected from the Freshwater Emergent Wetland on the east side of Site 108. Samples will be collected in 6-inch intervals up to 1-ft bgs, and in 1-ft intervals from 1 to 5-ft bgs or until native material is encountered, whichever comes first. If native material is encountered, a sample will be collected from the top 1-ft of native material. Samples are anticipated to be collected using a slide hammer and macrocore Lexan liner, but sampling methods, sample locations, and total sample depths may change based on site conditions at proposed sampling locations.

Pipeline Surface Soil Inspection: Surface soil beneath the above-ground pipeline that runs along the northern side of the site will be inspected. If visual evidence is identified, representative samples will be collected from the 0-2-inch and 2-12-inch intervals. Visual evidence includes surficial tar, staining, sheen, discoloration, etc. If tar or other similar wastes are encountered, a sample of the specific material will be collected and analyzed for hazardous waste characterization.

Survey: Soil boring locations and elevations, monitoring well top of casing elevations, surface elevations and locations, and test pit locations (four corners) will all be surveyed. Niagara River bathymetry will also be surveyed along the shoreline of Site 108.

Properly collected environmental data will be used to conduct a Focused Feasibility Study. The applicable field activities that will be conducted during execution of the remedial investigation, as well as the methods and procedures for each are described in detail in the following sections.

2.1 Sample Nomenclature System

The Field Team Leader will manage data generated in the field. This person 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 (COC) 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 was developed with the data management team. Each sample name will be unique to include a location ID and field sample ID. The following sample naming conventions will be used for each sampling task:

Groundwater/Surface Water Samples:

Naming Format: Monitoring well ID-Sample Date

Example: MW-5-2020-02052020. Groundwater sample from MW-5-2020.

Soil/Sediment Samples:

Naming Format: Soil boring/Test pit ID/Sediment core location-depth interval-Sample Date

Example: SB-2-2020-4-6-02052020. Soil sample from SB-2-2020, from 4 to 6-ft deep, collected on February 5, 2020

Waste Characterization Samples:

Naming Format: Sample number-waste type-date

Examples: Investigation Derived Waste (IDW)-01-SW-10192020 (SW = solid waste collected on October 19, 2020)

IDW-02-LW-10192020 (LW = liquid waste collected on October 19, 2020)

IDW-03-DW-101920 (DW = debris/mixed waste such as sample tubing, PPE, etc. collected on October 19, 2020)

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. An example of a label is located in **Appendix B**. This label must contain, as a minimum, the following information:

- Project Name
- Field Sample ID - The unique number that identifies the sample
- Date of sample collection – use six digit date (mm/dd/yy)
- Time of sample collection - use 24-hour format (hh:mm)

- Sample Medium - Water, soil, sediment, sludge, leachate, etc.
- Sample Method - Grab or Composite
- Preservation - Type of preservation added
- Analyses - use the method reference from the COC, (such as VOA-624 Full Scan, or A2340C Hardness)
- Initials - The initials of the sample collector

The field team leader will create the COC using the approved format provided in **Appendix B**. The field team leader will be responsible for verifying that information on the COC is consistent with the information recorded in the field book, on the sample log sheets, and on the bottle labels.

The field team leader will transmit the electronic COC to the Data Manager within 24 hours of COC completion. The Data Manager will enter the field sample information into the system and create COC data in Enterprise Information Management (EIM). The sample order will match the COC.

Upon entry of COC data, a text file will be generated by the Data Manager who transmits this text file via e-mail to the laboratory for entry in the laboratory information system (LIMS). The text file must be received by the laboratory within 48 hours of receipt of samples.

Within 24 hours of receipt of the text file, the laboratory must send an acknowledgement to the Data Manager indicating all the sample identification numbers and the analyses to be conducted on each sample. The Data Manager will review the acknowledgement and confirm that no errors have been made. If errors are detected, the Data Manager will coordinate with the laboratory to resolve the issue.

The Data Manager will track receipt of preliminary data and electronic data deliverables (EDDs) against the sample receipt date indicated by the laboratory for compliance with contract terms. The Data Manager will issue weekly reports of any data not received within contract terms and elevate any occurrence of non-compliance to the attention of the Project Manager.

2.2 Soil Borings and Test Pits

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

Depending on site-specific objectives and/or drilling conditions, soil borings may be advanced using hand, direct-push, or conventional hollow stem auger drilling methods. PFAS free solutions such as Alconox® or 7th Generation Free & Clear Dish Soap will be used to decontaminate drill tooling and sampling equipment. **Table 1** includes a summary of prohibited and acceptable PFAS items. A PFAS sampling checklist is included as **Appendix C** and should be filled out daily by field personnel.

2.2.1 Hand Auger

This method can be used to collect shallow soil samples. The advantage of this method is that it can be used in places where overhead utilities or other site conditions do not allow for utilization of direct push or conventional drill methods. The disadvantage is that only shallow borings can be completed using this method and each boring may be time-consuming.

2.2.1.1 Equipment and Supplies

- Hand auger or similar hand tool

- Field log
- Photoionization Detector (PID)
- Re-sealable plastic bags (e.g., Ziploc®)
- Lab-provided sample containers
- Coolers, ice, sample labels

2.2.1.2 Hand Auger Procedure

- Soil boring will be advanced by hand using a hand auger or similar hand tool.
- Soil samples retrieved from the borehole will be described for: 1) percent recovery; 2) soil type; 3) color; 4) moisture content; 5) texture; 6) grain size and shape; 7) consistency; 8) evidence of staining or other chemically-related impacts; and 9) any other relevant observations as discussed in **Section 2.9**. In addition, soil will be screened with a 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 as discussed in **Section 2.9**. This descriptive information will be recorded on a soil boring log form. An example of the typical soil boring log form is provided in **Appendix D**.
- Samples for headspace screening will be collected. A representative portion of each soil sample will be placed in a re-sealable plastic (e.g., Ziploc®) bag filled approximately half full. The bag will be labeled with the boring number and interval sampled. After allowing the bagged soil to warm, the tip of the sample probe attached to the PID will be inserted into the bag to measure the headspace for organic vapors.
- Soils collected for headspace screening will not be used for laboratory analysis, rather the sample will be taken directly from the auger.
- 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 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. Samples will be collected in the following order:
  - VOCs
  - PFAS
  - SVOCs
  - Metals
  - Cyanide
- Soils extracted during the advancement of the hand-augered borings will be used to backfill the boring, provided that the boring is not to be used for installation of a monitoring well. However, soils that exhibit “gross” contamination, as evidenced by staining or free-phase product, or any visual, olfactory, or high PID readings, will be managed in accordance with **Section 2.9**. In this event, bentonite chips or pellets will be used to backfill the boring(s).
- Hand tools will be decontaminated between each boring in accordance with methods specified in **Section 2.13**.
- Decontamination water will be handled in accordance with the Work Plan.
- The boring location will be surveyed.

2.2.2 Direct Push Method

This drilling method is typically used to collect shallow overburden soils and create boreholes for temporary or permanent (using pre-pack screens) monitoring well installations. This method is advantageous in that it typically allows for the advancement of numerous borings in a relatively short period of time. The disadvantage of this method is that it is typically limited to shallow overburden soils (less than 50-ft below grade) which exhibit relatively low densities.

2.2.2.1 Equipment and Supplies

- Direct push drill rig and all associated supplies and equipment
- MacroCore™ samplers with PFAS-free acetate liners
- Field log
- PID
- Re-sealable plastic bags (e.g., Ziploc®)
- Lab-provided sample containers
- Coolers, ice, sample labels

2.2.2.2 Direct Push Procedure

- Soil samples will be collected continuously from the ground surface to the bottom of the borings using 4-ft long, MacroCore™ samplers using PFAS free acetate liners.
- Soil samples retrieved from the borehole will be described for: 1) percent recovery; 2) soil type; 3) color; 4) moisture content; 5) texture; 6) grain size and shape; 7) consistency; 8) evidence of staining or other chemically-related impacts; and 9) any other relevant observations. In addition, soil will be screened with a PID to allow evaluation of the bulk volatile organic concentration of each soil sample. Should compound-specific monitoring be required to meet project objectives or by the Health & Safety Plan (HASP), then this monitoring will be conducted using appropriate monitoring devices/meter (i.e., Draeger tubes, mercury vapor analyzer, 4-gas meter, etc.).
- Soils will be described in accordance with the 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 **Appendix D**.
- Samples for headspace screening will be collected. A representative portion of each soil sample will be placed in a re-sealable plastic (e.g., Ziploc®) bag filled approximately half full. The bag will be labeled with the boring number and interval sampled. After allowing the bagged soil to warm, the tip of the sample probe attached to the PID will be inserted into the bag to measure the headspace for organic vapors.
- Soils collected for headspace screening will not be used for laboratory analysis, rather the sample will be taken directly from the liner/spoon.
- Soil samples collected for laboratory analysis will be collected in laboratory-supplies containers according to the QAPP and as described below. Samples will be submitted to an approved NYSDOH ELAP-certified laboratory. Analyses will be conducted using 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. Samples will be collected in the following order:
  - VOCs
  - PFAS
  - SVOCs

  - Metals
  - Cyanide
- Soils extracted during the advancement of the direct-push borings will be used to backfill the boring, provided that the boring is not to be used for installation of a monitoring well. However, soils that exhibit “gross” contamination, as evidenced by staining or free-phase product, or any visual, olfactory, or high PID readings, will be managed in accordance with the Work Plan. In this event, bentonite chips or pellets will be used to backfill the boring(s).
- Drilling equipment will be decontaminated between each boring in accordance with methods specified in **Section 2.13**.
- Decontamination water will be handled in accordance with the Work Plan.
- The boring location will be surveyed.

2.2.3 Conventional Drill Rig Methods

Typical drilling methods used to collect shallow and deeper overburden soils and create boreholes for monitoring well installations include:

- Hollow stem augers
- Drive and wash or spin and wash flush joint casing
- Fluid rotary methods (using potable water only)
- Air rotary

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 American Society for Testing and Materials (ASTM) Method D1586, can provide geotechnical information. When used, the following procedures will be followed by field personnel:

2.2.3.1 Equipment and Supplies

- Applicable drill rig and all associated supplies and equipment
- Field log
- PID
- Re-sealable plastic bags (e.g., Ziploc®)
- Lab-provided sample containers
- Coolers, ice, sample labels

2.2.3.2 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 PID to allow evaluation of the bulk volatile organic concentration of each soil sample. Soils will be described in accordance with the 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 **Appendix D**.
- 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 QAPP and as described below. Samples will be submitted to an approved NYSDOH ELAP-certified laboratory. Analyses will be conducted using 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. Samples will be collected in the following order:
  - VOCs
  - PFAS
  - SVOCs
  - Metals
  - Cyanide
- Soils extracted during the advancement of the hollow stem auger borings will be managed in accordance with Section 2.9.
- Drilling equipment will be decontaminated between each boring in accordance with methods specified in Section 2.13.
- Decontamination water will be handled in accordance with the Work Plan.
- The boring location will be surveyed.

2.2.4 Test Pits

Test pitting can provide an opportunity to collect soil samples from the shallow subsurface and can expose a larger area of the subsurface to be observed compared to traditional drilling or direct-push methods.

2.2.4.1 Equipment and Supplies

- Excavator or backhoe (to be run by qualified operator)
- Field log
- PID
- Re-sealable plastic bags (e.g., Ziploc®)
- Lab-provided sample containers
- Coolers, ice, sample labels

2.2.4.2 Test Pit Procedure

- Test pits will be excavated using a backhoe.
- As material is removed from the test pit, it will be visually assessed and described for 1) soil type; 2) color; 3) moisture content; 4) density; 5) texture; 6) grain size and shape; 7) consistency; 8) evidence of staining or other chemically-related impacts; and 9) any other relevant observations. If fill is present, all observed components will be thoroughly described. In addition, soil will be screened with a PID to allow evaluation of the bulk volatile organic concentration of each lithology. Soils will be described in accordance with the USCS and modified Burmister system according to Section 2.9. This descriptive information will be recorded.
- Analytical soil samples can be collected from the test pit wall only when the slope is stable, access to the test pit can be easily made, the test pit is less than 3-ft deep, and a PID and 4-gas meter have confirmed that the conditions allow entry to the pit.

- If the above conditions for direct sample collection from the sidewall are not met, analytical soil samples may be collected from the excavator bucket. When collecting the soil sample, the soil that has contacted the excavator bucket should be avoided.
- 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 QAPP and as described below. Samples will be submitted to an approved NYSDOH ELAP-certified laboratory. Analyses will be conducted using 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. Samples will be collected in the following order:
  - VOCs
  - PFAS
  - SVOCs
  - Metals
  - Cyanide
- Soils extracted during the test pit will be managed in accordance with the Work Plan
- The backhoe will be decontaminated between each test pit in accordance with methods specified in **Section 2.13**.
- Decontamination water will be handled in accordance with the Work Plan.
- The four corners of the test pit will be surveyed.

2.3 Monitoring Well Installation and Construction

Monitoring wells will be used to evaluate the hydrogeologic conditions and groundwater quality. Monitoring wells will be installed to allow characterization of groundwater levels, groundwater flow systems, and groundwater quality. The scope of work for this project includes installation of shallow monitoring wells in the fill layer and deep monitoring wells in the alluvium sand which underlies the western portion of the site. Monitoring wells installed adjacent to the Niagara River will be installed in pairs. Traditional best practice techniques and procedures shall be subject to modification to prevent the introduction of non-site-derived contaminants including PFAS into target samples as discussed in **Section 1**. **Table 1** includes a summary of prohibited and acceptable PFAS items. A PFAS sampling checklist is included as **Appendix C** and should be filled out daily by field personnel.

2.3.1 Equipment and Supplies

- Appropriate drill rig and necessary supplies and equipment
- Two-inch inner diameter (ID), threaded, flush-joint, polyvinyl chloride (PVC) casings and well screens
- Clean silica sand
- Choke sand
- Bentonite pellets or chips
- Cement-bentonite grout
- Field log

- PID
- Re-sealable plastic bags (e.g., Ziploc®)

2.3.2 Monitoring Well Installation Procedure

- Monitoring well borings will be advanced using the most appropriate drilling method for subsurface conditions as described above in **Section 2.2**.
- During boring advancement, soil samples will be collected at continuous two-ft intervals using two-inch diameter split barrel samplers in accordance with ASTM Method D1586 and 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 PID to allow evaluation of the bulk volatile organic concentration of each soil sample. Soils will be described in accordance with the USCS and the modified Burmister system according to **Section 2.9**. This descriptive information will be recorded on a soil boring log form. An example of the typical soil boring log form is provided in **Appendix D**.
- Monitoring wells will be constructed with two-inch ID, threaded, flush-joint, PVC casings and appropriately sized well screens. The well screen, plug, and riser should be certified clean from the manufacturer. If they are not, they will be cleaned using a high-pressure steam cleaner with PFAS-free water. Joints and end caps will be threaded or force fittings. No Teflon tape, solvents, or glues will be used to connect well sections. In general, well screens will be 5-ft long, unless greater lengths are required to meet project objectives.
- The annulus around the screens will be backfilled with clean silica sand. The volume of filter pack required to fill the annular space will be calculated and compared to the volume installed. This information will be recorded in the field log book. The filter pack will be installed in increments as the augers are withdrawn to enable monitoring of progress and to prevent bridging. If bridging occurs, the bridge will be broken before proceeding with installation. The filter pack should extend below the bottom of the screen and 2-ft above the top of the screen, if possible based on vertical space between top of screen and ground surface. A finer grained "choke" sand (100% passing a No. 30 sieve and less than 2% passing the No. 200 sieve) will be installed between the sand pack and the bentonite seal described below.
- A bentonite chip or pellet seal with a minimum thickness of 2-ft will be placed above the filter pack. If the seal is installed above the water table, it will be manually hydrated using potable (i.e. municipal) water. Once the bentonite seal is fully hydrated, a "choke" sand, as described above, will be installed six to 12 inches above the bentonite seal. The remainder of the annular space will be filled with cement-bentonite grout to ground surface using a tremie pipe. The grout will be allowed to set before wells are developed.
- Well heads may be completed either above grade, or flush with grade. For above grade completions, the well heads will extend approximately 3-ft above grade and will be fitted with a protective casing with a lockable lid. An approximate 2-ft diameter concrete well pad will be installed around the protective casing. The well pad will be sloped away from the protective casing to shed surface water away from the well head. The well identification will be clearly visible on the inside and outside of the lid of the protective casing. A drain hole will be installed at the base of the protective casing and vent hole will also be located at the top of the protective casing. A locking well cap will be installed at the top of the protective casing.
- The top of the well casing and ground surface will be marked and surveyed to 0.01-ft, and the elevation will be determined relative to a fixed benchmark or datum. The measuring point on all wells will be on the innermost PVC casing.
- Soil cuttings generated during the advancement of the monitoring well borings will be handled in accordance with the procedure described in the Work Plan.
- A Well Completion Log will be completed for each well installed. An example of the Well Completion Log is provided in **Appendix E**.

2.4 Monitoring Well Development

After installation, monitoring wells will be developed to remove the fine material which may have settled within the filter pack and to improve/restore the hydraulic communication with the surrounding formation. Monitoring well development will be performed or overseen by a field geologist. Traditional best practice techniques and procedures shall be subject to modification to prevent the introduction of non-site-derived contaminants including PFAS into target samples as discussed in **Section 1. Table 1** includes a summary of prohibited and acceptable PFAS items.

2.4.1 Equipment and Supplies

- Water level meter (Teflon-free)
- Horiba U-52® (or similar) water quality meter
- PVC bailer or Watera pump with HDPE tubing and HDPE or stainless steel surge block
- Well development log
- Power source (if using Watera)

2.4.2 Monitoring Well Development Procedure

- Development will be performed by surging and purging the well, as appropriate, using either a PVC bailer or Watera pump with HDPE tubing and HDPE or stainless steel surge block. 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-ft prior to during, and after development. Depth to well bottom will be measured prior to and after development.
- Monitoring wells will be developed until the water discharge from the well is 50 nephelometric turbidity unit (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 **Appendix F**.
- 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 2.8**.
- Monitoring well development water will be containerized and discharged to the Town of Tonawanda Publicly Owned Treatment Works (POTW) under RITC's Industrial Sewer Connection Permit No. 331 which allows for up to 2,000 gallons per day for equipment decontamination water from investigations on the property.
- Following development, the monitoring wells will be allowed to equilibrate for a minimum of 24 hours prior to groundwater sampling.

2.5 Monitoring Well Abandonment

There may be occasions when monitoring wells will require abandonment. The abandonment approach will be in accordance with NYSDEC Policy CP-43 – Groundwater Monitoring Well Decommissioning Policy. Details regarding the well abandonment will be documented on the Well Decommissioning Record provided in **Appendix G**.

2.6 Groundwater Monitoring and Sampling

These methods may include pumping, or low-flow purging and sampling. It is anticipated that low-flow sampling will be used. If monitoring well conditions indicate that low-flow sampling is not the ideal method, additional methods such as hand bailing and pumping will be added to this sampling plan. Traditional best practice techniques and procedures shall be subject to modification to prevent the introduction of non-site-derived contaminants including PFAS into target samples as discussed in **Sections 1 and 2**.

Quality control samples should be collected at the frequency listed below for the specified parameters.

- Collect one field blank, per field team per day for PFAS.
- Collect one equipment blank per field team, per sample media, per day for PFAS.
- Collect one equipment blank for every 20 field samples (1:20) if sampling equipment is reusable (NOT disposable). An equipment blank is not necessary if sampling equipment is disposable. Check with the data management team to determine when this sample needs to be collected.
- Collect 1:20 field duplicate and Matrix Spike/Matrix Spike Duplicates (MS/MSD), at a minimum. Check with the data management team to determine when these samples need to be collected.

Special Precautions for PFAS Sampling
▪ Refer to **Table 1** for special clothing, PPE, supply and equipment requirements for PFAS and sampling. ▪ Bottles for PFAS samples should be stored and shipped to and from laboratory in separate coolers from other bottleware/samples. ▪ DO NOT mix bottleware for PFAS samples with other bottleware to make bottle sets for sample locations. ▪ Change nitrile gloves prior to handling bottles for PFAS analysis and collection of samples for PFAS analysis. ▪ A PFAS sampling checklist is included as **Appendix C** and should be filled out daily by field personnel.

2.6.1 Low Flow Purging and Sampling

2.6.1.1 Equipment and Supplies

- Well gauging and sampling logs (no weatherproof field books permitted)
- Project plans
- Personal protective equipment (PPE) in accordance with the HASP and free of PFAS products (see **Table 1**)
- PID, if required by HASP
- PFAS free water level probe (see **Table 1** for list of PFAS free equipment)
- PFAS free electronic oil/water interface probe (see **Table 1** for list of PFAS free equipment)
- Polypropylene rope
- Graduated 5-gallon buckets
- Water quality meter (Horiba U-52 or similar) Flow-through cell
- Generator

- Extension cords
- Decontamination supplies
- PFAS free peristaltic or bladder pump capable of achieving flow rates of 0.5 liters per minute or less (see **Table 1** for list of PFAS free equipment)
- HDPE plastic tubing (appropriately sized for the chosen peristaltic or bladder pump)
- HDPE plastic sheeting
- Clear tape, duct tape
- Coolers and ice
- Laboratory sample bottles
- Shipping labels

2.6.1.2 Purging

- Equipment will be decontaminated prior to use at each location.
- Prior to sampling, the static water level and depth to well bottom will be measured to the nearest 0.01-ft from the surveyed well elevation mark on the top of the PVC casing with a decontaminated water level meter. NAPL thickness will be confirmed using a clear bailer or a weighted cotton string. The measurement will be recorded in the field notes.
- 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 notes.
- The intake of the peristaltic or submersible pump will be positioned in the center of the screened interval and the upper end of the tubing will be connected to the flow through cell. Flow rate shall not exceed 0.5 liters/min (500 ml/min). Initially, a flow rate between 200 ml/min and 500 ml/min will be used. The drawdown will be monitored using a water level probe and the flow rate will be reduced if the drawdown exceeds 0.3-ft. Efforts should be made to minimize the generation of air bubbles in the sample tubing by either increasing the flow rate as appropriate, or restricting the flow by clamping the tubing
- During purging, pH, specific conductivity, temperature, ORD (redox), dissolved oxygen, and turbidity will be monitored and recorded at time intervals sufficient to evacuate the volume of the flow-through cell. This information along with water level readings to monitor drawdown will be recorded on the Low Flow Groundwater Sampling Log. An example of the Low Flow Groundwater Sampling Log is provided in **Appendix I.**
- 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 Turbidity reading should be less than 50 NTUs before sample collection. If turbidity levels remain high, consult the project manager to discuss the possibility of having the analytical laboratory filter samples prior to analysis.
- 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 the Work Plan.

2.6.1.3 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 separate hand-held turbidity meter or within the flow-through cell. All measurements will be recorded on the Low Flow Groundwater Sampling Log (**Appendix I**). Turbidity reading should be less than 50 NTUs before sample collection. If turbidity levels remain high, consult the 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.
- 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 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. Sample bottles for PFAS samples should be kept separate from other sample bottles. 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.
- Record the appearance of the groundwater on the Standard Groundwater Sampling Log (**Appendix H**).
- A PFAS field blank should be collected daily during sampling activities. The PFAS field blank is a PFAS sample bottle pre-filled at the laboratory and sent with the sample bottles. Open the PFAS field blank bottle provided by the analytical laboratory and pour into an empty PFAS sample bottle. Gloves should be changed prior to handling the PFAS field blank bottle.
- When you are ready to fill the bottles, remove them from their transport containers (except for PFAS bottles). Prepare them to receive the samples.
- Samples are transferred directly to the container. The container should hold any necessary preservative and should be correctly labeled before the sample is transferred to it. Samples should be collected in the following order:
  - PFAS
  - VOCs
  - SVOCs
  - PCBs
  - Pesticides
  - Metals
  - Cyanide
- Inspect labels to see that the samples are properly identified.
- Fill each sample container in accordance with the QAPP or other sampling outline.
- 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.
- Close the PFAS filed blank bottle and return it to the PFAS designated cooler. Be sure to change gloves prior to handling the PFAS field blank bottle.
- Record the date and time.
- Secure the well head.
- The sample containers will be labeled, placed in a laboratory-supplied cooler (keeping PFAS sample bottles separate from other sample bottles), with protective packaging (i.e., bubble wrap) and packed on ice (to maintain a temperature of 4 C). Samples must not be allowed to freeze. Do not use ice packs.
- A PFAS equipment blank should be collected daily from each sample set-up. The equipment blank is collected by pouring or pumping laboratory supplied and certified PFAS free water through sample

apparatuses and collecting in appropriate sample bottles. Gloves should be changed prior to collecting the equipment blank sample.

- A temperature blank in the appropriate sample bottle (i.e., no Teflon lined caps for PFAS temperature blank bottles) should accompany each cooler.
- Check that PFAS field blank, and equipment blanks are included in the PFAS designated coolers.
- The cooler will be shipped overnight or delivered to the ELAP-certified laboratory for analysis.
- Samples for laboratory analysis will be submitted to an approved NYSDOH ELAP-certified laboratory. Analyses will be conducted using USEPA methodologies as specified in the QAPP. Samples will be managed in accordance with the QAPP. COC procedures will be followed as outlined in the QAPP.

2.7 Staff Gauge Installation and Measuring

Seven staff gauges will be installed and measured. Staff gauge installation and measurement will be performed as follows:

- Staff gauges will be mechanically driven into the stream bottom by hand methods.
- The top of the staff gauge will be surveyed for elevation.
- After installation, each staff gauge will be photographed for future reference to assess any movement or disturbance, and re-leveled for elevation, as necessary.
- Stream elevation will be measured from the top of the staff gauge or survey point using a water level indicator, tape measure, or folding ruler.

2.8 Surface Soil Sampling

Surface soil samples will be collected by either using a stainless steel spoon to fill the sample container directly or collecting surface soil using a stainless steel spoon, shovel, or a hand auger into a stainless steel bowl and then filling sample containers.

Quality control samples should be collected at the frequency listed below for the specified parameters.

- Collect one equipment blank for every 20 field samples (1:20). Check with the data management team to determine when this sample needs to be collected.
- Collect 1:20 field duplicate and MS/MSD. Check with the data management team to determine when these samples need to be collected.

2.8.1 Equipment and Supplies

- Appropriate, pre-cleaned sample bottles will be provided by the analytical laboratory
- Dedicated HDPE containers to collect samples
- PPE in accordance with the HASP
- Stainless steel auger and shovel
- Stainless steel bowls and spoons
- Decontamination chemicals and supplies
- Dedicated, clean cooler with ice
- Sample logs (no weatherproof field books permitted)
- Digital camera

2.8.2 Surface Soil Sampling Method

- For each sample collected, observations of soil type will be recorded in field logs according to **Section 2.9.** Sample field logs are included in **Appendix J**.
- An auger and/or stainless steel shovel will be used to collect soil samples. Sample locations may be modified in the field to allow for access. Minor clearing of vegetation may be required to access sample locations. To the extent practical, efforts will be made to minimize disturbance to the soils during clearing efforts.
- Upon retrieval, surface soil samples will be processed in the field. Samples will be obtained from the inner portion of the collected sample avoiding surface soil that has contacted sampling device, when possible.
- First, volatile organic compound samples will be obtained 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.
- Fill each sample container in accordance with the QAPP or other sampling outline. Samples should be collected in the following order:
  - VOCs
  - PFAS
  - SVOCs
  - Metals
  - Cyanide
- Equipment will be decontaminated prior to use at each location as described in **Section 2.13**.
- The sample containers will be labeled, placed in a laboratory-supplied cooler with protective packaging (i.e., bubble wrap) and packed on ice (to maintain a temperature of 4 C). The cooler will be shipped overnight or delivered to the ELAP-certified laboratory for analysis.
- Samples for laboratory analysis will be submitted to an approved NYSDOH ELAP-certified laboratory. Analyses will be conducted using USEPA methodologies as specified in the QAPP. Samples will be managed in accordance with the QAPP. COC procedures will be followed as outlined in the QAPP.

2.9 Sediment Sampling

Sediment samples will be collected by either using a slide hammer and Lexan core liner for drainage ditch sampling or a sediment core sampler for Niagara River Samples.

Quality control samples should be collected at the frequency listed below for the specified parameters.

- Collect one equipment blank for every 20 field samples (1:20). Check with the data management team to determine when this sample needs to be collected.
- Collect 1:20 field duplicate and MS/MSD. Check with the data management team to determine when these samples need to be collected.

2.9.1 Drainage Ditch and Wetland Soil/Sediment Sampling

It is anticipated that drainage ditch soil samples will be collected using a slide hammer and Lexan core liners. Based on site conditions, alternate methods may need to be developed. In that case, the FSP will be updated to reflect methods.

2.9.1.1 Equipment and Supplies

- Slide hammer, sample tube with shoe, and lexan liners;

- Excavator arm or tripod (if necessary);
- Saw, knife, cutters to open or split core liners;
- Containers, buckets, tubs;
- Wash box;
- Glassware;
- Log book, indelible pens/markers;
- Labels;
- Coolers;
- Duct tape;
- Spoons;
- Gloves;
- Meter wheel/measuring device (tape measure, yard stick/meter stick); and
- Photoionization detector.

2.9.1.2 Sample Collection

- Remove the sample tube shoe and insert a clean lexan liner. Screw the shoe back on to the sample tube and the sample tube back on to the slide hammer.
- Drive the sample tube to the specified interval using the slide hammer.
- If necessary, insert PVC pipe wide enough for the sampler to fit through into the hole to hold it open for sampling of subsequent intervals.
- If necessary, use a tripod or excavator arm to pull the slide hammer out of the subsurface if it gets stuck and cannot be removed by hand.
- Remove the liner from the sample tube and cap both ends.
- Measure core recovery. The criterion for an acceptable core recovery is of 70% or greater of the coring depth given in the work plan. If less than 70% recovery is obtained, take additional cores.
- Secure caps using tape caps so that the caps do not leak or slip off during transport or storage.
- Write the location ID, orientation (up arrow) and depth on the outside of the core tube and on the core cap with a permanent marker.
- Store the core vertically until processing.
- Decontaminate the slide hammer and sample tube and insert a clean liner for sampling subsequent depth intervals.
- For processing, the core will be laid on a sample processing table that has been covered with clean plastic or aluminum foil. The core tube will be cut along its length twice allowing approximately 35 to 50 percent of the core tube to be removed, thus exposing the sediment core. If VOCs are to be sampled from the core, they will be collected first. After sampling the VOCs (if required) and prior to homogenization or other sampling, material will be visually assessed. Pre-decontaminated implements made of stainless steel, glass, Teflon coated, or other inert material will be used to slice and transfer samples. Semicircular spatulas or knives will be used to slice the core segments, one segment at a time. The semicircular spatula will be left in place to hold back the rest of the sediment core and associated water. A second semicircular spatula will be inserted at the next sample interval and held in place. The first semicircular spatula will be removed and the new sediment slice will be transferred to a sample container. This process will be continued until all proposed sample intervals have been collected.
- If more material is needed for the sample than can be obtained from a single core, multiple cores will be composited. Additional cores will be processed as described in steps 3 and 4 above. VOC samples will be taken prior to homogenization.
- The contents of the core tube will be placed in an appropriate mixing container and will be thoroughly homogenized. The homogenized sample will be placed in the appropriate pre-labeled laboratory-provided

containers. All sample material will be homogenized before being placed in pre-labeled laboratory-provided containers so the contents of each container is as similar as possible.

- Where **Terra core® samplers** are specified for VOCs, the sediment core will be laid out and split on the sample processing table. The sediment core will be quickly screened and examined. The section of the core most closely matching the sampling criteria will be sampled using the terracore samplers. If the samples are to be collected from a specific depth, the sample will be collected before screening. After the VOC samples are collected, the remaining material will be placed in sample jars for the other specified parameters following the appropriate processing protocols.
- A physical description of each core section will be made by examining the horizontally sectioned core segments. The core descriptions will include color, primary and secondary constituents, grain sizes and distribution, layering, odor, stain, and sheen.
- Waste sediment cores will be separated from the used core liners and transferred into drums for proper disposal.
- Samples for laboratory analysis will be submitted 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.
- Sampling equipment will be decontaminated between sampling locations (see **Section 2.13**).

2.9.2 In-River Sediment Core Sampling

2.9.2.1 Equipment and Supplies

- Sediment sampler (Ponar dredge, gravity core sampler, push core sampler, Vibracore sampler(s), probing equipment or instruments). It is anticipated that a vibracore sampler will be appropriate for proposed work.
- Winch (if necessary);
- Boom arm or A-frame;
- Sediment core sampler (Vibracore, piston tube, Wildco tube sampler, etc.);
- Core liners, core catchers, liner caps, etc.;
- Saw, knife, cutters to open or split core liners;
- Sampling vessel or floating platform;
- Propulsion method for sampling vessel or floating platform;
- Containers, buckets, tubs;
- Wash box;
- Glassware;
- Log book, indelible pens/markers;
- Labels;
- Coolers;
- Duct tape;
- Spoons;
- Gloves;
- Meter wheel/measuring device (tape measure, yard stick/meter stick); and
- Photoionization detector.

2.9.2.2 Sample Collection

The following methods will be used to collect sediment core samples. These methods can be used to collect cores up to 20-ft in length. The maximum anticipated core length during RI activities is 5-ft.

- Select a sediment core sampler (Vibracore, piston tube, Wildco tube sampler, etc.) suitable for the bottom conditions/sediment characteristics, water depth expected, the volume of material needed, and the planned depth of sampling, and possible physical restrictions affecting deployment (e.g., vessel size, lifting capacity, etc.). It is anticipated that a vibracore sampler will be appropriate for core sampling during the Remedial Investigation (RI).
- Select sediment coring tools of sufficient diameter and length to obtain the needed sample volume and depth of penetration. Multiple sediment cores may need to be pushed depending on the volume of sediment needed. Predetermine the number of cores required to avoid having to return to a location for additional cores/sample volume.
- Set up the sediment coring tool and install the core liner tube, drive head, drive shoe, and/or core catcher, piston, and piston line, as appropriate for the specific sampler chosen and the proposed depth of sample/penetration.
- Securely attach the core sampler to a winch with a cable or line of sufficient strength to accommodate the weight of the sampler (Vibracore) or other sampler (piston tube or Wildco tube sampler).
- Slowly lower the sampler through the moon pool or over the side of the vessel until the sampler reaches the water/sediment interface. The sampler will be lowered on a winch cable (Vibracore) or with the assistance of an A-frame or boom to carry/control the weight of the sampler. Note the depth to the top of sediment.
- Advance the sediment core sampler into the sediment to the proposed penetration depth or to refusal, whichever occurs first. If refusal is encountered, the sampling location should be moved slightly and the sample attempted again. The location where refusal was encountered should be noted. Three attempts should be made at a station. If a sample cannot be collected after three attempts, the field crew should notify the field team leader. If unable to contact the field team leader then the crew will move the next location.
- The Vibracore sampler will be advanced by the vibrating head. The Vibracore sampler will continue to be attached to the winch line and the rate of descent will be controlled during penetration into the sediment. The piston tube or Wildco tube samplers will be advanced manually. If necessary, the piston tube or Wildco tube sampler may be advanced by tapping the top of the sampler conductance pipe with a rubber mallet. These samplers are intended for soft sediment and will not tolerate heavy abuse.
- Upon reaching the target penetration depth (or refusal), slowly retrieve the sediment-coring tool. As soon as possible, cap the bottom of the sample tube to prevent loss of sample. Secure the sampling apparatus.
- Remove the sediment core liner from the sampling apparatus.
- Cap the bottom end of the core tube if it was not capped previously.
- Allow the core to drain by decanting the water off the top of the core, without disturbing the surface of the sediment. Decanting of water will be accomplished by either sawing/cutting a slot or drilling a hole in the core tube below the sediment/water interface, and allowing free-standing water above the interface to drain out. After decanting, the hole will be sealed with duct tape or other material. For shorter cores, such as push tubes or Wildco samples, decanting can be conducted either on the boat, or in the sample processing area. At the first sign of sediment in the drained water sample, cease draining and tie or cap the sample liner to ensure that the sediment “fluff” layer is retained in the sample.
- Cap the top of the core tube. Measure core recovery. The criterion for an acceptable core recovery is of 70% or greater of the coring depth given in the work plan. If less than 70% recovery is obtained, take additional cores as described below.
- The cores will be cut into appropriate lengths to facilitate transport and handling. Cores will be cut by laying the cores horizontally on the deck, and marking the core tube intervals starting from the top of the sediment. The core tubes will then be cut with an appropriate saw. The sections will be separated using a broad knife, and capped at each end. The caps will be secured with duct tape.
- Secure caps using tape caps so that the caps do not leak or slip off during transport or storage.

- Write the location ID, orientation (up arrow) and depth on the outside of the core tube and on the core cap with a permanent marker.
- Store the core vertically on the vessel in a safe area where minimal disturbance to the sample will occur.
- Transport sediment cores to the onshore processing area throughout the day. Cores tubes should be secured in an upright position until core samples can be processed.
- Decontaminate the sediment coring apparatus as described in **Section 2.8**.
- Repeat the process at an offset location until sufficient sample quantity has been recovered. Additional cores may need to be obtained if many different analyses will be run on thin layers or bulk samples are required for settling tests or bench scale tests.
- If insufficient core sample recovery (less than 70%) or refusal is encountered before reaching the proposed depth, reposition the vessel in the vicinity of the prior attempt, and repeat the process up to two more times in an attempt to obtain better recovery or better penetration. Select the core with the best percent recovery and penetration for sampling and analysis. The coordinates for each core should be obtained and documented.
- For processing, the core will be laid on a sample processing table that has been covered with clean plastic or aluminum foil. The core tube will be cut along its length twice allowing approximately 35 to 50 percent of the core tube to be removed, thus exposing the sediment core. If VOCs are to be sampled from the core, they will be collected first. After sampling the VOCs (if required) and prior to homogenization or other sampling, material will be visually assessed using the methods described in **Section 2.9**. Pre-decontaminated implements made of stainless steel, glass, Teflon coated, or other inert material will be used to slice and transfer samples. Semicircular spatulas or knives will be used to slice the core segments, one segment at a time. The semicircular spatula will be left in place to hold back the rest of the sediment core and associated water. A second semicircular spatula will be inserted at the next sample interval and held in place. The first semicircular spatula will be removed and the new sediment slice will be transferred to a sample container. This process will be continued until all proposed sample intervals have been collected.
- If more material is needed for the sample than can be obtained from a single core, multiple cores will be composited. Additional cores will be processed as described in steps 3 and 4 above. VOC samples will be taken prior to homogenization.
- The contents of the core tube will be placed in an appropriate mixing container and will be thoroughly homogenized using the procedure as described in **Section 3.3**. The homogenized sample will be placed in the appropriate pre-labeled laboratory-provided containers. All sample material will be homogenized before being placed in pre-labeled laboratory-provided containers so the contents of each container is as similar as possible.
- Where **Terra core® samplers** are specified for VOCs, the sediment core will be laid out and split on the sample processing table. The sediment core will be quickly screened and examined. The section of the core most closely matching the sampling criteria will be sampled using the terracore samplers. If the samples are to be collected from a specific depth, the sample will be collected before screening. After the VOC samples are collected, the remaining material will be placed in sample jars for the other specified parameters following the appropriate processing protocols.
- A physical description of each core section will be made by examining the horizontally sectioned core segments. The core descriptions will include color, primary and secondary constituents, grain sizes and distribution, layering, odor, stain, and sheen, as described in **Section 2.9**.
- Waste sediment cores will be separated from the used core liners and transferred into drums for proper disposal.
- Samples for laboratory analysis will be submitted 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.
- Sampling equipment will be decontaminated between sampling locations (see **Section 2.13**).

2.10 Soil/Sediment Descriptions

Soils and sediments will be collected using the methods described in previous sections. The soils collected will be described using Burmister and USCS classification systems according to the methods and procedures outlined in the following sections.

2.10.1 Equipment and Supplies

- Digital camera or phone/tablet
- 1-gallon sealable bags
- Field forms and field logbook
- Scissors/knife
- Spray bottles with Alconox solution and water
- Nitrile gloves
- Permanent marker for labeling
- PID

2.10.2 Burmister Classification System

Samples described based on the Burmister Classification System 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."

<u>Consistency</u>:

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", "rounded") and the grading ("Well Graded, "Poorly Graded", or "Uniform").

When applicable, the penetration rate while conducting the 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-ft split spoon will be used to select a consistency description from the penetration guide below. SPT values are typically recorded in 6-inch intervals, so for example: a 2-ft 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 was sand the consistency from the table is "Medium Dense", if the material was 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.

First Entry: 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.

Second Entry: The second, third, etc. 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.

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 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 which is usually non-plastic in character and exhibits little or no strength when air dried.		

GRAIN SIZE AND SIEVES				
SOIL	FROM SIEVE NUMBER	TO SIEVE NUMBER	FROM MM	TO MM
Clay	#200	Material passing the No. 200 sieve which 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.

2.10.3 Unified Soil Classification System

The USCS is based on textural characteristics. Soils fall into one of fifteen 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.
- A complete list of symbols is provided below:

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 amt. 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 amt. 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.
	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.

MAJOR DIVISIONS		GROUP SYMBOLS	TYPICAL NAMES
		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**).			

2.10.4 Field Observations of Contamination or Site-Specific Character

Environmental samples are also screened for visual evidence of contamination. 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.

Odor:

Anthropogenic materials may have a distinctive 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.

Screening:

Samples for headspace screening will be collected. A representative portion of each soil sample will be placed in a re-sealable plastic (e.g., Ziploc®) bag filled approximately half full. The bag will be labeled with the boring number and interval sampled. After allowing the bagged soil to warm, the tip of the sample probe attached to the PID will be inserted into the bag to measure the headspace for organic vapors.

Soils collected for headspace screening will not be used for laboratory analysis.

2.11 Surface Water Sampling

Surface water samples will be collected using sample bottles provided by the laboratory or dedicated HDPE sampling containers (for sample bottles with preservatives).

Quality control samples should be collected at the frequency listed below for the specified parameters.

- Collect one field blank, per field team per day for PFAS.
- Collect one equipment blank per field team, per sample media, per day for PFAS.
- Collect one equipment blank for every 20 field samples (1:20) for full suite of analytes if sampling equipment is reusable (NOT disposable). An equipment blank is not necessary for a full suite of analytes if

sampling equipment is disposable. Check with the data management team to determine when this sample needs to be collected.

- Collect 1:20 field duplicate and MS/MSD, at a minimum. Check with the data management team to determine when these samples need to be collected.

2.11.1 Equipment and Supplies

- Appropriate, pre-cleaned sample bottles provided by the analytical laboratory;
- Horiba U-52 (or equivalent) water quality instrument;
- Dedicated HDPE containers to collect samples;
- PPE in accordance with the PSHEP and free of PFAS products
- Sample labels; and
- Dedicated, clean cooler with ice.

2.11.2 Sample Collection

- Before collecting any data, calibrate water quality meters per manufacturer's instructions.
- Keep sample bottles cool and with their caps on until they are ready to receive samples. Sample bottles for PFAS samples should be kept separate from other sample bottles. 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 sample probe into the water at each sample location and record the water temperature, pH, conductivity on sample forms.
- A PFAS field blank should be collected daily during sampling activities. If surface water sampling is occurring simultaneous with another sampling method (e.g., soil or groundwater sampling), only one field blank will be collected each day. The PFAS field blank is a PFAS sample bottle pre-filled at the laboratory and sent with the sample bottles. Open the PFAS field blank bottle provided by the analytical laboratory and pour into an empty PFAS sample bottle. Gloves should be changed prior to handling the PFAS field blank bottle.
- Fill each sample container in accordance with the QAPP or other sampling outline. Samples should be collected in the following order:
  - SVOCs
  - PCBs
  - Pesticides
  - Metals
  - Cyanide
- Hold the sample bottle (bottles with no preservatives) or dedicated HDPE sample container (for sample bottles with preservatives) at the water surface until the sample bottle or sample container is filled.
- Inspect labels to see that the samples are properly identified including sample ID, date, and time.
- Return each sample bottle to its proper transport container.
- Close the PFAS filed blank bottle and return it to the PFAS designated cooler. Be sure to change gloves prior to handling the PFAS field blank bottle.
- The sample containers will be labeled, placed in a laboratory-supplied cooler (keeping PFAS sample bottles separate from other sample bottles), with protective packaging (i.e., bubble wrap) and packed on ice (to maintain a temperature of 4˚C). Do not use ice packs.
- A PFAS equipment blank should be collected daily from each sample set-up. If surface water sampling is occurring simultaneous with another sampling method (e.g., soil or groundwater sampling), separate equipment blanks will be collected for each sampling method if different equipment is used. The equipment blank is collected by pouring or pumping PFAS free water provided by the analytical laboratory through/over

sample apparatuses and collecting in appropriate sample bottles. Gloves should be changed prior to collecting the equipment blank sample.
- Check that PFAS field blank, and equipment blanks are included in the PFAS designated coolers.
- The cooler will be shipped overnight or delivered to the NYSDOH ELAP-certified laboratory for analysis.
- Analyses will be conducted using USEPA methodologies as specified in the QAPP Samples will be managed in accordance with the QAPP. COC procedures will be followed as outlined in the QAPP.

2.12 Sediment Probing

2.12.1 Equipment and Supplies

- Sampling vessel/platform;
- Survey rods (graduated to measure water depth);
- Field notebook; and
- GPS unit with transect data.

2.12.2 Probing Procedure

- Navigate sampling vessel/platform to transect location using on-board GPS unit. Connect survey rods of sufficient length to reach the river-bottom.
- Position vessel at near-shore extent of survey transect and begin probing by deploying survey rods to encounter river bottom, and successively raising and lowering survey rods. Note the consistency of river-bottom sediments, e.g., whether bottom is soft/mucky, firm/granular, or hard/gravelly.
- Traverse the length of the transects while probing the river-bottom and recording bottom consistency, focusing on transitions between soft and firm/hard bottom conditions. A GPS shot should be taken at each probing point along the transect, resulting in co-located GPS and consistency data.
- Once probing has been completed along a specific transect, the sampling vessel/platform will navigate to the near-shore extent of the next transect and repeat the probing procedures.

2.13 Drainage Ditch and Shoreline Visual Assessment

An inspection of the drainage ditch and Niagara River shoreline will be performed as described below to document current conditions.

2.13.1 Equipment and Supplies

- Field book
- GPS unit
- Camera

2.13.2 Visual Assessment Procedure

- The assessment will predominantly take place from land, unless conditions persist that are not visible from the shore. In that case, if feasible, a vessel may be used to supplement the assessment.

- The shoreline will be walked and notable features will be recorded. Notable features include current or historic infrastructure (i.e., bulkheads, sheet piling), trash or other waste, water flow conditions, vegetation, habitats, and evidence of wildlife.
- Photos will be taken ever 25-50 ft along the inspection path. A GPS will be used to record the location of photos. The position and orientation of each photo will also be recorded.

2.14 Decontamination of Sampling Equipment

2.14.1 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 using potable (i.e. municipal) water 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 per 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.
- Pressure washers used to aid in equipment decontamination should be free of Teflon tape and parts.

2.14.2 Sampling Equipment Decontamination

2.14.2.1 Equipment and Supplies

- Laboratory supplied and certified PFAS free water
- PFAS free, phosphate-free detergent (see **Table 1**)
- HDPE sheeting
- Plastic buckets and brushes
- PPE in accordance with the HASP

2.14.2.2 Decontamination Procedures

- Prior to sampling, non-dedicated sampling equipment (e.g., bailers, bowls, spoons, certified PFAS-free interface probes, etc.) will be washed with laboratory supplied and certified PFAS free water and a PFAS/ phosphate-free detergent (see **Table 1**). Decontamination may take place at the sampling location as long as all liquids are contained in pails, buckets, etc. Traditional best practice techniques and procedures shall be subject to modification to prevent the introduction of non-site-derived contaminants including PFAS into target samples as discussed in **Section 1. Table 1** includes a summary of prohibited and acceptable PFAS items. A PFAS sampling checklist is included as **Appendix C** and should be filled out daily by field personnel.
- The sampling equipment will then be rinsed with laboratory supplied and certified PFAS free water.
- Between rinses, equipment will be placed on HDPE sheets, if necessary. At no time, will washed equipment be placed directly on the ground.
- Equipment will be wrapped in HDPE for storage or transportation from the designated decontamination area to the sampling location.

3.0 REFERENCES

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TABLES

TABLE 1 PROHIBITED AND ACCEPTABLE ITEMS FOR EMERGENT CONTAMINANT SAMPLING

PROHIBITED	ACCEPTABLE
Field Equipment	
Teflon® containing materials	High Density High density polyethylene (HDPE), stainless steel or polypropylene materials
Low density polyethylene (LDPE) materials	Acetate liners Silicone Tubing
Waterproof field books, waterproof paper and waterproof sample bottle labels	Loose non-waterproof paper and non-waterproof sample labels
Waterproof markers / Sharpies®	Pens
Post-It Notes®	Tape; loose leaf paper
Chemical (blue) ice packs	Wet Ice
Field Clothing and PPE	
New cotton clothing or synthetic water resistant, waterproof, or stain-treated clothing, clothing containing Gore-TexTM	Well-laundered clothing made of natural fibers (preferable cotton)
Clothing laundered using fabric softener	No fabric softener
Boots containing Gore-TexTM or treated with water-resistant sprays	Boots made with polyurethane and PVC
Coated Tyvek®	Laundered cotton clothing
No cosmetics, moisturizers, hand cream, or other related products as part of personal leaning/showering routine on the morning of sampling	Sunscreens - Alba Organics Natural Sunscreen, Yes To Cucumbers, Aubrey Organics, Jason Natural Sun Block, Kiss My Face, and baby sunscreens that are "chemical free", "toxin free", or "natural"
Sunscreens or insecticides except as noted on right	Insect Repellents - Jason Natural Quit Bugging Me, Repel Lemon Eucalyptus Insect Repellant, Herbal Armor, California Baby Natural Bug Spray, Baby Ganics Sunscreen and Insect Repellant - Avon Skin So Soft Bug Guard Plus - SPF 30 Lotion
Sample Containers	
LDPE or glass containers	HDPE or polypropylene
Teflon®-lined caps	Unlined polypropylene caps
Rain Events	
Waterproof or resistant rain gear	Wet weather gear made of polyurethane and PVC only; field tents that are only touched or moved prior to and following sampling activities
Equipment Decontamination	
Decon 90® Water from an on-site well	Alconox® and/or Liquinox®

TABLE 1 PROHIBITED AND ACCEPTABLE ITEMS FOR EMERGENT CONTAMINANT SAMPLING

PROHIBITED	ACCEPTABLE
Food Considerations	
All food and drink, with exceptions noted on right	Bottled water and hydration fluids (i.e., Gatorade® and Powerade®) to be brought and consumed only in the staging areas
Vehicle Considerations	
Vehicle fabrics, carpets and mats may contain PFASs	Avoid utilizing areas inside vehicle as sample staging areas.

APPENDIX A GUIDELINES FOR SAMPLING AND ANALYSIS OF PFAS (NYSDEC, JANUARY 2020)

NEW YORK STATE OF OPPORTUNITY. | Department of Environmental Conservation

SAMPLING, ANALYSIS, AND ASSESSMENT OF PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS)

Under NYSDEC's Part 375 Remedial Programs

October 2020

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NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

ERRATA SHEET for

SAMPLING, ANALYSIS, AND ASSESSMENT OF PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) Under NYSDEC's Part 375 Remedial Programs Issued January 17, 2020

Citation and Page Number	Current Text	Corrected Text	Date
Title of Appendix I, page 32	Appendix H	Appendix I	2/25/2020
Document Cover, page 1	Guidelines for Sampling and Analysis of PFAS	Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs	9/15/2020
Routine Analysis, page 9	"However, laboratories analyzing environmental samples…PFOA and PFOS in drinking water by EPA Method 537, 537.1 or ISO 25101."	"However, laboratories analyzing environmental samples…PFOA and PFOS in drinking water by EPA Method 537, 537.1, ISO 25101, or Method 533."	9/15/2020
Additional Analysis, page 9, new paragraph regarding soil parameters	None	"In cases where site-specific cleanup objectives for PFOA and PFOS are to be assessed, soil parameters, such as Total Organic Carbon (EPA Method 9060), soil pH (EPA Method 9045), clay content (percent), and cation exchange capacity (EPA Method 9081), should be included in the analysis to help evaluate factors affecting the leachability of PFAS in site soils."	9/15/2020
Data Assessment and Application to Site Cleanup Page 10	Until such time as Ambient Water Quality Standards (AWQS) and Soil Cleanup Objectives (SCOs) for PFAS are published, the extent of contaminated media potentially subject to remediation should be determined on a case-by-case basis using the procedures discussed below and the criteria in DER-10. Target levels for cleanup of PFAS in other media, including biota and sediment, have not yet been established by the DEC.	Until such time as Ambient Water Quality Standards (AWQS) and Soil Cleanup Objectives (SCOs) for PFOA and PFOS are published, the extent of contaminated media potentially subject to remediation should be determined on a case-by-case basis using the procedures discussed below and the criteria in DER-10. Preliminary target levels for cleanup of PFOA and PFOS in other media, including biota and sediment, have not yet been established by the DEC.	9/15/2020
Water Sample Results Page 10	PFAS should be further assessed and considered as a potential contaminant of concern in groundwater or surface water (…) If PFAS are identified as a contaminant of concern for a site, they should be assessed as	PFOA and PFOS should be further assessed and considered as potential contaminants of concern in groundwater or surface water (…) If PFOA and/or PFOS are identified as contaminants of concern for a site, they should be assessed as part of the remedy selection process in accordance with Part 375 and DER-10.	9/15/2020

Citation and Page Number	Current Text	Corrected Text	Date
	part of the remedy selection process in accordance with Part 375 and DER-10.		
Soil Sample Results, page 10	"The extent of soil contamination for purposes of delineation and remedy selection should be determined by having certain soil samples tested by Synthetic Precipitation Leaching Procedure (SPLP) and the leachate analyzed for PFAS. Soil exhibiting SPLP results above 70 ppt for either PFOA or PFOS (individually or combined) are to be evaluated during the cleanup phase."	"Soil cleanup objectives for PFOA and PFOS will be proposed in an upcoming revision to 6 NYCRR Part 375-6. Until SCOs are in effect, the following are to be used as guidance values. " [Guidance Value Table] "PFOA and PFOS results for soil are to be compared against the guidance values listed above. These guidance values are to be used in determining whether PFOA and PFOS are contaminants of concern for the site and for determining remedial action objectives and cleanup requirements. Site-specific remedial objectives for protection of groundwater can also be presented for evaluation by DEC. Development of site-specific remedial objectives for protection of groundwater will require analysis of additional soil parameters relating to leachability. These additional analyses can include any or all the parameters listed above (soil pH, cation exchange capacity, etc.) and/or use of SPLP. As the understanding of PFAS transport improves, DEC welcomes proposals for site-specific remedial objectives for protection of groundwater. DEC will expect that those may be dependent on additional factors including soil pH, aqueous pH, % organic carbon, % Sand/Silt/Clay, soil cations: K, Ca, Mg, Na, Fe, Al, cation exchange capacity, and anion exchange capacity. Site-specific remedial objectives should also consider the dilution attenuation factor (DAF). The NJDEP publication on DAF can be used as a reference: https://www.nj.gov/dep/srp/guidance/rs/daf.pdf. "	9/15/2020
Testing for Imported Soil Page 11	Soil imported to a site for use in a soil cap, soil cover, or as backfill is to be tested for PFAS in general conformance with DER-10, Section 5.4(e) for the PFAS Analyte List (Appendix F) using the analytical procedures discussed below and the criteria in DER-10 associated with SVOCs.	Testing for PFAS should be included any time a full TAL/TCL analyte list is required. Results for PFOA and PFOS should be compared to the applicable guidance values. If PFOA or PFOS is detected in any sample at or above the guidance values then the source of backfill should be rejected, unless a site-specific exemption is provided by DER based on SPLP testing, for example. If the concentrations of PFOA and PFOS in leachate are at or above 10 ppt (the Maximum Contaminant Levels established for drinking water by the New York State Department of Health), then the soil is not acceptable.	9/15/2020

Citation and Page Number	Current Text	Corrected Text	Date
	If PFOA or PFOS is detected in any sample at or above 1 µg/kg, then soil should be tested by SPLP and the leachate analyzed for PFAS. If the SPLP results exceed 10 ppt for either PFOA or PFOS (individually) then the source of backfill should be rejected, unless a site-specific exemption is provided by DER. SPLP leachate criteria is based on the Maximum Contaminant Levels proposed for drinking water by New York State's Department of Health, this value may be updated based on future Federal or State promulgated regulatory standards. Remedial parties have the option of analyzing samples concurrently for both PFAS in soil and in the SPLP leachate to minimize project delays. Category B deliverables should be submitted for backfill samples, though a DUSR is not required.	PFOA, PFOS and 1,4-dioxane are all considered semi-volatile compounds, so composite samples are appropriate for these compounds when sampling in accordance with DER-10, Table 5.4(e)10. Category B deliverables should be submitted for backfill samples, though a DUSR is not required.	
Footnotes	None	[1] TOP Assay analysis of highly contaminated samples, such as those from an AFFF (aqueous film-forming foam) site, can result in incomplete oxidation of the samples and an underestimation of the total perfluoroalkyl substances. [2] The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the soil cleanup objective for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf).	9/15/2020

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

Objective

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

Applicability

All work plans submitted to DEC pursuant to one of the remedial programs under Part 375 shall include PFAS sampling and analysis procedures that conform to the guidelines provided herein.

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

Field Sampling Procedures

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

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

QA/QC samples (e.g. duplicates, MS/MSD) should be collected as specified in DER-10, Section 2.3(c). For sampling equipment coming in contact with aqueous samples only, rinsate or equipment blanks should be collected.

Equipment blanks should be collected at a minimum frequency of one per day per site or one per twenty samples, whichever is more frequent.

Analysis and Reporting

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

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

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

Routine Analysis

Currently, New York State Department of Health's Environmental Laboratory Approval Program (ELAP) does not offer certification for PFAS in matrices other than finished drinking water. However, laboratories analyzing environmental samples for PFAS (e.g., soil, sediments, and groundwater) under DER's Part 375 remedial programs need to hold ELAP certification for PFOA and PFOS in drinking water by EPA Method 537, 537.1, ISO 25101, or Method 533. Laboratories should adhere to the guidelines and criteria set forth in the DER's laboratory guidelines for PFAS in non-potable water and solids (Appendix H - Laboratory Guidelines for Analysis of PFAS in Non-Potable Water and Solids). Data review guidelines were developed by DER to ensure data comparability and usability (Appendix H - Data Review Guidelines for Analysis of PFAS in Non-Potable Water and Solids).

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

Additional Analysis

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

In cases where site-specific cleanup objectives for PFOA and PFOS are to be assessed, soil parameters, such as Total Organic Carbon (EPA Method 9060), soil pH (EPA Method 9045), clay content (percent), and cation exchange capacity (EPA Method 9081), should be included in the analysis to help evaluate factors affecting the leachability of PFAS in site soils.

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

Impacted materials can be made up of PFAS that are not analyzable by routine analytical methodology. A TOP Assay can be utilized to conceptualize the amount and type of oxidizable PFAS which could be liberated in the environment, which approximates the maximum concentration of perfluoroalkyl substances that could be generated if all polyfluoroalkyl substances were oxidized. For example, some polyfluoroalkyl substances may degrade or transform to form perfluoroalkyl substances (such as PFOA or PFOS), resulting in an increase in perfluoroalkyl substance concentrations as contaminated groundwater moves away from a source. The TOP Assay converts, through oxidation, polyfluoroalkyl substances (precursors) into perfluoroalkyl substances that can be detected by routine analytical methodology.[1]

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

Data Assessment and Application to Site Cleanup

Until such time as Ambient Water Quality Standards (AWQS) and Soil Cleanup Objectives (SCOs) for PFOA and PFOS are published, the extent of contaminated media potentially subject to remediation should be determined on a case-by-case basis using the procedures discussed below and the criteria in DER-10. Preliminary target levels for cleanup of PFOA and PFOS in other media, including biota and sediment, have not yet been established by the DEC.

Water Sample Results

PFOA and PFOS should be further assessed and considered as potential contaminants of concern in groundwater or surface water if PFOA or PFOS is detected in any water sample at or above 10 ng/L (ppt) and is determined to be attributable to the site, either by a comparison of upgradient and downgradient levels, or the presence of soil source areas, as defined below. In addition, further assessment of water may be warranted if either of the following screening levels are met:

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

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

Soil Sample Results

Soil cleanup objectives for PFOA and PFOS will be proposed in an upcoming revision to 6 NYCRR Part 375-6. Until SCOs are in effect, the following are to be used as guidance values.

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

Guidance Values for Anticipated Site Use	PFOA (ppb)	PFOS (ppb)
Unrestricted	0.66	0.88
Residential	6.6	8.8
Restricted Residential	33	44
Commercial	500	440
Industrial	600	440
Protection of Groundwater[2]	1.1	3.7

PFOA and PFOS results for soil are to be compared against the guidance values listed above. These guidance values are to be used in determining whether PFOA and PFOS are contaminants of concern for the site and for determining remedial action objectives and cleanup requirements. Site-specific remedial objectives for protection of groundwater can also be presented for evaluation by DEC. Development of site-specific remedial objectives for protection of groundwater will require analysis of additional soil parameters relating to leachability. These additional analyses can include any or all the parameters listed above (soil pH, cation exchange capacity, etc.) and/or use of SPLP.

As the understanding of PFAS transport improves, DEC welcomes proposals for site-specific remedial objectives for protection of groundwater. DEC will expect that those may be dependent on additional factors including soil pH, aqueous pH, % organic carbon, % Sand/Silt/Clay, soil cations: K, Ca, Mg, Na, Fe, Al, cation exchange capacity, and anion exchange capacity. Site-specific remedial objectives should also consider the dilution attenuation factor (DAF). The NJDEP publication on DAF can be used as a reference: https://www.nj.gov/dep/srp/guidance/rs/daf.pdf.

Testing for Imported Soil

Testing for PFAS should be included any time a full TAL/TCL analyte list is required. Results for PFOA and PFOS should be compared to the applicable guidance values. If PFOA or PFOS is detected in any sample at or above the guidance values then the source of backfill should be rejected, unless a site-specific exemption is provided by DER based on SPLP testing, for example. If the concentrations of PFOA and PFOS in leachate are at or above 10 ppt (the Maximum Contaminant Levels established for drinking water by the New York State Department of Health), then the soil is not acceptable.

PFOA, PFOS and 1,4-dioxane are all considered semi-volatile compounds, so composite samples are appropriate for these compounds when sampling in accordance with DER-10, Table 5.4(e)10. Category B deliverables should be submitted for backfill samples, though a DUSR is not required.

[2] The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the guidance value for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf).

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

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

General Guidelines in Accordance with DER-10

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

Specific Guidelines for PFAS

- Include in the text that sampling for PFAS will take place
- Include in the text that PFAS will be analyzed by LC-MS/MS for PFAS using methodologies based on EPA Method 537.1
- Include the list of PFAS compounds to be analyzed (*PFAS Analyte List*)
- Include the laboratory SOP for PFAS analysis
- List the minimum method-achievable Reporting Limits for PFAS
    - Reporting Limits should be less than or equal to:
        - Aqueous – 2 ng/L (ppt)
        - Solids – 0.5 µg/kg (ppb)
- Include the laboratory Method Detection Limits for the PFAS compounds to be analyzed
- Laboratory should have ELAP certification for PFOA and PFOS in drinking water by EPA Method 537, 537.1, EPA Method 533, or ISO 25101
- Include detailed sampling procedures
    - Precautions to be taken
    - Pump and equipment types
    - Decontamination procedures
    - Approved materials only to be used
- Specify that regular ice only will be used for sample shipment

- Specify that equipment blanks should be collected at a minimum frequency of 1 per day per site for each matrix

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

General

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

Laboratory Analysis and Containers

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

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

Equipment

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

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

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

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

Equipment Decontamination

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

Sampling Techniques

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

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

Sample Identification and Logging

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

Quality Assurance/Quality Control

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

Documentation

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

Personal Protection Equipment (PPE)

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

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

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

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

Appendix C - Sampling Protocols for PFAS in Monitoring Wells

General

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

Laboratory Analysis and Container

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

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

Equipment

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

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

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

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

Equipment Decontamination

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

Sampling Techniques

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

Sample Identification and Logging

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

Quality Assurance/Quality Control

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

Documentation

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

Personal Protection Equipment (PPE)

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

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

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

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

Appendix D - Sampling Protocols for PFAS in Surface Water

General

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

Laboratory Analysis and Container

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

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

Equipment

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

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

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

- stainless steel cup

Equipment Decontamination

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

Sampling Techniques

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

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

Sample Identification and Logging

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

Quality Assurance/Quality Control

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

Documentation

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

Personal Protection Equipment (PPE)

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

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

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

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

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

General

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

Laboratory Analysis and Container

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

Equipment

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

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

Equipment Decontamination

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

Sampling Techniques

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

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

Sample Identification and Logging

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

Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at 4 ± 2º Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- If equipment was used, collect one equipment blank per day per site and a minimum 1 equipment blank per 20 samples. The equipment blank shall test the new and decontaminated sampling equipment utilized to obtain a sample for residual PFAS contamination. This sample is obtained by using laboratory provided PFAS-free water and passing the water over or through the sampling device and into laboratory provided sample containers.
- A field reagent blank (FRB) should be collected at a rate of one per 20 samples. The lab will provide a FRB bottle containing PFAS free water and one empty FRB bottle. In the field, pour the water from the one bottle into the empty FRB bottle and label appropriately.
- Request appropriate data deliverable (Category B) and an electronic data deliverable
- For sampling events where multiple private wells (homes or sites) are to be sampled per day, it is acceptable to collect QC samples at a rate of one per 20 across multiple sites or days.

Documentation

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

Personal Protection Equipment (PPE)

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

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

Appendix F - Sampling Protocols for PFAS in Fish

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

Procedure Name: General Fish Handling Procedures for Contaminant Analysis

Number: FW-005

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

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

Version: 8

Previous Version Date: 21 March 2018

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

Originator or Revised by: Wayne Richter, Jesse Becker

Date: 26 April 2019

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

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

GENERAL FISH HANDLING PROCEDURES FOR CONTAMINANT ANALYSES

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

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

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

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

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

   1. Project and Site Name.

   2. DEC Region.

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

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

   5. Preservation Method.

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

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

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

   3. Date collected.

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

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

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

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

D. General data collection recommendations:

1. It is helpful to use an ID or tag number that will be unique. It is best to use metal striped bass or other uniquely numbered metal tags. If uniquely numbered tags are unavailable, values based on the region, water body and year are likely to be unique: for example, R7CAY11001 for Region 7, Cayuga Lake, 2011, fish 1. If the fish are just numbered 1 through 20, we have to give them new numbers for our database, making it more difficult to trace your fish to their analytical results and creating an additional possibility for errors.

2. Process and record fish of the same species sequentially. Recording mistakes are less likely when all fish from a species are processed together. Starting with the bigger fish species helps avoid missing an individual.

3. If using Bureau of Ecosystem Health supplied tags or other numbered tags, use tags in sequence so that fish are recorded with sequential Tag Numbers. This makes data entry and login at the lab and use of the data in the future easier and reduces keypunch errors.

4. Record length and weight as soon as possible after collection and before freezing. Other data are recorded in the field upon collection. An age determination of each fish is optional, but if done, it is recorded in the appropriate “Age” column.

5. For composite samples of small fish, record the number of fish in the composite in the Remarks column. Record the length and weight of each individual in a composite. All fish in a composite sample should be of the same species and members of a composite should be visually matched for size.

6. Please submit photocopies of topographic maps or good quality navigation charts indicating sampling locations. GPS coordinates can be entered in the Location column of the collection record form in addition to or instead for providing a map. These records are of immense help to us (and hopefully you) in providing documented location records which are not dependent on memory and/or the same collection crew. In addition, they may be helpful for contaminant source trackdown and remediation/control efforts of the Department.

7. When recording data on fish measurements, it will help to ensure correct data recording for the data recorder to call back the numbers to the person making the measurements.

E. Each fish is to be placed in its own individual plastic bag. For small fish to be analyzed as a composite, put all of the fish for one composite in the same bag but use a separate bag for each composite. It is important to individually bag the fish to avoid difficulties or cross contamination when processing the fish for chemical analysis. Be sure to include the fish’s tag number inside the bag, preferably attached to the fish with the tag number turned out so it can be read. Tie or otherwise secure the bag closed. **The Bureau of Ecosystem Health will supply the bags.** If necessary, food grade bags may be procured from a suitable vendor (e.g., grocery store). It is preferable to redundantly label each bag with a manila tag tied between the knot and the body of the bag. This tag should be labeled with the project name, collection location, tag number, collection date, and fish species. If scales are collected, the scale envelope should be labeled with the same information.

F. Groups of fish, by species, are to be placed in one large plastic bag per sampling location. **The Bureau of Ecosystem Health will supply the larger bags.** Tie or otherwise secure the bag closed. Label the site bag with a manila tag tied between the knot and the body of the bag. The tag should contain: project, collection location, collection date, species and **tag number ranges**. Having this information on the manila tag enables lab staff to know what is in the bag without opening it.

G. Do not eviscerate, fillet or otherwise dissect the fish unless specifically asked to. If evisceration or dissection is specified, the fish must be cut along the exact midline or on the right side so that the left side fillet can be removed intact at the laboratory. If filleting is specified, the procedure for taking a standard fillet (SOP PREPLAB 4) must be followed, including removing scales.

H. Special procedures for PFAS: Unlike legacy contaminants such as PCBs, which are rarely found in day to day life, PFAS are widely used and frequently encountered. Practices that avoid sample contamination are therefore necessary. While no standard practices have been established for fish, procedures for water quality sampling can provide guidance. The following practices should be used for collections when fish are to be analyzed for PFAS:

No materials containing Teflon.
No Post-it notes.
No ice packs; only water ice or dry ice.
Any gloves worn must be powder free nitrile.
No Gore-Tex or similar materials (Gore-Tex is a PFC with PFOA used in its manufacture).
No stain repellent or waterproof treated clothing; these are likely to contain PFCs.
Avoid plastic materials, other than HDPE, including clipboards and waterproof notebooks.
Wash hands after handling any food containers or packages as these may contain PFCs. Keep pre-wrapped food containers and wrappers isolated from fish handling.
Wear clothing washed at least six times since purchase.
Wear clothing washed without fabric softener.
Staff should avoid cosmetics, moisturizers, hand creams and similar products on the day of sampling as many of these products contain PFCs (Fujii et al. 2013). Sunscreen or insect repellent should not contain ingredients with "fluor" in their name. Apply any sunscreen or insect repellent well downwind from all materials. Hands must be washed after touching any of these products.

I. All fish must be kept at a temperature <45° F (<8° C) immediately following data processing. As soon as possible, freeze at -20° C ± 5° C. Due to occasional freezer failures, daily freezer temperature logs are required. The freezer should be locked or otherwise secured to maintain chain of custody.

J. In most cases, samples should be delivered to the Analytical Services Unit at the Hale Creek field station. Coordinate delivery with field station staff and send copies of the collection records, continuity of evidence forms and freezer temperature logs to the field station. For samples to be analyzed elsewhere, non-routine collections or other questions, contact Wayne Richter, Bureau of Ecosystem Health, NYSDEC, 625 Broadway, Albany, New York 12233-4756, 518-402-8974, or the project leader about sample transfer. Samples will then be directed to the analytical facility and personnel noted on specific project descriptions.

K. A recommended equipment list is at the end of this document.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF FISH AND WILDLIFE
FISH COLLECTION RECORD

Project and Site Name ____ DEC Region ______________

Collections made by (include all crew) ____

Sampling Method: ☐Electrofishing ☐Gill netting ☐Trap netting ☐Trawling ☐Seining ☐Angling ☐Other ____________________

Preservation Method: ☐Freezing ☐Other ____________________ Notes (SWFDB survey number): ____________________

FOR LAB USE ONLY- LAB ENTRY NO.	COLLECTION OR TAG NO.	SPECIES	DATE TAKEN	LOCATION	AGE	SEX &/OR REPROD. CONDIT	LENGTH ( )	WEIGHT ( )	REMARKS

richter: revised 2011, 5/7/15, 10/4/16, 3/20/17; becker: 3/23/17, 4/26/19

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
CHAIN OF CUSTODY

I, ______________________________, of ____ collected the
(Print Name) (Print Business Address)

following on ____________________, 20____ from ____
(Date) (Water Body)

in the vicinity of ____
(Landmark, Village, Road, etc.)

Town of ____, in __________________________________ County.

Item(s) ____

____

Said sample(s) were in my possession and handled according to standard procedures provided to me prior to collection. The sample(s) were placed in the custody of a representative of the New York State Department of Environmental Conservation on ____________________________________, 20______.

____ ____________________________
Signature Date

I, ___________________________________, received the above mentioned sample(s) on the date specified and assigned identification number(s) ____ to the sample(s). I have recorded pertinent data for the sample(s) on the attached collection records. The sample(s) remained in my custody until subsequently transferred, prepared or shipped at times and on dates as attested to below.

_______________________________________ ___________________
Signature Date

SECOND RECIPIENT (Print Name)	TIME & DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
THIRD RECIPIENT (Print Name)	TIME & DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
FOURTH RECIPIENT (Print Name)	TIME & DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
RECEIVED IN LABORATORY BY (Print Name)	TIME & DATE	REMARKS
SIGNATURE	UNIT	
LOGGED IN BY (Print Name)	TIME & DATE	ACCESSION NUMBERS
SIGNATURE	UNIT	

richter: revised 21 April 2014; becker: 23 March 2017, 26 April, 2019

NOTICE OF WARRANTY

By signature to the chain of custody (reverse), the signatory warrants that the information provided is truthful and accurate to the best of his/her ability. The signatory affirms that he/she is willing to testify to those facts provided and the circumstances surrounding the same. Nothing in this warranty or chain of custody negates responsibility nor liability of the signatories for the truthfulness and accuracy of the statements provided.

HANDLING INSTRUCTIONS

On day of collection, collector(s) name(s), address(es), date, geographic location of capture (attach a copy of topographic map or navigation chart), species, number kept of each species, and description of capture vicinity (proper noun, if possible) along with name of Town and County must be indicated on reverse.

Retain organisms in manila tagged plastic bags to avoid mixing capture locations. Note appropriate information on each bag tag.

Keep samples as cool as possible. Put on ice if fish cannot be frozen within 12 hours. If fish are held more than 24 hours without freezing, they will not be retained or analyzed.

Initial recipient (either DEC or designated agent) of samples from collector(s) is responsible for obtaining and recording information on the collection record forms which will accompany the chain of custody. This person will seal the container using packing tape and writing his signature, the time and the date across the tape onto the container with indelible marker. Any time a seal is broken, for whatever purpose, the incident must be recorded on the Chain of Custody (reason, time, and date) in the purpose of transfer block. Container then is resealed using new tape and rewriting signature, with time and date.

EQUIPMENT LIST

Scale or balance of appropriate capacity for the fish to be collected.

Fish measuring board.

Plastic bags of an appropriate size for the fish to be collected and for site bags.

Individually numbered metal tags for fish.

Manila tags to label bags.

Small envelops, approximately 2” x 3.5”, if fish scales are to be collected.

Knife for removing scales.

Chain of custody and fish collection forms.

Clipboard.

Pens or markers.

Paper towels.

Dish soap and brush.

Bucket.

Cooler.

Ice.

Duct tape.

New York State of Opportunity | Department of Environmental Conservation

Appendix G – PFAS Analyte List

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

Appendix H - Laboratory Guidelines for Analysis of PFAS in Non-Potable Water and Solids

General

New York State Department of Environmental Conservation's Division of Environmental Remediation (DER) developed the following guidelines for laboratories analyzing environmental samples for PFAS under DER programs. If laboratories cannot adhere to the following guidelines, they should contact DER's Quality Assurance Officer, Dana Barbarossa, at dana.barbarossa@dec.ny.gov prior to analysis of samples.

Isotope Dilution

Isotope dilution techniques should be utilized for the analysis of PFAS in all media.

Extraction

For water samples, the entire sample bottle should be extracted, and the sample bottle rinsed with appropriate solvent to remove any residual PFAS.

For samples with high particulates, the samples should be handled in one of the following ways:

1. Spike the entire sample bottle with isotope dilution analytes (IDAs) prior to any sample manipulation. The sample can be passed through the SPE and if it clogs, record the volume that passed through.
2. If the sample contains too much sediment to attempt passing it through the SPE cartridge, the sample should be spiked with isotope dilution analytes, centrifuged and decanted.
3. If higher reporting limits are acceptable for the project, the sample can be diluted by taking a representative aliquot of the sample. If isotope dilution analytes will be diluted out of the sample, they can be added after the dilution. The sample should be homogenized prior to taking an aliquot.

If alternate sample extraction procedures are used, please contact the DER remedial program chemist prior to employing. Any deviations in sample preparation procedures should be clearly noted in the case narrative.

Signal to Noise Ratio

For all target analyte ions used for quantification, signal to noise ratio should be 3:1 or greater.

Blanks

There should be no detections in the method blanks above the reporting limits.

Ion Transitions

The ion transitions listed below should be used for the following PFAS:

PFOA	413 > 369
PFOS	499 > 80
PFHxS	399 > 80
PFBS	299 > 80
6:2 FTS	427 > 407
8:2 FTS	527 > 507
N-EtFOSAA	584 > 419
N-MeFOSAA	570 > 419

Branched and Linear Isomers

Standards containing both branched and linear isomers should be used when standards are commercially available. Currently, quantitative standards are available for PFHxS, PFOS, NMeFOSAA, and NEtFOSAA. As more standards become available, they should be incorporated in to the method. All isomer peaks present in the standard should be integrated and the areas summed. Samples should be integrated in the same manner as the standards.

Since a quantitative standard does not exist for branched isomers of PFOA, the instrument should be calibrated using just the linear isomer and a technical (qualitative) PFOA standard should be used to identify the retention time of the branched PFOA isomers in the sample. The total response of PFOA branched and linear isomers should be integrated in the samples and quantitated using the calibration curve of the linear standard.

Secondary Ion Transition Monitoring

Quantifier and qualifier ions should be monitored for all target analytes (PFBA and PFPeA are exceptions). The ratio of quantifier ion response to qualifier ion response should be calculated for each target analyte and the ratio compared to standards. Lab derived criteria should be used to determine if the ratios are acceptable.

Reporting

Detections below the reporting limit should be reported and qualified with a J qualifier.

The acid form of PFAS analytes should be reported. If the salt form of the PFAS was used as a stock standard, the measured mass should be corrected to report the acid form of the analyte.

Appendix I - Data Review Guidelines for Analysis of PFAS in Non-Potable Water and Solids

General

These guidelines are intended to be used for the validation of PFAS analytical results for projects within the Division of Environmental Remediation (DER) as well as aid in the preparation of a data usability summary report. Data reviewers should understand the methodology and techniques utilized in the analysis. Consultation with the end user of the data may be necessary to assist in determining data usability based on the data quality objectives in the Quality Assurance Project Plan. A familiarity with the laboratory's Standard Operating Procedure may also be needed to fully evaluate the data. If you have any questions, please contact DER's Quality Assurance Officer, Dana Barbarossa, at dana.barbarossa@dec.ny.gov.

Preservation and Holding Time

Samples should be preserved with ice to a temperature of less than 6°C upon arrival at the lab. The holding time is 14 days to extraction for aqueous and solid samples. The time from extraction to analysis for aqueous samples is 28 days and 40 days for solids.

Temperature greatly exceeds 6ºC upon arrival at the lab*	Use professional judgement to qualify detects and non-detects as estimated or rejected
Holding time exceeding 28 days to extraction	Use professional judgement to qualify detects and non-detects as estimated or rejected if holding time is grossly exceeded

*Samples that are delivered to the lab immediately after sampling may not meet the thermal preservation guidelines. Samples are considered acceptable if they arrive on ice or an attempt to chill the samples is observed.

Initial Calibration

The initial calibration should contain a minimum of five standards for linear fit and six standards for a quadratic fit. The relative standard deviation (RSD) for a quadratic fit calibration should be less than 20%. Linear fit calibration curves should have an R^2 value greater than 0.990.

The low-level calibration standard should be within 50% - 150% of the true value, and the mid-level calibration standard within 70% - 130% of the true value.

%RSD >20%	J flag detects and UJ non detects
R^2 >0.990	J flag detects and UJ non detects
Low-level calibration check <50% or >150%	J flag detects and UJ non detects
Mid-level calibration check <70% or >130%	J flag detects and UJ non detects

Initial Calibration Verification

An initial calibration verification (ICV) standard should be from a second source (if available). The ICV should be at the same concentration as the mid-level standard of the calibration curve.

ICV recovery <70% or >130%	J flag detects and non-detects

Continuing Calibration Verification

Continuing calibration verification (CCV) checks should be analyzed at a frequency of one per ten field samples. If CCV recovery is very low, where detection of the analyte could be in question, ensure a low level CCV was analyzed and use to determine data quality.

CCV recovery <70 or >130%	J flag results

Blanks

There should be no detections in the method blanks above the reporting limits. Equipment blanks, field blanks, rinse blanks etc. should be evaluated in the same manner as method blanks. Use the most contaminated blank to evaluate the sample results.

Blank Result	Sample Result	Qualification
Any detection	<Reporting limit	Qualify as ND at reporting limit
Any detection	>Reporting Limit and >10x the blank result	No qualification
>Reporting limit	>Reporting limit and <10x blank result	J+ biased high

Field Duplicates

A blind field duplicate should be collected at rate of one per twenty samples. The relative percent difference (RPD) should be less than 30% for analyte concentrations greater than two times the reporting limit. Use the higher result for final reporting.

RPD >30%	Apply J qualifier to parent sample

Lab Control Spike

Lab control spikes should be analyzed with each extraction batch or one for every twenty samples. In the absence of lab derived criteria, use 70% - 130% recovery criteria to evaluate the data.

Recovery <70% or >130% (lab derived criteria can also be used)	Apply J qualifier to detects and UJ qualifier to non detects

Matrix Spike/Matrix Spike Duplicate

One matrix spike and matrix spike duplicate should be collected at a rate of one per twenty samples. Use professional judgement to reject results based on out of control MS/MSD recoveries.

Recovery <70% or >130% (lab derived criteria can also be used)	Apply J qualifier to detects and UJ qualifier to non detects of parent sample only
RPD >30%	Apply J qualifier to detects and UJ qualifier to non detects of parent sample only

Extracted Internal Standards (Isotope Dilution Analytes)

Problematic analytes (e.g. PFBA, PFPeA, fluorotelomer sulfonates) can have wider recoveries without qualification. Qualify corresponding native compounds with a J flag if outside of the range.

Recovery <50% or >150%	Apply J qualifier
Recovery <25% or >150% for poor responding analytes	Apply J qualifier
Isotope Dilution Analyte (IDA) Recovery <10%	Reject results

Secondary Ion Transition Monitoring

Quantifier and qualifier ions should be monitored for all target analytes (PFBA and PFPeA are exceptions). The ratio of quantifier ion response to qualifier ion response should be calculated from the standards for each target analyte. Lab derived criteria should be used to determine if the ratios are acceptable. If the ratios fall outside of the laboratory criteria, qualify results as an estimated maximum concentration.

Signal to Noise Ratio

The signal to noise ratio for the quantifier ion should be at least 3:1. If the ratio is less than 3:1, the peak is discernable from the baseline noise and symmetrical, the result can be reported. If the peak appears to be baseline noise and/or the shape is irregular, qualify the result as tentatively identified.

Branched and Linear Isomers

Observed branched isomers in the sample that do not have a qualitative or quantitative standard should be noted and the analyte should be qualified as biased low in the final data review summary report. Note: The branched isomer peak should also be present in the secondary ion transition.

Reporting Limits

If project-specific reporting limits were not met, please indicate that in the report along with the reason (e.g. over dilution, dilution for non-target analytes, high sediment in aqueous samples).

Peak Integrations

Target analyte peaks should be integrated properly and consistently when compared to standards. Ensure branched isomer peaks are included for PFAS where standards are available. Inconsistencies should be brought to the attention of the laboratory or identified in the data review summary report.

APPENDIX B SAMPLE BOTTLE LABELS

PARSONS
301 Plainfield Road, Suite 350
Syracuse, NY 13212

Project/Client: Honeywell	Sample Medium:
Sample Number:	Sample Type:
Test Parameters:	
Container No.	Preservative:
Date &Time:	Sampler:

PARSONS
301 Plainfield Road, Suite 350
Syracuse, NY 13212

Project/Client: Honeywell	Sample Medium:
Sample Number:	Sample Type:
Test Parameters:	
Container No.	Preservative:
Date &Time:	Sampler:

PARSONS
301 Plainfield Road, Suite 350
Syracuse, NY 13212

Project/Client: Honeywell	Sample Medium:
Sample Number:	Sample Type:
Test Parameters:	
Container No.	Preservative:
Date &Time:	Sampler:

PARSONS
301 Plainfield Road, Suite 350
Syracuse, NY 13212

Project/Client: Honeywell	Sample Medium:
Sample Number:	Sample Type:
Test Parameters:	
Container No.	Preservative:
Date &Time:	Sampler:

PARSONS
301 Plainfield Road, Suite 350
Syracuse, NY 13212

Project/Client: Honeywell	Sample Medium:
Sample Number:	Sample Type:
Test Parameters:	
Container No.	Preservative:
Date &Time:	Sampler:

PARSONS
301 Plainfield Road, Suite 350
Syracuse, NY 13212

Project/Client: Honeywell	Sample Medium:
Sample Number:	Sample Type:
Test Parameters:	
Container No.	Preservative:
Date &Time:	Sampler:

PARSONS
301 Plainfield Road, Suite 350
Syracuse, NY 13212

Project/Client: Honeywell	Sample Medium:
Sample Number:	Sample Type:
Test Parameters:	
Container No.	Preservative:
Date &Time:	Sampler:

PARSONS
301 Plainfield Road, Suite 350
Syracuse, NY 13212

Project/Client: Honeywell	Sample Medium:
Sample Number:	Sample Type:
Test Parameters:	
Container No.	Preservative:
Date &Time:	Sampler:

PARSONS
301 Plainfield Road, Suite 350
Syracuse, NY 13212

Project/Client: Honeywell	Sample Medium:
Sample Number:	Sample Type:
Test Parameters:	
Container No.	Preservative:
Date &Time:	Sampler:

PARSONS
301 Plainfield Road, Suite 350
Syracuse, NY 13212

Project/Client: Honeywell	Sample Medium:
Sample Number:	Sample Type:
Test Parameters:	
Container No.	Preservative:
Date &Time:	Sampler:

APPENDIX C 1,4 DIOXANE AND PFAS SAMPLING CHECKLIST

PARSONS

Site Name: ______________________________

Weather (temp/precip): ____________________

Task: __________________________________

Date: __________________________________

Field Clothing and PPE:

☐ Ansell TNT® Powder-Free Nitrile Gloves ONLY

☐ No clothing or boots containing Gore-Tex™

☐ No clothing or boots treated with water-resistant spray

☐ Safety boots made from polyurethane and PVC or leather boots covered with overboots

☐ No materials containing Tyvek®

☐ Field crew has not used fabric softener on clothing

☐ Field crew has not used cosmetics, moisturizers, hand cream, or other related products this morning

☐ Field crew has not applied unauthorized sunscreen or insect repellant

☐ Samplers don fresh nitrile gloves for each sample collected

Field Equipment:

☐ No Teflon® or LDPE containing materials other than QED brand LDPE

☐ All sample materials made from stainless steel, HDPE, acetate, silicon, or polypropylene or QED brand LDPE

☐ No waterproof field books, waterproof paper or waterproof bottle labels, waterproof markers/Sharpies®

☐ No plastic clipboards, binders, or spiral hard cover notebooks

☐ No Post-It Notes®

☐ Coolers filled with regular ice only; no chemical (blue) ice packs in possession

Sample Containers:

☐ Containers for PFAS shipped in separate cooler

☐ Sample containers made of HDPE or polypropylene

☐ Caps are unlined and made of HDPE or polypropylene

Wet Weather (as applicable):

☐ Wet weather gear made of polyurethane and PVC only

Equipment Decontamination:

☐ PFAS-free water on-site for decontamination of sample equipment; no other water sources to be used

☐ Alconox® or 7th Generation Free & Clear Dish Soap to be used as decontamination cleaning agents

Food Considerations:

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

Vehicle Considerations:

☐ Avoid utilizing areas inside vehicle as sample staging areas

Sampling Equipment and Supply Summary (include brand names and serial numbers where available):

Decontamination fluid source(s): ____

Soap and other fluids used: ____

Gloves: ______________________ Rope: ______________________

Sampling Equipment: ____

Deviation Summary:

If possible, materials identified as potentially containing PFAS should be relocation to a separate area of the site as far away as possible from the sampling location(s) and containerized if practicable. Notes should include method of response including type of materials on site and how they were moved and containerized.

Deviations include: ____

____

____

____

Field Team Leader Name: ____

Field Team Leader Signature: ____

Field Team Member Name	Field Team Member Signature

APPENDIX D TEST BORING LOG

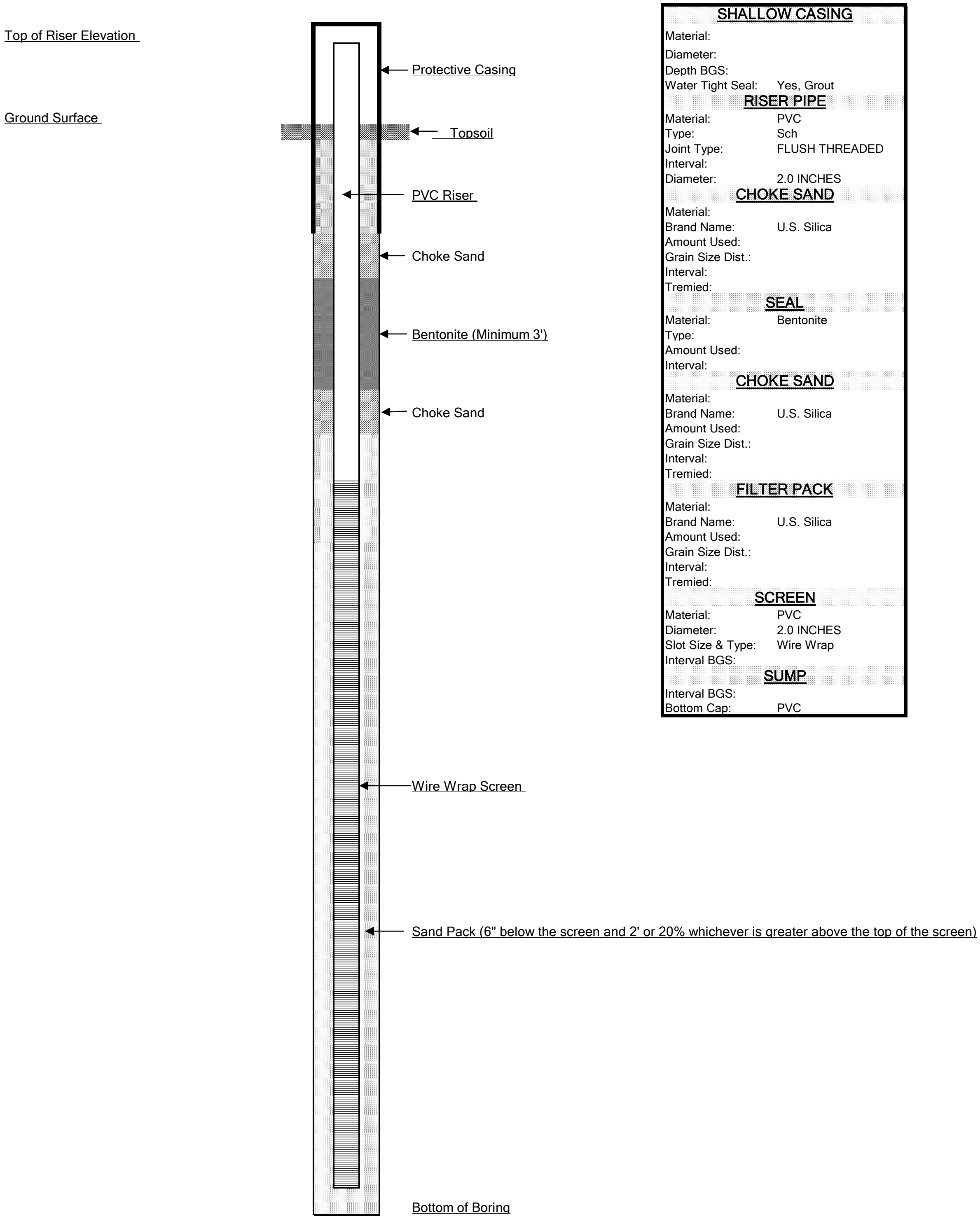
	TEST BORING LOG	REPORT OF BORING
Client: Proj. Loc: File No.:	Sampler: 2" split Spoon Hammer: 140-lb Fall: 30"	Page 1 of Location: Start Date: End Date:
Boring Company: Foreman: OBG Geologist:		Screen = / Riser / \ Grout / Sand Pack / Bentonite

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

APPENDIX E WELL COMPLETION LOG

Well Construction Log

WELL NO.:	CLIENT:
PROJ. NO.:	DRILLING CONTRACTOR:
INSPECTOR:	DATE END:
DATE START:	DRILLING METHOD:
LOCATION:	DRILLER:
SITE NAME:	RIG TYPE:



SHALLOW CASING	
Material:	
Diameter:	
Depth BGS:	
Water Tight Seal:	Yes, Grout
RISER PIPE	
Material:	PVC
Type:	Sch
Joint Type:	FLUSH THREADED
Interval:	
Diameter:	2.0 INCHES
CHOKE SAND	
Material:	
Brand Name:	U.S. Silica
Amount Used:	
Grain Size Dist.:	
Interval:	
Tremied:	
SEAL	
Material:	Bentonite
Type:	
Amount Used:	
Interval:	
CHOKE SAND	
Material:	
Brand Name:	U.S. Silica
Amount Used:	
Grain Size Dist.:	
Interval:	
Tremied:	
FILTER PACK	
Material:	
Brand Name:	U.S. Silica
Amount Used:	
Grain Size Dist.:	
Interval:	
Tremied:	
SCREEN	
Material:	PVC
Diameter:	2.0 INCHES
Slot Size & Type:	Wire Wrap
Interval BGS:	
SUMP	
Interval BGS:	
Bottom Cap:	PVC

APPENDIX F 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

Color ____________

Odor ____________

Sheen/Free Product ____________

Physical appearance at end

Color ____________

Odor ____________

Sheen/Free Product ____________

NOTES:

Geologist Signature:

APPENDIX G WELL DECOMMISSIONING RECORD

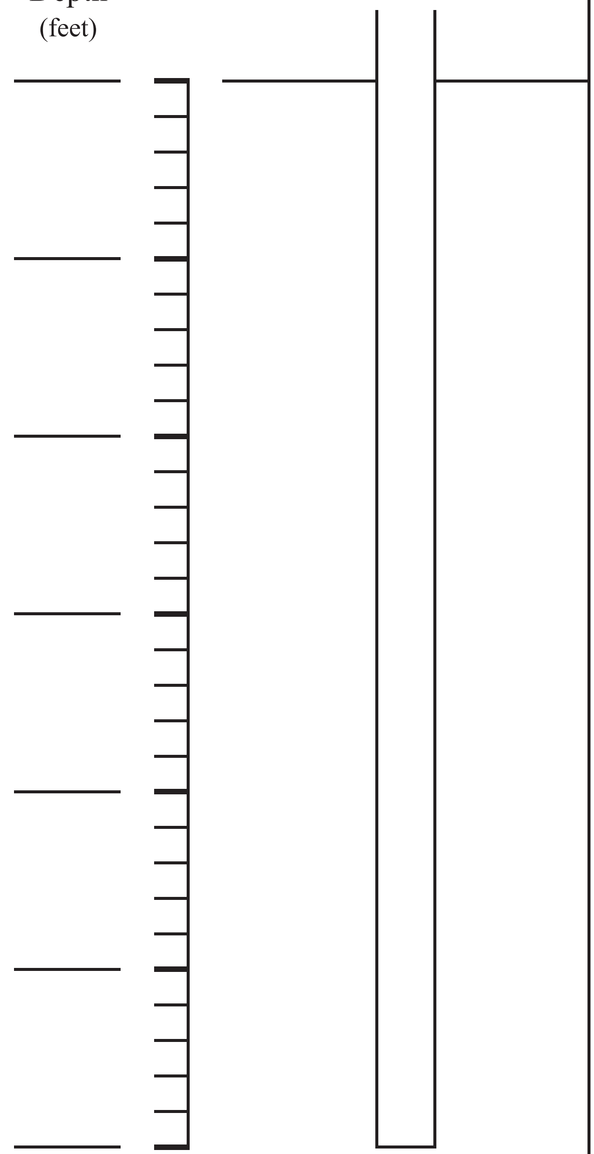
WELL DECOMMISSIONING RECORD

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

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

WELL SCHEMATIC*

Depth (feet)



COMMENTS:

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

Drilling Contractor

Department Representative

APPENDIX H STANDARD GROUNDWATER SAMPLING LOG

Standard Ground Water Sampling Log

Date ______________________
Site Name ______________________
Location ______________________
Project No. ______________________
Personnel ______________________

Weather ______________________
Well # ______________________
Evacuation Method ______________________
Sampling Method ______________________

Well Information:

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

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

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

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

Instrument Calibration:

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

Water parameters:

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

Water Sample:
Time Collected ________

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

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH

Notes:

APPENDIX I 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 J SURFACE SOIL SAMPLING RECORD

PARSONS

SURFACE SOIL SAMPLING RECORD

SITE NAME: ______________________

PROJECT NUMBER: ______________________

SAMPLING DATE / TIME: ______________________

WEATHER: ______________________

SAMPLERS: __________ of __________

__________ of __________

SAMPLE ID: ______________________

SAMPLING METHOD: ______________________

DEPTH OF SAMPLE: ______________________

DESCRIPTION OF SAMPLING POINT

LOCATION: ______________________

PHYSICAL APPEARANCE: ______________________

VEGETATION: ______________________

DRAINAGE DIRECTION: ______________________

SAMPLE DESCRIPTION

TEXTURE: ______________________

COLOR: ______________________

ODOR: ______________________

OTHER: ______________________

FIELD TESTS

TEMPERATURE: __________ REDOX: __________

pH: __________ DISSOLVED O2: __________

CONDUCTIVITY: __________ OTHER: __________

SAMPLE ANALYSIS / QA/QC / CHAIN OF CUSTODY

ANALYZE FOR: ______________________

QA/QC SAMPLE ID: ______________________

ANALYZE QA/QC SAMPLES FOR: ______________________

DATE/TIME REFRIGERATED: ______________________

CHAIN OF CUSTODY NUMBER: ______________________

SHIPPED VIA: ______________________

LABORATORY: ______________________

COMMENTS / MISCELLANEOUS ______________________

____

____

APPENDIX C – QUALITY ASSURANCE PROJECT PLAN

QUALITY ASSURANCE PROJECT PLAN (QAPP)
TONAWANDA COKE SITE
SITE 108
3800 RIVER ROAD
TONAWANDA, NEW YORK

Prepared For:

Honeywell

115 Tabor Road
Morris Plains, NJ 09750

Prepared By:

PARSONS

301 Plainfield Road, Suite 350
Syracuse, New York 13212

OCTOBER 2020

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LIST OF ACRONYMS

ACRONYM	Definition
ASTM	American Society for Testing and Materials
bml	below mudline
CAR	Corrective Action Request
CCS	contract compliance screening
CFR	Code of Federal Regulations
CLP	Contract Laboratory Procedure
COC	contaminant of concern
D	absolute difference
DER	New York State Division of Environmental Remediation
DNAPL	dense non-aqueous phase liquid
DOT	Department of Transportation
DQO	data quality objective
DUSR	Data Usability Summary Report
EDD	electronic data deliverable
EDP	EQuIS Data Processor
EIM	Enterprise Information Management
ELAP	Environmental Laboratory Approved Program
EMIS	Environmental Information Management System
FSP	Field Sampling Plan
ft bgs	feet below ground surface
GC/MS	gas chromatography/mass spectroscopy
HASP	Health and Safety Plan
HDPE	high-density polyethylene
ICP	inductively coupled plasma
IRM	Interim Remedial Measures
LCS	laboratory control sample
LDPE	low-density polyethylene
LIMS	laboratory information system
LNAPL	light non-aqueous phase liquid
LPM	laboratory project manager
MDL	method detection limit
MS/MSD	Matrix Spike/Matrix Spike Duplicates
NCM	Nonconformance Memo
NIST	National Institute of Standards and Technology
NTU	nephelometric turbidity unit
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
ORP	oxidation-reduction potential
PARCCS	precision, accuracy, representativeness, completeness, comparability, and sensitivity
PCB	polychlorinated biphenyls
PE	performance evaluation
PET	polyethylene terephthalate
PFAS	Per- and Polyfluoroalkyl Substances
PFOA	perflourooctanoic acid
PFOS	perfluorooctanesulfonic acid
PID	photoionization detector
PMP	Project Management Plan
PPE	personal protective equipment
PQL	project quantitation limit
PSHEP	Project Safety, Health, and Environmental Plan
PVC	polyvinyl chloride
QA	Quality Assurance
QC	Quality Control
QAPP	Quality Assurance Project Plan
RPD	relative percent difference
RL	reporting limit
SDG	Sample Delivery Group
SGV	Sediment Guidance Values
SOP	standard operating procedure
SOW	Statement of Work
SVOC	semi-volatile organic compound
TAL	Target Analyte List
TCC	Tonawanda Coke Corporation
TCL	Target Compound List
TOC	Total Organic Carbon
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound
VTSR	validated line of sample receipt

1.0 PROJECT DESCRIPTION

1.1 Introduction

This Quality Assurance Project Plan (QAPP) has been prepared to support remedial investigation (RI) activities and specifies the quality assurance/quality control (QA/QC) procedures for field and laboratory sampling and measurements for Site 108 at the Tonawanda Coke Site (Site). This RI is being completed by Parsons for Honeywell International, Inc. (Honeywell). 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 United States Environmental Protection Agency (USEPA) guidance (USEPA 2001a, 2002b). Standard field operating procedures including groundwater sampling, surface soil sampling, subsurface soil samples, decontamination activities, monitoring well development, etc., are included in the Generic Field Sampling Plan (FSP) prepared for the Site.

1.2 Remedial Investigation Overview

A metallurgical coke manufacturing and by products plant was operated at the former Tonawanda Coke Facility from 1917 through late 2018. During industrial operations, a refuse disposal area was established at Site 108. The area was subsequently filled with refuse, wood, scrap polyethylene, and ceramic saddle packing from refining equipment. The disposal of coke/coal, fly-ash cinders, and coal tar sludge has also been documented. Additionally, Site 108 formerly included a tank farm consisting of three large above ground storage tanks containing waste coal tar and standing water. Site 108 was also used for transferring coal and other materials between the Niagara River, where materials were delivered by boat, and the main plant facility via conveyor belts and pipes. Several previous investigations have been undertaken at the site and multiple Interim Remedial Measures (IRMs) have been completed, including the removal of above ground storage tanks and coal tar from the subsurface. The intent of the RI activities is to determine the nature and extent of the remaining contamination associated with Site 108 following previous IRM activities, including tank removal.

Volatile Organic Compounds (VOCs), Semi-volatile organic compounds (SVOCs), metals, and cyanide have previously been detected in samples from the Site during historic investigations in exceedance of standards and guidance values. To characterize current site conditions, additional samples will be collected and analyzed. Below is a brief summary of work that will be performed and types of samples that will be collected as part of the RI. All samples will be submitted on a standard turn-around-time and data (excluding waste characterization) will be validated. A summary of what is to be included in the analytical data package is included in **Attachment 1**.

Monitoring Well Installation: Up to nine groundwater monitoring wells will be installed at Site 108. Three wells will have screens located within the fill layer. The other wells will be installed in pairs at three locations along the Niagara River where alluvial sand underlies the fill layer, with one well from each pair screened in fill and the other screened at the bottom of alluvium. During drilling for well installation, soil samples (0 to 2 and 2 to 12 inches below grade; the 1-foot interval directly beneath visible coal tar (if present) or the interval displaying signs of contamination) will be collected from each boring. Soil samples will be analyzed for SVOCs (EPA Method SW8270D) and Total Organic Carbon (TOC) (EPA Lloyd Kahn Method). A subset of locations (MW-10-2020 and

MW-11S-2020) will also be analyzed for the full suite of analyses including Target Compound List (TCL) VOCs (EPA Method SW8260C), pesticides/PCBs (EPA Method SW8081B/SW8082A) Target Analyte List (TAL) metals (EPA Method SW6010C/SW7471B), cyanide (EPA Method SW9012)and per- and polyfluoroalkyl substances (PFAS) (Modified EPA Method 537.1). PFAS sampling and analysis will follow guidance provided in NYSDEC's "Guidelines for Sampling and Analysis of PFAS."

Groundwater Sampling: Groundwater samples will be collected from multiple newly installed monitoring wells and potentially one existing well using low-flow methods. Groundwater samples will be analyzed for TCL VOCs (EPA Method SW8260C), TCL SVOCs (EPA Method SW8270D), pesticides/PCBs (EPA Method SW8081B/ SW8082A) TAL metals (EPA Method SW6010C/SW7470A), cyanide (EPA Method SW9012). Shallow wells will also be analyzed for PFAS (Modified EPA Method 537.1), and 1,4-dioxane (EPA Method SW8270D SIM).

Test Pits: A series of test pits will be excavated throughout Site 108. Test pits will be excavated to the top of native soil (4 to 10 feet below ground surface [ft bgs]) and soil and fill materials will be visually assessed. If native soil shows signs of contamination such as staining, odor, or elevated PID readings, excavation will continue until soil appears free of signs of contamination for at least 2 feet. Soil/fill samples will be collected for chemical analysis from the following intervals at each test pit: 0 to 2 inches bgs, 2 to 12 inches bgs, and the 1-foot interval directly beneath visible coal tar (if present) or the interval displaying signs of contamination. If signs of contamination are present in native soil, a sample will be collected from each depth exhibiting staining, odor, or elevated PID readings. Samples of native soil exhibiting signs of contamination will be collected in intervals based on the thickness of apparent contamination, with a maximum sampling interval of 1-ft. A sample will also be collected in the 1-ft interval below the deepest identified sign of contamination. Samples from all locations will be analyzed for SVOCs (EPA Method SW8270D) and TOC (EPA Lloyd Kahn Method). Samples from TP-16-2020, TP-17-2020, TP-18-2020, and TP-26-2020 will also be analyzed for the full suite of analyses including TCL VOCs (EPA Method SW8260C), pesticides/PCBs (EPA Method SW8081B/SW8082A), TAL metals (EPA Method SW6010C/SW7471B), cyanide (EPA Method SW9012) and PFAS (Modified EPA Method 537.1).

Soil Borings: In an area of the site adjacent to the relocated drainage ditch, the shallow water table prohibits excavation and sampling of test pits. Therefore, three soil borings will be installed approximately 20 ft apart in order to assess subsurface conditions in this area. Soil borings will be installed to the top of native soil. All three soil borings will be visually assessed and one will be sampled for chemical analysis from the following intervals: 0 to 2 inches bgs, 2 to 12 inches bgs, and the 1-foot interval directly beneath visible coal tar (if present) or the interval displaying signs of contamination. Samples will be analyzed for SVOCs (EPA Method SW8270D) and TOC (EPA Lloyd Kahn Method).

Surface Water Sampling: Five surface water samples will be collected from the drainage ditch that runs through the site and from ponded areas adjacent to the ditch. Surface water samples will be analyzed for TCL VOCs (EPA Method SW8260C), TCL SVOCs (EPA Method SW8270D), pesticides/PCBs (EPA Method SW8081B/SW8082A) TAL metals (EPA Method SW6010C/SW7470A), and cyanide (EPA Method SW9012). Samples from SW-1-2020 and SW-5-2020 will also be analyzed for PFAS (Modified EPA Method 537.1) and 1,4-dioxane (EPA Method SW8270D SIM).

Drainage Ditch Deep Soil Sampling: Soil samples will be collected from nine locations within the on-site drainage ditch and within ponded areas. Analytical samples will be collected in 6-inch intervals to 1 ft bgs and 12-inch intervals to 5 ft bgs or native material, whichever is encountered first. If native material is encountered, a sample will be collected from the top 1 ft of native material. Samples will be analyzed for SVOCs (EPA Method SW8270D) (including the 34 PAHs specified for Sediment Guidance Values (SGV) comparison in NYSDEC's *Screening and Assessment of Contaminated Sediment* (NYSDEC 2014) via a modified EPA Method SW8270), TAL metals (EPA Method SW6010C/SW7471B), and TOC (EPA Lloyd Kahn Method).

Niagara River Embayment Sediment Sampling: Sediment samples will be collected from six locations within the embayment. Analytical samples will be collected in 6-inch intervals from 0 to 1 ft below mudline (bml), and in 12-inch intervals from 1 to 5 ft bml, or until native material is encountered, whichever comes first. If native material is encountered, a sample will be collected form the top 1 ft of native material. Samples will be analyzed for SVOCs (EPA Method SW8270D) (including the 34 PAHs used for SGV comparison via a modified EPA Method SW8270), TAL metals (EPA Method SW6010C/SW7471B), and TOC (EPA Lloyd Kahn Method).

Niagara River Shoreline Sediment Sampling: Sediment samples will be collected from approximately 20 nearshore and offshore locations along the Site 108 shoreline. Analytical samples will be collected in 6-inch intervals from 0 to 1 ft below mudline (bml), and in 12-inch intervals from 1 to 5 ft bml, or until native material is encountered, whichever comes first. If native material is encountered, a sample will be collected form the top 1 ft of native material. Samples will be analyzed for SVOCs (EPA Method SW8270D) (including the 34 PAHs used for SGV comparison via a modified EPA Method SW8270), TAL metals (EPA Method SW6010C/SW7471B), and TOC (EPA Lloyd Kahn Method).

Shoreline Surface Soil Sampling: Surface soil samples will be collected form approximately eight locations along the Niagara River shoreline (above water). Samples will be collected from 0 to 6 inches bgs, will be visually assessed, and analyzed for SVOCs (EPA Method SW8270D), TAL metals (EPA Method SW6010C/SW7471B), and TOC (EPA Lloyd Kahn Method).

Wetland Sediment Sampling: Three sediment samples will be collected from the Freshwater Emergent Wetland on the east side of the Site. Samples will be collected in 6-inch intervals up to 1 ft bgs, and in 1-ft intervals up to 5 ft bgs or until native material is encountered, whichever comes first. If native material is encountered, a sample will be collected from the top 1 ft. Samples will be analyzed for TCL VOCs (EPA Method SW8260C), SVOCs (EPA Method SW8270D) (including the 34 PAHs used for SGV comparison via a modified EPA Method SW8270), pesticides/PCBs (EPA Method SW8081B/SW8082A), TAL metals (EPA Method SW6010C/SW7471B), cyanide (EPA Method SW9012), and TOC (EPA Lloyd Kahn Method).

Breeze Pile Sampling: Four test pits will be excavated from within the breeze stockpile, one on each side of the pile. Each test pit will be excavated to approximately 5 ft below the surface of the pile. One composite sample will be collected from each test pit. Material will be collected from 3-5 discrete locations in each test pit, homogenized, and composited for analysis of TCL VOCs (EPA Method SW8260C), SVOCs (EPA Method SW8270D), pesticides/PCBs (EPA Method SW8081B/SW8082A) TAL metals (EPA Method SW6010C/ SW7471B), and cyanide (EPA Method SW9012). Each sample will also be analyzed for hazardous waste characterization as presented on **Table 3.2C**. Samples will also be analyzed for synthetic precipitation leaching procedure PFAS (Modified EPA Method 537.1).

Waste Characterization Sampling: Waste streams expected to be generated as part of this RI include drilling cuttings, well development water, decon water, purge water from groundwater sampling, personal protective equipment (PPE), and disposable sampling materials/supplies. Upon completion of waste generation, representative samples will be obtained for each waste type (e.g., solids and liquids) and analyzed for the standard suite of characterization parameters as listed in **Table 3.2C.** Samples will be submitted on a standard turn-around-time and data will be not be validated.

1.3 Analytical Restrictions

Polyfluoroalkyl substances (PFAS), can be found in many standard environmental sampling materials, including: Fluoropolymer bailer/tubing, some decontamination solutions, and pump bladders/valves. One specific PFAS compound, perflourooctanoic acid (PFOA), has been broadly utilized in the production of various everyday items such as: waterproof/stain-resistant clothing, non-stick cookware, and many commonly used plastics. The field activities and methods herein have been appropriately modified to prevent cross-contamination during sampling for PFAS and 1,4-dioxane (groundwater sampling only – after monitoring wells are installed).

The sampling team will review the summary of prohibited and acceptable items prior to mobilization to prevent cross contamination and to avoid the introduction of external contaminant sources. **Table 1.1** includes a summary of prohibited and acceptable PFAS items and 1,4-dioxane items. A PFAS and 1,4-dioxane sampling checklist is included as **Attachment 2** and should be filled out daily by field personnel. Additionally, field sampling efforts will comply with the NYSDEC Guidelines for Sampling and Analysis of PFAS under NYSDEC's Part 375 Remedial Programs (January 2020). A copy of this plan is included in **Attachment 3**.

SPECIAL PRECAUTIONS FOR PFAS SAMPLING
Refer to **Table 1.1** for special clothing, PPE, supply and equipment requirements for PFAS and 1,4-dioxane sampling. Bottles for PFAS samples should be stored and shipped to and from laboratory in separate coolers from other bottleware/samples. DO NOT mix bottleware for PFAS samples with other bottleware to make bottle sets for sample locations. Change nitrile gloves prior to handling bottles for PFAS analysis and collection of samples for PFAS analysis. A PFAS and 1,4-dioxane sampling checklist is included as **Attachment 2** and should be filled out daily by field personnel.

TABLE 1.1 PROHIBITED AND ACCEPTABLE ITEMS FOR PFAS AND 1,4-DIOXANE SAMPLING

PROHIBITED	ACCEPTABLE
Field Equipment	
Teflon® containing materials	High Density High density polyethylene (HDPE), stainless steel or polypropylene materials
Low density polyethylene (LDPE) materials	Acetate liners
	Silicone Tubing
Waterproof field books, waterproof paper and waterproof sample bottle labels	Loose non-waterproof paper and non-waterproof sample labels
Waterproof markers / Sharpies®	Pens
Post-It Notes®	Tape; loose leaf paper
Chemical (blue) ice packs	Wet Ice
Field Clothing and PPE	
New cotton clothing or synthetic water resistant, waterproof, or stain-treated clothing, clothing containing Gore-Tex™	Well-laundered clothing made of natural fibers (preferable cotton)
Clothing laundered using fabric softener	No fabric softener
Boots containing Gore-Tex™ or treated with water- resistant sprays	Boots made with polyurethane and PVC
Coated Tyvek®	Laundered cotton clothing

PROHIBITED	ACCEPTABLE
No cosmetics, moisturizers, hand cream, or other related products as part of personal leaning/showering routine on the morning of sampling	Sunscreens - Alba Organics Natural Sunscreen, Yes To Cucumbers, Aubrey Organics, Jason Natural Sun Block, Kiss My Face, and baby sunscreens that are "chemical free", "toxin free", or "natural"
Sunscreens or insecticides except as noted on right	Insect Repellents - Jason Natural Quit Bugging Me, Repel Lemon Eucalyptus Insect repellant, Herbal Armor, California Baby Natural Bug Spray, Baby Ganics Sunscreen and insect repellant - Avon Skin So Soft Bug Guard Plus - SPF 30 Lotion
Sample Containers	
LDPE or glass containers	HDPE or polypropylene
Teflon®-lined caps	Unlined polypropylene caps
Rain Events	
Waterproof or resistant rain gear	Wet weather gear made of polyurethane and PVC only; field tents that are only touched or moved prior to and following sampling activities
Equipment Decontamination	
Decon 90®	Alconox®
Water from an on-site well	

2.0 PROJECT ORGANIZATION

2.1 Project and Team Organization

The project organization and the function and responsibility of each group affected by the QAPP are presented below. The project organization is designed to promote the exchange of information and for efficient project operation. Key contact information is summarized in the Tonawanda Coke Site Work Plan.

Individual	Organization	Role	Responsibility
Benjamin McPherson	NYSDEC	NYSDEC Project Manager	Regulatory oversight
Ed Glaza	Parsons	Project Manager/Technical Director	Overall project direction
George Moreau	Parsons	RI Task Manager	Overall investigation planning and supervision
Maryanne Kosciewicz	Parsons	Data Validation Manager	Data validation and general QA/QC management
TBD	Parsons	Field Team Lead	Field activity performance and oversight
TBD	Analytical Laboratory (TBD)	Laboratory Project Manager	Point of contact at laboratory
TBD	Analytical Laboratory (TBD)	Laboratory QC Manager	QA/QC management at analytical lab

2.1.1 Analytical Services

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 the laboratory activities associated with the environmental media which they are responsible for analyzing for 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 Leader will check that all onsite personnel have read and understood the QAPP.

Field personnel will be required to adhere to the PSHEP and scope of work. They must also follow applicable task-specific health and safety plans that project subcontractors develop before they begin investigation activities.

The laboratory will have trained and experienced staff capable of performing the analyses specified in this QAPP. The laboratory will have New York State Department of Health (NYSDOH) Environmental Laboratory Accreditation Program (ELAP) certification for all project analyses they are responsible for conducting. Additionally, the laboratory 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.

3.0 DATA QUALITY OBJECTIVES AND DATA QUALITY CRITERIA

3.1 Introduction

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

Step 1: State the problem

Step 2: Identify the decision

Step 3: Identify inputs to the decision

Step 4: Define the study boundaries

Step 5: Define the decision rule

Step 6: Specify tolerable limits of decision error

Step 7: Optimize the design

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

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

The data produced during sampling activities will be compared with the defined quality assurance (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 volatile organic compounds (VOCs), semivolatile organic compounds

(SVOCs), 1,4-dioxane, pesticides, polychlorinated biphenyls (PCBs), and PFAS. 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 Tonawanda Coke Site 108 activities, these project objectives are stated in the Tonawanda Coke Site 108 Scoping Documents.

3.2 Data Quality Objectives (DQOs) (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 II data quality assurance program will be executed by the field team for obtaining data.
- 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 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 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: % 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 **Table 3.1**.

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 COC 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 [SOPs]) for both sampling and analysis phases of this project.
- Requiring traceability of all analytical standards and/or source materials to the USEPA or National Institute of Standards and Technology (NIST).

- Requiring that calibrations be verified with an independently prepared standard from a source other than that used for calibration (if applicable).
- Using standard reporting units and reporting formats including the reporting of QC data.
- Performing data validation on the analytical results, including the use of data qualifiers in all cases where appropriate.
- Evaluating the sample collection information and analytical QC sample results.
- Requiring that the significance of all validation qualifiers be assessed any time an analytical result is used for any purpose.

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

3.2.2.6 Sensitivity and Quantitation Limits

When selecting an analytical method during the DQO process, the achievable detection limit (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 Code of Federal Regulations (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 in the NYSDEC 6 NYCRR Part 375 Soil Cleanup Objectives for Unrestricted Use, the NYSDEC Division of Water Technical and Operational Guidance Series (TOGS) "Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations," and/or NYSDEC Guidelines for Sampling and Analysis of PFAS.

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 gas chromatography (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 **Tables 3.2A, 3.2B, and 3.2C.**

TABLE 3.1A QUALITY CONTROL LIMITS – GROUNDWATER AND SURFACE WATER

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	SW8260C	All target VOCs	70-130 or lab QC limit	0-20 or lab QC limit	70-130 or lab QC limit	Toluene-d8 4-Bromofluorobenzene 1,2-Dichloroethane-d4 Dibromofluoromethane	Lab QC Limit
SVOCs	SW8270D	All target SVOCs	70-130 or lab QC limit	0-20 or lab QC limit	70-130 or lab QC limit	Nitrobenzene-d5 2-Fluorobiphenyl Terphenyl-d14 Phenol-d5 2-Fluorophenol 2,4,6-Tribromophenol	Lab QC Limit
1,4-dioxane	SW8270D SIM	1,4-dioxane	70-130 or lab QC limit	0-20 or lab QC limit	70-130 or lab QC limit	1,4-dioxane-d8	Lab QC Limit
Pesticides	SW8081B	All target pesticides	70-130 or lab QC limit	0-20 or lab QC limit	70-130 or lab QC limit	Tetrachloro-m-xylene Decachlorobiphenyl	Lab QC Limit
PCBs	SW8082A	All target PCBs	50-150 or lab QC limit	0-20 or lab QC limit	50-150 or lab QC limit	Tetrachloro-m-xylene Decachlorobiphenyl	Lab QC Limit
Metals	SW6010C/ SW7470A	All target metals	75-125 or lab QC limit	0-20 or lab QC limit	85-115 or lab QC limit	NA	NA
Cyanide	SW9012	Cyanide	90-110 or lab QC limit	0-20 or lab QC limit	90-110 or lab QC limit	NA	NA
PFAS	E537.1 modified	All target PFAS	70-130 or lab QC limit	0-20 or lab QC limit	70-130 or lab QC limit	all tracer PFAS (isotope dilution all PFAS)	50-150 or lab QC limit

TABLE 3.1B QUALITY CONTROL LIMITS – SOIL, SEDIMENT, AND WASTE CHARACTERIZATION

Analytical Parameter	Analytical Method	Matrix Spike (MS) Compound	MS/MSD (a) % Recovery	MS/MSD RPD (b)	LCS (c) % Recovery	Surrogate	Surrogate % Recovery
VOCs and TCLP VOCs	SW8260C	All target VOCs	70-130 or lab QC limit	0-30 or lab QC limit	70-130 or lab QC limit	Toluene-d8 Bromofluorobenzene 1,2-Dichloroethane-d4	Lab QC Limit
SVOCs, TCLP SVOCs, alkyl PAHs	SW8270D	All target SVOCs	50-150 or lab QC limit	0-30 or lab QC limit	50-150 or lab QC limit	Nitrobenzene-d5 2-Fluorobiphenyl Terphenyl-d14 Phenol-d5 2-Fluorophenol 2,4,6-Tribromophenol	Lab QC Limit
Pesticides and TCLP Pesticides	SW8081B	All target pesticides	50-150 or lab QC limit	0-30 or lab QC limit	50-150 or lab QC limit	Tetrachloro-m-xylene Decachlorobiphenyl	Lab QC Limit
PCBs	SW8082A	All target PCBs	50-150 or lab QC limit	0-30 or lab QC limit	50-150 or lab QC limit	Tetrachloro-m-xylene Decachlorobiphenyl	Lab QC Limit
TCLP Herbicides	SW8051A	All target herbicides	50-150 or lab QC limit	0-30 or lab QC limit	50-150 Or Lab QC Limit	DCAA	Lab QC Limit
Metals and TCLP Metals	SW6010C/ SW7470A/ SW7471B	All target metals	75-125 or lab QC limit	0-20 or lab QC limit	85-115 Or lab QC limit	NA	NA

TABLE 3.1B QUALITY CONTROL LIMITS – SOIL, SEDIMENT, AND WASTE CHARACTERIZATION (CONT.)

Analytical Parameter	Analytical Method	Matrix Spike (MS) Compound	MS/MSD (a) % Recovery	MS/MSD RPD (b)	LCS (c) % Recovery	Surrogate	Surrogate % Recovery
Cyanide	SW9012	Cyanide	80-120 or lab QC limit	0-20 or lab QC limit	90-110 or lab QC limit	NA	NA
Ignitability, Corrosivity, Reactivity	SW1010B/SW1030 SW9040/SW9045 7.3.3.2/7.3.4.2	NA	NA	0-20 or lab QC limit	80-120 or lab QC limit	NA	NA
TOC	Lloyd Kahn	TOC	80-120 or lab QC limit	0-20 or lab QC limit	90-110 or lab QC limit	NA	NA
SPLP PFAS	E537.1 modified	All target PFAS	70-130 or lab QC limit	0-20 or lab QC limit	70-130 or lab QC limit	all tracer PFAS (isotope dilution all PFAS)	50-150 or lab QC limit

(a) Matrix Spike/Matrix Spike Duplicate
(b) Relative Percent Difference
(c) Laboratory Control Sample
NA – Not Applicable
VOC – volatile organic compound
SVOC – semi-volatile organic compound
PCB – polychlorinated biphenyl
TCLP – toxicity characteristic leaching procedure
TOC – Total organic carbon

TABLE 3.2A
STANDARDS AND QUANTITATION LIMITS
GROUNDWATER AND SURFACE WATER
TONAWANDA COKE SITE 108

CAS NO.	COMPOUND	NYSDEC Class GA Ambient Water Quality Standards/Guidance Criteria(1)	QAPP Quantitation Limit (2)	UNITS
VOLATILES (SW8260C)				
71-55-6	1,1,1-TRICHLOROETHANE	5	1	µg/l
79-34-5	1,1,2,2-TETRACHLOROETHANE	5	1	µg/l
76-13-1	1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	5	1	µg/l
79-00-5	1,1,2-TRICHLOROETHANE	1	1	µg/l
75-34-3	1,1-DICHLOROETHANE	5	1	µg/l
75-35-4	1,1-DICHLOROETHENE	5	1	µg/l
87-61-6	1,2,3-TRICHLOROBENZENE	5	1	µg/l
120-82-1	1,2,4-TRICHLOROBENZENE	5	1	µg/l
96-12-8	1,2-DIBROMO-3-CHLOROPROPANE	0.04	1	µg/l
106-93-4	1,2-DIBROMOETHANE	0.0006	1	µg/l
95-50-1	1,2-DICHLOROBENZENE	3	1	µg/l
107-06-2	1,2-DICHLOROETHANE	0.6	1	µg/l
78-87-5	1,2-DICHLOROPROPANE	1	1	µg/l
541-73-1	1,3-DICHLOROBENZENE	3	1	µg/l
106-46-7	1,4-DICHLOROBENZENE	3	1	µg/l
591-78-6	2-HEXANONE	50	5	µg/l
67-64-1	ACETONE	50	5	µg/l
71-43-2	BENZENE	1	1	µg/l
74-97-5	BROMOCHLOROMETHANE	5	1	µg/l
75-27-4	BROMODICHLOROMETHANE	50	1	µg/l
75-25-2	BROMOFORM	50	1	µg/l
74-83-9	BROMOMETHANE	5	1	µg/l
75-15-0	CARBON DISULFIDE	60	1	µg/l
56-23-5	CARBON TETRACHLORIDE	5	1	µg/l
108-90-7	CHLOROBENZENE	5	1	µg/l
75-00-3	CHLOROETHANE	5	1	µg/l
67-66-3	CHLOROFORM	7	1	µg/l
74-87-3	CHLOROMETHANE	5	1	µg/l
156-59-2	CIS-1,2-DICHLOROETHYLENE	5	1	µg/l
10061-01-5	CIS-1,3-DICHLOROPROPENE	0.4	1	µg/l
110-82-7	CYCLOHEXANE	NS	1	µg/l
124-48-1	DIBROMOCHLOROMETHANE	50	1	µg/l
75-71-8	DICHLORODIFLUOROMETHANE	5	1	µg/l
100-41-4	ETHYLBENZENE	5	1	µg/l
98-82-8	ISOPROPYLBENZENE (CUMENE)	5	1	µg/l
79-20-9	METHYL ACETATE	NS	5	µg/l
78-93-3	METHYL ETHYL KETONE (2-BUTANONE)	50	5	µg/l
108-10-1	METHYL ISOBUTYL KETONE	NS	5	µg/l
108-87-2	METHYLCYCLOHEXANE	NS	1	µg/l
75-09-2	METHYLENE CHLORIDE	5	1	µg/l
100-42-5	STYRENE	5	1	µg/l
1634-04-4	TERT-BUTYL METHYL ETHER	10	1	µg/l
127-18-4	TETRACHLOROETHYLENE (PCE)	5	1	µg/l
108-88-3	TOLUENE	5	1	µg/l
156-60-5	TRANS-1,2-DICHLOROETHENE	5	1	µg/l
10061-02-6	TRANS-1,3-DICHLOROPROPENE	0.4	1	µg/l
79-01-6	TRICHLOROETHYLENE (TCE)	5	1	µg/l
75-69-4	TRICHLOROFLUOROMETHANE	5	1	µg/l
75-01-4	VINYL CHLORIDE	2	1	µg/l
XYLENES	XYLENES, TOTAL	5	2	µg/l
1,4-DIOXANE (8270D SIM)				
123-91-1	1,4-DIOXANE	200(5)	0.35	µg/l
SEMIVOLATILES (SW8270D)				
58-90-2	2,3,4,6-TETRACHLOROPHENOL	1(6)	10	µg/l
95-95-4	2,4,5-TRICHLOROPHENOL	1(6)	10	µg/l

TABLE 3.2A
STANDARDS AND QUANTITATION LIMITS
GROUNDWATER AND SURFACE WATER
TONAWANDA COKE SITE 108

CAS NO.	COMPOUND	NYSDEC Class GA Ambient Water Quality Standards/Guidance Criteria(1)	QAPP Quantitation Limit (2)	UNITS
88-06-2	2,4,6-TRICHLOROPHENOL	1(6)	10	µg/l
120-83-2	2,4-DICHLOROPHENOL	5	10	µg/l
105-67-9	2,4-DIMETHYLPHENOL	50	10	µg/l
51-28-5	2,4-DINITROPHENOL	10	20	µg/l
121-14-2	2,4-DINITROTOLUENE	5	2	µg/l
606-20-2	2,6-DINITROTOLUENE	5	2	µg/l
91-58-7	2-CHLORONAPHTHALENE	10	10	µg/l
95-57-8	2-CHLOROPHENOL	1(6)	10	µg/l
91-57-6	2-METHYLNAPHTHALENE	NS	10	µg/l
95-48-7	2-METHYLPHENOL (O-CRESOL)	1(6)	10	µg/l
88-74-4	2-NITROANILINE	5	10	µg/l
88-75-5	2-NITROPHENOL	1(6)	10	µg/l
91-94-1	3,3'-DICHLOROBENZIDINE	5	10	µg/l
99-09-2	3-NITROANILINE	5	10	µg/l
106-44-5	3&4-METHYLPHENOL (M&P-CRESOL)	1(6)	10	µg/l
534-52-1	4,6-DINITRO-2-METHYLPHENOL	1(6)	20	µg/l
101-55-3	4-BROMOPHENYL PHENYL ETHER	NS	10	µg/l
59-50-7	4-CHLORO-3-METHYLPHENOL	1(6)	10	µg/l
106-47-8	4-CHLOROANILINE	5	10	µg/l
7005-72-3	4-CHLOROPHENYL PHENYL ETHER	NS	10	µg/l
100-01-6	4-NITROANILINE	5	10	µg/l
100-02-7	4-NITROPHENOL	1(6)	20	µg/l
83-32-9	ACENAPHTHENE	20	10	µg/l
208-96-8	ACENAPHTHYLENE	NS	10	µg/l
98-86-2	ACETOPHENONE	NS	10	µg/l
120-12-7	ANTHRACENE	50	10	µg/l
1912-24-9	ATRAZINE	7.5	2	µg/l
100-52-7	BENZALDEHYDE	NS	10	µg/l
56-55-3	BENZO(A)ANTHRACENE	0.002	1	µg/l
50-32-8	BENZO(A)PYRENE	ND	1	µg/l
205-99-2	BENZO(B)FLUORANTHENE	0.002	2	µg/l
191-24-2	BENZO(G,H,I)PERYLENE	NS	10	µg/l
207-08-9	BENZO(K)FLUORANTHENE	0.002	1	µg/l
85-68-7	BENZYL BUTYL PHTHALATE	50	10	µg/l
92-52-4	BIPHENYL (DIPHENYL)	5	10	µg/l
111-91-1	BIS(2-CHLOROETHOXY) METHANE	5	10	µg/l
111-44-4	BIS(2-CHLOROETHYL) ETHER	1	1	µg/l
108-60-1	BIS(2-CHLOROISOPROPYL) ETHER	5	10	µg/l
117-81-7	BIS(2-ETHYLHEXYL) PHTHALATE	5	2	µg/l
105-60-2	CAPROLACTAM	NS	10	µg/l
86-74-8	CARBAZOLE	NS	10	µg/l
218-01-9	CHRYSENE	0.002	2	µg/l
53-70-3	DIBENZ(A,H)ANTHRACENE	NS	1	µg/l
132-64-9	DIBENZOFURAN	NS	10	µg/l
84-66-2	DIETHYL PHTHALATE	50	10	µg/l
131-11-3	DIMETHYL PHTHALATE	50	10	µg/l
84-74-2	DI-N-BUTYL PHTHALATE	50	10	µg/l
117-84-0	DI-N-OCTYLPHTHALATE	50	10	µg/l
206-44-0	FLUORANTHENE	50	10	µg/l
86-73-7	FLUORENE	50	10	µg/l
118-74-1	HEXACHLOROBENZENE	0.04	1	µg/l
87-68-3	HEXACHLOROBUTADIENE	0.5	1	µg/l
77-47-4	HEXACHLOROCYCLOPENTADIENE	5	10	µg/l
67-72-1	HEXACHLOROETHANE	5	2	µg/l
193-39-5	INDENO(1,2,3-C,D)PYRENE	0.002	2	µg/l
78-59-1	ISOPHORONE	50	10	µg/l
91-20-3	NAPHTHALENE	10	10	µg/l
98-95-3	NITROBENZENE	0.4	1	µg/l

TABLE 3.2A
STANDARDS AND QUANTITATION LIMITS
GROUNDWATER AND SURFACE WATER
TONAWANDA COKE SITE 108

CAS NO.	COMPOUND	NYSDEC Class GA Ambient Water Quality Standards/Guidance Criteria(1)	QAPP Quantitation Limit (2)	UNITS
621-64-7	N-NITROSODI-N-PROPYLAMINE	NS	1	µg/l
86-30-6	N-NITROSODIPHENYLAMINE	50	10	µg/l
87-86-5	PENTACHLOROPHENOL	1(6)	20	µg/l
85-01-8	PHENANTHRENE	50	10	µg/l
108-95-2	PHENOL	1(6)	10	µg/l
129-00-0	PYRENE	50	10	µg/l
	PESTICIDES (SW8081B)			
309-00-2	ALDRIN	ND, 0.001(7)	0.05	µg/l
319-84-6	ALPHA BHC	0.01	0.05	µg/l
959-98-8	ALPHA ENDOSULFAN	NS	0.05	µg/l
5103-71-9	ALPHA-CHLORDANE	0.05	0.05	µg/l
319-85-7	BETA BHC	0.04	0.05	µg/l
33213-65-9	BETA ENDOSULFAN	NS	0.05	µg/l
5103-74-2	BETA-CHLORDANE	0.05	0.05	µg/l
319-86-8	DELTA BHC	0.04	0.05	µg/l
60-57-1	DIELDRIN	0.004, 0.001(7)	0.05	µg/l
1031-07-8	ENDOSULFAN SULFATE	NS	0.05	µg/l
72-20-8	ENDRIN	ND	0.05	µg/l
7421-93-4	ENDRIN ALDEHYDE	5	0.05	µg/l
53494-70-5	ENDRIN KETONE	5	0.05	µg/l
58-89-9	GAMMA BHC (LINDANE)	0.05	0.05	µg/l
76-44-8	HEPTACHLOR	0.04	0.05	µg/l
1024-57-3	HEPTACHLOR EPOXIDE	0.03	0.05	µg/l
72-43-5	METHOXYCHLOR	35	0.5	µg/l
72-54-8	P,P'-DDD	0.3	0.05	µg/l
72-55-9	P,P'-DDE	0.2	0.05	µg/l
50-29-3	P,P'-DDT	0.2	0.05	µg/l
8001-35-2	TOXAPHENE	0.06	1	µg/l
	PCBs (SW8082A)			
12674-11-2	PCB-1016 (Aroclor 1016)	0.09(8)	0.5	µg/l
11104-28-2	PCB-1221 (Aroclor 1221)	0.09(8)	0.5	µg/l
11141-16-5	PCB-1232 (Aroclor 1232)	0.09(8)	0.5	µg/l
53469-21-9	PCB-1242 (Aroclor 1242)	0.09(8)	0.5	µg/l
12672-29-6	PCB-1248 (Aroclor 1248)	0.09(8)	0.5	µg/l
11097-69-1	PCB-1254 (Aroclor 1254)	0.09(8)	0.5	µg/l
11096-82-5	PCB-1260 (Aroclor 1260)	0.09(8)	0.5	µg/l
37324-23-5	PCB-1262 (Aroclor 1262)	0.09(8)	0.5	µg/l
11100-14-4	PCB-1268 (Aroclor 1268)	0.09(8)	0.5	µg/l
	PFAS (Modified E537.1)(9)			
2355-31-9	2-(N-methyl perfluorooctanesulfonamido) acetic acid	100, 500(10)	20	ng/L
27619-97-2	6:2 Fluorotelomer sulfonate	100, 500(10)	20	ng/L
39108-34-4	8:2 Fluorotelomer sulfonate	100, 500(10)	20	ng/L
2991-50-6	N-Ethyl-N-((heptadecafluorooctyl)sulphonyl) glycine	100, 500(10)	20	ng/L
375-73-5	Perfluorobutanesulfonic acid (PFBS)	100, 500(10)	2	ng/L
375-22-4	Perfluorobutanoic Acid	100, 500(10)	2	ng/L
	Perfluorodecane Sulfonic Acid	100, 500(10)	2	ng/L
335-76-2	Perfluorodecanoic acid (PFDA)	100, 500(10)	2	ng/L
307-55-1	Perfluorododecanoic acid (PFDoA)	100, 500(10)	2	ng/L
375-92-8	Perfluoroheptane Sulfonate (PFHPS)	100, 500(10)	2	ng/L
375-85-9	Perfluoroheptanoic acid (PFHpA)	100, 500(10)	2	ng/L
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	100, 500(10)	2	ng/L
307-24-4	Perfluorohexanoic acid (PFHxA)	100, 500(10)	2	ng/L
375-95-1	Perfluorononanoic acid (PFNA)	100, 500(10)	2	ng/L
754-91-6	Perfluorooctane Sulfonamide (FOSA)	100, 500(10)	2	ng/L
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	10, 500(10)	2	ng/L

TABLE 3.2A
STANDARDS AND QUANTITATION LIMITS
GROUNDWATER AND SURFACE WATER
TONAWANDA COKE SITE 108

CAS NO.	COMPOUND	NYSDEC Class GA Ambient Water Quality Standards/Guidance Criteria(1)	QAPP Quantitation Limit (2)	UNITS
335-67-1	Perfluorooctanoic acid (PFOA)	10, 500(10)	2	ng/L
2706-90-3	Perfluoropentanoic Acid (PFPeA)	100, 500(10)	2	ng/L
376-06-7	Perfluorotetradecanoic acid (PFTA)	100, 500(10)	2	ng/L
72629-94-8	Perfluorotridecanoic Acid (PFTriA)	100, 500(10)	2	ng/L
2058-94-8	Perfluoroundecanoic Acid (PFUnA)	100, 500(10)	2	ng/L
METALS (SW6010C/SW7470A) and CYANIDE (SW9012)				
7429-90-5	ALUMINUM	NS	200	µg/l
7440-36-0	ANTIMONY	3	20	µg/l
7440-38-2	ARSENIC	25	15	µg/l
7440-39-3	BARIUM	1000	200	µg/l
7440-41-7	BERYLLIUM	3	2	µg/l
7440-43-9	CADMIUM	5	4	µg/l
7440-70-2	CALCIUM	NS	5000	µg/l
7440-47-3	CHROMIUM, TOTAL	50	10	µg/l
7440-48-4	COBALT	NS	50	µg/l
7440-50-8	COPPER	200	25	µg/l
7439-89-6	IRON	300, 500(11)	150	µg/l
7439-92-1	LEAD	25	10	µg/l
7439-95-4	MAGNESIUM	35,000	5000	µg/l
7439-96-5	MANGANESE	300, 500(11)	15	µg/l
7439-97-6	MERCURY	0.7	0.2	µg/l
7440-02-0	NICKEL	100	40	µg/l
7440-09-7	POTASSIUM	NS	5000	µg/l
7782-49-2	SELENIUM	10	20	µg/l
7440-22-4	SILVER	50	10	µg/l
7440-23-5	SODIUM	20,000	5000	µg/l
7440-28-0	THALLIUM	0.5	20	µg/l
7440-62-2	VANADIUM	NS	50	µg/l
7440-66-6	ZINC	2,000	30	µg/l
57-12-5	CYANIDE	200	10	µg/l

NOTES:

(1) Groundwater criteria obtained from the NYSDEC document titled, "Division of Water Technical and Operational Gidance Series (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwter Effluent Limitations," June 1998; Errata Sheet for June 1998 Edition.
(2) Actual laboratory reporting limit (RL) may vary. Laboratory RL or, at a minimum, the laboratory method detection limit (MDL) will meet the standard criteria.
(3) Applies to the sum of 1,2,3-, 1,2,4-, and 1,3,5-trichlorobenze. For the waters of the Great Lakes System, the Department will substitute a guidance value for the aquatic Type standard if so determined under 702.15
(4) Applies to the sum of 1,2-, 1,3- and 1,4-dichlorobenzene
(5) EPA Lifetime Health Advisory level (0.2 mg/L = 200 µg/L).
(6) Applies to the sum of phenolic compounds
(7) Applies to the sum of Aldrin and Dieldrin
(8) Applies to the sum of these substances
(9) PFAS standards obtained from the NYSDEC document titled "Guidelines for Sampling and Analysis of Per- and Polyfluoroalkyl Substanced (PFAS) under NYSDEC's Part 375 Remedial Programs," January 2020
(10) Applies to sum of PFAS (including PFOA and PFOS)
(11) Applies to sum of iron and manganese
µg/L Micrograms per liter
ng/L Nanograms per liter
NS No Standard
ND Non-Detect

Honeywell PARSONS

TABLE 3.2B
STANDARDS AND QUANTITATION LIMITS
SOIL AND SEDIMENT
TONAWANDA COKE SITE 108

		6 NYCRR Part 375 Soil Cleanup Objective (SCO) for Commercial Use[1]	6 NYCRR Part 375 Soil Cleanup Objective (SCO) for Industrial Use[1]	Guidelines for Sampling and Analysis of Per- and Polyfluoroalkyl Substances (PFAS)[2]	Screening and Assessment of Contaminated Sediments Class A Sediment Guidance Value (SGV)[3]	Screening and Assessment of Contaminated Sediments Class C Sediment Guidance Value (SGV)[3]	QAPP Quantitation Limit [4]	UNITS
VOLATILES (SW8260C)								
71-55-6	1,1,1-TRICHLOROETHANE	500,000	1,000,000	N/A	N/A	N/A	5	µg/kg
79-34-5	1,1,2,2-TETRACHLOROETHANE	NS	NS	N/A	2,800	5,400	5	µg/kg
76-13-1	1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	NS	NS	N/A	N/A	N/A	5	µg/kg
79-00-5	1,1,2-TRICHLOROETHANE	NS	NS	N/A	N/A	N/A	5	µg/kg
75-34-3	1,1-DICHLOROETHANE	240,000	480,000	N/A	N/A	N/A	5	µg/kg
75-35-4	1,1-DICHLOROETHENE	500,000	1,000,000	N/A	520	4,700	5	µg/kg
87-61-6	1,2,3-TRICHLOROBENZENE	NS	NS	N/A	230	2,800	5	µg/kg
120-82-1	1,2,4-TRICHLOROBENZENE	NS	NS	N/A	35,000	55,000	5	µg/kg
96-12-8	1,2-DIBROMO-3-CHLOROPROPANE	NS	NS	N/A	N/A	N/A	5	µg/kg
106-93-4	1,2-DIBROMOETHANE	NS	NS	N/A	N/A	N/A	5	µg/kg
95-50-1	1,2-DICHLOROBENZENE	500,000	1,000,000	N/A	280	2,500	5	µg/kg
107-06-2	1,2-DICHLOROETHANE	30,000	60,000	N/A	N/A	N/A	5	µg/kg
78-87-5	1,2-DICHLOROPROPANE	280,000	560,000	N/A	N/A	N/A	5	µg/kg
541-73-1	1,3-DICHLOROBENZENE	280,000	560,000	N/A	1,800	7,100	5	µg/kg
106-46-7	1,4-DICHLOROBENZENE	130,000	250,000	N/A	720	3,300	5	µg/kg
591-78-6	2-HEXANONE	NS	NS	N/A	N/A	N/A	10	µg/kg
67-64-1	ACETONE	500,000	1,000,000	N/A	N/A	N/A	10	µg/kg
71-43-2	BENZENE	44,000	89,000	N/A	530	1,900	5	µg/kg
74-97-5	BROMOCHLOROMETHANE	NS	NS	N/A	N/A	N/A	5	µg/kg
75-27-4	BROMODICHLOROMETHANE	NS	NS	N/A	N/A	N/A	5	µg/kg
75-25-2	BROMOFORM	NS	NS	N/A	N/A	N/A	5	µg/kg
74-83-9	BROMOMETHANE	NS	NS	N/A	N/A	N/A	5	µg/kg
75-15-0	CARBON DISULFIDE	NS	NS	N/A	N/A	N/A	5	µg/kg
56-23-5	CARBON TETRACHLORIDE	22,000	44,000	N/A	1,070	9,600	5	µg/kg
108-90-7	CHLOROBENZENE	500,000	1,000,000	N/A	200	1,700	5	µg/kg
75-00-3	CHLOROETHANE	NS	NS	N/A	N/A	N/A	5	µg/kg
67-66-3	CHLOROFORM	350,000	700,000	N/A	N/A	N/A	5	µg/kg
74-87-3	CHLOROMETHANE	NS	NS	N/A	N/A	N/A	5	µg/kg
156-59-2	CIS-1,2-DICHLOROETHYLENE	500,000	1,000,000	N/A	N/A	N/A	5	µg/kg
10061-01-5	CIS-1,3-DICHLOROPROPENE	NS	NS	N/A	N/A	N/A	5	µg/kg
110-82-7	CYCLOHEXANE	NS	NS	N/A	N/A	N/A	5	µg/kg
124-48-1	DIBROMOCHLOROMETHANE	NS	NS	N/A	N/A	N/A	5	µg/kg
75-71-8	DICHLORODIFLUOROMETHANE	NS	NS	N/A	N/A	N/A	5	µg/kg
100-41-4	ETHYLBENZENE	390,000	780,000	N/A	430	3,700	5	µg/kg
98-82-8	ISOPROPYLBENZENE (CUMENE)	NS	NS	N/A	210	1,800	5	µg/kg
79-20-9	METHYL ACETATE	NS	NS	N/A	N/A	N/A	10	µg/kg
78-93-3	METHYL ETHYL KETONE (2-BUTANONE)	500,000	1,000,000	N/A	N/A	N/A	10	µg/kg
108-10-1	METHYL ISOBUTYL KETONE	500,000	1,000,000	N/A	N/A	N/A	10	µg/kg
108-87-2	METHYLCYCLOHEXANE	NS	NS	N/A	N/A	N/A	5	µg/kg
75-09-2	METHYLENE CHLORIDE	500,000	1,000,000	N/A	68[5]	N/A	5	µg/kg
100-42-5	STYRENE	NS	NS	N/A	N/A	N/A	5	µg/kg
1634-04-4	TERT-BUTYL METHYL ETHER	500,000	1,000,000	N/A	N/A	N/A	5	µg/kg
127-18-4	TETRACHLOROETHYLENE (PCE)	150,000	300,000	N/A	16,000	57,000	5	µg/kg
108-88-3	TOLUENE	500,000	1,000,000	N/A	930	4,500	5	µg/kg
156-60-5	TRANS-1,2-DICHLOROETHENE	500,000	1,000,000	N/A	1,200	11,000	5	µg/kg
10061-02-6	TRANS-1,3-DICHLOROPROPENE	NS	NS	N/A	N/A	N/A	5	µg/kg
79-01-6	TRICHLOROETHYLENE (TCE)	200,000	400,000	N/A	N/A	N/A	5	µg/kg
75-69-4	TRICHLOROFLUOROMETHANE	NS	NS	N/A	N/A	N/A	5	µg/kg
75-01-4	VINYL CHLORIDE	13,000	27,000	N/A	N/A	N/A	5	µg/kg
XYLENES	XYLENES, TOTAL	500,000	1,000,000	N/A	N/A	N/A	5	µg/kg
SEMIVOLATILES (SW8270D)								
123-91-1	1,4-DIOXANE	130,000	250,000	N/A	N/A	N/A	100	µg/kg
58-90-2	2,3,4,6-TETRACHLOROPHENOL	NS	NS	N/A	99[6]	N/A	660	µg/kg
95-95-4	2,4,5-TRICHLOROPHENOL	NS	NS	N/A	N/A	N/A	660	µg/kg
88-06-2	2,4,6-TRICHLOROPHENOL	NS	NS	N/A	N/A	N/A	660	µg/kg
120-83-2	2,4-DICHLOROPHENOL	NS	NS	N/A	N/A	N/A	660	µg/kg
105-67-9	2,4-DIMETHYLPHENOL	NS	NS	N/A	3600[5]	N/A	660	µg/kg
51-28-5	2,4-DINITROPHENOL	NS	NS	N/A	280[5]	N/A	660	µg/kg
121-14-2	2,4-DINITROTOLUENE	NS	NS	N/A	N/A	N/A	330	µg/kg
606-20-2	2,6-DINITROTOLUENE	NS	NS	N/A	N/A	N/A	330	µg/kg
91-58-7	2-CHLORONAPHTHALENE	NS	NS	N/A	N/A	N/A	330	µg/kg
95-57-8	2-CHLOROPHENOL	NS	NS	N/A	N/A	N/A	660	µg/kg
91-57-6	2-METHYLNAPHTHALENE	NS	NS	N/A	N/A	N/A	330	µg/kg
95-48-7	2-METHYLPHENOL (O-CRESOL)	500,000	1,000,000	N/A	N/A	N/A	660	µg/kg
88-74-4	2-NITROANILINE	NS	NS	N/A	N/A	N/A	330	µg/kg
88-75-5	2-NITROPHENOL	NS	NS	N/A	N/A	N/A	660	µg/kg
91-94-1	3,3'-DICHLOROBENZIDINE	NS	NS	N/A	N/A	N/A	330	µg/kg
99-09-2	3-NITROANILINE	NS	NS	N/A	N/A	N/A	330	µg/kg
106-44-5	3&4-METHYLPHENOL (M&P-CRESOL)	500,000	1,000,000	N/A	N/A	N/A	660	µg/kg
534-52-1	4,6-DINITRO-2-METHYLPHENOL	NS	NS	N/A	N/A	N/A	660	µg/kg
101-55-3	4-BROMOPHENYL PHENYL ETHER	NS	NS	N/A	N/A	N/A	330	µg/kg
59-50-7	4-CHLORO-3-METHYLPHENOL	NS	NS	N/A	N/A	N/A	660	µg/kg
106-47-8	4-CHLOROANILINE	NS	NS	N/A	N/A	N/A	330	µg/kg
7005-72-3	4-CHLOROPHENYL PHENYL ETHER	NS	NS	N/A	N/A	N/A	330	µg/kg
100-01-6	4-NITROANILINE	NS	NS	N/A	N/A	N/A	330	µg/kg
100-02-7	4-NITROPHENOL	NS	NS	N/A	N/A	N/A	660	µg/kg
83-32-9	ACENAPHTHENE	500,000	1,000,000	N/A	9,820	N/A	330	µg/kg
208-96-8	ACENAPHTHYLENE	500,000	1,000,000	N/A	9,040	N/A	330	µg/kg
98-86-2	ACETOPHENONE	NS	NS	N/A	N/A	N/A	330	µg/kg
120-12-7	ANTHRACENE	500,000	1,000,000	N/A	11,880	N/A	330	µg/kg
1912-24-9	ATRAZINE	NS	NS	N/A	N/A	N/A	330	µg/kg

TABLE 3.2B
STANDARDS AND QUANTITATION LIMITS
SOIL AND SEDIMENT
TONAWANDA COKE SITE 108

		6 NYCRR Part 375 Soil Cleanup Objective (SCO) for Commercial Use[1]	6 NYCRR Part 375 Soil Cleanup Objective (SCO) for Industrial Use[1]	Guidelines for Sampling and Analysis of Per- and Polyfluoroalkyl Substances (PFAS)[2]	Screening and Assessment of Contaminated Sediments Class A Sediment Guidance Value (SGV)[3]	Screening and Assessment of Contaminated Sediments Class C Sediment Guidance Value (SGV)[3]	QAPP Quantitation Limit [4]	UNITS
100-52-7	BENZALDEHYDE	NS	NS	N/A	N/A	N/A	330	µg/kg
56-55-3	BENZO(A)ANTHRACENE	5,600	11,000	N/A	16,820	N/A	330	µg/kg
50-32-8	BENZO(A)PYRENE	1,000	1,100	N/A	19,280	N/A	330	µg/kg
205-99-2	BENZO(B)FLUORANTHENE	5,600	11,000	N/A	19,580	N/A	330	µg/kg
191-24-2	BENZO(G,H,I)PERYLENE	500,000	1,000,000	N/A	21,900	N/A	330	µg/kg
207-08-9	BENZO(K)FLUORANTHENE	56,000	110,000	N/A	19,600	N/A	330	µg/kg
85-68-7	BENZYL BUTYL PHTHALATE	NS	NS	N/A	N/A	N/A	330	µg/kg
92-52-4	BIPHENYL (DIPHENYL)	NS	NS	N/A	N/A	N/A	330	µg/kg
111-91-1	BIS(2-CHLOROETHOXY) METHANE	NS	NS	N/A	N/A	N/A	330	µg/kg
111-44-4	BIS(2-CHLOROETHYL) ETHER	NS	NS	N/A	N/A	N/A	330	µg/kg
108-60-1	BIS(2-CHLOROISOPROPYL) ETHER	NS	NS	N/A	N/A	N/A	330	µg/kg
117-81-7	BIS(2-ETHYLHEXYL) PHTHALATE	NS	NS	N/A	360,000	N/A	330	µg/kg
105-60-2	CAPROLACTAM	NS	NS	N/A	N/A	N/A	330	µg/kg
86-74-8	CARBAZOLE	NS	NS	N/A	N/A	N/A	330	µg/kg
218-01-9	CHRYSENE	56,000	110,000	N/A	16,860	N/A	330	µg/kg
53-70-3	DIBENZ(A,H)ANTHRACENE	560	1,100	N/A	22,440	N/A	330	µg/kg
132-64-9	DIBENZOFURAN	350,000	1,000,000	N/A	N/A	N/A	330	µg/kg
84-66-2	DIETHYL PHTHALATE	NS	NS	N/A	N/A	N/A	330	µg/kg
131-11-3	DIMETHYL PHTHALATE	NS	NS	N/A	N/A	N/A	330	µg/kg
84-74-2	DI-N-BUTYL PHTHALATE	NS	NS	N/A	N/A	N/A	330	µg/kg
117-84-0	DI-N-OCTYLPHTHALATE	NS	NS	N/A	N/A	N/A	330	µg/kg
206-44-0	FLUORANTHENE	500,000	1,000,000	N/A	14,160	N/A	330	µg/kg
86-73-7	FLUORENE	500,000	1,000,000	N/A	10,780	N/A	330	µg/kg
118-74-1	HEXACHLOROBENZENE	6,000	12,000	N/A	0.19[5], 6.1[6]	N/A	330	µg/kg
87-68-3	HEXACHLOROBUTADIENE	NS	NS	N/A	12[5], 137[6]	N/A	330	µg/kg
77-47-4	HEXACHLOROCYCLOPENTADIENE	NS	NS	N/A	810	8,100	330	µg/kg
67-72-1	HEXACHLOROETHANE	NS	NS	N/A	110[5], 2,700[6]	N/A	330	µg/kg
193-39-5	INDENO(1,2,3-C,D)PYRENE	5,600	11,000	N/A	22,300	N/A	330	µg/kg
78-59-1	ISOPHORONE	NS	NS	N/A	N/A	N/A	330	µg/kg
91-20-3	NAPHTHALENE	500,000	1,000,000	N/A	7,700	N/A	330	µg/kg
98-95-3	NITROBENZENE	NS	NS	N/A	N/A	N/A	330	µg/kg
621-64-7	N-NITROSODI-N-PROPYLAMINE	NS	NS	N/A	N/A	N/A	330	µg/kg
86-30-6	N-NITROSODIPHENYLAMINE	NS	NS	N/A	N/A	N/A	330	µg/kg
87-86-5	PENTACHLOROPHENOL	6,700	55,000	N/A	14,000	19,000	330	µg/kg
85-01-8	PHENANTHRENE	500,000	1,000,000	N/A	11,940	N/A	660	µg/kg
108-95-2	PHENOL	500,000	1,000,000	N/A	N/A	N/A	660	µg/kg
129-00-0	PYRENE	500,000	1,000,000	N/A	13,960	N/A	330	µg/kg
ALKYLATED PAHs (Modified SW8270D)[8]								
91-20-3	NAPHTHALENE	N/A	N/A	N/A	7,700	N/A	TBD[9]	µg/kg
	C1-NAPHTHALENE	N/A	N/A	N/A	8,900	N/A	TBD[9]	µg/kg
208-96-8	ACENAPHTHYLENE	N/A	N/A	N/A	9,040	N/A	TBD[9]	µg/kg
83-32-9	ACENAPHTHENE	N/A	N/A	N/A	9,820	N/A	TBD[9]	µg/kg
	C2-NAPHTHALENE	N/A	N/A	N/A	10,200	N/A	TBD[9]	µg/kg
86-73-7	FLUORENE	N/A	N/A	N/A	10,780	N/A	TBD[9]	µg/kg
	C3-NAPHTHALENE	N/A	N/A	N/A	11,620	N/A	TBD[9]	µg/kg
120-12-7	ANTHRACENE	N/A	N/A	N/A	11,880	N/A	TBD[9]	µg/kg
85-01-8	PHENANTHRENE	N/A	N/A	N/A	11,940	N/A	TBD[9]	µg/kg
	C1-FLUORENE	N/A	N/A	N/A	12,220	N/A	TBD[9]	µg/kg
	C4-NAPHTHALENE	N/A	N/A	N/A	13,140	N/A	TBD[9]	µg/kg
	C1-PHENANTHRENE/ANTHRACENE	N/A	N/A	N/A	13,400	N/A	TBD[9]	µg/kg
	C2-FLUORENE	N/A	N/A	N/A	13,740	N/A	TBD[9]	µg/kg
129-00-0	PYRENE	N/A	N/A	N/A	13,960	N/A	TBD[9]	µg/kg
206-44-0	FLUORANTHENE	N/A	N/A	N/A	14,160	N/A	TBD[9]	µg/kg
	C2-PHENANTHRENE/ANTHRACENE	N/A	N/A	N/A	14,900	N/A	TBD[9]	µg/kg
	C3-FLUORENE	N/A	N/A	N/A	15,360	N/A	TBD[9]	µg/kg
	C1-PYRENE/FLUORANTHENE	N/A	N/A	N/A	15,380	N/A	TBD[9]	µg/kg
	C3-PHENANTHRENE/ANTHRACENE	N/A	N/A	N/A	16,600	N/A	TBD[9]	µg/kg
56-55-3	BENZO(A)ANTHRACENE	N/A	N/A	N/A	16,820	N/A	TBD[9]	µg/kg
218-01-9	CHRYSENE	N/A	N/A	N/A	16,860	N/A	TBD[9]	µg/kg
	C4-PHENANTHRENE/ANTHRACENE	N/A	N/A	N/A	18,280	N/A	TBD[9]	µg/kg
	C1-BENZANTHRACENE/CHRYSENE	N/A	N/A	N/A	18,600	N/A	TBD[9]	µg/kg
50-32-8	BENZO(A)PYRENE	N/A	N/A	N/A	19,280	N/A	TBD[9]	µg/kg
198-55-0	PERYLENE	N/A	N/A	N/A	19,340	N/A	TBD[9]	µg/kg
192-97-2	BENZO(E)PYRENE	N/A	N/A	N/A	19,340	N/A	TBD[9]	µg/kg
205-99-2	BENZO(B)FLUORANTHENE	N/A	N/A	N/A	19,580	N/A	TBD[9]	µg/kg
207-08-9	BENZO(K)FLUORANTHENE	N/A	N/A	N/A	19,600	N/A	TBD[9]	µg/kg
	C2-BENZANTHRACENE/CHRYSENE	N/A	N/A	N/A	20,180	N/A	TBD[9]	µg/kg
191-24-2	BENZO(G,H,I)PERYLENE	N/A	N/A	N/A	21,900	N/A	TBD[9]	µg/kg
	C3-BENZANTHRACENE/CHRYSENE	N/A	N/A	N/A	22,240	N/A	TBD[9]	µg/kg
193-39-5	INDENO(1,2,3-C,D)PYRENE	N/A	N/A	N/A	22,300	N/A	TBD[9]	µg/kg
53-70-3	DIBENZ(A,H)ANTHRACENE	N/A	N/A	N/A	22,440	N/A	TBD[9]	µg/kg
	C4-BENZANTHRACENE/CHRYSENE	N/A	N/A	N/A	24,260	N/A	TBD[9]	µg/kg
PESTICIDES (SW8081B)								
309-00-2	ALDRIN	680	1,400	N/A	1.1[6][7]	N/A	0.67	µg/kg
319-84-6	ALPHA BHC	3,400	6,800	N/A	0.21[5]	N/A	0.67	µg/kg
959-98-8	ALPHA ENDOSULFAN	200,000[10]	920,000[10]	N/A	N/A	N/A	0.67	µg/kg
5103-71-9	ALPHA-CHLORDANE	24,000	47,000	N/A	N/A	N/A	0.67	µg/kg
319-85-7	BETA BHC	3,000	14,000	N/A	0.84[5]	N/A	0.67	µg/kg
33213-65-9	BETA ENDOSULFAN	200,000[10]	920,000[10]	N/A	N/A	N/A	0.67	µg/kg

Honeywell PARSONS

TABLE 3.2B
STANDARDS AND QUANTITATION LIMITS
SOIL AND SEDIMENT
TONAWANDA COKE SITE 108

		6 NYCRR Part 375 Soil Cleanup Objective (SCO) for Commercial Use(1)	6 NYCRR Part 375 Soil Cleanup Objective (SCO) for Industrial Use(1)	Guidelines for Sampling and Analysis of Per- and Polyfluoroalkyl Substances (PFAS)(2)	Screening and Assessment of Contaminated Sediments Class A Sediment Guidance Value (SGV)(3)	Screening and Assessment of Contaminated Sediments Class C Sediment Guidance Value (SGV)(3)	QAPP Quantitation Limit (4)	UNITS
5103-74-2	BETA-CHLORDANE	NS	NS	N/A	N/A	N/A	0.67	µg/kg
319-86-8	DELTA BHC	500,000	1,000,000	N/A	0.81(5)	N/A	0.67	µg/kg
60-57-1	DIELDRIN	1,400	2,800	N/A	180	780	0.67	µg/kg
1031-07-8	ENDOSULFAN SULFATE	200,000(10)	920,000(10)	N/A	N/A	N/A	0.67	µg/kg
72-20-8	ENDRIN	89,000	410,000	N/A	90	220	0.67	µg/kg
7421-93-4	ENDRIN ALDEHYDE	NS	NS	N/A	N/A	N/A	0.67	µg/kg
53494-70-5	ENDRIN KETONE	NS	NS	N/A	N/A	N/A	0.67	µg/kg
58-89-9	GAMMA BHC (LINDANE)	9,200	23,000	N/A	0.65(5)	N/A	0.67	µg/kg
76-44-8	HEPTACHLOR	15,000	29,000	N/A	75	10,000	0.67	µg/kg
1024-57-3	HEPTACHLOR EPOXIDE	NS	NS	N/A	15	2,100	0.67	µg/kg
72-43-5	METHOXYCHLOR	NS	NS	N/A	59	N/A	1.3	µg/kg
72-54-8	P,P'-DDD	92,000	180,000	N/A	N/A	N/A	0.67	µg/kg
72-55-9	P,P'-DDE	62,000	120,000	N/A	N/A	N/A	0.67	µg/kg
50-29-3	P,P'-DDT	47,000	94,000	N/A	44	48,000	0.67	µg/kg
8001-35-2	TOXAPHENE	NS	NS	N/A	6	250	17	µg/kg
			PCBs (SW8082A)					
12674-11-2	PCB-1016 (Aroclor 1016)	1,000	25,000	N/A	100(11)	1000(11)	33	µg/kg
11104-28-2	PCB-1221 (Aroclor 1221)	1,000	25,000	N/A	100(11)	1000(11)	33	µg/kg
11141-16-5	PCB-1232 (Aroclor 1232)	1,000	25,000	N/A	100(11)	1000(11)	33	µg/kg
53469-21-9	PCB-1242 (Aroclor 1242)	1,000	25,000	N/A	100(11)	1000(11)	33	µg/kg
12672-29-6	PCB-1248 (Aroclor 1248)	1,000	25,000	N/A	100(11)	1000(11)	33	µg/kg
11097-69-1	PCB-1254 (Aroclor 1254)	1,000	25,000	N/A	100(11)	1000(11)	33	µg/kg
11096-82-5	PCB-1260 (Aroclor 1260)	1,000	25,000	N/A	100(11)	1000(11)	33	µg/kg
37324-23-5	PCB-1262 (Aroclor 1262)	1,000	25,000	N/A	100(11)	1000(11)	33	µg/kg
11100-14-4	PCB-1268 (Aroclor 1268)	1,000	25,000	N/A	100(11)	1000(11)	33	µg/kg
			PFAS (Modified E537.1)					
2355-31-9	2-(N-methyl perfluorooctanesulfonamido) acetic acid	N/A	N/A	NS	N/A	N/A	2	µg/kg
27619-97-2	6:2 Fluorotelomer sulfonate	N/A	N/A	NS	N/A	N/A	2	µg/kg
39108-34-4	8:2 Fluorotelomer sulfonate	N/A	N/A	NS	N/A	N/A	2	µg/kg
2991-50-6	N-Ethyl-N-((heptadecafluorooctyl)sulphonyl) glycine	N/A	N/A	NS	N/A	N/A	2	µg/kg
375-73-5	Perfluorobutanesulfonic acid (PFBS)	N/A	N/A	NS	N/A	N/A	0.2	µg/kg
375-22-4	Perfluorobutanoic Acid	N/A	N/A	NS	N/A	N/A	0.2	µg/kg
	Perfluorodecane Sulfonic Acid	N/A	N/A	NS	N/A	N/A	0.2	µg/kg
335-76-2	Perfluorodecanoic acid (PFDA)	N/A	N/A	NS	N/A	N/A	0.2	µg/kg
307-55-1	Perfluorododecanoic acid (PFDoA)	N/A	N/A	NS	N/A	N/A	0.2	µg/kg
375-92-8	Perfluoroheptane Sulfonate (PFHPS)	N/A	N/A	NS	N/A	N/A	0.2	µg/kg
375-85-9	Perfluoroheptanoic acid (PFHpA)	N/A	N/A	NS	N/A	N/A	0.2	µg/kg
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	N/A	N/A	NS	N/A	N/A	0.2	µg/kg
307-24-4	Perfluorohexanoic acid (PFHxA)	N/A	N/A	NS	N/A	N/A	0.2	µg/kg
375-95-1	Perfluorononanoic acid (PFNA)	N/A	N/A	NS	N/A	N/A	0.2	µg/kg
754-91-6	Perfluorooctane Sulfonamide (FOSA)	N/A	N/A	NS	N/A	N/A	0.2	µg/kg
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	N/A	N/A	0.07(12)	N/A	N/A	0.2	µg/kg
335-67-1	Perfluorooctanoic acid (PFOA)	N/A	N/A	0.07(12)	N/A	N/A	0.2	µg/kg
2706-90-3	Perfluoropentanoic Acid (PFPeA)	N/A	N/A	NS	N/A	N/A	0.2	µg/kg
376-06-7	Perfluorotetradecanoic acid (PFTA)	N/A	N/A	NS	N/A	N/A	0.2	µg/kg
72629-94-8	Perfluorotridecanoic Acid (PFTriA)	N/A	N/A	NS	N/A	N/A	0.2	µg/kg
2058-94-8	Perfluoroundecanoic Acid (PFUnA)	N/A	N/A	NS	N/A	N/A	0.2	µg/kg
			METALS (SW6010C/SW7470A) and CYANIDE (SW9012)					
7429-90-5	ALUMINUM	NS	NS	N/A	N/A	N/A	10	mg/kg
7440-36-0	ANTIMONY	NS	NS	N/A	N/A	N/A	6	mg/kg
7440-38-2	ARSENIC	16	16	N/A	10	33	1	mg/kg
7440-39-3	BARIUM	400	10,000	N/A	N/A	N/A	2	mg/kg
7440-41-7	BERYLLIUM	590	2,700	N/A	N/A	N/A	0.5	mg/kg
7440-43-9	CADMIUM	9.3	60	N/A	1	5	0.5	mg/kg
7440-70-2	CALCIUM	NS	NS	N/A	N/A	N/A	100	mg/kg
7440-47-3	CHROMIUM, TOTAL	400(13)	800(13)	N/A	43	110	1	mg/kg
7440-48-4	COBALT	NS	NS	N/A	N/A	N/A	5	mg/kg
7440-50-8	COPPER	270	10,000	N/A	32	150	2	mg/kg
7439-89-6	IRON	NS	NS	N/A	N/A	N/A	10	mg/kg
7439-92-1	LEAD	1,000	3,900	N/A	36	130	5	mg/kg
7439-95-4	MAGNESIUM	NS	NS	N/A	N/A	N/A	100	mg/kg
7439-96-5	MANGANESE	10,000	10,000	N/A	N/A	N/A	1	mg/kg
7439-97-6	MERCURY	2.8(14)	5.7(14)	N/A	0.2	1	0.033	mg/kg
7440-02-0	NICKEL	310	10,000	N/A	23	49	4	mg/kg
7440-09-7	POTASSIUM	NS	NS	N/A	N/A	N/A	200	mg/kg
7782-49-2	SELENIUM	1,500	6,800	N/A	N/A	N/A	1	mg/kg
7440-22-4	SILVER	1,500	6,800	N/A	1	2.2	1	mg/kg
7440-23-5	SODIUM	NS	NS	N/A	N/A	N/A	100	mg/kg
7440-28-0	THALLIUM	NS	NS	N/A	N/A	N/A	1	mg/kg
7440-62-2	VANADIUM	NS	NS	N/A	N/A	N/A	5	mg/kg
7440-66-6	ZINC	10,000	10,000	N/A	120	460	6	mg/kg
57-12-5	CYANIDE	27(13)	10,000(13)	N/A	N/A	N/A	0.5	mg/kg

Honeywell PARSONS

TABLE 3.2B
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SOIL AND SEDIMENT
TONAWANDA COKE SITE 108

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TOTAL ORGANIC CARBON (USEPA approved Lloyd Kahn)							
TOTAL ORGANIC CARBON	NS	NS	NS	NS	NS	500	mg/kg

NOTES:

(1) Soil cleanup objectives from Table 375-6.8(b) in NYSDEC's "6 NYCRR PART 375 Environmental Remediation Programs," December 14, 2006.
(2) PFAS guidelines from NYSDEC's "Guidelines for Sampling and Analysis of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 365 Remedial Programs," January 2020.
(3) Sediment Guidance Values from NYSDEC's "Screening and Guidelines of Contaminated Sediments," June 24, 2014
(4) Actual laboratory reporting limit (RL) may vary. Laboratory RL or, at a minimum, the laboratory method detection limit (MDL) will meet the standard criteria.
(5) Bioaccumulation-based SGV for human health
(6) Bioaccumulation-based SGV for wildlife
(7) SGV for sum of aldrin and dieldrin
(8) Sediment analysis only; Used for comparison to Sediment Guidance Values
(9) Quantitation limits vary. Suitable quantitation limits will be determined by selected analytical laboratory
(10) This SCO is for the sum of endosulfan I, endosulfan II, and endosulfan sulfate
(11) SGV applies to total PCBs
(12) This guideline is for Synthetic Precipitation Leaching Procedure (SPLP) results and is applicable to either individual or combined concentrations of PFOA and PFOS
(13) The SCO for this specific compound (or family of compounds) is considered to be met if the analysis for the total species of this contaminant is below the specific SCO.
(14) This SCO is the lower of the values for mercury (elemental) or mercury (inorganic salts).
µg/kg Micrograms per kilogram
mg/kg Millagrams per kilogram
NS No Standard
N/A Not Applicable
TBD To be determined

Honeywell PARSONS

TABLE 3.2C
STANDARDS AND QUANTITATION LIMITS - WASTE
TONAWANDA COKE SITE 108

CAS NO.	COMPOUND	TCLP Criteria	QAPP Quantitation Limit (1)	UNITS
	TCLP VOLATILES (SW1311/SW8260C)			
75-35-4	1,1-DICHLOROETHENE	0.7	0.01	mg/L
107-06-2	1,2-DICHLOROETHANE	0.5	0.01	mg/L
106-46-7	1,4-DICHLOROBENZENE	7.5	0.01	mg/L
71-43-2	BENZENE	0.5	0.01	mg/L
56-23-5	CARBON TETRACHLORIDE	0.5	0.01	mg/L
108-90-7	CHLOROBENZENE	100	0.01	mg/L
67-66-3	CHLOROFORM	6	0.01	mg/L
78-93-3	METHYL ETHYL KETONE (2-BUTANONE)	200	0.1	mg/L
127-18-4	TETRACHLOROETHYLENE (PCE)	0.7	0.01	mg/L
79-01-6	TRICHLOROETHYLENE (TCE)	0.5	0.01	mg/L
75-01-4	VINYL CHLORIDE	0.2	0.01	mg/L
	TCLP SEMIVOLATILES (SW1311/SW8270D)			
95-95-4	2,4,5-TRICHLOROPHENOL	400	0.05	mg/L
88-06-2	2,4,6-TRICHLOROPHENOL	2	0.05	mg/L
121-14-2	2,4-DINITROTOLUENE	0.13	0.05	mg/L
95-48-7	2-METHYLPHENOL (O-CRESOL)	200	0.05	mg/L
106-44-5	3&4-METHYLPHENOL (M&P-CRESOL)	200	0.05	mg/L
118-74-1	HEXACHLOROBENZENE	0.13	0.05	mg/L
87-68-3	HEXACHLOROBUTADIENE	0.5	0.05	mg/L
67-72-1	HEXACHLOROETHANE	3	0.05	mg/L
98-95-3	NITROBENZENE	2	0.05	mg/L
87-86-5	PENTACHLOROPHENOL	100	0.1	mg/L
110-86-1	PYRIDINE	5	0.05	mg/L
	TCLP PESTICIDES (SW1311/SW8081B)			
57-74-9	CHLORDANE	0.03	0.01	mg/L
72-20-8	ENDRIN	0.02	0.0005	mg/L
58-89-9	GAMMA BHC (LINDANE)	0.4	0.0005	mg/L
76-44-8	HEPTACHLOR	0.008	0.0005	mg/L
1024-57-3	HEPTACHLOR EPOXIDE	0.008	0.0005	mg/L
72-43-5	METHOXYCHLOR	10	0.0005	mg/L
8001-35-2	TOXAPHENE	0.5	0.02	mg/L
	TCLP Herbicides (SW1311/SW8082A)			
94-75-7	2,4-D (DICHLOROPHENOXYACETIC ACID)	10	0.005	mg/L
93-72-1	SILVEX (2,4,5-TP)	1	0.005	mg/L
	TCLP METALS (SW1311/SW6010C/SW7470A)			
7440-38-2	ARSENIC	5	0.15	mg/L
7440-39-3	BARIUM	100	2.5	mg/L
7440-43-9	CADMIUM	1	0.01	mg/L
7440-47-3	CHROMIUM, TOTAL	5	0.025	mg/L
7439-92-1	LEAD	5	0.10	mg/L
7439-97-6	MERCURY	0.2	0.002	mg/L
7782-49-2	SELENIUM	1	0.10	mg/L
7440-22-4	SILVER	5	0.025	mg/L

NOTES:

(1) Actual laboratory reporting limit (RL) may vary. Laboratory RL or, at a minimum, the laboratory method detection limit (MDL) will meet the standard criteria.

mg/L Millagrams per liter

4.0 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 FSP, best practices, and field decontamination methods will be used 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 COC 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.

TABLE 4.1A WATER 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, Pesticides, PCBs	2-1 Liter amber glass containers with Teflon-lined lid	Cool to $4^{o}C$	7 days for extraction 40 days for analysis
1,4-dioxane	1000 mL glass w/ Teflon lined cap	Cool to $4^{o}C$	7 days for extraction 40 days for analysis
Metals	1000 mL plastic bottle	Nitric Acid to pH<2 Cool to $4^{o}C$	6 months 28 days (mercury)
Cyanide	500 mL plastic bottle	NaOH to pH>12 Cool to $4^{o}C$	14 days
PFAS	2-250 mL HDPE	Cool to $4^{o}C$	14 days for extraction, 28 days for analysis

(a) All samples to be preserved in ice during collection and transport.

(b) Days from sample collection.

mL milliliter

TABLE 4.1B SOIL/SEDIMENT SAMPLE CONTAINERIZATION PRESERVATION, AND HOLDING TIMES

Analysis	Bottle Type	Preservation [(a)]	Holding Time [(b)]
VOCs	Encore or TerraCores	Cool to 4°C	48 hours for extraction 14 days for analysis
SVOCs, alkyl PAHs, Pesticides, PCBs	250 mL wide-mouth glass container	Cool to 4°C	14 days for extraction 40 days for analysis
Metals	250 mL wide-mouth glass container	Cool to 4°C	6 months 28 days (mercury)
Cyanide	250 mL wide-mouth glass container	Cool to 4°C	14 days
PFAS	250 mL wide-mouth glass container	Cool to 4°C	14 days for extraction, 28 days for analysis
TOC	250 mL wide-mouth glass container	Cool to 4°C	14 days

(a) All samples to be preserved in ice during collection and transport.

(b) Days from sample collection.

NA = Not applicable.

TABLE 4.1C WASTE SAMPLE CONTAINERIZATION PRESERVATION, AND HOLDING TIMES

Analysis	Bottle Type	Preservation[a]	Holding Time[b]
VOCs	3-40 mL glass vial w/ Teflon septum	Cool to 4±2°C	7 days
TCLP VOCs	Wide-mouth glass container.	Cool to 4±2°C	14 days for TCLP extraction 14 days for analysis
SVOCs, Pesticides, PCBs	Wide-mouth glass container with Teflon-lined lid	Cool to 4±2°C	14 days for extraction 40 days for analysis
TCLP SVOCs TCLP Pesticides TCLP Herbicides	Wide-mouth glass container with Teflon-lined lid	Cool to 4±2°C	14 days for TCLP extraction 7 days for extraction 40 days for analysis
Metals	Wide-mouth glass container.	Cool to 4±2°C	6 months (mercury – 28 days)
TCLP Metals	Wide-mouth glass container.	Cool to 4±2°C	6 months (mercury – 28 days)
Ignitability, Corrosivity, Reactivity	Wide-mouth glass container.	Cool to 4±2°C	7 days (14 days for reactivity)

(a) All samples to be preserved in ice during collection and transport.

(b) Days from sample collection.

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 COC 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 COC will be required.

4.2.1 Sample Handling

Samples to be collected for the work assignment are specified in work 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 COC 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:

Soil and water samples:

- Fill a dry shipment cooler with inert cushioning to a depth of 1 inch to prevent bottle breakage. A separate shipment cooler will be used for PFAS samples.
- 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 degrees Celsius (°C).
- Complete the COC form (see Section 4.2.2). Place the COC 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 COC form; another copy is transmitted to the data manager (quality assurance officer, QAO) and the Project Manager specified in the PMP.

- 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 COC 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. Laboratory performance requirements for analysis turnaround time will be established using the validated time of sample receipt (VTSR) in accordance to NYSDEC requirements. The field team will carefully coordinate sampling activities with the laboratory to see that holding times are met.

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

4.2.2 Field Sample Custody

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

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

The sample custody flowchart is shown in **Figure 4.1.**

DATA REQUIRED ON CHAIN-OF-CUSTODY
Project name and client Signatures of samplers Sample number, data 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 COC 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 COC record must be completed for each sample set collected. See chart for data requirements.

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

The REMARKS space on the COC 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 COC 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 COC 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 COC 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 COC 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 COC 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 COC form, and note any discrepancies. Specifically, the sample-receiving personnel note any damaged or missing sample containers. At this time, the field COC 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 COC 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 SOPs for laboratory sample security will be implemented to confirm that the laboratory satisfies sample COC requirements:

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

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

4.2.6 Retention and Disposal of Samples

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

FIGURE 4.1 SAMPLE CUSTODY FLOW CHART

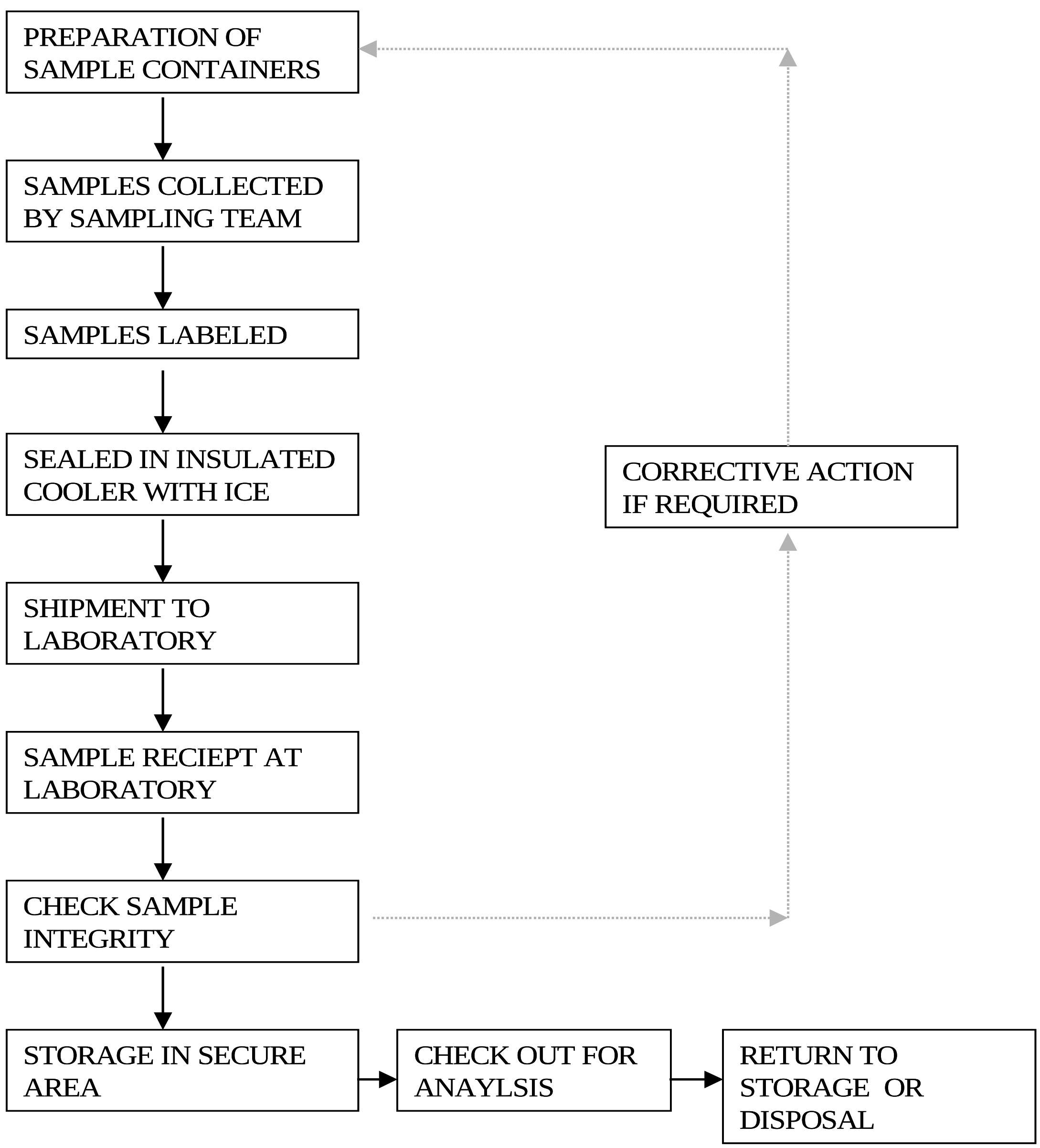

FIGURE 4.2 EXAMPLE OF CHAIN-OF-CUSTODY RECORD

Submitted to:

Chain Of Custody / Analysis Request

AESI Ref:

COC #:

Lab Use Only

Lab Proj #

Lab ID

Privileged & Confidential

EDD To:

Site Name:

Location of Site:

Client Contact: (name, co., address)

Sampler:

P O #

Analysis Turnaround Time:

Standard - Y

2 weeks -

1 week -

Next Day -

Hardcopy Report To:

Invoice To:

Preservative: 0 0 2

Job No.

Column Study Sediment

Grab/Composite

Field Filtered Sample ?

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):

5.0 DATA MANAGEMENT

5.1 Introduction

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

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

5.2 Field Data Management

The Field Team Leader will manage data generated in the field. This person or their designee will be responsible for recording and documenting sampling activities in the field logs, on sampling records (as appropriate), and on COC 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 was developed with the data management team. Each sample name will be unique to include a location ID and field sample ID. The following sample naming conventions will be used for each sampling task:

Groundwater/Surface Water Samples:

Naming Format: Monitoring well ID-Sample Date

Example: MW-5-2020-02052020. Groundwater sample from MW-5-2020.

Soil/Sediment Samples:

Naming Format: Soil boring/Test pit ID/Sediment core location-depth interval-Sample Date

Example: SB-2-2020-4-6-02052020. Soil sample from SB-2-2020, from 4 to 6 feet deep, collected on February 5, 2020

Waste Characterization Samples:

Naming Format: Sample number-waste type-date

Examples: IDW-01-SW-10192020 (SW = solid waste collected on October 19, 2020)

IDW-02-LW-10192020 (LW = liquid waste collected on October 19, 2020)

IDW-03-DW-101920 (DW = debris/mixed waste such as sample tubing, PPE, etc. collected on October 19, 2020)

The Database Manager will add data to EIMS through the input module of the system.

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

5.3 Laboratory Data Management

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

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

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

6.0 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, COC records, photographs, and pre-design investigation records. The Field Team Leader is responsible for maintaining these documents. Each record is described below.

6.2.1 Field Log

A Field Log will be used to document RI 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 COC record can be printed as well.

6.2.3 Chain-of-Custody Record

The COC 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 COC procedures. These procedures are necessary to support the validity of the data and will accompany each shipping container.

A copy of the COC 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.

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

Overwriting or disposal of any electronic media prior to a five-year 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 five-year 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 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 seven 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 seven 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 LPM. 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 EDD and as an analytical data package. The analytical laboratories are required to submit all data, preliminary and final, in formatted EDDs in accordance with NYSDEC's requirements.

The laboratory must meet 100% compliance with these requirements. The Parsons Database Manager will submit written requests dictating the requirements and appropriate files to be supplied by the laboratory. The specifications of the EDD are presented in **Section 5**. EDDs are required for this project for all data collected regardless of whether the data will be validated or not.

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 in the NYSDEC ASP Category B format for all data requiring validation, unless an alternative requirement is specified in a laboratory statement of work (SOW) and will contain all information to support the data validation in accordance with the USEPA Region II SOP as described in **Section 9**. Additionally, the completed copies of the COC records, accompanying each sample from the time of initial bottle preparation to completion of analysis, must be attached to the analytical reports.

6.4 Data Validation and Audit Records

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

6.4.1 Data Usability Summary Records

The DUSR will be prepared as required by NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation, Appendix 2B, May, 2010. The DUSR will summarize the impacts of using data that do not achieve overall data quality objectives or that do not meet PARCC and sensitivity criteria identified in **Section 3.2**.

6.4.2 Audit Records

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

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

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

REPORT	PERSON RESPONSIBLE FOR		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 (CONT.)

	PERSON RESPONSIBLE FOR		
REPORT	MAINTENANCE	DISTRIBUTION	STORAGE
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

7.0 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, 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), Methods for Chemical Analysis of Water and Wastes (USEPA 1983), and NYSDEC Guidance for Sampling and Analysis of PFAS. 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 (SOPs)

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

8.0 QUALITY CONTROL (QC)

8.1 Introduction

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

- **Field performance:** QC samples are used to evaluate the effectiveness of the sampling program to obtain representative samples, eliminating any cross contamination. These samples will include trip blanks, field duplicates and rinse blanks.
- **Sample performance:** Factors associated with sample preparation and analysis influence accuracy and precision. Such factors are monitored by the use of internal QC samples. QC field samples are analyzed to evaluate measurement bias due to the sample matrix based on evaluation of matrix spike (MS) and matrix spike duplicate (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 (water and soil). An equipment rinse blank will be collected from disposable sampling equipment at a frequency of once per lot. For PFAS sampling, equipment rinse blanks and field blanks will be collected daily. 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 samples 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 samples. For groundwater sampling, an equipment rinse blank is a sample of deionized water provided by the laboratory that is poured over or through the sampling equipment (e.g., stainless steel spoon, tubing, etc.) 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. For PFAS sampling, equipment rinse blanks will be collected daily using laboratory supplied PFAS-free water.

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 and to assess sampling errors for vapor intrusion samples. Field duplicates will be collected at frequency of 1 duplicate per 20 samples per media per method. 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 Blanks

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. A field blank will be collected daily for PFAS sampling only using laboratory supplied PFAS-free water.

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 $4 \pm 2°C$ 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 general chemistry parameters will be taken at a frequency of one 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 COC 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)

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. 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. PFAS-specific requirements for field sampling equipment are described in the checklists and NYSDEC guidance documents included in **Attachments 2** and **3**. 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.

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. Daily for PFAS sampling.
Field Blank	Water	Daily for PFAS sampling only.
Trip Blank	Water	One per cooler of aqueous VOC samples
Field Duplicates	Water, soil, sediment	1:20 Samples
Extra Volume Sample (collected for MS/MSD)	Water, soil, sediment	1:20 Samples

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

TABLE 8.2 LABORATORY QUALITY CONTROL SAMPLE FREQUENCY

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

TABLE 8.3 OPERATIONAL CALIBRATION FORMULAS

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

9.0 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. Groundwater, surface water and vapor intrusion sample data will be validated following verification and reduction. Waste characterization samples will not be validated.

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

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

The laboratory's analytical report for each 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 COC 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 seven years.

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 DUSR, as defined by NYSDEC DER-10 requirements. Level III validation will be performed on all DQO Level III and all DQO Level IV data. Ten percent (10%) of the DQO Level IV Data for each analytical method will undergo a Level IV validation. Certain geotechnical and field screening data may be evaluated in a manner suitable for the intended data uses.

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

After data validation, the data will be evaluated for consistency with site conditions and developed conceptual models. Data validation personnel will prepare a project DUSR that summarizes the implications of the use of any data out of criteria. In addition, the data usability report will include the percentage of sample completeness for critical and non-critical samples and a discussion of any issues in representativeness of the data that may develop as a result of validation. The data usability report will address overall data quality and achievement of PARCCS criteria and assess issues associated with the overall data and data quality for all validated Level III and Level IV data.

9.2 Verification and Validation Methods

9.2.1 Laboratory

The laboratory will verify and assess analytical data against the stated requirements on the COC 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 9.1** 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 COC 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.

FULL VALIDATION (LEVEL IV)	
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

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 Region 2 Data Validation SOPs for organic and inorganic data review (USEPA, 2012, 2015a, 2015b, 2016a, 2016b, 2016c, 2016d, 2016e) and NYSDEC Guidelines for Sampling and Analysis of PFAS under NYSDEC's Part 375 Remedial Programs (NYSDEC 2020). 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.

Data validation will be conducted using the USEPA guidelines (USEPA 2017a, 2017b) as supplementary guidelines. Where USEPA guidelines and SW-846 disagree, this QAPP and data validation professional judgment will prevail.

Trained and experienced data validation chemists will perform the data validation work. The QAO will review the data validation report before it is finalized. The data validation report will present the results of data validation, including a summary assessment of laboratory data packages, sample preservation and COC 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.

TABLE 9.1 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 (milligram per kilogram, mg/kg) C = analytical concentration (mg/L) V = final volume (mL) of processed sample solution D = dilution factor W = wet weight (g) of as-received sample taken for analysis %S = percent solids of as-received sample

1. Used for quantitation by the external standard technique
2. Used for quantitation by the internal standard technique
3. Used for total, filterable, nonfilterable, and volatile residues as well as gravimetric oil and grease
4. Used to calculate the dry-weight concentration of a solid sample from the analytical concentration of the processed sample.
5. Conversion factor to convert g/mL to mg/L:
   $\frac{mg}{L} = \frac{g}{mL} \times \frac{10^3 mL}{L} \times \frac{10^3 mg}{g}$

10.0 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 field sampling plan and the contents of this QAPP itself.

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 COC 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 performance evaluation (PE) samples or provide proof that PE samples were submitted by an approved USEPA or NYSDEC performance testing provider within the past 12 months. If necessary, proof that applicable PE samples have been analyzed at the laboratory within the past 12 months will be included in the laboratory procurement package.

10.2.3 Formal Audits

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

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

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

10.2.4 Laboratory Audits

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

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

10.2.4.1 Laboratory Performance Audits

Performance audits are independent sample checks made by a supervisor or auditor to arrive at a quantitative measure of the quality of the data produced by one section or the entire measurement process. Performance audits are conducted by introducing control samples, in addition to those used routinely, into the data production process. These control samples include PE samples of known concentrations. The results of performance audits will be evaluated against acceptance criteria. The results will be summarized and maintained by the laboratory QA manager and distributed to the supervisors who must investigate and respond to any results that are outside control limits.

10.2.4.2 Laboratory Internal Audits

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

10.2.4.3 Laboratory Data Audits

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

10.2.4.3 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 non-conformance documentation tracking system in the form of an NCM. Each NCM is traceable so that it can be cross-referenced with its resolution to the associated project records. The laboratory QA manager summarizes critical nonconformances, such as reissued reports and client complaints, in a monthly report to the laboratory management staff. Management of the NCM is described in **Section 6.3**. Corrective action procedures applicable to QC requirements that do not meet the criteria of this QAPP are described in the following sections. Consistent, frequent contacts between laboratory personnel, the QAO, or designated personnel are required.

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

FIGURE 10.1 CORRECTIVE ACTION REQUEST FORM

CORRECTIVE ACTION REQUEST

Number ____________________ **Date:**__________________

TO: ______________________

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

Condition:

Reference Documents:

Originator ________ Date ________ Approval ________ Date ________ Approval ________ Date ________

Response

Cause of Condition:

Corrective Action

(A) Resolution:

(B) Prevention

(B2) Affected Documents

Signature____________________ Date_________

CA Follow-up

Corrective Action verified by:____________________ Date ________

11.0 REPORT 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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ATTACHMENT 1 SUMMARY OF ANALYTICAL DATA PACKAGE (DQO LEVEL IV)

ATTACHMENT 1 SUMMARY OF ANALYTICAL DATA PACKAGE (DQO LEVEL IV)

1.0 Introduction

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

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

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

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

2.0 General Documentation Requirements

2.1 Data Package Format

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

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

Level II data packages will not contain the raw data.

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

In cases where the laboratory has varied from established methodologies, they will be required to provide the 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 COC 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 COC forms and/or internal laboratory tracking documents will include the following information:

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

3.0 Organic Analyses Documentation Requirements

These requirements are applicable to organic methods (e.g., VOCs, SVOCs, PFAS).

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 reanalyzes, 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 (i.e. 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 reanalyzes;
- 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 reanalyzes;
- Mass spectrometer tuning and mass calibration (BFB, DFTPP);
- Initial and continuing instrument calibrations; and
- QC analyses (i.e., method blanks, LCS, etc.).

Raw data for each analysis shall include the following:

- Appropriately scaled chromatograms (label all analyte peaks, internal standards and surrogate standards with chemical names). All chromatograms shall be scaled such that individual peaks can be readily resolved from any neighboring peaks;
- Appropriately scaled before and after manual integrations;
- Ion scans and enhanced spectra of target analytes and tentatively identified compounds (TICs), with the associated best-match spectra;
- Area print-outs and quantitation reports;

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

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

4.0 Inorganic Analyses Documentation Requirements

4.1 Summary of Environmental Sample Results

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

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

4.2 Summary of QA/QC Results

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

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

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

4.2.1 Instrument Calibration Verification (if applicable)

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

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

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

4.2.2 Blank Analysis

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

4.2.3 Matrix Spike (MS) Analysis

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

4.2.4 Post Digestion Spike Analysis (if applicable)

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

4.2.5 Laboratory Duplicate Analysis

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

4.2.6 Laboratory Control Sample

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

4.2.7 Other QC Criteria (if applicable)

- **Method of Standard Additions (MSA)**. This summary must be included if MSA analyses are performed. Report absorbance values with corresponding concentration values. Report the final analyte concentration and list the associated correlation coefficient and control limits.
- **ICP-AES Serial Dilution**. Report initial and serial dilution results, associated %D, and control limits.
- **ICP-AES Linear Dynamic Ranges.** For each instrument and wavelength used, report the date on which linear ranges were established, the integration time, and the upper limit concentration.
- **MDL Determination.** List most recent method detection limits 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 reanalyzes;
- 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 reanalyzes;
- 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 normalties, 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 reanalyzes;
- Calibrations; and
- QC analyses (i.e., method blanks, LCS, etc.).

Raw data for each analysis shall include the following:

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

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

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

Method Requirements	Laboratory Deliverables
Requirements for all methods:	
Parsons project identification number	Case narrative
Discussion of unusual circumstances or problems	Case narrative
Analytical method description and reference citation	Case narrative
Field sample identification	Signed chain-of-custody forms and sample results form
Laboratory assigned sample number	Signed chain-of-custody forms and sample results form
Sample matrix description	Signed chain-of-custody forms and sample results form
Date of sample collection	Signed chain-of-custody forms and sample results form
Date of sample receipt at laboratory	Signed chain-of-custody forms
Analytical method description and reference citation	Signed chain-of-custody forms and case narrative
Sample analysis results	USEPA Contract Laboratory Program (CLP) form or equivalent sample analysis results summary form (e.g., ASP Form I-VOA)
Dates of sample preparation and analysis (including first run and any subsequent runs)	Specific deliverable depends on type of analysis
Laboratory analytical QC batch info and sample analysis associations	Specific deliverable depends on type of analysis
Instrument analysis sequence log	Specific deliverable depends on type of analysis
Analytical holding times compliance	USEPA CLP form or equivalent holding time summary form
Method detection limit (MDL) determination	USEPA CLP form or equivalent MDL summary form
Method reporting limits (RLs) achieved	Specific deliverable depends on type of analysis (see below)
Dilution or concentration factors	Specific deliverable depends on type of analysis
Discussion of unusual circumstances or problems	Case narrative
Laboratory Control Sample (LCS) results	USEPA CLP form or equivalent LCS results summary form
"Raw" analytical data sufficient to recreate and check analysis results for all calibrations, QC sample results, and sample results	Sequentially numbered pages with tabulated index
Matrix spike / matrix spike duplicate	USEPA CLP form or equivalent MS/MSD summary form (e.g., NYSDEC ASP Form III-SV
Method blank analysis	USEPA CLP form or equivalent method blank summary form (e.g., NYSDEC ASP Form IV-SV)
GC/MS instrument performance check. Tuning and mass calibration (abundance) using 4-bromofluorobenzene (BFB) for method SW8260C and decafluoro-triphenyphosphene (DFTPP) for method SW8270CD	USEPA CLP form or equivalent instrument tuning/performance check summary form
Internal Standard Area Counts and Retention Time, as applicable	USEPA CLP form or equivalent internal standard summary form (e.g., NYSDEC ASP Form VIII-SV)

Method Requirements	Laboratory Deliverables
GC/MS initial calibration data	USEPA CLP form or equivalent initial calibration summary form (e.g., NYSDEC ASP Form VI-SV)
GC/MS continuing calibration data.	USEPA CLP form or equivalent continuing calibration summary form (e.g., NYSDEC ASP Form VII-SV)
GC/MS calibration verification (initial and continuing)/2nd source calibration verification (ICV/CCV)	USEPA CLP form or equivalent calibration verification summary form
GC continuing calibration data for volatile and semivolatile analyses. If calibration factors are used, calibration factors and their percent differences from the initial calibration must be reported. Retention time windows and analyte retention times must be included in this form	USEPA CLP form or equivalent calibration verification summary form
GC/MS internal standard area and retention time summary data	USEPA CLP form or equivalent internal standard summary form
GC second column confirmation, as applicable. To be done for all compounds that are detected above method detection limits	Chromatograms of all confirmations of all samples and the standard laboratory form for all positive results
Surrogate Compound percent recovery summary	USEPA form or equipment percent recovery summary form (e.g., NYSDEC ASP Form II-SV)
"Raw" analytical data sufficient to recreate and check analysis results for all calibrations, QC sample results, and sample results	Sequentially numbered pages with tabulated index
Requirements for inorganic analytical methods:	
Initial and Continuing Calibration Verification	USEPA CLP form or equivalent calibration verification summary form(s) (e.g., NYSDEC ASP Form II-IN)
ICP Interference Check Sample (ICS), as applicable	USEPA CLP form or equivalent ICS standard summary form (e.g., NYSDEC ASP Form IV-IN)
ICP Interelement Correction Factors, as applicable	USEPA CLP form or equivalent internal standard summary form (e.g., NYSDEC ASP Form XII-IN
Instrument Detection Limit (IDL) or MDL determination	USEPA CLP form or equivalent IDL or MDL summary form(s)
Post-digestion spike, as applicable	USEPA CLP form or equivalent post-digestion spike summary form(s) (e.g., NYSDEC ASP Form V-IN)
ICP linear range	USEPA CLP form or equivalent linear range summary form(s) (e.g., NYSDEC ASP Form XII-IN)
ICP serial dilution, as applicable	USEPA CLP form or equivalent serial dilution summary form(s) (e.g., NYSDEC ASP Form IX-IN)
Method of standard addition (MSA), as applicable	USEPA CLP form or equivalent MSA summary form(s)
Laboratory duplicate results, as applicable	USEPA CLP form or equivalent duplicate analysis summary form(s) (e.g., NYSDEC ASP Form VI-IN)
Requirements for other methods:	
Preparation and analysis logs	No format
Sample results	No format
MS/MSD results	No format
Lab duplicate sample results	No format
Laboratory control sample	Control limits

Method Requirements	Laboratory Deliverables
Method blank results	No format
Initial calibration results	No format
Continuing calibration check (calibration verification)	No format. Report percent relative standard deviation or percent difference from initial calibration

ATTACHMENT 2 PFAS SAMPLING CHECKLIST

PARSONS

Site Name: ______________________________
Weather (temp/precip): ____________________

Task: ______________________________________
Date: ______________________________________

Field Clothing and PPE:

☐ Ansell TNT® Powder-Free Nitrile Gloves ONLY
☐ No clothing or boots containing Gore-Tex™
☐ No clothing or boots treated with water-resistant spray
☐ Safety boots made from polyurethane and PVC or leather boots covered with overboots
☐ No materials containing Tyvek®
☐ Field crew has not used fabric softener on clothing
☐ Field crew has not used cosmetics, moisturizers, hand cream, or other related products this morning
☐ Field crew has not applied unauthorized sunscreen or insect repellant
☐ Samplers don fresh nitrile gloves for each sample collected

Field Equipment:

☐ No Teflon® or LDPE containing materials other than QED brand LDPE
☐ All sample materials made from stainless steel, HDPE, acetate, silicon, or polypropylene or QED brand LDPE
☐ No waterproof field books, waterproof paper or waterproof bottle labels, waterproof markers/Sharpies®
☐ No plastic clipboards, binders, or spiral hard cover notebooks
☐ No Post-It Notes®
☐ Coolers filled with regular ice only; no chemical (blue) ice packs in possession

Sample Containers:

☐ Containers for PFAS shipped in separate cooler
☐ Sample containers made of HDPE or polypropylene
☐ Caps are unlined and made of HDPE or polypropylene

Wet Weather (as applicable):

☐ Wet weather gear made of polyurethane and PVC only

Equipment Decontamination:

☐ PFAS-free water on-site for decontamination of sample equipment; no other water sources to be used
☐ Alconox® or 7th Generation Free & Clear Dish Soap to be used as decontamination cleaning agents

Food Considerations:

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

Vehicle Considerations:

☐ Avoid utilizing areas inside vehicle as sample staging areas

Sampling Equipment and Supply Summary (include brand names and serial numbers where available):

Decontamination fluid source(s): ____

Soap and other fluids used: ____

Gloves: _____________________________ Rope: _____________________________

Sampling Equipment: ____

Deviation Summary:

If possible, materials identified as potentially containing PFAS should be relocation to a separate area of the site as far away as possible from the sampling location(s) and containerized if practicable. Notes should include method of response including type of materials on site and how they were moved and containerized.

Deviations include: ____

____

____

____

Field Team Leader Name: ______________________________

Field Team Leader Signature: ______________________________

Field Team Member Name	Field Team Member Signature

ATTACHMENT 3 NYSDEC GUIDELINES FOR SAMPLING AND ANALYSIS OF PFAS

NEW YORK
STATE OF
OPPORTUNITY.

Department of
Environmental
Conservation

SAMPLING, ANALYSIS, AND ASSESSMENT OF PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS)

Under NYSDEC's Part 375 Remedial Programs

October 2020

Table of Contents

Department of Environmental Conservation

ERRATA SHEET for

SAMPLING, ANALYSIS, AND ASSESSMENT OF PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) Under NYSDEC's Part 375 Remedial Programs Issued January 17, 2020

Citation and Page Number	Current Text	Corrected Text	Date
Title of Appendix I, page 32	Appendix H	Appendix I	2/25/2020
Document Cover, page 1	Guidelines for Sampling and Analysis of PFAS	Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs	9/15/2020
Routine Analysis, page 9	"However, laboratories analyzing environmental samples…PFOA and PFOS in drinking water by EPA Method 537, 537.1 or ISO 25101."	"However, laboratories analyzing environmental samples…PFOA and PFOS in drinking water by EPA Method 537, 537.1, ISO 25101, or Method 533."	9/15/2020
Additional Analysis, page 9, new paragraph regarding soil parameters	None	"In cases where site-specific cleanup objectives for PFOA and PFOS are to be assessed, soil parameters, such as Total Organic Carbon (EPA Method 9060), soil pH (EPA Method 9045), clay content (percent), and cation exchange capacity (EPA Method 9081), should be included in the analysis to help evaluate factors affecting the leachability of PFAS in site soils."	9/15/2020
Data Assessment and Application to Site Cleanup Page 10	Until such time as Ambient Water Quality Standards (AWQS) and Soil Cleanup Objectives (SCOs) for PFAS are published, the extent of contaminated media potentially subject to remediation should be determined on a case-by-case basis using the procedures discussed below and the criteria in DER-10. Target levels for cleanup of PFAS in other media, including biota and sediment, have not yet been established by the DEC.	Until such time as Ambient Water Quality Standards (AWQS) and Soil Cleanup Objectives (SCOs) for PFOA and PFOS are published, the extent of contaminated media potentially subject to remediation should be determined on a case-by-case basis using the procedures discussed below and the criteria in DER-10. Preliminary target levels for cleanup of PFOA and PFOS in other media, including biota and sediment, have not yet been established by the DEC.	9/15/2020
Water Sample Results Page 10	PFAS should be further assessed and considered as a potential contaminant of concern in groundwater or surface water (…) If PFAS are identified as a contaminant of concern for a site, they should be assessed as	PFOA and PFOS should be further assessed and considered as potential contaminants of concern in groundwater or surface water (…) If PFOA and/or PFOS are identified as contaminants of concern for a site, they should be assessed as part of the remedy selection process in accordance with Part 375 and DER-10.	9/15/2020

Citation and Page Number	Current Text	Corrected Text	Date
	part of the remedy selection process in accordance with Part 375 and DER-10.		
Soil Sample Results, page 10	"The extent of soil contamination for purposes of delineation and remedy selection should be determined by having certain soil samples tested by Synthetic Precipitation Leaching Procedure (SPLP) and the leachate analyzed for PFAS. Soil exhibiting SPLP results above 70 ppt for either PFOA or PFOS (individually or combined) are to be evaluated during the cleanup phase."	"Soil cleanup objectives for PFOA and PFOS will be proposed in an upcoming revision to 6 NYCRR Part 375-6. Until SCOs are in effect, the following are to be used as guidance values. " [Guidance Value Table] "PFOA and PFOS results for soil are to be compared against the guidance values listed above. These guidance values are to be used in determining whether PFOA and PFOS are contaminants of concern for the site and for determining remedial action objectives and cleanup requirements. Site-specific remedial objectives for protection of groundwater can also be presented for evaluation by DEC. Development of site-specific remedial objectives for protection of groundwater will require analysis of additional soil parameters relating to leachability. These additional analyses can include any or all the parameters listed above (soil pH, cation exchange capacity, etc.) and/or use of SPLP. As the understanding of PFAS transport improves, DEC welcomes proposals for site-specific remedial objectives for protection of groundwater. DEC will expect that those may be dependent on additional factors including soil pH, aqueous pH, % organic carbon, % Sand/Silt/Clay, soil cations: K, Ca, Mg, Na, Fe, Al, cation exchange capacity, and anion exchange capacity. Site-specific remedial objectives should also consider the dilution attenuation factor (DAF). The NJDEP publication on DAF can be used as a reference: https://www.nj.gov/dep/srp/guidance/rs/daf.pdf. "	9/15/2020
Testing for Imported Soil Page 11	Soil imported to a site for use in a soil cap, soil cover, or as backfill is to be tested for PFAS in general conformance with DER-10, Section 5.4(e) for the PFAS Analyte List (Appendix F) using the analytical procedures discussed below and the criteria in DER-10 associated with SVOCs.	Testing for PFAS should be included any time a full TAL/TCL analyte list is required. Results for PFOA and PFOS should be compared to the applicable guidance values. If PFOA or PFOS is detected in any sample at or above the guidance values then the source of backfill should be rejected, unless a site-specific exemption is provided by DER based on SPLP testing, for example. If the concentrations of PFOA and PFOS in leachate are at or above 10 ppt (the Maximum Contaminant Levels established for drinking water by the New York State Department of Health), then the soil is not acceptable.	9/15/2020

Citation and Page Number	Current Text	Corrected Text	Date
	If PFOA or PFOS is detected in any sample at or above 1 µg/kg, then soil should be tested by SPLP and the leachate analyzed for PFAS. If the SPLP results exceed 10 ppt for either PFOA or PFOS (individually) then the source of backfill should be rejected, unless a site-specific exemption is provided by DER. SPLP leachate criteria is based on the Maximum Contaminant Levels proposed for drinking water by New York State's Department of Health, this value may be updated based on future Federal or State promulgated regulatory standards. Remedial parties have the option of analyzing samples concurrently for both PFAS in soil and in the SPLP leachate to minimize project delays. Category B deliverables should be submitted for backfill samples, though a DUSR is not required.	PFOA, PFOS and 1,4-dioxane are all considered semi-volatile compounds, so composite samples are appropriate for these compounds when sampling in accordance with DER-10, Table 5.4(e)10. Category B deliverables should be submitted for backfill samples, though a DUSR is not required.	
Footnotes	None	[1] TOP Assay analysis of highly contaminated samples, such as those from an AFFF (aqueous film-forming foam) site, can result in incomplete oxidation of the samples and an underestimation of the total perfluoroalkyl substances. [2] The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the soil cleanup objective for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf).	9/15/2020

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

Objective

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

Applicability

All work plans submitted to DEC pursuant to one of the remedial programs under Part 375 shall include PFAS sampling and analysis procedures that conform to the guidelines provided herein.

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

Field Sampling Procedures

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

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

QA/QC samples (e.g. duplicates, MS/MSD) should be collected as specified in DER-10, Section 2.3(c). For sampling equipment coming in contact with aqueous samples only, rinsate or equipment blanks should be collected.

Equipment blanks should be collected at a minimum frequency of one per day per site or one per twenty samples, whichever is more frequent.

Analysis and Reporting

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

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

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

Routine Analysis

Currently, New York State Department of Health's Environmental Laboratory Approval Program (ELAP) does not offer certification for PFAS in matrices other than finished drinking water. However, laboratories analyzing environmental samples for PFAS (e.g., soil, sediments, and groundwater) under DER's Part 375 remedial programs need to hold ELAP certification for PFOA and PFOS in drinking water by EPA Method 537, 537.1, ISO 25101, or Method 533. Laboratories should adhere to the guidelines and criteria set forth in the DER's laboratory guidelines for PFAS in non-potable water and solids (Appendix H - Laboratory Guidelines for Analysis of PFAS in Non-Potable Water and Solids). Data review guidelines were developed by DER to ensure data comparability and usability (Appendix H - Data Review Guidelines for Analysis of PFAS in Non-Potable Water and Solids).

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

Additional Analysis

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

In cases where site-specific cleanup objectives for PFOA and PFOS are to be assessed, soil parameters, such as Total Organic Carbon (EPA Method 9060), soil pH (EPA Method 9045), clay content (percent), and cation exchange capacity (EPA Method 9081), should be included in the analysis to help evaluate factors affecting the leachability of PFAS in site soils.

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

Impacted materials can be made up of PFAS that are not analyzable by routine analytical methodology. A TOP Assay can be utilized to conceptualize the amount and type of oxidizable PFAS which could be liberated in the environment, which approximates the maximum concentration of perfluoroalkyl substances that could be generated if all polyfluoroalkyl substances were oxidized. For example, some polyfluoroalkyl substances may degrade or transform to form perfluoroalkyl substances (such as PFOA or PFOS), resulting in an increase in perfluoroalkyl substance concentrations as contaminated groundwater moves away from a source. The TOP Assay converts, through oxidation, polyfluoroalkyl substances (precursors) into perfluoroalkyl substances that can be detected by routine analytical methodology.[1]

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

Data Assessment and Application to Site Cleanup

Until such time as Ambient Water Quality Standards (AWQS) and Soil Cleanup Objectives (SCOs) for PFOA and PFOS are published, the extent of contaminated media potentially subject to remediation should be determined on a case-by-case basis using the procedures discussed below and the criteria in DER-10. Preliminary target levels for cleanup of PFOA and PFOS in other media, including biota and sediment, have not yet been established by the DEC.

Water Sample Results

PFOA and PFOS should be further assessed and considered as potential contaminants of concern in groundwater or surface water if PFOA or PFOS is detected in any water sample at or above 10 ng/L (ppt) and is determined to be attributable to the site, either by a comparison of upgradient and downgradient levels, or the presence of soil source areas, as defined below. In addition, further assessment of water may be warranted if either of the following screening levels are met:

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

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

Soil Sample Results

Soil cleanup objectives for PFOA and PFOS will be proposed in an upcoming revision to 6 NYCRR Part 375-6. Until SCOs are in effect, the following are to be used as guidance values.

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

Guidance Values for Anticipated Site Use	PFOA (ppb)	PFOS (ppb)
Unrestricted	0.66	0.88
Residential	6.6	8.8
Restricted Residential	33	44
Commercial	500	440
Industrial	600	440
Protection of Groundwater[2]	1.1	3.7

PFOA and PFOS results for soil are to be compared against the guidance values listed above. These guidance values are to be used in determining whether PFOA and PFOS are contaminants of concern for the site and for determining remedial action objectives and cleanup requirements. Site-specific remedial objectives for protection of groundwater can also be presented for evaluation by DEC. Development of site-specific remedial objectives for protection of groundwater will require analysis of additional soil parameters relating to leachability. These additional analyses can include any or all the parameters listed above (soil pH, cation exchange capacity, etc.) and/or use of SPLP.

As the understanding of PFAS transport improves, DEC welcomes proposals for site-specific remedial objectives for protection of groundwater. DEC will expect that those may be dependent on additional factors including soil pH, aqueous pH, % organic carbon, % Sand/Silt/Clay, soil cations: K, Ca, Mg, Na, Fe, Al, cation exchange capacity, and anion exchange capacity. Site-specific remedial objectives should also consider the dilution attenuation factor (DAF). The NJDEP publication on DAF can be used as a reference: https://www.nj.gov/dep/srp/guidance/rs/daf.pdf.

Testing for Imported Soil

Testing for PFAS should be included any time a full TAL/TCL analyte list is required. Results for PFOA and PFOS should be compared to the applicable guidance values. If PFOA or PFOS is detected in any sample at or above the guidance values then the source of backfill should be rejected, unless a site-specific exemption is provided by DER based on SPLP testing, for example. If the concentrations of PFOA and PFOS in leachate are at or above 10 ppt (the Maximum Contaminant Levels established for drinking water by the New York State Department of Health), then the soil is not acceptable.

PFOA, PFOS and 1,4-dioxane are all considered semi-volatile compounds, so composite samples are appropriate for these compounds when sampling in accordance with DER-10, Table 5.4(e)10. Category B deliverables should be submitted for backfill samples, though a DUSR is not required.

[2] The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the guidance value for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf).

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

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

General Guidelines in Accordance with DER-10

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

Specific Guidelines for PFAS

- Include in the text that sampling for PFAS will take place
- Include in the text that PFAS will be analyzed by LC-MS/MS for PFAS using methodologies based on EPA Method 537.1
- Include the list of PFAS compounds to be analyzed (*PFAS Analyte List*)
- Include the laboratory SOP for PFAS analysis
- List the minimum method-achievable Reporting Limits for PFAS
    - Reporting Limits should be less than or equal to:
        - Aqueous – 2 ng/L (ppt)
        - Solids – 0.5 µg/kg (ppb)
- Include the laboratory Method Detection Limits for the PFAS compounds to be analyzed
- Laboratory should have ELAP certification for PFOA and PFOS in drinking water by EPA Method 537, 537.1, EPA Method 533, or ISO 25101
- Include detailed sampling procedures
    - Precautions to be taken
    - Pump and equipment types
    - Decontamination procedures
    - Approved materials only to be used
- Specify that regular ice only will be used for sample shipment

- Specify that equipment blanks should be collected at a minimum frequency of 1 per day per site for each matrix

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

General

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

Laboratory Analysis and Containers

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

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

Equipment

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

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

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

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

Equipment Decontamination

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

Sampling Techniques

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

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

Sample Identification and Logging

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

Quality Assurance/Quality Control

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

Documentation

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

Personal Protection Equipment (PPE)

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

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

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

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

Appendix C - Sampling Protocols for PFAS in Monitoring Wells

General

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

Laboratory Analysis and Container

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

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

Equipment

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

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

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

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

Equipment Decontamination

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

Sampling Techniques

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

Sample Identification and Logging

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

Quality Assurance/Quality Control

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

Documentation

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

Personal Protection Equipment (PPE)

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

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

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

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

Appendix D - Sampling Protocols for PFAS in Surface Water

General

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

Laboratory Analysis and Container

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

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

Equipment

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

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

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

- stainless steel cup

Equipment Decontamination

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

Sampling Techniques

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

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

Sample Identification and Logging

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

Quality Assurance/Quality Control

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

Documentation

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

Personal Protection Equipment (PPE)

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

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

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

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

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

General

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

Laboratory Analysis and Container

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

Equipment

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

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

Equipment Decontamination

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

Sampling Techniques

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

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

Sample Identification and Logging

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

Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at 4 ± 2º Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- If equipment was used, collect one equipment blank per day per site and a minimum 1 equipment blank per 20 samples. The equipment blank shall test the new and decontaminated sampling equipment utilized to obtain a sample for residual PFAS contamination. This sample is obtained by using laboratory provided PFAS-free water and passing the water over or through the sampling device and into laboratory provided sample containers.
- A field reagent blank (FRB) should be collected at a rate of one per 20 samples. The lab will provide a FRB bottle containing PFAS free water and one empty FRB bottle. In the field, pour the water from the one bottle into the empty FRB bottle and label appropriately.
- Request appropriate data deliverable (Category B) and an electronic data deliverable
- For sampling events where multiple private wells (homes or sites) are to be sampled per day, it is acceptable to collect QC samples at a rate of one per 20 across multiple sites or days.

Documentation

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

Personal Protection Equipment (PPE)

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

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

Appendix F - Sampling Protocols for PFAS in Fish

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

Procedure Name: General Fish Handling Procedures for Contaminant Analysis

Number: FW-005

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

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

Version: 8

Previous Version Date: 21 March 2018

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

Originator or Revised by: Wayne Richter, Jesse Becker

Date: 26 April 2019

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

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

GENERAL FISH HANDLING PROCEDURES FOR CONTAMINANT ANALYSES

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

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

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

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

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

   1. Project and Site Name.

   2. DEC Region.

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

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

   5. Preservation Method.

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

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

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

   3. Date collected.

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

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

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

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

D. General data collection recommendations:

1. It is helpful to use an ID or tag number that will be unique. It is best to use metal striped bass or other uniquely numbered metal tags. If uniquely numbered tags are unavailable, values based on the region, water body and year are likely to be unique: for example, R7CAY11001 for Region 7, Cayuga Lake, 2011, fish 1. If the fish are just numbered 1 through 20, we have to give them new numbers for our database, making it more difficult to trace your fish to their analytical results and creating an additional possibility for errors.

2. Process and record fish of the same species sequentially. Recording mistakes are less likely when all fish from a species are processed together. Starting with the bigger fish species helps avoid missing an individual.

3. If using Bureau of Ecosystem Health supplied tags or other numbered tags, use tags in sequence so that fish are recorded with sequential Tag Numbers. This makes data entry and login at the lab and use of the data in the future easier and reduces keypunch errors.

4. Record length and weight as soon as possible after collection and before freezing. Other data are recorded in the field upon collection. An age determination of each fish is optional, but if done, it is recorded in the appropriate “Age” column.

5. For composite samples of small fish, record the number of fish in the composite in the Remarks column. Record the length and weight of each individual in a composite. All fish in a composite sample should be of the same species and members of a composite should be visually matched for size.

6. Please submit photocopies of topographic maps or good quality navigation charts indicating sampling locations. GPS coordinates can be entered in the Location column of the collection record form in addition to or instead for providing a map. These records are of immense help to us (and hopefully you) in providing documented location records which are not dependent on memory and/or the same collection crew. In addition, they may be helpful for contaminant source trackdown and remediation/control efforts of the Department.

7. When recording data on fish measurements, it will help to ensure correct data recording for the data recorder to call back the numbers to the person making the measurements.

E. Each fish is to be placed in its own individual plastic bag. For small fish to be analyzed as a composite, put all of the fish for one composite in the same bag but use a separate bag for each composite. It is important to individually bag the fish to avoid difficulties or cross contamination when processing the fish for chemical analysis. Be sure to include the fish’s tag number inside the bag, preferably attached to the fish with the tag number turned out so it can be read. Tie or otherwise secure the bag closed. **<u>The Bureau of Ecosystem Health will supply the bags.</u>** If necessary, food grade bags may be procured from a suitable vendor (e.g., grocery store). It is preferable to redundantly label each bag with a manila tag tied between the knot and the body of the bag. This tag should be labeled with the project name, collection location, tag number, collection date, and fish species. If scales are collected, the scale envelope should be labeled with the same information.

F. Groups of fish, by species, are to be placed in one large plastic bag per sampling location. **The Bureau of Ecosystem Health will supply the larger bags.** Tie or otherwise secure the bag closed. Label the site bag with a manila tag tied between the knot and the body of the bag. The tag should contain: project, collection location, collection date, species and **tag number ranges**. Having this information on the manila tag enables lab staff to know what is in the bag without opening it.

G. Do not eviscerate, fillet or otherwise dissect the fish unless specifically asked to. If evisceration or dissection is specified, the fish must be cut along the exact midline or on the right side so that the left side fillet can be removed intact at the laboratory. If filleting is specified, the procedure for taking a standard fillet (SOP PREPLAB 4) must be followed, including removing scales.

H. Special procedures for PFAS: Unlike legacy contaminants such as PCBs, which are rarely found in day to day life, PFAS are widely used and frequently encountered. Practices that avoid sample contamination are therefore necessary. While no standard practices have been established for fish, procedures for water quality sampling can provide guidance. The following practices should be used for collections when fish are to be analyzed for PFAS:

    No materials containing Teflon.
    No Post-it notes.
    No ice packs; only water ice or dry ice.
    Any gloves worn must be powder free nitrile.
    No Gore-Tex or similar materials (Gore-Tex is a PFC with PFOA used in its manufacture).
    No stain repellent or waterproof treated clothing; these are likely to contain PFCs.
    Avoid plastic materials, other than HDPE, including clipboards and waterproof notebooks.
    Wash hands after handling any food containers or packages as these may contain PFCs. Keep pre-wrapped food containers and wrappers isolated from fish handling.
    Wear clothing washed at least six times since purchase.
    Wear clothing washed without fabric softener.
    Staff should avoid cosmetics, moisturizers, hand creams and similar products on the day of sampling as many of these products contain PFCs (Fujii et al. 2013). Sunscreen or insect repellent should not contain ingredients with "fluor" in their name. Apply any sunscreen or insect repellent well downwind from all materials. Hands must be washed after touching any of these products.

I. All fish must be kept at a temperature <45° F (<8° C) immediately following data processing. As soon as possible, freeze at -20° C ± 5° C. Due to occasional freezer failures, daily freezer temperature logs are required. The freezer should be locked or otherwise secured to maintain chain of custody.

J. In most cases, samples should be delivered to the Analytical Services Unit at the Hale Creek field station. Coordinate delivery with field station staff and send copies of the collection records, continuity of evidence forms and freezer temperature logs to the field station. For samples to be analyzed elsewhere, non-routine collections or other questions, contact Wayne Richter, Bureau of Ecosystem Health, NYSDEC, 625 Broadway, Albany, New York 12233-4756, 518-402-8974, or the project leader about sample transfer. Samples will then be directed to the analytical facility and personnel noted on specific project descriptions.

K. A recommended equipment list is at the end of this document.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF FISH AND WILDLIFE
FISH COLLECTION RECORD

Project and Site Name ____ DEC Region ______________

Collections made by (include all crew) ____

Sampling Method: ☐Electrofishing ☐Gill netting ☐Trap netting ☐Trawling ☐Seining ☐Angling ☐Other ____________________

Preservation Method: ☐Freezing ☐Other ____________________ Notes (SWFDB survey number): ____________________

FOR LAB USE ONLY- LAB ENTRY NO.	COLLECTION OR TAG NO.	SPECIES	DATE TAKEN	LOCATION	AGE	SEX &/OR REPROD. CONDIT	LENGTH ( )	WEIGHT ( )	REMARKS

richter: revised 2011, 5/7/15, 10/4/16, 3/20/17; becker: 3/23/17, 4/26/19

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
CHAIN OF CUSTODY

I, ______________________________, of ____ collected the
(Print Name) (Print Business Address)

following on ____________________, 20____ from ____
(Date) (Water Body)

in the vicinity of ____
(Landmark, Village, Road, etc.)

Town of _______________________________________, in _________________________________ County.

Item(s) ____

____

Said sample(s) were in my possession and handled according to standard procedures provided to me prior to collection. The sample(s) were placed in the custody of a representative of the New York State Department of Environmental Conservation on ___________________________________, 20______.

____ _____________________________
Signature Date

I, __________________________________, received the above mentioned sample(s) on the date specified and assigned identification number(s) ____ to the sample(s). I have recorded pertinent data for the sample(s) on the attached collection records. The sample(s) remained in my custody until subsequently transferred, prepared or shipped at times and on dates as attested to below.

_______________________________________ ___________________
Signature Date

SECOND RECIPIENT (Print Name)	TIME & DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
THIRD RECIPIENT (Print Name)	TIME & DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
FOURTH RECIPIENT (Print Name)	TIME & DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
RECEIVED IN LABORATORY BY (Print Name)	TIME & DATE	REMARKS
SIGNATURE	UNIT	
LOGGED IN BY (Print Name)	TIME & DATE	ACCESSION NUMBERS
SIGNATURE	UNIT	

richter: revised 21 April 2014; becker: 23 March 2017, 26 April, 2019

NOTICE OF WARRANTY

By signature to the chain of custody (reverse), the signatory warrants that the information provided is truthful and accurate to the best of his/her ability. The signatory affirms that he/she is willing to testify to those facts provided and the circumstances surrounding the same. Nothing in this warranty or chain of custody negates responsibility nor liability of the signatories for the truthfulness and accuracy of the statements provided.

HANDLING INSTRUCTIONS

On day of collection, collector(s) name(s), address(es), date, geographic location of capture (attach a copy of topographic map or navigation chart), species, number kept of each species, and description of capture vicinity (proper noun, if possible) along with name of Town and County must be indicated on reverse.

Retain organisms in manila tagged plastic bags to avoid mixing capture locations. Note appropriate information on each bag tag.

Keep samples as cool as possible. Put on ice if fish cannot be frozen within 12 hours. If fish are held more than 24 hours without freezing, they will not be retained or analyzed.

Initial recipient (either DEC or designated agent) of samples from collector(s) is responsible for obtaining and recording information on the collection record forms which will accompany the chain of custody. This person will seal the container using packing tape and writing his signature, the time and the date across the tape onto the container with indelible marker. Any time a seal is broken, for whatever purpose, the incident must be recorded on the Chain of Custody (reason, time, and date) in the purpose of transfer block. Container then is resealed using new tape and rewriting signature, with time and date.

EQUIPMENT LIST

Scale or balance of appropriate capacity for the fish to be collected.

Fish measuring board.

Plastic bags of an appropriate size for the fish to be collected and for site bags.

Individually numbered metal tags for fish.

Manila tags to label bags.

Small envelops, approximately 2” x 3.5”, if fish scales are to be collected.

Knife for removing scales.

Chain of custody and fish collection forms.

Clipboard.

Pens or markers.

Paper towels.

Dish soap and brush.

Bucket.

Cooler.

Ice.

Duct tape.

Appendix G – PFAS Analyte List

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

Appendix H - Laboratory Guidelines for Analysis of PFAS in Non-Potable Water and Solids

General

New York State Department of Environmental Conservation's Division of Environmental Remediation (DER) developed the following guidelines for laboratories analyzing environmental samples for PFAS under DER programs. If laboratories cannot adhere to the following guidelines, they should contact DER's Quality Assurance Officer, Dana Barbarossa, at dana.barbarossa@dec.ny.gov prior to analysis of samples.

Isotope Dilution

Isotope dilution techniques should be utilized for the analysis of PFAS in all media.

Extraction

For water samples, the entire sample bottle should be extracted, and the sample bottle rinsed with appropriate solvent to remove any residual PFAS.

For samples with high particulates, the samples should be handled in one of the following ways:

1. Spike the entire sample bottle with isotope dilution analytes (IDAs) prior to any sample manipulation. The sample can be passed through the SPE and if it clogs, record the volume that passed through.
2. If the sample contains too much sediment to attempt passing it through the SPE cartridge, the sample should be spiked with isotope dilution analytes, centrifuged and decanted.
3. If higher reporting limits are acceptable for the project, the sample can be diluted by taking a representative aliquot of the sample. If isotope dilution analytes will be diluted out of the sample, they can be added after the dilution. The sample should be homogenized prior to taking an aliquot.

If alternate sample extraction procedures are used, please contact the DER remedial program chemist prior to employing. Any deviations in sample preparation procedures should be clearly noted in the case narrative.

Signal to Noise Ratio

For all target analyte ions used for quantification, signal to noise ratio should be 3:1 or greater.

Blanks

There should be no detections in the method blanks above the reporting limits.

Ion Transitions

The ion transitions listed below should be used for the following PFAS:

PFOA	413 > 369
PFOS	499 > 80
PFHxS	399 > 80
PFBS	299 > 80
6:2 FTS	427 > 407
8:2 FTS	527 > 507
N-EtFOSAA	584 > 419
N-MeFOSAA	570 > 419

Branched and Linear Isomers

Standards containing both branched and linear isomers should be used when standards are commercially available. Currently, quantitative standards are available for PFHxS, PFOS, NMeFOSAA, and NEtFOSAA. As more standards become available, they should be incorporated in to the method. All isomer peaks present in the standard should be integrated and the areas summed. Samples should be integrated in the same manner as the standards.

Since a quantitative standard does not exist for branched isomers of PFOA, the instrument should be calibrated using just the linear isomer and a technical (qualitative) PFOA standard should be used to identify the retention time of the branched PFOA isomers in the sample. The total response of PFOA branched and linear isomers should be integrated in the samples and quantitated using the calibration curve of the linear standard.

Secondary Ion Transition Monitoring

Quantifier and qualifier ions should be monitored for all target analytes (PFBA and PFPeA are exceptions). The ratio of quantifier ion response to qualifier ion response should be calculated for each target analyte and the ratio compared to standards. Lab derived criteria should be used to determine if the ratios are acceptable.

Reporting

Detections below the reporting limit should be reported and qualified with a J qualifier.

The acid form of PFAS analytes should be reported. If the salt form of the PFAS was used as a stock standard, the measured mass should be corrected to report the acid form of the analyte.

Appendix I - Data Review Guidelines for Analysis of PFAS in Non-Potable Water and Solids

General

These guidelines are intended to be used for the validation of PFAS analytical results for projects within the Division of Environmental Remediation (DER) as well as aid in the preparation of a data usability summary report. Data reviewers should understand the methodology and techniques utilized in the analysis. Consultation with the end user of the data may be necessary to assist in determining data usability based on the data quality objectives in the Quality Assurance Project Plan. A familiarity with the laboratory's Standard Operating Procedure may also be needed to fully evaluate the data. If you have any questions, please contact DER's Quality Assurance Officer, Dana Barbarossa, at dana.barbarossa@dec.ny.gov.

Preservation and Holding Time

Samples should be preserved with ice to a temperature of less than 6°C upon arrival at the lab. The holding time is 14 days to extraction for aqueous and solid samples. The time from extraction to analysis for aqueous samples is 28 days and 40 days for solids.

Temperature greatly exceeds 6ºC upon arrival at the lab*	Use professional judgement to qualify detects and non-detects as estimated or rejected
Holding time exceeding 28 days to extraction	Use professional judgement to qualify detects and non-detects as estimated or rejected if holding time is grossly exceeded

*Samples that are delivered to the lab immediately after sampling may not meet the thermal preservation guidelines. Samples are considered acceptable if they arrive on ice or an attempt to chill the samples is observed.

Initial Calibration

The initial calibration should contain a minimum of five standards for linear fit and six standards for a quadratic fit. The relative standard deviation (RSD) for a quadratic fit calibration should be less than 20%. Linear fit calibration curves should have an R^2 value greater than 0.990.

The low-level calibration standard should be within 50% - 150% of the true value, and the mid-level calibration standard within 70% - 130% of the true value.

%RSD >20%	J flag detects and UJ non detects
R^2 >0.990	J flag detects and UJ non detects
Low-level calibration check <50% or >150%	J flag detects and UJ non detects
Mid-level calibration check <70% or >130%	J flag detects and UJ non detects

Initial Calibration Verification

An initial calibration verification (ICV) standard should be from a second source (if available). The ICV should be at the same concentration as the mid-level standard of the calibration curve.

ICV recovery <70% or >130%	J flag detects and non-detects

Continuing Calibration Verification

Continuing calibration verification (CCV) checks should be analyzed at a frequency of one per ten field samples. If CCV recovery is very low, where detection of the analyte could be in question, ensure a low level CCV was analyzed and use to determine data quality.

CCV recovery <70 or >130%	J flag results

Blanks

There should be no detections in the method blanks above the reporting limits. Equipment blanks, field blanks, rinse blanks etc. should be evaluated in the same manner as method blanks. Use the most contaminated blank to evaluate the sample results.

Blank Result	Sample Result	Qualification
Any detection	<Reporting limit	Qualify as ND at reporting limit
Any detection	>Reporting Limit and >10x the blank result	No qualification
>Reporting limit	>Reporting limit and <10x blank result	J+ biased high

Field Duplicates

A blind field duplicate should be collected at rate of one per twenty samples. The relative percent difference (RPD) should be less than 30% for analyte concentrations greater than two times the reporting limit. Use the higher result for final reporting.

RPD >30%	Apply J qualifier to parent sample

Lab Control Spike

Lab control spikes should be analyzed with each extraction batch or one for every twenty samples. In the absence of lab derived criteria, use 70% - 130% recovery criteria to evaluate the data.

Recovery <70% or >130% (lab derived criteria can also be used)	Apply J qualifier to detects and UJ qualifier to non detects

Matrix Spike/Matrix Spike Duplicate

One matrix spike and matrix spike duplicate should be collected at a rate of one per twenty samples. Use professional judgement to reject results based on out of control MS/MSD recoveries.

Recovery <70% or >130% (lab derived criteria can also be used)	Apply J qualifier to detects and UJ qualifier to non detects of parent sample only
RPD >30%	Apply J qualifier to detects and UJ qualifier to non detects of parent sample only

Extracted Internal Standards (Isotope Dilution Analytes)

Problematic analytes (e.g. PFBA, PFPeA, fluorotelomer sulfonates) can have wider recoveries without qualification. Qualify corresponding native compounds with a J flag if outside of the range.

Recovery <50% or >150%	Apply J qualifier
Recovery <25% or >150% for poor responding analytes	Apply J qualifier
Isotope Dilution Analyte (IDA) Recovery <10%	Reject results

Secondary Ion Transition Monitoring

Quantifier and qualifier ions should be monitored for all target analytes (PFBA and PFPeA are exceptions). The ratio of quantifier ion response to qualifier ion response should be calculated from the standards for each target analyte. Lab derived criteria should be used to determine if the ratios are acceptable. If the ratios fall outside of the laboratory criteria, qualify results as an estimated maximum concentration.

Signal to Noise Ratio

The signal to noise ratio for the quantifier ion should be at least 3:1. If the ratio is less than 3:1, the peak is discernable from the baseline noise and symmetrical, the result can be reported. If the peak appears to be baseline noise and/or the shape is irregular, qualify the result as tentatively identified.

Branched and Linear Isomers

Observed branched isomers in the sample that do not have a qualitative or quantitative standard should be noted and the analyte should be qualified as biased low in the final data review summary report. Note: The branched isomer peak should also be present in the secondary ion transition.

Reporting Limits

If project-specific reporting limits were not met, please indicate that in the report along with the reason (e.g. over dilution, dilution for non-target analytes, high sediment in aqueous samples).

Peak Integrations

Target analyte peaks should be integrated properly and consistently when compared to standards. Ensure branched isomer peaks are included for PFAS where standards are available. Inconsistencies should be brought to the attention of the laboratory or identified in the data review summary report.

APPENDIX D – HEALTH AND SAFETY PLAN

TONAWANDA COKE SITE
SITE 108
PROJECT SAFETY, HEALTH, AND ENVIRONMENTAL PLAN (PSHEP)
TONAWANDA, NEW YORK

Prepared For:

Honeywell

301 Plainfield Road
Suite 330
Syracuse, New York 13212

Prepared By:

PARSONS

301 Plainfield Road
Suite 350
Syracuse, New York 13212

Project Manager: ______________________ ____________
Ed Glaza Date

Project Safety Manager: ______________________ 5/14/2020
Gregory Ertel, CIH, CSP Date

OCTOBER 2020

Project Key Personnel

Project Office:	Syracuse, New York	
Address:	301 Plainfield Road, Suite 350 Syracuse, NY 13212	
Telephone 315-451-9560	**Fax 315-451-9570**	**Email**
Company Executive responsible for project		**Contact No.**
Pratima Poplai		Direct Line: 732-537-3552 Cell Phone: 732-853-4957 Email: Pratima.Poplai@parsons.com
Market SH&E Director		**Contact No.**
John Barker		Cell: 704-558-4209 John.Barker@parsons.com
Site Project Managers		**Contact No.**
Ed Glaza		Direct Line: 315-552-9691 Cell: 315-730-4685 Edward.Glaza@parsons.com
Program Safety Manager (PrSM)		**Contact No.**
Greg Ertel		Cell Phone: 585-465-0557 gregory.ertel@parsons.com
Site Safety Officer (SSO)		**Contact No.**
TBD		TBD
Client Project Management		**Contact Information**
Steve Coladonato		Direct Line: 302-791-6738 Cell Phone: 973-216-2438 Email: Steven.Coladonato@Honeywell.com

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LIST OF ACRONYMS

AED	Automated External Defibrillator
AHA	Activity Hazard Analysis
BBO	Behavior Based Observation
COVID-19	Coronavirus Disease 2019
CPR	Cardiopulmonary Resuscitation
CRZ	Contamination Reduction Zone
CSE	Contractor Safety Evaluation
EBS	Employee Based Safety
ERT	Emergency Response Team
ESHARP	Environment, Safety, Health and Risk Management Program
EZ	Exclusion Zone
ft.	foot/feet
GFCI	ground fault circuit interrupters
HAZWOPER	Hazardous Waste Operations and Emergency Response
IMA	Industrial Medical Associates
JSA	Job Safety Analysis
LHA	Labor Harmony Agreement
LOTO	Lockout/Tagout
MOC	Management of Change
MRO	Medical Review Officer
NYDOT	New York Department of Transportation
OM&M	Operation, Maintenance, and Monitoring
OSHA	Occupational Health and Safety Administration
PFD	Personal Flotation Device
PM	Project Manager
PPE	Personal Protective Equipment
PrM	Program Manager
PSHEP	Project Safety, Health, and Environmental Plan
PrSM	Program Safety Manager
RFP	Request for Proposal
SDS	Safety Data Sheets
SH&E	Safety, Health and Environment
SOW	Scope of Work
SSHEP	Subcontractor Safety, Health, and Environment Plan
SSO	Site Safety Officer
TCC	Tonawanda Coke Corporation
UV	Ultraviolet Radiation
USEPA	United States Environmental Protection Agency

1.0 INTRODUCTION

This Project Safety, Health, and Environmental Plan (PSHEP) has been prepared for the Honeywell field operations at the Tonawanda Coke Site, Site 108, located at 3800 River Road, Tonawanda, New York. This PSHEP covers Remedial Investigation (RI) activities including installation of groundwater monitoring wells, groundwater sampling, surface and subsurface soil sampling, sediment sampling, surface water sampling, surveying, and test pitting and is intended to be amended as needed to address subsequent site activities. Subcontractor activities will be covered by their own Subcontractor Safety, Health, and Environment Plan (SSHEP).

During field activities, Parsons' staff and its subcontractors may be exposed to hazards associated with the scope of work (SOW) activities. Employees will be required to use personal protective equipment (PPE) suitable for the task at hand. Upgrades to PPE will be implemented as necessary.

Field staff may also be exposed to other hazards that are encountered during field activities including slips, trips, and falls; working in proximity to heavy equipment, winches, suspended loads, hazardous energy sources, traffic hazards, on-water hazards, and automobile use. Depending on the time of season, field staff may be exposed to biological hazards such as insect bites, stings, ticks, and snakes. Meteorological hazards such as lightning, wind, rain, and ultraviolet radiation may also be present. This PSHEP addresses the various hazards that may be encountered during completion of the SOW.

This PSHEP is based upon the Hazardous Waste Operations and Emergency Response (HAZWOPER) standard, The Parsons Environment, Safety, Health, and Risk Management Program (ESHARP) Manual, Version 7.0, April 2017, and the Parsons Corporate Safety and Health Manual. The Parsons Corporate Safety, Health, and Environment (SH&E) Policy is provided in **Exhibit 1-1**. Honeywell safety requirements have also been incorporated.

EXHIBIT 1-1 – PARSONS CORPORATE SH&E POLICY

PARSONS

Corporate Safety, Health & Environment Policy Statement

As an industry-leading engineering, construction, and technical services firm, Parsons is firmly committed to maintaining a safe, healthy, and environmentally compliant workplace at all its offices and project facilities. We have adopted the following code of ethics:

- We will hold Safety, Health and Environment (SH&E) as our highest core value.
- Executive management will lead the SH&E improvement process.
- SH&E will be a responsibility shared by everyone in our organization.
- SH&E performance will be a key indicator of our organizational excellence and will be incorporated into our business processes.
- We will communicate SH&E performance openly with employees.
- Employees will be given the knowledge and skills necessary to perform their jobs in a SH&E compliant manner.
- We will extend our SH&E efforts beyond the workplace to include travel, homes, and communities.
- We will continually strive to improve our SH&E processes.

To meet our SH&E objectives, all employees are expected to be actively engaged with regard to SH&E issues. This requires the combined efforts of a concerned management, responsible and knowledgeable supervision, and conscientious, well-trained employees.

Parsons will meet or exceed the applicable SH&E legal and other requirements and will continuously monitor and improve operations, procedures, technologies, and programs that are conducive to maintaining a safe, healthy, and environmentally compliant workplace.

Charles L. Harrington

Chairman and Chief Executive Officer

1.1 The Project Safety, Health, and Environment Plan

Parsons' goal is zero accidents using control measures designed to minimize or eliminate hazards to personnel, process, equipment, the general public and the environment. This PSHEP outlines SH&E requirements and guidelines developed by Parsons for project work. When implemented, these requirements will help protect site personnel, visitors, the public, and the environment from exposure from incidents caused due to SH&E hazards. 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 damage the environment.

This plan should be updated as conditions or situations change, usually by addenda to the PSHEP. All Parsons and subcontractor personnel must understand and implement the PSHEP and any addenda. Parsons documents this process by having employees sign an acknowledgement form stating that they understand the PSHEP and its requirements.

1.2 Subcontractor Safety, Health, and Environment Plans (SSHEPs)

Subcontractors must establish a safety program for their work and employees. Contract specifications require all subcontractors to accept the Parsons' PSHEP and prepare their own SSHEP for work activities the subcontractor has responsibility for performing. The subcontractor will present the SSHEP to the Parsons' Project and Safety Managers at least 10 business days before site mobilization. At a minimum, subcontractor plans must meet the requirements of this PSHEP and provide SH&E equipment and safeguards suitable for the hazards involved. This PSHEP may not cover all potential hazards on every project, and subcontractors must ensure that appropriate SH&E information is available for all of the subcontractor's project tasks.

All PSHEP requirements for Parsons' personnel (e.g., training, substance abuse screening, and incident reporting, etc.) also apply to subcontractor personnel and will be included in the SSHEP, if applicable.

If the subcontractor is performing activities that require specialized training (i.e., confined space entry, excavation/trenching, scaffold use, HAZWOPER, etc.), copies of training certifications must be provided for applicable employees AND the supervisor. Refer to **Section 5** for more details on SSHEP requirements and Safety Evaluation information.

For these projects, there will be subcontractors directly hired by Parsons. Each contractor hired by Parsons, regardless of whether they are performing intrusive work activities, must complete the Parsons Online Contractor Safety Evaluation (CSE) Program and maintain a subscription with a satisfactory rating in the Honeywell ISNetwork system before being eligible to work for Parsons. Detailed information concerning the Parsons CSE Program is covered in **Section 5.4**.

Below are the names of subcontractors and the work activities each will be performing as part of the Honeywell – Tonawanda Coke Site 108.

SUBCONTRACTOR	CONSTRUCTION ACTIVITIES	Approval Status
ATL	Collection of subsurface soil samples, sediment samples, and installation of groundwater monitoring wells	Approved in CSE, SSHEP submitted
Analytical Laboratory (TBD)	Third party analytical work	NA
Niagara Boundary and Thew Associates	Survey groundwater monitoring wells and location of soil samples	Low Risk work – CSE not required AHAs and CP Forms pending
Ontario Speciality Corporation (OSC)	Excavation of test pits	Approved in CSE, SSHEP and drug testing submitted
Ravi Utility Location	Locate underground utilities using surface methods	Low Risk work – CSE not required SSHEP submitted
MJW	Radiation Consulting	CSE and SSHEP Pending

1.3 Management of Change (MOC)

An important aspect of project management that is equally important to safety management is the process for Management of Change (MOC). In accordance with Parsons' ESHARP requirements, field modifications may be made to this document after discussion and approval by the Parsons Honeywell Program Safety Manager. Make note of any pertinent notations in the comment section below (insert additional rows as necessary).

Requirements for MOC include:

- Documentation of the proposed change, including identification of affected documents and the changed conditions
- Independent design review of potential safety, health, and environmental impacts
- Identification of modified or new hazards as a result of change
- Resolution of safety, health, and environmental concerns generated during all stages of the review
- Approval and authorization of the change
- Communication (and training, if needed) of the change to affected personnel

PSHEP Section	SSO Initials	Date	Comments

2.0 SCOPE OF WORK

Parsons, in its contracted role with Honeywell International Inc., will be conducing RI activities including excavation of test pits, surface soil and subsurface soil sampling, sediment sampling, surface water sampling, installation of groundwater monitoring wells, groundwater sampling, and surveying. The anticipate scope is outlined below.

Test Pit Excavation

Test pits will be excavated using a backhoe. Prior to test pit excavation, the backhoe subcontractor will have called the New York State 1-800 dig safe number and provided Parsons with the confirmation number. An underground utility subcontractor will survey the proposed test pit areas to confirm that there are no underground utilities near the proposed area of each test pit a Utility Clearance Checklist documenting clearance prior to starting subsurface work will be completed and retained in the project files (see **Attachment A**). During test pit activities, no personnel other than the operator will be within the reach of the extended excavator arm. A spotter will be observing the excavation any time test pit operations are on-going. Soil samples will be collected from the backhoe bucket or directly from the test pit, if conditions of the excavation allow entry. Personnel will not enter a test pit if the depth of the test pit exceeds five feet below ground surface or the depth that groundwater begins to fill the excavation.

Soils will be placed adjacent to the test pit and will be returned to the excavation upon completion. Air monitoring in the test pit area breathing zone will be completed using a photoionization detector any time excavation or backfilling is taking place. The backhoe bucket will be decontaminated between test pit locations.

Surface Soil Sampling

Surface soil samples will be collected using either a stainless-steel spoon and bowl or a stainless-steel hand auger based on surface soil conditions. Equipment used in collection of the surface soil samples will be decontaminated between sampling locations.

Groundwater Monitoring Well Installation

Monitoring well locations will be advanced using a drilling rig. Prior to monitoring well installation, the drilling subcontractor will have called the New York State 1-800 dig safe number and provided Parsons with the confirmation number. An underground utility subcontractor will survey the proposed monitoring well locations to confirm that there are not any underground utilities near the proposed area of each monitoring well. Additionally, each location will be cleared a minimum of five feet below the ground surface to ensure that any utilities are not contacted during drilling. Monitoring wells will be installed by advancing 4.25-inch inside-diameter hollow stem augers to the total depth of the monitoring well installation. Spilt spoon samples will be collected continuously. Total depth of the installation will depend on the depth to water at the location and the depth to the clay layer below the fill. The screen will be constructed to a depth to have the water level within the screened interval. A PID and a multi-gas meter will be used to monitor the breathing zone during drilling and well installation activities. Soil waste generated during the drilling process will be placed in 55-gallon drums, labelled, and staged at the site for future disposal.

Monitoring wells will be constructed of two-inch diameter PVC screen and riser. Screens will be filter packed to approximately two feet above the top of the screen. Approximately two feet of bentonite will be placed in the annulus above the filter pack. The annulus between the riser and borehole will be filled with grout to the ground surface. Completion at the surface will be either a stick-up of approximately three feet with a protective, lockable steel casing or a flush mounted well vault. A two-foot concrete collar will be installed around each well location sloped to drain away from the well. After monitoring well installation, the wells will be developed with development water being containerized and discharged to the Town of Tonawanda POTW under RITC's Industrial Sewer Connection Permit No. 331.

Drainage Ditch Sediment Sampling

Drainage ditch sediment samples will be collected using a slide-hammer sampler and macrocore lexan liner. A tripod or excavator may be used to remove the sampler from the sediment after sample collection. Samplers will wade into the ditch for sample collection. Samplers will wear waders when in the ditch and will wear a personal flotation device (PFD) any time they are within 6 ft of the water's edge

Niagara River Sediment Sampling

Sediment samples will be collected from the Niagara River using a vibracore sampler attached to a pontoon boat. Samples will be collected to a maximum of 5 ft below the mudline. Any work conducted in the water or within 6 ft of the water's edge will require workers to wear a Coast Guard approved PFD and completion of a Float Plan (see **Attachment A**). Prior to commencement of any activities on the water, watercraft will be inspected, radio communication with shore personnel will be established, rescue procedures reviewed, and Coast Guard approved PFDs issued to workers. All equipment and operating personnel will meet or exceed U.S. Coast Guard requirements for safety. Prior to performing work on the water, a float plan and applicable AHAs will be completed and reviewed by boating personnel. In addition, the Niagara River is a recreational use river where boating, fishing and other marine activities take place and the safety of the public in regards to the dredging activities will be addressed.

Surface Water Sampling

Surface water samples will be collected from a drainage ditch that flows through the site. To collect surface water samples, sample bottles or a designated HDPE sampler will be held at the water surface until the container is filled. If possible, samplers will stand on the shore with the sample bottle or designated sampling container attached to a pole. In some instances where the ditch is too wide to allow for sampling from land, samplers will wade into the ditch. Samplers will wear waders when in the ditch and will wear a PFD any time they are within 6 ft of the water's edge.

Groundwater Sampling

A minimum of one week after completion of the installation of the monitoring wells, groundwater sampling will be completed using low-flow methods as described in the Field Sampling Plan (FSP). Sampling will be completed once purging parameters have stabilized. Purge water will be containerized and discharged to the Town of Tonawanda POTW under RITC's Industrial Sewer Connection Permit No. 331.

Surveying

Once surface and subsurface soil sampling and monitoring well installation has been completed, their locations will be surveyed. Monitoring wells will have the elevation of the ground surface as well as the top of the monitoring well (at the top of the two-inch PVC) surveyed.

2.1 Potential Hazards

Electrical

Overhead power lines, downed electrical wires, and buried cables all pose a danger of shock or electrocution if contacted or severed during site operations. A minimum distance of 10 feet (ft.) will be present between overhead wires and equipment. **This distance will vary according to voltage, the greater the voltage, the greater the clearance between any part of the equipment and the power line.** A spotter will be utilized to maintain a safe distance between equipment and overhead wires. Overhead electrical power lines will be considered energized unless the person owning such line, or operating officials of the electrical utility supplying the line assures that it is not energized, and it has been visibly grounded. **Only the utility company is authorized to de-energize, insulate, or handle the lines. No one else may attempt these operations.**

Electrical equipment used on-site may also pose a hazard to workers. Whenever possible, contractors will use low-voltage equipment with ground-fault interrupters and watertight, corrosion-resistant connecting cables to help minimize this hazard. All electrical wiring and equipment will be intrinsically safe for use in potentially explosive environments and atmospheres. Ground-fault circuit interrupters are standard for use at the site.

In addition, lightning is a hazard during outdoor operations, particularly for workers handling metal containers. In the event of an electrical storm, all operations will cease for the duration of the storm.

Heavy Equipment/Vehicle Traffic

Some RI activities take place in close proximity to construction activities and heavy equipment. Workers should not take any action unless they have made eye contact with the operator and clearly communicated their intentions. In addition, all equipment and vehicles must be equipped with back-up alarms, which are checked daily and if not operating properly, removed from service and repaired immediately. Truck traffic will be controlled by a flagger/spotter, as required.

Material Handling

Various materials and equipment may be handled manually during project operations. Care should be taken when lifting and handling heavy or bulky items to avoid back injuries. The following fundamentals address the proper lifting techniques that are essential in preventing back injuries include but are not limited to:

- The size, shape, and weight of the object to be lifted must first be considered. Multiple employees or the use of mechanical lifting devices are required for heavy objects.
- The anticipated path to be taken by the lifter should be considered for the presence of slip, trip, and fall hazards prior to lifting any object.
- The feet will be placed far enough apart for good balance and stability (typically shoulder width).
- The worker will get as close to the load as possible. The legs will be bent at the knees.
- The back will be kept as straight as possible and abdominal muscles should be tightened.
- Twisting motions should be avoided.
- A worker will never carry a load that cannot be seen over or around.

When placing an object down, the stance and position are identical to that for lifting. The legs are bent at the knees and the object lowered. When two or more workers are required to handle the same object, workers will coordinate the effort so that the load is lifted uniformly and that the weight is equally divided between the individuals carrying the load. When carrying the object, each worker, if possible, will face the direction in which the object is being carried.

In handling bulky or heavy items, the following guidelines will be followed to avoid injury to the hands and fingers:

- A firm grip on the object is essential; leather gloves will be used if necessary.
- The hands and object will be free of oil, grease, and water which might prevent a firm grip and the fingers will be kept away from any points that could cause them to be pinched or crushed, especially when setting the object down.

- The item will be inspected for metal slivers, jagged edges, burrs, and rough or slippery surfaces prior to being lifted.

Hand and Power Tools

Hand and power tools are used for various site activities. Procedures for using hand and power tools are as follows:

- Persons using power tools will be trained in their use.
- Ground Fault Circuit Interrupters must be used for all electrical tools unless built in to the providing generator.
- Tools should be inspected prior to each use to ensure that they are in proper working condition. Only tools in good condition will be used.
- Tools will be kept clean.
- Guards and shields will be kept on all tools.
- Air couplings will be secured.
- Non-sparking tools will be used in hazardous areas.
- Proper eye protection is critical when using power tools. At a minimum, safety glasses will be required during site operations. Where appropriate, full-face shields will be utilized in addition to the glasses.

Chemical Hazards

Operational chemicals may be brought to the project site for use in activities supporting the RI activities. These chemicals are anticipated to be fuels for operating heavy equipment. The use of operational chemicals is regulated by Occupational Health and Safety Administration (OSHA) under the Hazard Communication Standard (29 CFR 1910.1200). Safety Data Sheets (SDS) for operational chemicals must be kept on-site. An inventory list of the anticipated operational chemicals (Hazardous Chemical Inventory List) for use at the site will be maintained at the site and updated as new material is received.

Site background indicates the site has been impacted with coal and coal tar wastes. Potential chemicals of concern (COCs) identified for the site are listed below. Exhibit 2-1 presents additional details on these COCs.

- Asbestos (potential for waste building materials and pipe insulation)
- Polycyclic aromatic hydrocarbons (PAHs)
- Benzene
- Cis-1,2-Dichloroethene
- Ethylbenzene
- Toluene
- Trichloroethene
- Cyanide
- Arsenic
- Beryllium
- Cadmium
- Copper
- Lead
- Manganese
- Mercury
- Nickel

Radiological Hazards

Technologically Enhanced Naturally Occurring Radioactive Material (TENORM) slag may be encountered at the site. In the event that material visually consistent with slag is encountered, monitoring will be performed by a radiological contractor. Properly trained radiological control technicians will screen potential TENORM material using radiation detection equipment including a Ludlum 2241 (or equivalent) survey meter and a 2”x2” NaI detector. The radiological contractor will then render an opinion based upon the readings, whether the subject material emits radiation at a level statistically in excess of the localized background radiation levels. If this is the case, and the material appears to be anthropogenic, the material is presumably TENORM.

TENORM will only be handled by the trained radiological contractor. No additional PPE will be required during handling of potential TENORM, unless higher than expected concentrations of TENORM are encountered. If higher than expected concentrations of TENORM are encountered additional PPE may be used. Types of PPE to be used will be dependent TENORM concentrations and the physical characteristics of the TENORM (such as readily or not readily dispersible, moisture content, etc.). Additional PPE may include disposable coveralls, disposable gloves, or shoe covers. All supplies and equipment in contact with TENORM will be surveyed afer use with the appropriate equipment, at the discretion of the radiological contractor.

If significant areas of TENORM slag are encountered, areas will be isolated with rope or tape and signage will be posted to warn workers of the presence of TENORM. In these areas, work will be performed in a manner that minimizes physically exposed TENORM slag, especially during non-work hours.

2.2 Project Safety, Health and Environment Plan Application

This PSHEP and referenced documents applies to all locations, facilities, operations, and projects associated with the scope of work to be performed by Parsons and its subcontractors. The provisions of this plan are mandatory for all Parsons personnel engaged in activities consistent with the scope of work. Subcontractors working for Parsons must prepare and administer a plan with equivalent requirements unless otherwise specified. All Parsons and Parsons’ contract personnel who engage in project activities must be familiar with this plan and comply with its requirements.

EXHIBIT 2-1 CHEMICAL PROPERTIES OF CONCERN

Chemical of Concern	Monitoring Equipment	Action Levels	Routes of Exposure(6)
Asbestos containing material (ACM)	Personal Monitoring (monitoring will be required for abatement or removal activities)	**0.1 Fib/cc**	Airborne
Benzene	Solid Sorbent Tube or PID with 10.6 eV bulb	**OSHA:** PEL = 1 ppm **ACGIH:** TLV/TWA =10 ppm **NIOSH:** IDLH = 500 ppm	Inhalation, skin absorption, ingestion, skin and/or eye contact
1,2-Dichloroethene	Solid Sorbent Tube or PID with 10.6 eV bulb	**OSHA:** PEL = 200 ppm **ACGIH:** TLV/TWA = 200 ppm **NIOSH:** IDLH = 200 ppm	Inhalation, skin absorption, ingestion, skin and/or eye contact
Ethylbenzene	Solid Sorbent Tube or PID with 10.6 eV bulb	**OSHA:** PEL = 100 ppm **ACGIH:** TLV/TWA = 20 ppm **NIOSH:** IDLH = 800 ppm	Inhalation, skin absorption, skin and/or eye contact
Toluene	Solid Sorbent Tube or PID with 10.6 eV bulb	**OSHA:** PEL = 200 ppm C=300 **ACGIH:** TLV/TWA = 50 ppm NIOSH: IDLH = 500 ppm	Inhalation, skin absorption, ingestion, skin and/or eye contact
Trichloroethene	PID with 11.7eV bulb	**OSHA:** PEL = 100 ppm C=500 **ACGIH:** TLV/TWA =10 ppm **NIOSH:** IDLH = 1,000 ppm	Inhalation, skin absorption, ingestion, skin and/or eye contact
Cyanide	NA	**OSHA:** PEL = 5 ppm **ACGIH:** TLV/TWA =5 ppm **NIOSH:** IDLH **=** 25 ppm	Skin absorption, ingestion
Polyaromatic Hydrocarbons (PAHs/petroleum pitch) (covers PAH related analytes listed above)	Semi-volatile Sorbent tubes with pre-filter PID with 10.6 eV bulb	**OSHA:** PEL = 0.2 mg/M3 **ACGIH:** TLV/TWA = 0.2 Mg/M3 IDLH = 80 mg/M^3 (CA)	Inhalation, ingestion, skin and/or eye contact

Notes:

1. OSHA PELs as published in the NIOSH Pocket Guide
2. TWA = time weighted average
3. mg/m3 = milligrams of contaminant per cubic meter of air
4. ppm = parts of contaminant per million parts of air
5. ACGIH TLV = American Conference of Government Industrial Hygienist Threshold Limit Value
6. Source: NIOSH Pocket Guide to Chemical Hazards

3.0 PROJECT SH&E SAFETY MANAGEMENT RESPONSIBILITIES AND AUTHORITY

3.1 Safety, Health and Environment (SH&E) Responsibility Matrix

Exhibit 3-1 summarizes the responsibilities of selected roles related to the primary SH&E activities identified in the PSHEP.

EXHIBIT 3-1 ROLES AND RESPONSIBILITIES

Project Responsibility Matrix		Project												BU							Corporate					
Phases	Work Elements	Project Manager	Safety & Health	Environmental	Construction/Site Management	Engineering	First Line Supervision	Facilities and Maintenance	Training	Contracts/Procurement	Security	Sustainability	Quality	President	Operations/Risk Management	Division Management	Sector Management	Safety, Health & Environment	Quality	Business Development	CEO	Operations/Risk Management	Safety, Health & Environment	Security	Workers' Compensation	Insurance
Introduction to ESHARP for Project	1. ESHARP Project Management	R	D	D	P	P	P	P	P	P	P	P	P	P	P	P	P	A	P	P	P	P	P	P	P	P
Business Development	2. Business Development	R	P	P	P	P				P				P	P	A	P	P	P	D	P	P	P	P		P
Startup	3. Initial Hazard Analysis and Planning	A	R	D	P	P					D							P					P	P		
	4. Project Safety Health, and Environmental Plan (PSHEP)	A	D	D	P										P	P	P	R					P	P		
	5. Stakeholder PSHEP Alignment Meeting	A	D	D	P													R								
Construction and/or Field	6. Preconstruction Safety, Health & Environment Activities	A	D	D	P		P						P				P	R	P					P		
	7. Project/Site Orientation, Training, and Recurring Field SH&E Meetings	A	D	D	P		P	P	P									R						P		
	8. SH&E Committee	A	D	D	P		P	P			P							R						P		
	9. Meet Building Trades, Safety, Health, Environmental Regulatory Agencies, & Others	A	D	D	P													R						P	P	
	10. Review Contractor/Subcontractor SH&E Programs	A	D	D	P					P								R						P		
	11. Subcontractor Premobilization Meeting	A	D	D	P	P				P	P							R						P		
	12. Risk Mitigation Planning (2-week look ahead)	A	D	D	R													D						P		
	13. Activity Hazards Analysis	A	D	D	P	P	P	P										R						P		
	14. Project Management Site Safety, Health, & Environmental Inspections	A	D	D	P											P	P	R	P					P		
	15. Audits, Inspections, and Recordkeeping	A	D	D	P		P						P			P	P	R	P					P		
	16. Incident Management Process	A	D	D	P		P						P		P	P	P	R	P					P		P

EXHIBIT 3-1 ROLES AND RESPONSIBILITIES (CONTINUED)

Project Responsibility Matrix		Project												BU							Corporate					
Phases	Work Elements	Project Manager	Safety & Health	Environmental	Construction/Site Management	Engineering	First Line Supervision	Facilities and Maintenance	Training	Contracts/Procurement	Security	Sustainability	Quality	President	Operations/Risk Management	Division Management	Sector Management	Safety, Health & Environment	Quality	Business Development	CEO	Operations/Risk Management	Safety, Health & Environment	Security	Workers' Compensation	Insurance
Testing, Commissioning, Operations, and Decommissioning	17. Management Systems and Transition	A	R	R	D	P	P	P	P		P	P	P	P	P	P	P	P	P		P	P	P	P		P
	18. Equipment and Systems Integrity	A	P	P	R	P	P	D	P				P					P	P				P			
	19. Operations Training and Education	A	D	D	P	P	P	P	P		P		P					R					P			
	20. Assessments and Corrective Action	A	D	D	P	P	P	P	P		P		P					R					P			
	21. Operations Emergency Management	A	P	P	P	P	P	P	P	P	D		P					R					P	P		
	22. Safe and Environmentally Compliant Work Practices	A	D	D	P	R	R	P	P									P					P			
Closeout	23. Lessons Learned and Final SH&E Report	A	D	D	P											P	P	R	P				P			
	24. Records Retention	A	P	P					P		D		P					R	P				P			

R – Responsible and accountable for ensuring the project develops and implements the work element.
D – Develops the plan, tool, training, document, or other item needed for the work element.
P – Participates by providing advice, assisting in the implementation or development, reviewing and providing comments, or otherwise supporting the development or implementation effort.
A – Approval at the management level with responsibility for the project; establishes requirements for the project or serves as sponsor for the item.

4.0 ADMINISTRATION PHASE

4.1 Project Safety, Health & Environment (SH&E) Committee

The project must have a SH&E Committee if more than five full-time Parsons employees or when 25 or more Parsons and subcontractor employees are assigned to the project. Based on the anticipated SOW for calendar year 2020, a project safety committee is not expected.

4.2 Project (Employee) Orientation

The project has a comprehensive employee orientation program. The SH&E personnel help to develop applicable SH&E sections of the orientation and meet with new employees to review site procedures and requirements (**Exhibit 4-1**). Topics covered in the PSHEP orientation include:

- PSHEP overview
- Project rules and disciplinary policies
- Reporting emergencies, incidents and unsafe conditions
- Near miss reporting
- Hazard communication
- Emergency/evacuation plans
- WorkCare
- Spill/release reporting and response actions
- Waste management
- Stormwater and wastewater management
- Scope of work
- Names of personnel responsible for site safety and health
- Communication protocol/suggestion box
- Safety, health, environment and other hazards at the site
- Review of all activities on-site and related Activity Hazard Analysis (AHAs)
- Proper use of PPE
- Work practices by which a worker can minimize risk from hazards
- Safe use of engineering controls and equipment on-site
- Acute effects of compounds at the site
- Decontamination procedures
- Other applicable environmental issues and regulatory requirements
- Stop Work Authority
- Biological hazards training

All personnel, including subcontractors, new hires, transfers, union workers and visitors on a project must attend the site orientation program on their first day and sign an acknowledgement form indicating they attended, received and understood the orientation. Any individual who is unsure of any information presented in the orientation must request clarification. Individuals who do not participate in the orientation or refuse to sign the acknowledgment when requested will not be granted access to the site. The Field Safety Manager will provide employees with Orientation.

4.3 Awareness Campaign

The project has an awareness program consistent with the Parsons SH&E awareness campaign in its various elements (e.g., signs, posters, banners, and focus briefings). This program promotes worker awareness of SH&E goals and daily risks, hazards, and exposures in the field. In addition to topics selected by Corporate Safety each month, the project will supplement the awareness program with information specifically applicable to the SOW. The Project Safety Representative may also provide training, presentations, or informational materials as part of the awareness campaign.

The SH&E bulletin board maintained by the Project Safety Manager (PrSM)/Site Safety Officer (SSO) is the primary information point for the project awareness campaign. Bulletin boards will be set up in field trailers as appropriate. The PrSM/SSOs may also provide training, presentations, or informational materials as part of the awareness campaign.

4.4 Stakeholder Project Safety Plan Alignment Meeting

A stakeholder PSHEP alignment meeting will be held before beginning any field work. The meeting allows Parsons to focus and coordinate efforts, obtain input for improvements and gain concurrence from all stakeholders for execution of the PSHEP. The following representatives should be in attendance for the PSHEP alignment meeting:

- Honeywell – Richard Galloway
- Parsons – Edward Glaza, PrM
- Parsons - Gregory Ertel, PrSM
- Drilling Subcontractor Manager – TBD

Parsons should present the PSHEP and obtain stakeholders concurrence with the approach outlined in the plan. The meeting should include a review of stakeholder roles and responsibilities and elements of control appropriate to the project risks.

4.5 Training

The project will develop an SH&E training program tailored to the SOW. All employees receive a general project orientation as outlined in **Section 4.2** upon assignment to the project. All office-based employees, field employees and new hires who spend a significant portion of their time in an office or field trailer shall receive a specialized office training including the following topics as appropriate:

- Proper lifting techniques
- Biological hazards (ticks, bees, poison ivy, etc.)
- Ergonomics
- Housekeeping
- Common office hazards and environmental risks (if any)
- Asbestos license/certification
- Technological Enhanced Naturally Occurring Radioactive Material (TENORM)
- Waste management
- Office procedures
- Evacuation/Drills/Emergencies
- Other relevant topics
- Field-based employees and office employees who spend a significant portion of their time in the field also receive field training as appropriate and as described in **Section 7** of this PSHEP including the following topics:

- HAZWOPER
- Asbestos
- PPE
- Defensive driving
- Lifting
- Back safety
- Cardiopulmonary resuscitation (CPR)/first aid/automated external defibrillator (AED) and blood borne pathogens
- Electrical safety
- Overhead hazards
- Emergency response
- Fire Prevention
- Housekeeping
- Hand tools/Power tools
- Hazard communication: Identifying the Danger
- Honeywell accident/incident reporting procedures
- Parsons accident/incident reporting procedures

They may also receive the following training as applicable to a specific task:

- Lockout/Tagout (LOTO)
- Stairs / ladders

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, including, but not limited to, initial 40-hour, 8-hour Supervisor and annual 8-hour refresher training.

4.6 Audits and Inspections

The SH&E manager has implemented an audit and inspection program in conjunction with the Corporate SH&E Departments. The Project Manager (PM), or their designee, in accordance with **Section 6.5** conducts weekly site inspections. Additional inspections will also be completed when a significant task is being performed (e.g., soil/sediment sample collection, sample surface water collection, major restoration efforts by subcontractor, etc.). If the PM is not on-site, the most senior person on-site will conduct the inspection. Inspections and audits are intended to identify unsafe behaviors or conditions and implement corrective actions before an incident occurs. Completed inspections will be saved in the project files. Additional information on audits and inspections during construction is detailed in **Section 6.5** of this PSHEP. All noted deficiencies and corrective actions will be tracked with the use of a tracking log. The PrSM will evaluate inspection and audit results and provide a summary to the Safety Steering Committee. When appropriate, Safety Bulletins will be issued to convey safety lessons from near misses or incidents that are applicable to our own circumstances for the purpose of continuous improvement. In accordance with the Parsons' safety protocol, safety inspections and audits are required to be performed in the manner and frequency described below.

4.6.1 Periodic Safety Audits

Projects will be selected at the discretion of the SH&E Manager for periodic project audits. These audits will generally be more comprehensive in nature and will include a documentation review as well as a site walk-through. Completed inspections will be sent to the safety Director and will be summarized in the next Monthly

Safety Report. The Safety Director will forward inspection results to the Safety Manager so that corrective actions can be tracked to conclusion.

4.6.2 Corrective Actions

Deficiencies identified by audits and inspections will be logged in a deficiency tracking log. Any deficiencies that cannot be immediately corrected must be assigned to a specific individual with a reasonable completion date. The Safety Manager or the designated SSO will track corrective actions, verify their closure, and update the Corrective Action Tracking Log or equivalent. Findings of a severe nature or that indicate a declining site safety trend may warrant notification of subcontractor's senior management. Ongoing failure to implement safety requirements as by applicable regulations, the contract, and may be considered a breach of contract and result in the subcontractor's removal from the project.

The PrSM has implemented an audit and inspection program in conjunction with the corporate safety and quality assurance departments. The PM, together with the Field Team Leader or the SSO, will conduct a safety inspection each month. Office work areas (including trailers) are audited according to the corporate office audit standards.

4.6.3 Employee Based Inspections (EBS)(Observations)

This project will utilize the EBS system for field inspections and observations by conducting periodic Behavior Based Observation (BBOs). BBOs are about conducting worker observations, providing positive reinforcement for significantly important behaviors that are correct and consistent with company work standards, and constructively identifying and eliminating deviations from these work standards.

Observations shall be recorded electronically in the field typically by management personnel utilizing IndustrySafe® proprietary software located on the PWEB. Unsafe acts or situations shall be immediately corrected, if possible. Items which cannot be corrected shall be logged as incomplete within the system for corrective action tracking. Data shall be uploaded to a central database maintained by IndustrySafe®. IndustrySafe® has set up a database specifically for this project where inspections, trends and collected data can be reviewed by the entire project management team.

Personnel responsible to perform employee observations typically shall consist of project management staff. For this project, the personnel performing observations shall include the following:

- PM
- SSO
- Field Team Leader

A metric of 1 inspection or observation per week has been established by the Program Safety Director. Due to the effectiveness of an unscheduled random inspection model, as well as project management scheduling, these inspections may or may not be performed in any given week or performed above the quota during higher risk activities. The PSM shall be responsible for stewardship of this inspection program.

4.7 SH&E Meetings

All project meetings that include five or more people must begin with a SH&E moment. The meeting chairperson may present the SH&E topic or ask for a volunteer to open the discussion. In general, these “SH&E moments” are brief, perhaps a minute or two, and should be directly relevant to the work of the day or applicable to most employees (e.g., non-work-related injuries, waste management procedures, effects of stormwater discharges, home exposure to hazards materials, etc.). Monthly all hands SH&E meetings are held to review critical safety procedures, discuss safety incidents, and celebrate safety milestones. The PM announces the time and schedule of these meetings at least one week in advance.

Daily toolbox safety meetings are held with all personnel at the beginning of each shift to review current site conditions, incidents, or injuries from the previous shift activities, safe or at-risk observations from the previous shift, activities planned for the current shift, anticipated hazards, engineering controls, work practices, PPE to protect against hazards, and any additional safety topic or comments. Toolbox safety meetings shall be documented and signed by all individuals accessing the site using a Safety Meeting Sign-In Sheet.

4.8 Rewards and Recognition

4.8.1 Rewards and Recognition Program

At Parsons, we expect every employee to work safe. We do offer incentives for those who proactively go the extra yard, or mile, to make Parsons an even safer place to work. Our incentive program is project-based but similar across all Parsons' projects.

Things that we want to incentivize (and why):

1) **Near-Miss Reporting** (The root cause of a near miss is generally identical to the root cause of a "hit". If we report near-misses, find their root causes and actually fix them we have lowered the potential for having an incident.) Employees who submit near-misses may be eligible to receive a Red Safety Token that can be exchanged for items. (Red Tokens are a Corporate way of giving thanks for safety efforts.)
2) **Good or Great Ideas that make the job safer** or **Significant Safety Observations** (Many employee ideas go unrecognized because we never hear about them.) Please let your PM/Superintendent or SSO know what your idea is to make Parsons a safer place to work. Employees who submit ideas that are implemented (as determined by the Project Safety Committee or, the PM/SSO) or make significant observations (saw a hazardous condition and reported it; made an adjustment to a task to make it safer, etc.) that the site leadership team can act upon, may receive Red Safety Tokens that can be exchanged for items as determined by the Rewards and Recognition Committee.
3) **Employees that go the extra yard to improve the safety program** (Our program only gets better if all members of the team understand and contribute to our zero injury goals.) Emergency Response Team (ERT) Members, Employee Based Safety (Industry Safe) volunteers, safety committee members, those who contribute to AHA development and others, may be eligible to receive a Safety Token.
4) **Sustained, high performance by a site team/project** (No one gets hurt!) Teams, projects or, even the entire portfolio who maintain a high level of safety consciousness as exhibited by a high level of near-miss reporting, overall safety culture, quality H&S observations, etc., can be recognized by virtue of a safety breakfast/lunch or, Honeywell/Parsons recognition token gift.

SSOs will work with their PMs to determine the rewards and recognition program appropriate for the project and will be responsible for local administration of this program. They are also responsible for inter-portfolio sharing of the near-misses reported as well as the great ideas that are surfaced. PMs will budget for this recognition program. Charges will go to project/program overhead. Employees who receive tokens will be tracked for audit purposes. SSOs will collect red tokens when awarding gifts.

4.9 Measurement and Reporting

Complete incident reporting guidelines are provided as **Exhibit 4-2** of this section.

4.9.1 Emergencies

For emergencies, call 911!

4.9.1.1 WorkCare

Parsons and WorkCare have partnered together to promote Incident Intervention™, a resource designed to provide Parsons' employees with immediate access to qualified medical clinicians who are able to provide our employees with prompt medical assessment in the event of non-life threatening, non-medical emergency work related injury or illness. Each of Parsons' subcontractors is required by contract to participate in this program. Through this process, Parsons can leverage clinical expert resources to coordinate appropriate treatment care. WorkCare serves as a "medical advocate" for the employee, the WorkCare clinician provides responsive evaluation of the incident, assists the employee/employer in determining the most appropriate course of action, and consults with the treating physician.

4.9.1.2 Work-Related Injury Procedures

For Emergencies

If there is a life threatening or significant medical event (e.g., not breathing, no heartbeat, unconscious, open wound, amputation, obviously broken arm or leg, etc.), then the first employee on the scene should:

1) Call for help
2) Call 911
3) Begin first aid/CPR if trained

For Non-Emergency, Non-Life-Threatening Work-Related Injury or Illness

Upon notification of a non-life-threatening illness or injury event the **Field Team Leader** will:

1) Make sure that 1st Aid/CPR trained employees are on scene and assisting the injured.
2) Make sure that any ancillary work ceases to make scene safe for responders.
3) Contact the SSO; For anything beyond a minor band-aid case the SSO will confer with Greg Ertel (585-465-0557) to determine if WorkCare shall be called.
4) If determined, contact WorkCare and allow the injured employee to speak with a WorkCare doctor or nurse.
5) Follow WorkCare guidelines; Drive the employee to the clinic if directed and stay with him/her until the visit is concluded.
6) Provide the employee with "Questions to Consider Asking Your Doctor During a Clinic Visit."
7) Provide the employee with "Memo to Treating Medical Professional" prior to the employee going into the exam room.
8) Participate in the incident investigation process upon return to the site.

To coordinate the WorkCare triage process, it is imperative that Parsons' employees report all work-related injuries immediately to their supervisors.

For work-related injuries or illnesses that may require physician direction on appropriate treatment, Parsons' employees should then promptly contact WorkCare, ideally before seeking medical care, as this will provide the greatest opportunity for appropriate intervention.

If an injured employee requires medical care for a work-related injury/illness, the Order for Treatment of Work-Related Injury/Illness Form MUST be sent with the injured worker and/or faxed to the occupational medicine clinic at the time of the initial evaluation. See **Exhibit 4-3**.

WorkCare's Incident Intervention is available 24/7 and 365 days per year.

WorkCare contact number is 1-888-449-7787.

Be prepared to provide the following:

- Injured worker's name
- Injured worker's contact number
- Injured worker's location (at a minimum include the city and state)
- Employee ID number
- Employee's Market
- Employee's project or office location
- Functional manager's name

Near-Miss Reporting

In an effort to streamline near-miss reporting, especially for employees conducting fieldwork who do not have real-time web access, will contact the PM or the Safety Manager for assistance. All entries will be saved as initial and can be accessed by the caller when they return to their computers. Entry into the database does not relieve the caller from the responsibility of following through with the near-miss investigation or of notifying other employees in the office or project team of the occurrence.

Callers will be prompted to provide the following information:

- Name and phone number
- Date of near-miss
- Location
- Project number (if applicable)
- Brief description of what happened
- What you think happened if this situation resulted in injury or damage
- Any other information you think may be important

The intent of this service is to enable employees to phone in near-misses immediately and have events entered into the Parsons Industry Safe database. As we all know, the expectation is that immediately after having a near-miss, Stop Work Authority will be used to ensure the area is safe and determine what changes must be made before it is safe to proceed.

4.9.2 Measurement and Compliance

The PM and PrSM establish and post a measurement system to provide indicators of safety performance, including the following metrics for the project:

- Project start date
- Days without a recordable injury
- Date of last OSHA recordable injury (if applicable)
- Percent of safe observations from each monthly audit

Subcontractors must submit a monthly report of incidents, exposure hours (hours worked on the project, paid or unpaid) to the Parsons PM within three (3) days after the end of each month. The PM compiles the figures and submits them to the PrM (or via the online safety reporting system if instructed by the PrM) by the first Friday of each month; where necessary, estimated figures are acceptable. If a project involves air monitoring or personnel wearing any type of respirator, a monthly Field Project Report is also completed and submitted to the SH&E Director by the 3rd calendar day after the end of each month.

To accurately measure performance and comply with corporate and regulatory requirements, Parsons and its subcontractors have an emergency communications system to contact the following onsite offices for the events listed below:

All incidents	*(Program Manager) Tom Abrams (315-552-9670)*
Worker injury or exposure	*(Program Safety Manager) Greg Ertel (585-465-0557)*
Hazardous material/contaminant releases	*Site Emergency Response Lead (315-715-1800)*
Fires/explosions	*Fire (911)*
Medical emergencies	*First Aid/Medical (911)*

This notification information should be provided to site workers in either posters or individual wallet cards that can be distributed to site workers. In addition, this information should be prominently displayed in the PSHEP (e.g., on the back of the plan cover).

The SH&E Manager has established a measurement system to provide indicators of SH&E performance, including the following metrics:

- Consecutive days without a recordable incident
- Consecutive days without a days-away-from-work incident
- Recordable incident rate
- Days-away-from-work incident rate
- Contaminant exposures monitored and over exposures documented
- Environmental citations from regulatory agencies
- Total number of environmental spills and/or releases recorded
- Environmental spills and/or releases requiring reporting (e.g., Reportable Quantities)
- Number of monthly audit findings by type (i.e., safety, health and environmental)

4.9.3 Incident Reporting

Employees involved in or witnessing an injury, worker exposure, environmental incident, or near miss must immediately report it to the responsible Field Team Leader, who in turn immediately relays the report to Parsons Project SSO. No Field Team Leader may decline to accept or relay a report of SH&E incident or significant near miss from a subordinate.

The PM must ensure that all SH&E incidents are reported to the SH&E and other management personnel (as required) within four hours. The Project SSO (who has been trained on Parsons' reporting requirements and Online Safety Reporting System) prepares and submits SH&E reports. The PrSM sends reports to the required management personnel and validates that client reporting requirements are also met.

The PrSM must notify the local OSHA office and/or regional, municipal and/or local regulations office in writing within 8 hours if an accident involves any work-related fatalities within eight hours of the event and all work-related in-patient hospitalizations, as well as amputations and losses of an eye, to OSHA within 24 hours of the event. In addition, spills/releases of reportable quantities and other reporting required by environmental regulation are the responsibility of the PrSM.

The PM and Safety Director must be notified by the SHSO of any incident as soon as it is safe to do so but within the notification guidelines identified in the following table. After notification, written incident reports must be submitted by the SHSO to the Safety Director in accordance with the time frames shown in the **Attachment B**.

The Safety Director's delegate shall then enter incidents into the Honeywell Event Reporting System within the applicable time frames which can be found in **Attachment B** of this PSHEP. If the Safety Director is unavailable, then the Safety Manager shall assume or delegate Safety Director's responsibilities in an effort to support timely incident reporting and follow-up.

For a complete listing of Tier 1, 2, and 3 examples see **Attachment B**.

Monthly Statistics Summary Reports

Root causes must be identified, and corrective actions implemented. The Safety Manager can assist project SSOs in reviewing and tracking incident reports as well as following up on completion of corrective actions. The SSO shall update the Safety Manager as corrective actions are implemented and completed. The Safety Manager will track and verify completion of corrective actions on the Corrective Action Tracking Log or equivalent.

The Safety Director will summarize incidents on the next monthly Safety Report following the incident. The timeliness of incident reporting and any significant "Lessons Learned" will be included in the summary.

A Honeywell Notification/Activation Decision Table is also presented in **Attachment B**.

In addition to the Honeywell incident notification requirements, Parsons' employees involved in or witnessing an incident or near-miss incident must immediately report it to the responsible SSO, who in turn immediately relays the report to Parsons PM. Near-miss incidents that could cause significant injury or loss of life must be immediately reported, in the same manner as an actual incident. No supervisor may decline to accept or relay a report of injury or significant near-miss incident from a subordinate.

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

The Program Safety Manager, or their designee, must notify the local OSHA office immediately if an accident involves the death of an employee or hospitalization of three or more workers.

Subcontractors must submit a monthly report of exposure hours (hours worked on the project, paid or unpaid) to the Parsons PM within four days after the end of each month, or as specified by the contract. The PM compiles the figures and submits them via the online safety reporting system by the first Friday of each month. If necessary, estimated figures are acceptable, but the reports must be filed.

4.10 Incident Investigations

All accidents, worker over exposures, environmental incidents and significant near misses are investigated by an individual or team with training in incident investigation and root cause analysis. Subcontractors must investigate incidents involving their employees or activities and submit an investigation report to the Parsons PM within 48 hours of an incident.

In Parsons, the PrSM investigates or assigns an investigator to each significant incident. The investigator submits a final investigation report using the online safety reporting system within 72 hours of the incident. The Project SSO maintains the investigation file.

4.11 Responsibility/Identification of Key Line Personnel

For project responsibility and identification of key personnel.

Project Key Personnel

Project Office:	Syracuse, New York	
Address:	301 Plainfield Road, Suite 350 Syracuse, NY 13212	
Telephone 315-451-9560	**Fax 315-451-9570**	**Email**
Company Executive responsible for project		**Contact No.**
Pratima Poplai		Direct Line: 732-537-3552 Cell Phone: 732-853-4957 Email: Pratima.Poplai@parsons.com
Market SH&E Director		**Contact No.**
John Barker		Cell: 704-558-4209 John.Barker@parsons.com
Site Project Managers		**Contact No.**
Ed Glaza		Direct Line: 3150 552-9691 Cell: 315-730-4685 Edward.Glaza@parsons.com
Program Safety Manager (PrSM)		**Contact No.**
Gregory Ertel, CIH, CSP		Cell Phone: 585-465-0557 gregory ertel@parsons.com
Site Safety Officer (SSO)		**Contact No.**
TBD		TBD
Client Project Management		**Contact Information**
Steve Coladonato		Direct Line: 302-791-6738 Cell Phone: 973-216-2438 Email: Steven.Coladonato@Honeywell.com

The personnel listed above have the authority and responsibility for implementing the provisions of this project.

4.12 Medical Requirements and Workers' Compensation

In accordance with corporate requirements, the SH&E Manager has established and implemented the following medical requirements for the project:

4.12.1 Substance Abuse Tests

Honeywell and Parsons are committed to maintaining a safe and healthy work environment for its employees, its subcontractors and the community. Honeywell and, Parsons recognize that on-the-job, as well as off-the-job, use of drugs and consumption of alcohol can have a negative impact on job performance, endanger individual safety, the safety of co-workers, and the community. Contractor crews are covered by the drug and alcohol policies of their employers.

NOTE: **Parsons Employees and subcontractors are subject to additional post accident drug testing requirements that include (but are not limited to) company vehicles and high-risk power tools. Refer to Parsons Employment Standards Rev 3, Appendix 4 –Substance Abuse.**

Policy

In an effort to establish a substance abuse-free workplace and with an understanding that *subcontractors* often perform *Safety-Sensitive Activities*, Honeywell and Parsons require *subcontractors* to have a Drug-Free Workplace Policy that meets or exceeds this policy when working on Honeywell projects and/or property. See **Exhibit 4-4** for Parsons Corporate Substance Abuse Policy.

Pre-Access

The PM shall require project personnel to have pre-access drug and alcohol screening within **two weeks** prior to the commencement of field work.

- Pre-access testing is not necessary if subcontractors have been off-site **≤30 days**.
- Short-term subcontractors needed to provide emergency response support or unscheduled repairs to critical on-site equipment may be exempted from pre-access testing if approved by the Portfolio Safety Manager or Market SH&E Director.
- The PM will document approved exemptions in pre-work planning documents associated with unscheduled repairs of critical equipment.
- Exemptions may be extended for a maximum of **three days** after which time exempted subcontractors must tested for drugs and alcohol.

Reasonable Suspicion

Reasonable suspicion testing may be triggered by direct observations of employee behavior or drug-related paraphernalia. Site personnel who have been observed using alcohol or controlled substances on site or during breaks at off-site locations after which they will return to work will be requested to take an alcohol or drug test. Reasonable suspicion includes possession (on person or in vehicles) of alcohol or controlled substances on site as well as paraphernalia that suggest drug use. Site personnel who exhibit signs, symptoms, or behaviors of drug or alcohol use as interpreted by a reasonable person will also be requested to take a drug and/or alcohol test. Reasonable suspicion drug testing must be conducted **as soon as feasible not to exceed four hours**.

Post-Accident

Honeywell reserves the right to drug and/or alcohol test Parsons or subcontractor personnel involved in an accident. Honeywell requires Parsons or subcontractor personnel to submit to an alcohol test within 2 hours and to a drug test within 32 hours after an accident. If the alcohol test is not collected within 8 hours and the drug test within 32 hours after an accident, then the Safety Director will cease efforts to have the tests collected and document the reason for failing to collect these tests. Failure to cooperate with drug and alcohol testing procedures may result in disciplinary action up to and including removal from site for a minimum of one year.

Project Drug & Alcohol Screen

The Safety Director may select specific projects for drug and/or alcohol testing at his discretion. Project personnel will either be randomly selected from the total project personnel, or on smaller projects, all project personnel will be tested. Parsons engineering and construction management personnel routinely working on-site shall not be excluded from testing.

Commercial Motor Vehicle Drivers

Project personnel who operate commercial motor vehicles will be required to participate in periodic and random drug and alcohol testing by their employers in accordance with the Federal Department of Transportation regulations. Evidence of such participation shall be provided upon request.

Drug & Alcohol Testing Procedures

When required by this program, Parsons' employees and subcontractors will report to Well Now Urgent Care drug collection facilities. Well Now drug collection facilities are located at 961 Sheridan Drive, Buffalo (716.844.7100). Drug test results from non-Well Now drug collection facilities may be acceptable if collection and analysis of samples is otherwise equal to those outlined in this document. The Safety Director/Manager shall make the final determination if drug test results collected at non-Well Now facilities are acceptable.

After-Hours Testing (Post-Accident & Reasonable Suspicion)

Well Now Urgent Care provides post-accident testing. All post-accident testing is conducted at their Tonawanda clinic location. Health & Safety and the appropriate People representatives (formerly called Talent Management) should be notified as soon as feasible following an employee being sent for testing. After hours testing of subcontractor personnel does not require notification of Parsons' People representative. Well Now Urgent Care's address in Tonawanda is as follows:

1751 Sheridan Drive
Tonawanda, NY 14223
716.541.0234

Normal Business Hours: 8:00am – 8:00pm. 7 days a week

- Notify the PM, Health & Safety and the appropriate Parsons' People representative as soon as feasible.
- For subcontractor personnel, notify Health & Safety as soon as feasible.

Confidentiality of Test Results

Test results will be maintained in accordance with applicable law in a confidential file of medical information. Subcontractors will be copied on drug and alcohol results for their personnel. The Safety Director/Manager will retain and secure subcontractor drug and alcohol test results as necessary to support a policy of prohibiting such individuals from being assigned to another project within the next year AND before a negative drug and alcohol test is provided.

Positive Test Results

A positive drug test result will be confirmed by a Medical Review Officer (MRO) responsible for reviewing test results and procedures. A positive alcohol test result will indicate blood-alcohol levels **greater than or equal to 0.04** and will also be confirmed with a second alcohol test and MRO review. Detectable alcohol **less than 0.04** will be considered a negative result and the individual will not be classified as intoxicated or otherwise under the influence. Individuals with blood-alcohol levels **less than 0.04** may be permitted to return to normal work duties including safety-sensitive activities. However, commercial drivers with blood alcohol between **0.04 and 0.02** must be removed from safety-sensitive activities that are specifically related to the operation of commercial vehicles for **24 hours** as required by Federal Department of Transportation (DOT) regulations. After 24 hours, normal driving duties may be resumed.

Any person who does not provide an acceptable urine sample after 3 hours or does not otherwise cooperate with testing procedures, will be classified as a refusal. Refusals will be treated as a positive result for purposes of follow-up and disciplinary action.

Testing positive or refusing a request for a drug and alcohol test may result in disciplinary action, up to being immediately removed from the project and not be permitted to work on another project for one year. A negative drug and alcohol test are also required prior to being reassigned to a project. The Safety Director will track drug and alcohol testing results.

4.12.2 On-Site Medical Services and Panel of Physicians

The Parsons Corporate Workers' Compensation Analyst establishes medical providers for the project and selects medical facilities to treat work-related injuries and illnesses, as follows:

Emergency Medical Services

- **Location**: Kenmore Mercy Hospital, 2950 Elmwood Avenue, Kenmore, NY 14217
- **Phone**: General Phone: 716.447.6100
- **Hours of Operation**: 24 hours
- **Directions**: See **Exhibit 4-5**

Non-Emergency Medical Services

- **Location**: Well Now Urgent Care, 1751 Sheridan Drive, Buffalo, NY 14223
- **Phone**: 716.844-7100
- **Directions:** See **Exhibit 4-5**

WorkCare Information

- See **Exhibit 4-6** for WorkCare forms

NOTE: Transportation to a medical facility for non-emergencies must be done by at least two (2) individuals (i.e., driver and observer).

4.12.3 Emergency Response

The project displays posters with emergency telephone numbers and locations of emergency facilities in visible locations and at selected phone locations throughout the project area (including subcontractor facilities). The following information is provided:

Emergency Contacts	Phone Number
Ambulance	**911**
Fire Department	**911**
State Police (NYS)	**911**
Parsons Contract Physician (WorkCare)	888.449.7787
Poison Control Center	800.252.5655
Well Now Urgent Care	716.844.7100

4.12.4 Workers' Compensation Program

The Corporate Risk Management Department establishes the workers' compensation carrier. If a workers' compensation loss occurs, the Corporate Workers' Compensation Analyst handles all communication with the workers' compensation carrier.

This project does NOT participate in an Owner's Controlled Insurance Program or project-specific insurance program. The workers' compensation policy covering Parsons Employees on this project is as follows:

AIG
15 Cornell Drive, 2nd Floor
Latham, NY 12110
877.640.2450
Policy Number: 0007169963

4.12.5 Medical Monitoring

Potential health hazards and potential exposures associated with these projects are zero to minimal and will not require medical monitoring. If new tasks are identified, health hazards and potential exposure will be re-evaluated and medical monitoring may be implemented, if warranted.

EXHIBIT 4-1 SITE-SPECIFIC PROJECT SAFETY PLAN ORIENTATION

Project Name: Tonawanda Coke Sites

Project Location: 3875 River Road, Tonawanda, New York

Names of Personnel Responsible for Site Safety and Health:

- Project Manager (PrM)- Ed Glaza (315) 552-9691 (office)
- Program Safety Manager – Gregory Ertel (585) 465-0557 (cell)
- SSHO – TBD

Site specific safety plan orientation must be conducted with all new site workers prior to beginning any work. The orientation shall be conducted by any of the above-mentioned responsible personnel or their designees. Orientation shall consist of a review of the Parsons Safety Plan and site-specific AHAs.

<u>Emergencies</u> - Call 911 and/or your Supervisor for emergencies. In the event of an evacuation, the assembly points will be determined, located, and shown at the initial site task(s) Safety meeting, and again located and shown when the site tasks are to commence at other locations. Evacuation protocols and procedures will be discussed at these Safety meetings. The sound for an evacuation is three short fog horn blasts.

<u>Incidents</u> - Report all incidents that result in personal injury, property damage, or environmental release and near-miss incidents to your Supervisor and the SSO. Near-miss incidents COULD HAVE been an incident but did not because of a slight change in conditions or luck. However, they have the same causal factors as an incident, so it is just as important to investigate them for identifying solutions to prevent recurrence and share lessons learned. Both incidents and near misses will be reported according to both Honeywell and Parsons procedural protocol.

<u>Workcare</u> - Workcare will be utilized for Parsons Employees and provides 24-hour 7 day a week on-call medical professionals to answer any medical-related questions. These medical professionals also help provide injury assessment and guidance, treatment options, have access to advanced medical personnel, and will assist with suspected work-related injuries.

WORKCARE – 1 (888) 449-7787

<u>Open Door</u> - The management team is committed to an open-door policy and all will make themselves available to any team member at any time for any real or suspected Health, Safety or Environmental concern. Employees should attempt to utilize first line supervisors and the chain of command; however, employees are not prohibited from contacting any management team member should they believe concerns are not or will not be addressed and may do so without fear of retribution.

<u>Communications</u> - For Media Inquiries direct questions to Victoria Strietfeld (Honeywell) 973.455.5281.

<u>Personal Protective Equipment (PPE)</u>

Minimum PPE:

- Safety glasses with side shields (tinted safety glasses are not permitted during overcast weather, after sundown or inside buildings)
- Honeywell hard hat (hard hats do not have to be worn during routine site inspections on remediated sites with no construction activities taking place)
- Steel or composite toe work boots
- Long pants
- Minimum of short sleeve shirt (no tank tops or sleeves cut off)

* High visibility vest or T-shirt
* Hand protection (task specific – refer to appropriate AHAs)

Additional PPE requirements may include:

* Dust mask when the potential for elevated dust generation is a concern.
* Hearing protection – When working in an area where decibel level exceeds 85 for an 8-hour period.
* PFD (Personal Floatation Device) - To be implemented in areas with water greater than knee deep. When PFD is worn, all connections must be affixed.

Additional Site-Specific Health and Safety Hazards

Identify all activities on-site as being dangerous and having a possibility for an accident. Review with the worker the activities he/she is here to perform. Then, identify all possible hazards and safeguards for those activities. Next, have worker review all AHAs associated with those activities.

Physical Hazards

Slips trips and falls - Site conditions contain multiple walking hazards.

Manual Handling - Hazards presented by manual handling of material, tools or equipment. Individual lifting limits are capped at 50 lbs./person. For repetitive tasks, the NIOSH lifting equation is to be used. Employ the use of mechanical lifting devices or assistance when and wherever feasible.

BIOLOGICAL HAZARDS

Insects - Bees, ticks, mosquitoes, spiders and other insects may be encountered on-site. Notify your supervisor and any SHSO if you possess a known allergy and have been prescribed a personal emergency injection device. You will be required to carry with you any emergency allergic reaction mitigation devices while you will perform work on-site.

Plants - Poison ivy/sumac/oak may exist on-site in wooded areas.

Wildlife - Native wildlife may be encountered onsite such as raccoons, squirrels, opossums, snakes, rats, bats, frogs, mice, deer, coyote, fox, minx, rabbits, turkey, geese and birds, as well as other native species. Animal dens may present physical hazards.

COVID-19 – Coronavirus disease 2019 (COVID-19) is a respiratory illness that can spread from person to person. The virus is thought to spread mainly between people who are in close contact with one another (within 6 feet) through respiratory droplets produced when an infected person coughs or sneezes. It may also be transferred by touching a surface or object that has the virus on it and then touching their eyes, nose, or mouth. COVID-19 Prevention Procedures and a COVID-19 Management Plan are included in **Attachments I** and **J**, respectively.

Site Access Control –Personnel reporting to the site must park in the designated parking areas. Only vehicles approved by the SSO may enter the work zone. Site speed limits in any work zone will be set and discussed at the site(s) initial safety meetings.

Cell Phone Usage – Parsons' policy is no cell phone usage while operating a vehicle or equipment, this includes no hands-free devices.

Training – Site-specific training (PSHEP review and sign off). Copies of the PSHEP and SDS are available to all personnel. Daily safety meetings shall be documented and reviewed by all personnel working at the site. Prior to entering a work site, site workers must report to either the site PM/Field Team Leader/PrSM with valid documentation of the following:

- ✱ Negative drug test and alcohol documentation required annually and random for all personnel active on Honeywell projects

HAZCOM - General Hazard Communication training is provided by your employer. Specific chemicals have been previously covered in this orientation. Site Specific HAZCOM elements are listed below:

SDS Sheets - The SDS Master book is kept in the Team site vehicle. Any chemical brought onsite should be accompanied by the appropriate SDS sheet, sheets should be provided to safety prior to use so an evaluation on any new material can be conducted.

Appropriate PPE - PPE identified on an SDS must be used. If you are unaware of what PPE to use or need any specialized equipment, please inform your supervisor.

Specific Hazards in your Work Area - The sediment material is dynamic and nature with regard to hazards. Hazards specific to your work area will be communicated through your supervision, task specific AHAs, job safety analysis (JSA), and Take 5 Cards.

Gases, Vapors and Fumes - Gases, vapors and fumes may be released from a variety of processes, including:

- Using internal combustion engines
- Fueling vehicles or equipment

Mobile equipment – Use horns to alert others. Mirrors and back-up/travel alarm must be functional on all equipment and vehicles driving on-site. Use a spotter when backing vehicles with blind spots and/or around equipment (i.e., pipe lines, electrical boxes, etc.).

Work permits – It is not anticipated that tasks will require any additional permits. Permit requirements will be evaluated for any new tasks that are identified.

Decontamination - The SSO will determine the proper procedures for personal and equipment decontamination based on the work activities.

Proper Hygiene – Wash hands and face before eating, drinking, and smoking.

General Safety Requirements, Site Safety Rules

1) All site personnel must attend each shift's Daily Safety Meeting.
2) Report all incidents (any unplanned or unexpected event that results in personal injury, property damage or environmental release) and “near-miss reports” to your Supervisor or the SHSO. Near-miss incidents COULD HAVE been an incident but didn’t because of a slight change in conditions or luck. However, they have the same causal factors as an incident, so it is just as important to investigate them for identifying solutions to prevent recurrence and share lessons learned.
3) Any individual taking prescribed or over the counter medication that may impair their ability work shall inform the site HSO. The HSO will review the matter with the appropriate personnel to determine if the employee can perform his/her work duties safely while taking the medication.
4) The personal protective equipment specified by the SHSO and in the HASP shall be worn by all site personnel. This includes Level D PPE which must be worn at all times in active work areas. Hardhats are not required for routine monitoring tasks in areas where not construction activities are taking place.
5) Respirators shall not be worn when conditions prevent a good face seal. Such conditions may be a growth of beard, sideburns, a skull cap that projects under the facepiece, or temple pieces on glasses. This regulation does not ban facial hair on respirator users, per se, from the workplace. However, when a

respirator must be worn to protect employees from airborne contaminants, it has to fit correctly, and this will require the wearer's face to be clean-shaven where the respirator seals against it.

6) All personnel must sign the site log when entering and leaving the site property.
7) Personnel must follow proper decontamination procedures during and at the end of the work shift.
8) Eating, drinking, chewing tobacco or gum, smoking and any other practice that may increase the possibility of hand-to-mouth contact is prohibited in the Exclusion Zone (EZ) or the hot portion of the Contamination Reduction Zone (CRZ).
9) All signs and delineation shall be followed. Such signs and delineations shall not be removed except as authorized by the SHSO.
10) No one shall enter a permit required confined space without a permit, and Confined Space Entry Permits shall be implemented as issued.
11) All personnel must follow Hot Work Permits as issued.
12) All personnel must use the Buddy System in the Exclusion Zone.
13) All personnel must follow the work-rest regimens and other practices as required by the Heat Stress Program.
14) All personnel must follow lockout / tag-out procedures when working on equipment involving moving parts or hazardous energy sources.
15) No person shall operate equipment unless properly trained and authorized.
16) No one may enter an excavation greater than 4ft. deep unless authorized by the Competent Person.
17) Excavations must be sloped or shored properly. Safe means of access and egress from excavations must be maintained.
18) Ladders and scaffolds shall be solidly constructed, in good working condition and inspected prior to use. No one may use defective ladders or scaffolds.
19) Fall protection or fall arrest systems must be in place when working at elevations greater than 6 ft. from temporary working surfaces and more than 4 ft. from fixed platforms.
20) Safety harnesses and lanyards must be approved by the responsible party. The user must inspect the equipment prior to use. No defective personal fall protection equipment shall be used. Preloaded personal fall protection which has been involved in an incident must be recertified prior to re-use.
21) Hand and portable power tools must be inspected prior to use. Defective tools and equipment shall not be used.
22) Ground fault circuit interrupters (GFCI)s shall be used for cord and plug equipment used outdoors or in damp locations. Electrical cords shall be kept out of walkways and puddles unless protected and rated for the service.
23) Improper use, mishandling or tampering with health and safety equipment and samples is prohibited.
24) Horseplay of any kind is prohibited.
25) Possession or use of alcoholic beverages, controlled substances or firearms on any site is forbidden.
26) Use of cell-phones or personal electronic devices is prohibited while performing any work onsite, including the operation of any mobile equipment or motor vehicle.
27) All personnel shall be familiar with the Site Emergency Evacuation Procedures.

Disciplinary procedures to enforce compliance

General - All project personnel covered by this document are subject to disciplinary action, up to and including termination, for failure to comply with its applicable requirements. Management reserves the right to discharge or remove an employee from the project immediately for offenses that are grossly severe in nature. All project management personnel are responsible for enforcing safety requirements. Subcontractors must implement equivalent disciplinary action programs.

Non-compliance - For minor safety related infractions, as determined by project management personnel, such as failure to wear eye protection, personnel generally will be reminded of site policy verbally and given ample opportunity to comply or for retraining.

Documentation - More severe or repeat offenses may be reported immediately to an individual's supervisor, who will initiate disciplinary action in accordance with each company's policies. Subcontractors may receive notices of violation with additional requirements for compliance.

Continued Repeat Offense - Willful continued failure to comply will result in removal from the site permanently.

Right to ask questions, report information

Media and Local Questions asked of you - The proper response to all questions relating to the site or any work happening on-site is, "I'm not the right person to answer your question." Please refer any visitor to Parsons Site Management personnel.

Reporting and Questions from you - All site workers possess the right to ask questions of, and report information to Parsons.

Employee use of Medication

Prescription - Any individual taking prescription or over the counter medication which could cause adverse side effects while working, as indicated by their healthcare professional or medication warning label, shall inform the site SSO or Talent Management prior to using such medication. The SO will review the matter with the project Talent Management Lead to determine if the employee can perform his/her work duties safely while taking the medication. We reserve the right, if necessary, to have a 3rd party licensed healthcare professional determine if the use of the medication by the employee will affect the employee's work performance or the health & safety of others".*

- * Craft union represented employees should refer to the project Labor Harmony Agreement for additional specific details on these requirements.

Stop Work Authority

Right, Obligation and Responsibility - Stop Work Authority establishes the 'authority and obligation' of any individual to suspend a single work task or group operation when the control of HSE risk is not clearly established or understood. In general terms, the stop work authority process involves a stop, notify, correct and resume approach for the resolution of a perceived unsafe condition, act, error, omission, or lack of understanding that could result in an undesirable event.

EXHIBIT 4-2 INCIDENT REPORTING

Employees involved in or witnessing an incident or near-miss incident must immediately report it to the responsible SSO/Field Team Leader, who in turn immediately relays the report to the Parsons PM, and the appropriate subcontractor representatives, per Incident Reporting Requirements included in **Attachment A**. Near-miss incidents that could cause significant injury or loss of life must also be immediately reported in the same manner. No supervisor may decline to accept or relay a report of injury or significant near-miss incident from a subordinate. The PrSM will report near misses to Honeywell representatives, per Event Reporting Requirements in **Attachment B**.

Parsons requires that all incidents/accidents be reported within **four hours** to the Market SH&E Director (Jason Townsell Mobile (562) 565-3491] by the Parsons PrM, Ed Glaza (315) 552-9691; Mobile: (315) 730-4685 and PrSM Gregory Ertel (585) 465-0557. The Industrial Safety Manager is responsible for notifying the Corporate Workers' Compensation Analyst.

Parsons also requires that the PM and/or PrSM report an incident that results in a lost workday case or any fatality, injury of a private citizen, property loss, or damage in excess of $50,000, or catastrophes require **immediate** notification of the Market SH&E Director (Jason Townsell Mobile (562) 565-3491] The Industrial Safety Manager or Corporate Safety Manager must report any work-related fatalities within eight hours of the event and all work-related in-patient hospitalizations, as well as amputations and losses of an eye, to OSHA within 24 hours of the event.

Gregory Ertel, PrSM (585) 465-0557 (cell) is available for assistance in addressing documentation and notification. The PM or SSO (who has been trained on Parsons' reporting requirements and Online Safety Reporting System) then prepares and submits the incident information.

INCIDENT INVESTIGATIONS

All incidents and significant near-miss incidents are investigated by an individual or team with training in accident investigation and root cause analysis. Personal injuries involving medical treatment and incidents resulting in more than $1,000 damage will be verbally reported and submitted on the PWeb using the On-Line Safety Reporting System at https://pwebtools.parsons.com/safety/IncidentSelect.aspx within **4 hours**. Additionally, an Incident Investigation Report will be completed to identify root causes and corrective actions to prevent recurrence. Subcontractors must investigate incidents involving their employees or activities and submit an investigation report to the Parsons PM within **48 hours** of an incident. The Parsons Industrial Safety Manager will investigate or assign an investigator to each significant incident. The investigator will submit a final investigation report using the Online Safety Reporting System within **72 hours** of the incident. The PrSM maintains the investigation file. Instructions for entering incidents into the On-Line Safety Reporting System, Parsons Incident/Accident Report Form, Parsons Near Miss Report Form, and Parsons Wallet Card-Incident Reporting Guidelines are located in **Attachment A** of this report.

EXHIBIT 4-3 ORDER FOR WORK RELATED INJURY/ILLNESS EVAL/TREATMENT

______________________________ ________________________________ of Parsons
(Employee Name) (Occupation)

is authorized to go to ____ for the following service(s):
(Name of Medical Provider)
Treatment for a Work-Related Injury/Illness for Date of Injury: ________________________.

In the event the above medical provider determines this injury or condition NOT TO BE WORK RELATED, the employee and Parsons understand that this employee may then be referred by the above medical provider to his/her personal medical doctor.

Employer Information:	Parsons 100 West Walnut Street Pasadena, CA 91124
Workers' compensation carrier:	AIG
Policy No.:	0007169963
Adjusting Office and Telephone No.:	15 Cornell Drive, 2nd Floor Latham, NY 12110 (877) 640-2450

Comments to Provider: Parsons attempts to provide any modified, alternate, light duty recommended.
____
____

________________________________ ________________________________ ____________________

Authorized Employer Signature Print Name Date

_____ _____

Phone Number Fax Number

Disability slips and return-to-work notifications: Immediately fax to Parsons ***and*** provide copy to employee at conclusion of every evaluation/treatment.

Attention Emergency Department: After acute care, please refer patient back to a
____ for follow-up treatment.

(Medical provider—to be completed by Parsons—where permitted by law.)

EXHIBIT 4-4 PARSONS CORPORATION SUBSTANCE ABUSE POLICY

STATEMENT OF POLICY:

Parsons expects all employees to report to work in a fit condition in order to perform their duties at the utmost levels of safety and efficiency. To that end, Parsons expressly prohibits the unlawful manufacture, distribution, dispensing, possession, use, or sale of a controlled substance or alcohol on its premises at any time. Employees are prohibited from being at work under the influence of these substances. Parsons will reasonably accommodate the efforts of an employee to obtain medical treatment for substance abuse and to return to employment thereafter. However, no provisions of this policy will contravene the provision of the Employee Personal Conduct Policy or preclude the corporation from terminating an employee in accordance with this policy.

Parsons has an obligation to safeguard the privacy rights of all employees; however, it is also committed to provide a healthy and safe work environment for all employees and to take reasonable steps to safeguard the health and safety of others and protect the environment in conducting its business.

Safety and Environmental Provisions

In some instances employees may be required to undergo random toxicological tests to ensure their continuing fitness for duty to comply with contract mandated requirements or government regulations, or if performing work at locations where the nature of their duties is such that there is the potential for serious physical injury to themselves, to others, or the general public, or potential for significant damage to property or the environment.

Assignment of employees to such job sites will be done on a voluntary basis. Employees who refuse to participate in the random testing program and whose job duties would normally expose them to random testing will be considered for placement in other positions not requiring random testing. Every reasonable effort will be made to accommodate such transfers; however, if suitable work for which the employee is qualified is not available, the employee will be subject to termination. A positive test result will lead to immediate removal from the site, in addition to either corrective action in accordance with this policy or the employee's termination in accordance with the Employee Personal Conduct Policy.

Searches are another means of protecting the safety of individuals and property at those locations where the nature of the work has the potential for serious injury or damage. Reasonable searches may be conducted of individuals, their personal vehicles, effects, and other areas under the individual's control while at such work sites or engaged in Parsons business at such sites.

Employees will not be detained or searched without their consent. An employee's cooperation in a search at such work sites is a condition of employment. The employee will be required to sign an Acknowledgment and Consent for Random Toxicological Tests and Searches form. Such testing will be performed by the company using qualified contracted agents, or trained employees.

SUBSTANCE ABUSE TESTING - EMPLOYMENT OFFER

No candidate for employment will be subjected to substance abuse testing prior to the receipt of an offer of employment. Offers of employment, regardless of employment category, must contain a contingency regarding satisfactory completion of substance abuse testing. Failure to submit to or pass an examination will result in immediate disqualification from consideration for placement.

EMPLOYEE PERSONAL CONDUCT

All employees are expected to conduct themselves in a manner that ensures a positive, safe and efficient work environment while at Parsons. Improper conduct may be considered either a "General Offense" or a "Major Offense" and may result in disciplinary action, or in appropriate cases, termination. Termination is generally the result of the commission of a major offense, or where previous efforts to bring about correction have failed in terms of major or general offenses.

Employee Personal Conduct Policy

RESPONSIBILITIES:

The immediate supervisor monitors employee behavior and performance and is alert to problems arising from an employee's behavior or performance.

Human Resources ensures consistent and uniform application of this policy and, when required, interfaces with supervisor and employee to evaluate performance and behavior.

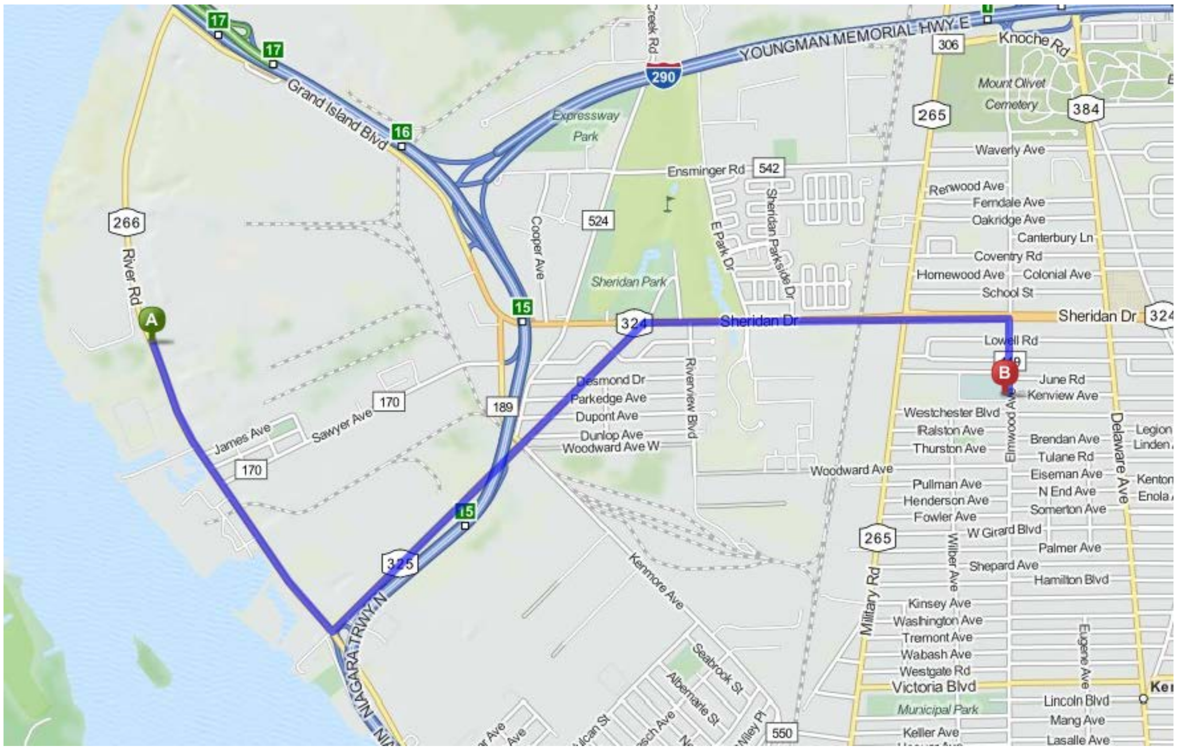
REFERENCES:

Employee Personal Conduct Policy

APPROVED:	*Debra Fiori*	*DATE:*	*8/14/19*

EXHIBIT 4-5 ROUTE TO HOSPITAL

Kenmore Mercy Hospital
2950 Elmwood Ave
Kenmore, 14217
716-447-6100



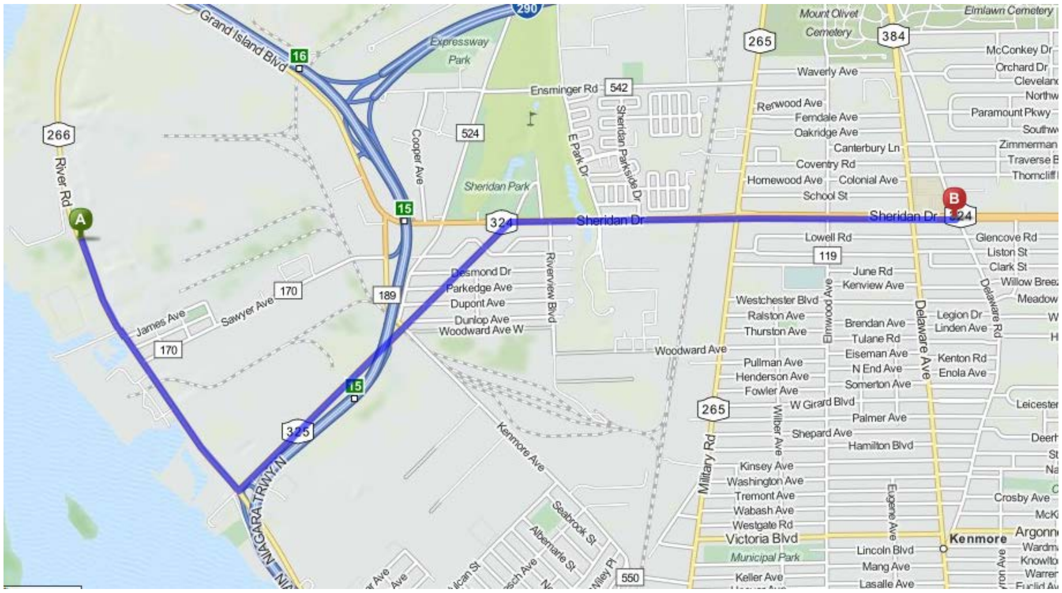
Directions to Kenmore Mercy Hospital

6 minutes/4 miles

1. *Start out going south on RIVER ROAD/NY-266 toward James Ave.*
2. *Turn left onto Sheridan Drive/NY-325*
3. *Turn slight right onto Grand Island Blvd/NY-324*
4. *Turn right onto Elmwood Ave/County Highway-119*
5. *2950 Elmwood is on the right*

NOTE: Transportation of an injured worker to a medical facility for non-emergency treatment must be done by at least two (2) individuals (i.e., driver and observer). If a driver is not available, then a cab service is acceptable as long as an observer is present.

Well Now Urgent Care
1751 Sheridan Dr
Buffalo, NY 14223
716-844-7100



Directions to Urgent Care

10 minutes/5.7 miles

1. *Start out going south on River Rd/NY-266 toward James Ave*
2. *Turn left onto Sheridan Dr/NY-325*
3. *Turn right onto Kenmore Ave/County Hwy-189*
4. *Turn slight right onto Dunston Ave*
5. *Enter next roundabout and take the 2nd exit onto Kenmore Ave/County Hwy-550.*
6. *Turn left onto Military Rd/NY-265*
7. *Turn right onto Sheridan Dr/NY-324*
8. *1751 SHERIDAN DR is on the right*

EXHIBIT 4-6 WORKCARE ASSESSMENT

Post-Injury Guidelines

If there is a Life-Threatening or significant medical event e.g. (not breathing, no heartbeat, unconscious, open wound, amputation, obviously broken arm or leg, etc.) then the first employee on the scene should:

1) Call for help
2) Call 911
3) Begin first aid/CPR if trained

Upon notification of a medical emergency the Field Team Leader will:

1) Make sure that 1st Aid/CPR trained employees are on scene and assisting the injured.
2) Make sure that any ancillary work ceases to make scene safe for responders.
3) Make sure that an employee is sent to the gate or entrance area to meet first responders and bring them to the injury scene.
4) Contact the Site Safety Officer.

Upon notification of a medical emergency the **Site Safety Officer** will:

1) Notify the Emergency Response Team if required.
2) Move to the injury scene with required first aid materials and direct the response.
3) Assist the first responders with any necessary decontamination or SDS' as needed.

If there is a non-life-threatening illness or injury event e.g. (stain or sprain, stiff back, minor laceration, sore muscle, bruised toe/finger, etc.) then the first employee on the scene should:

1) Call for help
2) Begin first aid if trained

Upon notification of a non-life-threatening illness or injury event the Field Team Leader will:

1) Make sure that 1st Aid/CPR trained employees are on scene and assisting the injured
2) Make sure that any ancillary work ceases to make scene safe for responders.
3) Contact the Site Safety Officer
4) Contact WorkCare and allow the injured employee to speak with a WorkCare doctor or nurse
5) Follow WorkCare guidelines; Drive the employee to the clinic if directed and stay with him/her until the visit is concluded
6) Provide the employee with "Questions to Consider Asking Your Doctor During a Clinic Visit"
7) Provide the employee with "Memo to Treating Medical Professional" prior to the employee going into the exam room.
8) Participate in the incident investigation process upon return to the site.

Upon notification of a medical emergency the **Site Safety Officer** will:

1) Notify the Shift Emergency Response Team Lead and the contractor CM/PM
2) Move to the injury scene with required first aid materials and direct the response
3) Assist the Field Team Leader in contacting WorkCare at (888) 449-7787

5.0 PRE-CONSTRUCTION PHASE

5.1 Risk Analysis and Safety Specification Development

Procurement procedures require that a site-specific SH&E risk analysis be conducted before issuance of construction Request for Proposals (RFPs). Using the pre-bid risk analysis checklist, the PM leads this analysis to document existing exposures that may impact the work, surrounding facilities, equipment, workers, or the public at large. The analysis includes locating, documenting, and photographing items such as:

- Overhead and underground power lines
- Sewer and water utilities
- Traffic
- Security
- Fences
- Water hazards
- Existing geographical and environmental conditions
- Damage to ecological or cultural resources
- Risks due to buried items
- Other environmental regulatory requirements

Upon completion of the site risk analysis, high-risk activities are listed in the RFPs (as applicable), and bidders must describe controls and mitigation strategies to address these activities in their proposals. The RFP should note that the list is representative and that the selected contractor must identify and control all work-related hazards, worker exposures and potential environmental incidents. The standard safety specifications are given below.

- Preconstruction SH&E Meeting, Site Specific SH&E Review Checklist, and Project Technical and General Conditions Specification Review - **Exhibit 5-1**
- Pre-Field Work Safety Meeting Checklist - **Exhibit 5-2**
- Mobilization/Kick-Off Safety Meeting Checklist - **Exhibit 5-3**

5.2 Prebid Meeting

Pre-bid meetings are required to ensure that bidders understand the RFP. These meetings must include a discussion of safety, health and environmental performance expectations. During the pre-bid meeting, the PM can use the Preconstruction SH&E Meeting, Site Specific SH&E Review Checklist, and Project Technical and General Conditions Specification Review (3 Sheets) (**Exhibit 5-1**) to review the project SH&E philosophy, principles, and Parsons requirements with prospective bidders. Although this information is included in the RFP, the meeting reinforces the message.

5.3 Subcontractor Prequalification Review

Project procurement procedures require that all subcontractors submit prequalification documentation for evaluation. The PM or PrSM conducts the safety prequalification evaluation in accordance with the online CSE system. Subcontractors are required to provide safety information to complete their CSE on an annual basis. The provided information is reviewed by a safety manager and the subcontractor receives a safety grade. A “C” or

"D" grade may require additional mitigation measures to allow the subcontractor to work on-site.

5.4 Pre-construction Meeting

The PM holds a pre-construction meeting before the subcontractor begins work. The meeting includes subcontractor representatives, the Parsons PM, the contract manager, and representatives from all construction disciplines, including safety. During the SH&E review, meeting participants review specific SH&E concerns, the pre-bid risk analysis, and competent person and site-specific SSHEP requirements. The PM provides the SH&E Point of Contact and emergency management information. The PM uses the Preconstruction SH&E Meeting, Site Specific SH&E Review Checklist, and Project Technical and General Conditions Specification Review (3 Sheets) (**Exhibit 5-1**) to document the meeting. *See ESHARP Guidebook, Volume 1 – Project, Section 6 for further detail.*

5.5 Competent Person Submission Review

Parsons and its subcontractors must identify the OSHA-regulated and certified competent persons for work or tasks that require this level of expertise. The supervisor of the competent person must certify the specific competencies of the named competent person in writing.

The supervisor and competent person sign and submit the Competent Person Form (**Exhibit 9-1**) to the Parsons PM. (Note click on this link for the Subcontractor Competent Person Form.

5.6 Subcontractor Safety Plan Submission Review

5.6.1 Site-Specific Subcontractor Safety, Health, and Environmental Plans (SSHEP)

At least 10 days before work begins, each subcontractor must submit two copies of its SH&E program to the Parsons PM for review. The PM and PrSM review the plan to ensure that it meets Parsons' requirements.

If a contractor needs assistance developing a SSHEP, a model SSHEP has been provided in **Attachment D**.

The subcontractor safety plan must address the following elements:

- Responsibilities
- SH&E compliance
- Communication
- Hazard Assessment
- Hazard Correction
- Risk of environmental incident
- Environmental controls
- Engineering controls
- Control measures to prevent environmental incident
- Incident investigation
- Training and instruction
- Recordkeeping
- The plan must include all applicable requirements of Parsons PSHEP, OSHA CFR 1910/1926 and applicable federal, regional, state, municipal, and/or local environmental regulation scope of work evaluation describing sequence of work and associated hazardous or environmentally risky activities
- AHA including evaluation of environmental risks
- Site employee SH&E orientation program to address location-specific issues

- Site-specific Emergency Action Plan that includes a list of key management personnel and contact information (home, office, project site, and cellular telephone numbers).
- Site-specific Medical Emergency Plan that lists qualified First Aid personnel by name and includes copies of their current certificates
- List of key line management personnel, by name and position, who will enforce the plan
- List of key competent or qualified personnel by name and copy of current documentation identifying specific certified competency (e.g., scaffolding, excavations, fall protection)
- A written progressive disciplinary program for violations of SH&E procedures
- Trenching and Shoring Plan (if applicable)
- 100% Fall Protection Plan (if applicable)
- Waste and hazardous material management (if applicable)
- Control measures for storm water and other wastewater discharges (if applicable)
- Identification of risks and control measures for activities that could involve environmental spills/releases
- Measures to address any other environmental regulatory requirements
- Contractor task hazard and risk planning
- Subcontractor weekly SH&E planning submission
- Contractor daily task SH&E planning

5.7 Pre-mobilization SH&E Meeting

Project Managers, or their designee, conduct the Premobilization SH&E Meeting on or before the first day of subcontractor mobilization in the field at the work site. *(See ESHARP Guidebook, Volume 1 - Project, Section 11 for additional details.)* **Exhibit 5-2**, Subcontractor Premobilization Safety Meeting, shows the checklist used for the SH&E portion of this meeting. The meeting includes a review of the pre-bid site/area risk analysis and a walk through of the work area to locate items on the Pre-Bid Risk Analysis Checklist.

EXHIBIT 5-1 PRECONSTRUCTION SH&E MEETING SITE-SPECIFIC SH&E REVIEW CHECKLIST PROJECT TECHNICAL AND GENERAL CONDITIONS SPECIFICATION REVIEW (SHEET 1 OF 3)

Date:	
Subcontractor Representative:	
Phone:	
Project Location:	
Parsons Project Manager:	
Phone:	
Subcontractor Safety & Health Representative:	
Phone:	
Parsons Safety & Health Manager:	
Phone:	
Subcontractor Environmental Representative:	
Phone:	
Parsons Environmental Representative:	
Phone:	
This checklist supports the identification of work activities and programs in a preconstruction SH&E meeting. This list also includes items identified through the subcontractor review and high-risk activities identified through the project specification review. High-risk activities (denoted with an asterisk) checked with a checkmark must be followed up during the construction phase with training, written plans and/or a specific Activity Hazard Analysis (AHA). This list should be reviewed with prospective bidders during the pre-bid meeting. NOTE: Use check box and add specifics and details as applicable (next to the callouts)	
SAFETY & HEALTH\	
☐	Site-Specific Safety, Health and Environmental Plans
☐	Competent/Qualified Person Documentation
☐	SH&E Audits/Inspections
☐	Subcontractor Responsibilities
☐	Site Orientation Requirements
☐	Preconstruction SH&E Meeting/Date
☐	Crane Inspection Certification
☐	Personal Protective Equipment (PPE) (Work activities or work site requires hearing protection/using respirators/special protective clothing/other)
☐	Public Exposure (Work activities or location requires special precautions to protect the public)
CONSTRUCTION SAFETY ISSUES	

EXHIBIT 5-1 PRECONSTRUCTION SH&E MEETING FORM SITE-SPECIFIC SH&E REVIEW CHECKLIST
PROJECT TECHNICAL AND GENERAL CONDITIONS SPECIFICATION REVIEW
(SHEET 2 OF 3)

CONSTRUCTION SAFETY ISSUES (Contd.)	
☐	Steel Erection (SENRAC Requirements)
☐	Excavations/Trenching
☐	Powered Industrial Trucks, Fork Lifts
☐	Crane Work/Heavy Lifts, Rigging
☐	Work involving Hazardous Materials
☐	Electrical Tie-ins/Lockout – Tagout
☐	Aerial Lift Work – Scissor Lifts, Extendable Boom, etc.
☐	Underground, Caissons, Cofferdams
☐	Scaffold Erection/Work
☐	Demolition
☐	Marine Work/Live Boating
☐	Heavy Hauling
☐	Concrete
☐	Diving
☐	Work Adjacent to Production Areas
☐	Site Security/Visitor Control/Public Areas
☐	Process Safety Management
☐	Permits (Excavations, Scaffolding, Demolition, Traffic, Confined Space, Hot Work, Line Breaking, etc.)
☐	Confined Space (Confined space entry is required)
☐	Welding and cutting (Acetylene/gas cutting, arc welding, soldering and brazing)
☐	Ladders (Portable ladder use is required)
☐	Traffic Control (Work is on or near highways, roads, or mass transit)
MEDICAL	
☐	Substance Abuse Screening
☐	Emergency Procedures
☐	Site Security
☐	Smoking Policy
☐	Medical Services Requirements
☐	Treatment Locations, Addresses, and/or Phone List
ENVIRONMENTAL	
☐	Environmental Hazards
☐	Air Pollution/Emissions and required reporting
☐	Wastewater Discharges
☐	Drinking Water
☐	Management of Hazardous Materials and Hazardous and Solid Wastes
☐	Emergency Response to Spills and Releases Environmental Assessments
☐	Protected Ecological and Cultural Resources
☐	Specific Reports on Toxic or Hazardous Chemicals Usage and Storage (Required by Environmental Regulation)

EXHIBIT 5-1 PRECONSTRUCTION SH&E MEETING FORM SITE-SPECIFIC SH&E REVIEW CHECKLIST PROJECT TECHNICAL AND GENERAL CONDITIONS SPECIFICATION REVIEW (SHEET 3 OF 3)

	ENVIRONMENTAL (Contd.)
☐	Materials to be Recycled
☐	Possibility of Buried Items Onsite (cultural artifacts, tanks, wastes, and ordinance) and what to do if encountered
☐	Environmental Regulatory Requirements
☐	Environmental Assets
☐	Resource Conservation/Sustainability
☐	Insects
☐	Plants
☐	Wildlife
☐	Medical Waste and Other Biohazards

Additional Notes/Comments:

ATTENDEES

Name	Title	Company

EXHIBIT 5-2 STANDARD PRE-FIELD WORK SAFETY MEETING CHECKLIST

Date:	______	Project/Location:	______
Subcontractor Representative:	______	Parsons Project Manager:	______
Phone:	______	Phone:	______
Subcontractor Safety Rep:		Parsons Safety Manager:	
Phone:	______	Phone:	______

The following items were identified and reviewed with the subcontractor.

Health & Safety		Medical	
Site-Specific Safety Plans/Model Program	____	Substance Abuse Screening	____
Competent/Qualified Person Documentation	____	Emergency Procedures	____
Safety Audits/Inspections	____	Site Security	____
Subcontractor Responsibilities	____	Smoking Policy	____
Site Orientation Requirements	____	Medical Services Requirements	____
Mobilization/Kickoff Safety Meeting/Date	____	Treatment Locations/Addresses/Phone List	____
Crane Inspection Certification	____	Other	____
Personal Protective Equipment (PPE)	____		____
Environmental Hazards	____		
Other			

Additional Notes/Comments:

____

____

____

____

____

EXHIBIT 5-3 MOBILIZATION/KICK-OFF SAFETY MEETING

PROJECT INFORMATION			
Project Name:		Meeting Date:	
Project Location:		Project Number:	
Scope of Work Covered In This Meeting			

MEETING ATTENDANCE			
Name (print)	Signature	Title or Project Role	Company

1. Honeywell Safety Vision – Review and reaffirm vision and beliefs as outlined in Section 1.0 of the HSP² program.
2. Project Safety Goals and Objectives
   - Total Incident Rate (TIR) target of ______
   - Lost Workday Incident Rate (LWIR) target of 0.0
3. Scope Of Work and Highly Hazardous Activities - Review key safety issues associated with highly hazardous activities.
   - Line breaking (process piping LOTO)
   - Work that may disrupt or damage existing piping, vents, drains (LOTO).
   - Any work on equipment that requires LOTO.
   - Major excavations (>5' deep or potential for damage to underground utilities)
   - Roof activities
   - Elevated work >6' that will not be done from manlifts or scaffolds
   - Hazardous painting or coating (epoxy paints, electro-static painting, cocooning, etc.)
   - Structural steel erection
   - Use of ladders above 24 feet.
   - Confined Space Entry (permit-required)
   - Any work within 20' of overhead power lines
   - Critical Crane Picks (>80% of rated capacity, multiple cranes on a single pick, near power lines, picks over occupied buildings, and picks of long-lead or specialized equipment.)
   - Other:
4. Honeywell Specification 01620 - Verify that copies were received by subcontractors and address any questions.
5. Incident Reporting Requirements
6. Drug & Alcohol Testing Requirements
7. Commitment to Light Duty work and the location of Industrial Medical Associates (IMA)
8. Safety Planning Requirements - Review the development and use of Project Safety, Health, and Environmental Plans (PSHEPs) and Job Safety Analyses (JSAs).
9. Safety Meetings - Review requirements related to daily safety meetings and Weekly Toolbox Safety Meetings. Review the use of daily Pre-Task Planners
10. Roles and Responsibilities
11. Other Site-Specific Safety Issues

6.0 FIELD OPERATIONS

6.1 SITE RISK ANALYSIS

Before work begins, PMs lead a team that performs a risk analysis at each work site to identify hazards and risks that require specific control measures. During the weekly action item meeting, the project team discusses upcoming work tasks and associated risks and control measures. The weekly action item list generated during this meeting identify upcoming mobilization or demobilizations tasks, audits and inspections, competent person changes, training and new activities requiring an AHA. The project team and subcontractors also submit a Two-Week Look Ahead each week to identify upcoming tasks and assess if the new activities require a new or revised AHA.

As a part of the site risk analysis process, a risk register was developed, identifying potential hazards and evaluating the associated risks. This centralized, continually updated document also contains a list of controls to be implemented to reduce the risk of planned activities to an acceptable level. The project-specific risk register is included as **Attachment F**.

6.1.1 Chemical Hazards

Activities are being completed on sites where remedial construction activities have been completed or where contaminant concentrations are below remedial criteria. Risk of exposure to site workers is variable based on the task. A hazard assessment and applicable controls will be conducted for various tasks and documented in the AHA. All employees with potential for exposure to hazardous materials will be trained in HAZWOPER. Employees involved in asbestos sampling, air monitoring or abatement will be trained and certified in accordance with NYCRR Code Rule 56. See **Section 2.1.1** for a list of known or expected chemical hazards at the site.

6.1.2 Physical Hazards

Physical hazards that may be encountered during the construction activities include, but are not limited to heat stress, cold-related illness, ultra-violet radiation, biological, noise hazards, and on-water hazards.

<u>Heat Induced Illness – Heat Stress:</u>

The use of protective equipment may create heat stress. Monitoring of personnel wearing personal protective clothing should commence when the ambient temperature is 70 degrees Fahrenheit (°F) or above. **Table 6.1** presents the suggested frequency for such monitoring. **Table 6.2** presents the apparent temperature for given humidity and ambient temperature readings in shade. Monitoring frequency should increase as ambient temperature increases or as slow recovery rates are observed. Heat stress monitoring should be performed by a person with a current first aid certification who is trained to recognize heat stress symptoms. For monitoring the body's recuperative abilities to excess heat, one or more of the following techniques will be used. Other methods for determining heat stress monitoring, such as the wet bulb globe temperature Index from American Conference of Governmental Industrial Hygienist Threshold Limit Values Booklet can be used.

To monitor the worker, measure:

- Heart rate. Count the radial pulse during a 30-second period as early as possible in the rest period.
  - If the heart rate exceeds 100 beats per minute at the beginning of the rest period, shorten the next work cycle by one-third and keep the rest period the same.

  - If the heart rate still exceeds 100 beats per minute at the next rest period, shorten the following work cycle by one-third.
- Oral temperature. Use a clinical thermometer (3 minutes under the tongue) or similar device to measure the oral temperature at the end of the work period (before drinking).
  - If oral temperature exceeds 99.6°F (37.6 degrees Celsius (°C)), shorten the next work cycle by one-third without changing the rest period.
  - If oral temperature still exceeds 99.6°F (37.6°C) at the beginning of the next rest period, shorten the following cycle by one-third.
  - Do <u>not</u> permit a worker to wear a semi-permeable or impermeable garment when oral temperature exceeds 100.6°F (38.1°C).

Prevention of Heat Stress - Proper training and preventative measures will aid in averting loss of worker productivity and serious illness. Heat stress prevention is particularly important because once a person suffers from heat stroke or heat exhaustion, that person may be predisposed to additional heat related illness. To avoid heat stress the following steps should be taken:

- Adjust work schedules.
  - Modify work/rest schedules according to monitoring requirements.
  - Mandate work slowdowns as needed.
- Perform work during cooler hours of the day, if possible, or at night if adequate lighting can be provided.
- Provide shelter (air-conditioned, if possible) or shaded areas to protect personnel during rest periods.
- Maintain worker's body fluids at normal levels. This is necessary to ensure that the cardiovascular system functions adequately. Daily fluid intake must approximately equal the amount of water lost in sweat, i.e., 8 fluid ounces (0.23 liters) of water must be ingested for approximately every 8 ounces (0.23 kilograms) of weight lost. The normal thirst mechanism is not sensitive enough to ensure that enough water will be ingested to replace lost sweat. When heavy sweating occurs, encourage the worker to drink more. The following strategies may be useful:
  - Maintain water temperature 50° to 60°F (10° to 16.6°C).
  - Provide small disposal cups that hold about four ounces (0.1 liter).
  - Have workers drink 16 ounces (0.5 liters) of fluid (preferably water) before beginning work.
  - Urge workers to drink a cup or two every 15 to 20 minutes, or at each monitoring break. A total of 1 to 1.6 gallons (4 to 6 liters) of fluid per day are recommended, but more may be necessary to maintain body weight.
- The best prevention method for heat induced illnesses is to train personnel to recognize the symptoms. Avoid extended site tours when temperature and relative humidity are high. Perform site tour during cooler hours of the day if possible. Go to air-conditioned building or shaded area during periods of rest (field support trailer).

<u>Cold-Related Illness:</u>

If work on this project is conducted during the winter months, thermal injury due to cold exposure can become a problem for field personnel. Systemic cold exposure is referred to as hypothermia. Local cold exposure is generally called frostbite.

Hypothermia - Hypothermia is defined as a decrease in the patient core temperature below 96°F. The body temperature is normally maintained by a combination of central (brain and spinal cord) and peripheral (skin and muscle) activity. Interference with any of these mechanisms can result in hypothermia, even in the absence of what normally is considered a "cold" ambient temperature. Symptoms of hypothermia include: shivering, apathy, listlessness, sleepiness, and unconsciousness.

Frostbite - Frostbite is both a general and medical term given to areas of local cold injury. Unlike systemic hypothermia, frostbite rarely occurs unless the ambient temperatures are less than freezing and usually less than 20ºF. Symptoms of frostbite are: a sudden blanching or whitening of the skin; the skin has a waxy or white appearance and is firm to the touch; tissues are cold, pale, and solid.

Working on Water in Cold Weather - If air temperature is below 50 deg F and water temperature is below 50 deg F, either Mustang suits, exposure suit, wet suit, or other type of survival suit is required for small craft (16 ft. and below) or craft with no side rails in lieu of PFDs.

Prevention of Cold-Related Illness - To prevent cold-related illness:

- Educate workers to recognize the symptoms of frostbite and hypothermia
- Identify and limit known risk factors
- Implement the requirement for wear of the full-body marine exposure suits for all Parsons and subcontractor personnel for on the lake boating operations during cold weather months
- 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
- Allow employees to take a warming break if they are shivering

Any person developing moderate hypothermia (a core temperature of 92ºF) cannot return to work for 48 hours.

Ultraviolet Radiation:

The sun emits ultraviolet radiation (UV) as heat and light. The skin's natural defense mechanisms attempt to reject the UV by distributing melanin pigmentation where needed. However, overexposure to direct sunlight can cause inflammation or blistering of the skin (sunburn). The use of sunscreen, long sleeve shirts, and wide brim hats can help prevent sunburn. Chronic exposure to UV radiation is known to cause skin cancer. In case of sunburn, do not apply burn ointment, cold cream, or butter to relieve pain. Use a dry dressing and get medical attention for severe, extensive sunburns. Also watch for dehydration. If a person is dehydrated, try and keep their fluid volume at their normal level.

Electrocution:

All heavy equipment will be kept a safe distance from live sources of electricity. All subsurface and overhead electrical sources and lines will be identified before ground disturbance activities commence. Where possible and/or practical, electric lines and sources will be deactivated or insulated before ground disturbance activities commence. Personnel should remain at a safe distance from equipment when not performing work to prevent the risk of injury from electrical arcing when high-voltage surges and spikes cause arcing in electronic circuits.

Ground fault circuit interrupters will be utilized on electrical equipment, where applicable, and extension cords will be inspected for splices, taps, and breaks in its outer cover insulation. If splices, taps, or breaks are noted on an extension cord, it shall not be used and it will either be removed from the site or cut up and rendered unusable.

Noise:

Noise is generated during construction activities in such operations as transportation of materials and operation of heavy construction equipment. Hearing protection will be worn by personnel to protection against the effects of hazardous noise exposure whenever sound-pressure levels exceed 85 dB(A) steady-state expressed as a time-weighted average. Personnel operating or working around heavy equipment should wear hearing protection.

Vehicle Traffic:

Vehicle traffic may include cars, trucks, and heavy equipment operated by contractors, subcontractors, or visitors to the site. Drivers should approach building corners with extreme caution as many of the buildings have blind corners making it extremely difficult to see intersection traffic. All heavy equipment should have a back-up alarm or drivers should honk to signal when they are backing up or when approaching blind corners. The speed limit at the site is 5 miles per hour on the causeway and 10 miles per hour everywhere else on-site.

Drivers are not permitted to use any communications device (e.g., cell phone) while driving. The driver and all passengers must use seatbelts in all moving vehicles at all times. A vehicle inspection of the tires, lights, horn, wipers, and backup alarm should be completed each day.

Boat Operation / On-Water Hazards:

On-water work is anticipated. Vessels should only be operated by qualified and trained personnel. A U.S. Coast Guard Float Plan must be completed every day prior to on-water work (**Attachment K**). All personnel on boat or within 6 feet of the water's edge must wear a PFD. Personnel on boat should stay seated (when possible) to avoid stumbling and the deck of the boat should be kept clear of clutter. The boat must be equipment with safety lines, PFDs, and a throw ring with rope. Prior to operation, watercraft will be inspected, radio communication with shore personnel will be established, and rescue procedures will be reviewed. Al equipment and operating personnel will meet or exceed U.S. Coast Guard reuirements for safety.

6.1.3 Biological Hazards

Biological hazards can result from encounters with mammals, insects, snakes, spiders, ticks, plants, parasites, and pathogens. Mammals can bite or scratch when cornered or surprised. The bite or scratch can result in local infection or infection with systemic pathogens or parasites. Insect and spider bites can result in severe allergic reactions in sensitive individuals. Exposure to poison ivy, poison oak, or poison sumac results in skin rash. Ticks carry a number of serious diseases. Dead animals, organic wastes, and contaminated soil and water can harbor parasites and pathogens. Spent needles and/or syringes could be infected with potential blood or other infectious materials that could carry serious diseases.

Poison Ivy:

Some of the most common and severe allergic reactions result from contact with poison ivy, poison oak, or poison sumac. Contact with the poisonous sap of these plants produces a severe rash characterized by redness, blisters, swelling, and intense burning, and itching. The victim also may develop a high fever and may be very ill. Ordinarily, the rash begins within a few hours after exposure, but it may be delayed for 24 to 48 hours.

Ticks:

Ticks are common during the spring and summer throughout the work area when off any paved area. Two types of ticks may be encountered: the dog tick and the deer tick. The dog tick is the larger, more common tick. After biting, the dog tick will remain attached to the victim until engorged with blood. Dog ticks may transmit Rocky Mountain spotted fever and other diseases. The deer tick is much smaller, ranging from poppy seed to grape seed size, and does not remain attached to the skin for very long after biting. Deer ticks can transmit Lyme disease, which can have serious, long-term health effects if left untreated. Lyme disease is often characterized by a bulls-eye type rash; light in the center with an outer red area. Flu-like symptoms may also occur. These signs may occur at different times and the rash may not appear. If you discover any bites on the skin, wash the affected area and seek medical attention if a rash or flu-like symptoms appear.

Bees, Wasps, Hornets, and Other Insects:

Symptoms of an insect bite are normally a sharp, immediate pain in the body part bitten. Report any significant bite immediately. Poisonous insects and insect-like creatures that may be encountered around the work areas include the following:

- Bees (honeybees, bumble bees, sweat bees, wasps, and hornets)
- Caterpillars
- Beetles/Bugs
- Mosquitoes

Spiders:

The two poisonous spiders that may be encountered during the construction project are the Brown Recluse and the Black Widow. The Brown Recluse is up to one inch long with a violin or "fiddle" shaped mark on the top of the head. The Black Widow is a smaller, bulbous black spider with a red hourglass-shaped mark on the underside.

Reactions to a Brown Recluse spider bite include mild to severe pain within two to eight hours and a star shaped area around the bite within three to four days. Significant tissue death and loss accompanies a Brown Recluse spider bite. Reactions to a Black Widow spider include intense pain at the site of the bite after approximately 15 to 60 minutes, followed by profuse sweating, rigid abdominal muscles, muscle spasms, breathing difficulty, slurred speech, poor coordination, dilated pupils, and generalized swelling of face and extremities.

Persons that have been bitten by a Brown Recluse or Black Widow spider should be immediately transported to a hospital. The spider should be collected (if possible) for confirmation of the species.

Personnel will be alert to the potential for spider bites. Spiders sometimes establish residence in stored clothing and PPE. It is advisable for personnel to inspect clothing and PPE for spiders prior to donning.

Blood Borne Pathogens:

Blood borne pathogens enter the human body and blood circulation system through punctures, cuts or abrasions of the skin or mucous membranes. They are not transmitted through ingestion (swallowing), through the lungs (breathing), or by contact with whole, healthy skin. However, under the principle of universal precautions, all blood should be considered infectious, and all skin and mucous membranes should be considered to have possible points of entry for pathogens.

COVID-19

COVID-19 is a respiratory illness that can spread from person to person. It spreads mainly between people who are in close contact with one another (within 6 feet) through respiratory droplets produced when an infected person coughs or sneezes. It may also be possible to contract by touching a surface or object that has the virus on it and then touching their nose, mouth, and eyes.

Symptoms include fever, cough, shortness of breath, and/or pneumonia in both lungs.

To avoid the spread of COVID-19, personal hygiene measures should be implemented including: frequently washing hands with soap and water for at least 20 seconds and always before and after eating and arriving or departing from a site; use an alcohol-based hand rub with at least 60% alcohol; avoid touching your eyes, nose, and mouth; minimize contact with other people and maintain 6-feet distance; utilize disinfectant to wipe down all surfaces, supplies, etc.; do not come into work if sick. COVID-19 Prevention Procedures and a COVID-19 Management Plan are included in **Attachments I** and **J**, respectively.

6.1.4 Environmental Hazards

Slip, Trip, and Fall Hazards:

The site may contain slip, trip, and fall hazards for site workers, such as:

- Wet and slippery surfaces
- Holes, pits, tree roots, or ditches
- Slippery surfaces
- Steep grades
- Uneven grades
- Sharp objects, such as nails, metal shards, needles and broken glass

Site inspections are required to be performed in the manner and frequency described in **Section 4.6**. The **Exhibit 6-1** checklist can be used as site inspection form to document safe work areas and walkways and general housekeeping. This inspection can be used to identify hazards that can contribute to tripping hazards.

Thunderstorm Hazards:

During the course of field operations, severe weather may be encountered, including thunderstorms, lightning, rainstorms, and other unsafe weather conditions (i.e., high winds and tornadoes). Criteria indicating that severe weather conditions may exist include:

- High winds (greater than 40 miles per hour – depending on the tree cover and other site specific conditions)
- Tornado watch or warning in place for the area including the site
- Visible lightning
- Extreme temperatures (e.g., greater than 100 degrees F)
- Heavy rainfall that makes footing treacherous and visibility difficult

If severe weather is approaching, personnel will secure the location, secure the equipment, stop all work activities and go to a designated safe location. The SSO and CM will determine if weather conditions allow for restart of work activities. Monitor weather radio and if possible monitor weather radar via internet.

All water activities will cease during a thunder or lightning storm. All personnel must get off the water as quickly and safety as possible. All activities will cease for 30 minutes after the last thunder or lightening.

If weather conditions allow for restart of work activities, a visual inspection will be performed to check for damage or hazards caused by the storm. If damage is noted, activities will be evaluated and corrective actions to fix, repair or eliminate the hazard will be completed prior to start of any activities.

Technologically Enhanced Naturally Occurring Radioactive Material (TENORM) Hazards:

TENORM slag may be encountered at the site, which results in increased risk for human exposure to radioactivity. In the event that material visually consistent with slag is encountered, monitoring will be performed by a radiological contractor. Properly trained radiological control technicians will screen potential TENORM material using radiation detection equipment including a Ludlum 2241 (or equivalent) survey meter and a 2”x2” NaI detector. The radiological contractor will then render an opinion based upon the readings, whether the subject material emits radiation at a level statistically in excess of the localized background radiation levels. If this is the case, and the material appears to be anthropogenic, the material is presumably TENORM.

TENORM will only be handled by the trained radiological contractor. No additional PPE will be required during handling of potential TENORM, unless higher than expected concentrations of TENORM are encountered. If higher than expected concentrations of TENORM are encountered additional PPE may be used. Types of PPE to be used will be dependent TENORM concentrations and the physical characteristics of the TENORM (such as readily or not readily dispersible, moisture content, etc.). Additional PPE may include disposable coveralls, disposable gloves, or shoe covers. All supplies and equipment in contact with TENORM will be surveyed afer use with the appropriate equipment, at the discretion of the radiological contractor.

If significant areas of TENORM slag are encountered, areas will be isolated with rope or tape and signage will be posted to warn workers of the presence of TENORM. In these areas, work will be performed in a manner that minimizes physically exposed TENORM slag, especially during non-work hours.

6.1.5 Fire Hazards

Although fires and explosions may arise spontaneously, they are more commonly the result of carelessness during the conduct of site activities, such as moving drums, mixing/bulking of site chemicals and during refueling of heavy or hand held equipment. Some potential causes of explosions and fires include:

- Mixing of incompatible chemicals, which cause reactions that spontaneously ignite due to the production of both flammable vapors and heat
- Ignition of explosive or flammable chemical gases or vapors by external ignition sources
- Ignition of materials due to oxygen enrichment
- Agitation of shock or friction-sensitive compounds
- Sudden release of materials under pressure

6.2 Five Hazard Control Measures – Order of Precedence

Site SH&E hazards and risks are controlled using one or more of the control measures listed below in order of precedence:

- 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 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 controls.

6.3 Activity Hazards Analysis

Parsons and its subcontractors are required to conduct an AHA for all aspects of the work. An AHA includes the following steps:

- Identify the task and break it down into steps.
- Identify the hazards associated with each step.
- Identify the specific hazard control measure used for each step in accordance with the order-of-precedence method of control.

PMs can use the following list to determine the construction/operations AHAs for various high-hazard operations and critical tasks.

- Premobilization inspection. Conduct an initial site inspection for pre-job planning. The inspection should cover potential exposures such as the location of electrical lines, underground utilities, nearby structures, traffic conditions, site security needs, public exposures general liability, and other potential exposures. Environmental risks should be included in this inspection (e.g., potential for wastewater discharges, adequacy of planned storm water controls, planned hazardous materials/waste management, measures to prevent spills/releases).
- Water, wastewater, and marine work. Analyze work adjacent to, in, or over water (including lakes, canals, dams, treatment plants, water tanks, clarifiers, and reservoirs).
- Traffic controls. Internal traffic control plans should include ways to restrict the number of vehicles on-site, the flow of vehicles through the site, haul roads, speed controls, subcontractor employee parking areas, merging of site traffic with local vehicle traffic, pedestrian controls in traffic zones, access by emergency vehicles and operator controls. Plan traffic controls for delivery of equipment or materials and equipment operations. Control measures include warning signs, flagmen, traffic stoppage and control, and unloading procedures.
- Material storage. Consider where materials and equipment will be stored on-site, and labeling and signage requirements. Implement measures to protect against vandalism and theft. Also consider the hazards that may exist for workers and the environment when storing or retrieving materials.
- Material handling. Consider the size and weight of loads, how equipment will be used, how equipment is set up and protected, and safety and maintenance inspections of material handling and rigging equipment. Consider to employee training in use of the equipment and ergonomic issues when engaged in manual material handling activities.
- Heavy equipment controls. Evaluate the use of heavy equipment in operations such as site clearing, grading, excavation, or lifting. Controls should include equipment alarms, use of qualified operators, pre-use inspections, and OSHA, regional, municipal, and local regulatory requirements.
- Fall protection. Use fall protection when employees are working above the normal work surface level. Consider how and where ladders, scaffolding, work platforms, or lifts (including scissors lifts or bucket lifts), roofing work, and leading edges are used. Evaluate protective measures such as Fall Protection Plans, use of personal fall arrest systems, and work surfaces for slip and fall hazards and protection.
- Consider operations where PPE is required and the type required, e.g., eye, head, foot, respiratory, hearing and hand protection, and types of special protective clothing.
- Portable hand and power tools. Evaluate tools to be used and the ways that workers can be protected from the hazards associated with their use. Consider tool maintenance requirements, electrical requirements, use of ground fault circuit interrupters, grounding, extension cords, tool inspection procedures, and employee training.
- Employee training. Review the safety training needs of employees. Training should include initial site SH&E orientations and hazard communication training. Some operations (e.g., excavation, blasting, scaffold erection, tunneling, confined space, heavy equipment operations, handling hazardous materials, storm water and waste water management, response to spills/releases, waste management, and hazardous plant process operations) may require special training that should be checked and evaluated.
- Mechanical, electrical, and piping. Evaluate all work associated with the installation, repair and maintenance of mechanical, piping and electrical work for interferences, lockout/tagout, line break procedures, and applicable customer requirements.

Site-specific AHAs have been developed and are contained in **Attachment C**. Exhibit **6-2** is an AHA Example. **Exhibit 6-3** contains the AHA Template.

6.4 OM&M Site Inspection

As discussed in **Section 4.6**, the PM, or their designee conducts weekly site inspections. Additional inspections will also be completed when a significant task is being performed (e.g., soil/sediment sample collection, surface water sample collection, major restoration efforts by subcontractor, etc.). If the PM is not on-site, the most senior person on-site will conduct the inspection. An example site inspection checklist is provided as Exhibit 6-1. Site inspections are a protocol designed to identify and correct unsafe acts or conditions in the scope of work conducted by either Parsons or any subcontractor. The PrSM maintains the original audit documentation on file and forwards results of the audit to the SH&E Manager.

6.5 SH&E Enforcement

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.

6.6 Notice of Violation of Safety and Health Regulations

The project has a formal notice of Subcontractor Violation of SH&E Regulations Program (**Exhibit 6-4**) to ensure that violations are issued as the result of an immediately dangerous to life and health situation, respiratory airborne hazards), and/or when the subcontractor repeatedly fails to comply with SH&E requirements. The Notice of Subcontractors Noncompliance to SH&E Regulations (**Exhibit 6-5**) documents poor performance and requires a response from subcontractor senior management. The notice contains five distinct levels of discipline, from submission of a recovery plan to contract termination.

6.7 Competent First Aid Person

At least one competent person must be available at the work site at all times to render first aid. This person must have a valid certificate in first aid training from the United States Bureau of Mines, the Red Cross/Crescent, or equivalent and verifiable regional, municipal, or local training programs. First aid supplies must be accessible for immediate use and in sufficient quantity to handle common first aid incidents.

The response time and distance to the nearest clinic, hospital, or physician identified in **Section 4.11.3** has been determined to be 10 minutes. Based on the activities provided in the SOW (**Section 2.1**) and the list of AHA included in **Section 6.3**, the project has the potential to have an accident involving suffocation, severe bleeding, or other life threatening or permanently disabling injury or illness. Due to the aforementioned potential hazards and to meet this requirement, the project will require at least one individual on-site to be CPR/first aid trained. This person can be the SSO for the site provided that the field team informs the SSO where they will be working onsite and when they enter and leave the site. Copies of valid training certificates will be retained by the SSO prior to starting work. The employee(s) listed below are assigned to the project on a full-time basis and will have a valid certificate in first aid, CPR/AED, and blood-borne pathogens:

NAME	JOB TITLE	FIRST AID	CPR/AED	BLOOD-BORNE PATHOGENS

TBD	-	-	-	-
TBD	-	-	-	-
				-

6.8 Community Air Monitoring Plan

A community air monitoring program is included in the project work plan.

TABLE 6.1 SUGGESTED FREQUENCY OF PHYSIOLOGICAL MONITORING FOR FIT AND ACCLIMATED WORKERS

ADJUSTED TEMPERATURE[b]	NORMAL WORK ENSEMBLE[c]	IMPERMEABLE ENSEMBLE
90°F (32.2°C) or above	After each 45 minutes of work	After each 15 minutes of work
87.5°-90°F (30.8°-32.2°C)	After each 60 minutes of work	After each 30 minutes of work
82.5°-87.5°F (28.1°-28.1°C)	After each 90 minutes of work	After each 60 minutes of work
77.5°-82.5°F (25.3°-28.1°C)	After each 120 minutes of work	After each 90 minutes of work
72.5°-77.5°F (22.5°-25.3°C)	After each 150 minutes of work	After each 120 minutes of work

a For work levels of 250 kilocalories/hour.

b Calculate the adjusted air temperature (T adj) by using this equation: T adj °F = T °F + (13 x % sunshine). Measure air temperature (T) with a standard mercury-in-glass thermometer, with the bulb shielded from radiant heat. Estimate percent sunshine by judging what percent time the sun is not covered by clouds that are thick enough to produce a shadow. (100% sunshine = no cloud cover and a sharp, distinct shadow; 0% sunshine = no shadows.), or use **Figure A-9.1 Heat Index, or Figure A-9.2** Heat Stress Calculator.

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

TABLE 6.2 HEAT INDEX

	ENVIRONMENTAL TEMPERATURE (Fahrenheit)										
	70	75	80	85	90	95	100	105	110	115	120
RELATIVE HUMIDITY											
0%	64	69	73	78	83	87	91	95	99	103	107
10%	65	70	75	80	85	90	95	100	105	111	116
20%	66	72	77	82	87	93	99	105	112	120	**130**
30%	67	73	78	84	90	96	104	113	123	**135**	**148**
40%	68	74	79	86	93	101	110	123	**137**	**151**	
50%	69	75	81	88	96	107	120	**135**	**150**		
60%	70	76	82	90	100	114	**132**	**149**			
70%	70	77	85	93	106	124	**144**				
80%	71	78	86	97	113	**136**					
90%	71	79	88	102	122						
100%	72	80	91	108							

*Combined Index of Heat and Humidity...what it "feels like" to the body
Source: National Oceanic and Atmospheric Administration

How to use Heat Index:

1. Across top locate Environmental Temperature
2. Down left side locate Relative Humidity
3. Follow across and down to find Apparent Temperature
4. Determine Heat Stress Risk on chart at right

Apparent Temperature	Heat Stress Risk with Physical Activity and/or Prolonged Exposure
90-105	Heat Cramps or Heat Exhaustion Possible
105-130	Heat Cramps or Heat Exhaustion Likely, Heat Stroke Possible
>130	Heat Stroke Highly Likely

Note: Exposure to full sunshine can increase Heat Index values by up to 1 degrees

EXHIBIT 6-1 SH&E INSPECTION CHECKLIST (SHEET 1 OF 2)

Project Name:	Date/Time:
Project Number:	Signature:
Observation Details – Provide a description of the task observed including items such as: titles and company of observees, work activities, site/traffic conditions and weather as well as general positive comments observed during the observation.	
Check the appropriate box during your inspection or indicate N/A. Add observations in the comments section for Safe and At-Risk items. At-Risk items must have a comment to describe what was observed.	

1 - Observation - PPE	Safe	At Risk	Comments
1. Fall protection utilized per AHA requirements			
2. Hearing protection worn per AHA requirements			
3. Hand protection worn per AHA requirements			
4. Eye/Face protection worn per AHA requirements			
5. Foot protection worn per AHA requirements			
6. Respiratory protection worn per AHA requirements			
7. Head protection worn per AHA requirements			
8. Reflective vest, clothing etc. worn per AHA requirements			
9. PPE inspected and in good condition			
2 - Observation – Body Use and Positioning	Safe	At Risk	**Comments**
10. Uses proper Lifting/Carrying/Pushing Safety in Motion Techniques			
11. Faces machine or ladder and maintains 3 point contact when mounting and dismounting			
12. Keeping hand and body parts away from pinch points			
13. Body parts and body out of line of fire			
3 - Observation – Work Environment	Safe	At Risk	**Comments**
14. Work areas and pathways clear of slip and trip hazards; uneven surfaces addressed			
15. Site free from obstructions and housekeeping maintained			

EXHIBIT 6-1 SH&E INSPECTION CHECKLIST (SHEET 2 OF 2)

16. Work zone defined and/or secured			
17. Maintains adequate lighting and illumination			
18. Wastes properly stored, secured and disposed of			
19. Decontamination techniques performed per AHA and task requirements			
4 - Observation – Operating Procedures	Safe	At Risk	Comments
20. Take 5/Job Plan/Pre Job Inspection Performed			
21. Held and documented toolbox safety meeting			
22. Reviewed, modified as needed and signed AHA			
23. Permits complete and present at job site			
24. Interfaces with other personnel effectively			
25. Identified and documented subsurface structures and utilities using Pre Drill/Subsurface Checklist			
Observation – Tools and Equipment	Safe	At Risk	Comments
26. Inspects tools and equipment			
27. Chose the right tool for the job			
28. Uses tools only for their intended purpose			
29. Air monitoring equipment is in use and calibrated			
30. Vehicle and equipment parked to allow for first move forward/backed in when possible/chocks in use/GOAL performed/Parking Brake set			

Corrective Actions and Root Cause Analysis

Root Cause				
	1.	Lack of skill or knowledge	5.	Lack of or inadequate procedures
	2.	Done it that way before and no incident occurred	6.	Inadequate communication of expectations
	3.	Supervisor allowed questionable behavior to occur	7.	Inadequate tools or equipment
	4.	Following JSA takes more time or effort		

At Risk Items (IndSafe Problem Description)	Root Cause Number (IndSafe Comments)	Solution (IndSafe Recommendation)	Responsible Party	Target Completion Date	Actual Completion Date

EXHIBIT 6-2 COMPLETED ACTIVITY HAZARDS ANALYSIS EXAMPLE PAGE 1 OF 3

Activity/Work Task: Entering Excavation	Overall Risk Assessment Code (RAC) (Use highest code)						M
Project Location:	**Risk Assessment Code (RAC) Matrix**						
Contract Number:	**Severity**	**Probability**					
Date Prepared (MM/DD/YY):		Frequent	Likely	Occasional	Seldom	Unlikely	
Prepared by (Name/Title):	Catastrophic	E	E	H	H	M	
	Critical	E	H	H	M	L	
Reviewed by (Name/Title):	Marginal		M	M	L	L	
Employer / BU: Parsons	Negligible	M	L	L	L	L	

Notes: (Field Notes, Review Comments, etc.) **References:** Parsons Excavation SOP	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
1. Arrival, passing near, and/or around the excavation	1.1 Absence of edge protection and warning signs.	1.1.1 Maintain a safe distance away from the edge of the excavation. 1.1.2 Ensure that the edge protection and warning will be immediately provided. 1.1.3 Ensure gangways are provided across trenches to eliminate jumping over the trench. 1.1.4 Designated and trained Excavation Competent Person must be on site and conduct a daily inspection	S	Cr	M
	1.2 Presence of tension cracks near the edge of the excavation and evidence of soil collapse.	1.2.1 Maintain a safe distance away from the edge on the excavation. 1.2.2 Ensure that no materials are placed on the excavation edge. 1.2.3 Follow warning signs onsite.	S	Cr	M

EXHIBIT 6-2 COMPLETED ACTIVITY HAZARDS ANALYSIS EXAMPLE PAGE 2 OF 3

Activity/Work Task: Entering Excavation		Overall Risk Assessment Code (RAC) (Use highest code)			M
Project Location:		Risk Assessment Code (RAC) Matrix			
Job Steps (Cont'd)	Hazards	Controls	P	S	RAC
2. Entering the excavation	2.1 Access and Egress – Unsafe Ramp.	2.1.1 Look ahead and be aware of moving plant and vehicles. 2.1.2 Keep the hands free (not in the pocket) while walking 2.1.3 Avoid slippery surfaces (oil, water mud, stones, etc.) 2.1.4 Ensure that ramp/walkway is adequately illuminated. 2.1.5 Keep scanning the floor; avoid obstacles, such as building material, cables, and tools.	S	M	L
	2.2 Access and egress – Unsafe Ladder.	2.2.1 Ensure that the top and bottom ends of the ladder are secure. 2.2.2 Make a visual inspection to ensure that the ladder is safe and sound. 2.2.3 Ensure that the ladder will extend one meter clearance on top. 2.2.4 Ensure that ladder is free from oil, grease, or mud. 2.2.5 Maintain three-point contact. 2.2.6 Check for proper angle of the ladder (4:1). 2.2.7 Do not use job made ladder unless certified. 2.2.8 Do not carry a load on a ladder. 2.2.9 Only one person at a time will use a ladder. 2.2.10 Ensure that adequately illumination is provided onsite.	S	Cr	M
	2.3 Access and egress – Unsafe Stairs.	2.3.1 Check for the proper angle of the stairs. 2.3.2 Check if the tread is anti-slip. 2.3.3 Ensure that railing is in good condition. 2.3.4 Maintain 3-point contact. 2.3.5 Ensure that stairs treads is free from oil, grease or mud. 2.3.6 Ensure that adequately illumination is provided on site. 2.3.7 Ensure all stairs of 4 or more risers have a hand rail.	S	Cr	M
	2.4 Access and egress - Unsafe man basket.	2.4.1 Ensure third party certification of the man basket and crane. 2.4.2 Perform a pre-use inspection on the man basket to ensure that it is in good condition 2.4.3 Check for the safe working load (SWL) of the man basket. 2.4.4 Check for the full body harness and adequate anchor point 2.4.5 Ensure that the crane operator and rigger are all certified.	S	Cr	M

EXHIBIT 6-2 COMPLETED ACTIVITY HAZARDS ANALYSIS EXAMPLE PAGE 3 OF 3

Activity/Work Task: Entering Excavation		Overall Risk Assessment Code (RAC) (Use highest code)			M
Project Location:		**Risk Assessment Code (RAC) Matrix**			
Job Steps (Cont'd)	Hazards	Controls	P	S	RAC
3. Walking inside the excavation	3.1 Falling Materials	3.1.1 Ensure that materials are not placed on the edge. 3.1.2 Follow all mandatory signs and out of bound areas 3.1.3 Ensure that basic PPE is worn (hard hat, safety glass, safety shoes). 3.1.4 Ensure no overhanging or undermined sides.	S	M	L
	3.2 Falls on same level	3.2.1 Use designated route and walkway. 3.2.2 Look ahead and be aware. 3.2.3 Keep hands free (not in pocket) while walking onsite. 3.2.4 Follow mandatory signs onsite.	S	M	L
	3.3 Signs of cracks or collapse on the sides of the excavation	3.3.1 Work should be stopped and adequate support system shall be installed to prevent cave-ins.	S	Cr	M
4. Walking on elevated areas of the excavation	4.1 Falls from Height	4.1.1 Ensure that edge protection is in place. 4.1.2 Follow mandatory warning signs onsite. 4.1.3 Do not approach near unprotected edges. 4.1.4 Use designated routes and walkways. 4.1.5 Do not stop on and/or over covered voids, where possible.	S	Cr	M
5. Passing a noisy area in the excavation	5.1 Noise	5.1.1 Check if the contractor has conducted noise survey. 5.1.2 Follow mandatory use of PPE.	S	M	L
6. Passing near Moving Equipment and Vehicles on or near the excavation	6.1 Moving Equipment and Vehicles	6.1.1 Wear high-visibility vest. 6.1.2 Use designated walkways. 6.1.3 Do not pass behind moving equipment and vehicles.	S	Cr	M
7. Passing live utilities	7.1 Live Utilities	7.1.1 Coordinate with the contractor regarding presence of any live utilities. If so, ensure that control measures are provided. 7.1.2 Follow mandatory signs and out of bound areas.	S	Cr	M
8. Passing flooded areas	8.1 Flooding and presence of water in the excavation/trench	8.1.1 Check for the weather condition before entering the excavation. Exit if heavy rain starts. 8.1.2 Ensure water intrusion is controlled by dewatering	S	M	L

EXHIBIT 6-3 ACTIVITY HAZARDS ANALYSIS TEMPLATE PAGE 1 OF 2

Activity/Work Task:	Overall Risk Assessment Code (RAC) (Use highest code)					
Project Location:	**Risk Assessment Code (RAC) Matrix**					
Contract Number:	**Severity**	**Probability**				
Date Prepared (MM/DD/YY):		Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name/Title):	Catastrophic	**E**	**E**	**H**	**H**	**M**
	Critical	**E**	**H**	**H**	**M**	**L**
Reviewed by (Name/Title):	Marginal		**M**	**M**	**L**	**L**
Employer / BU: Parsons	Negligible	**M**	**L**	**L**	**L**	**L**

Notes: (Field Notes, Review Comments, etc.) **References:**	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

EXHIBIT 6-3 ACTIVITY HAZARDS ANALYSIS TEMPLATE PAGE 2 OF 2

Activity/Work Task: Entering Excavation		**Overall Risk Assessment Code (RAC) (Use highest code)**			
Project Location:		**Risk Assessment Code (RAC) Matrix**			
Job Steps (Cont'd)	Hazards	Controls	P	S	RAC

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements

EXHIBIT 6-4 NOTICE OF SUBCONTRACTOR VIOLATION OF SH&E REGULATIONS

DATE:		
CONTRACTOR NAME:		
ADDRESS:		
ATTENTION:		

This letter officially notifies you that you have been found to be in violation of the following Safety, Health, and Environmental Regulations:

____

on (date) ______________________, by ______________________________________

Confined Space Entry	☐	Lockout/Tagout	☐	Hot Work	☐	Personal protective equipment
Knowledge of environmental requirements	☐	Awareness of warning alarms	☐	Evacuation routes	☐	Backup alarms
Assembly locations	☐	Fall Protection	☐	Scaffolding	☐	Environmental/hazardous material storage
Trenching	☐	Safe Work Practices	☐	Security Practices	☐	Spill to the environment
Waste storage or disposal	☐	Wastewater discharge	☐	Buried items	☐	Violation of environmental regulation

Other: ____ ____________
Environmental:
This/These violations occurred at the following locations: ______________________________________
At the following times and dates:
The name of the employee(s) was (were):

Pweb link: Notice of Subcontractor Violation

EXHIBIT 6-5 NOTICE OF NONCOMPLIANCE WITH SH&E REGULATIONS

Under conditions of this enforcement procedure check all items that apply:

☐	1.	You are being notified of this violation and should take corrective action to prevent a reoccurrence. The corrective action shall be documented to the Parsons Construction Management representative immediately.
☐	2.	You must submit a plan for compliance to your Parsons Construction Management representative and the Construction Safety Manager within two days of receipt of this letter. The compliance plan must include the means or methods of compliance and the date that the requirements for compliance will be completed. Once compliance has been achieved, a follow up letter must be sent to the Parsons Construction Management representative and Construction Safety Manager. Failure to comply will result in disciplinary action against your Company.
☐	3.	You are required to review the stated procedures with your Parsons Construction Management representative. Work may not commence on the site until the review is complete and the Subcontractor responds formally that the procedure is understood and will comply.
☐	4.	You are required to review the stated procedures with your Parsons Construction Management representative. Work may not commence on the site until the review is complete and you **must** confirm formally the disciplinary action to be taken against the supervisor and employees.
☐	5.	All work on the site will stop until the Parsons Construction Management representative reviews all the facts with the Subcontractor and determines if the contract between the parties will be terminated.

Sincerely,

Parsons Representative

cc:
Issuing Construction Manager Representative
Job File
BU Safety Director
PM

Pweb link: Notice of Subcontractor Noncompliance

7.0 SAFETY TRAINING

7.1 Project Safety Orientation

The Parsons PM, Project Engineer, or SSO conducts the site-specific orientation for all new Parsons' staff and subcontractor management personnel.

The Orientation takes approximately two hours to complete and includes applicable owner, Parsons, and regulatory reference material, including:

- Owner – SH&E requirements
  - Applicable regional, municipal, and local regulations and if applicable and in the United States or its territories OSHA 1910 General Industry and 1926 Construction Regulations and
- Parsons applicable requirements, including items covered in **Section 4.2**
- Subcontractor requirements

All visitors must receive a brief orientation as described in **Section 4.2**, and be escorted by the PM, Project Engineer, SSO, or a designee familiar with the potential hazards on the project.

Subcontractors must conduct similar orientations for their staff and craft employees and must document all orientations using the Subcontractor Employee Training Acknowledgement Form (**Exhibit 7-1**) and Subcontractor Competent Persons Form (**Exhibit 7-2**). The project Talent Manager maintains orientation documents and acknowledgement forms.

7.2 Zero Incident Techniques / Start Training

Consistent with Parsons corporate initiatives in safety, all managers and supervisors, including subcontractor personnel, must complete START training. Records of training completion are maintained by the SSO and forwarded to the Market SH&E Director.

7.3 Daily Toolbox SH&E Meetings

Parsons and its subcontractors conduct toolbox safety meetings at the beginning of day when field work is occurring. These meetings include topics relevant to upcoming work, review of applicable AHAs, remind employees of SH&E work procedures established for the tasks, and may include reviews of recent incidents. The toolbox training content and attendance is documented and retained (**Exhibit 7-3**). Supervisors should always ask whether any workers have questions before they are released for work

7.4 Activity Hazard Analysis Training

When the activity hazards analysis is complete, the Parsons supervisor or subcontractor conducts a training session with all employees involved with the analyzed task. The training may be informal and at the site where the task is performed. Employees should be given an opportunity to provide input regarding task steps, hazards identified, and appropriate control measures.

7.5 Regulatory Training Programs

Regional, municipal, local, and OSHA regulations require specific training in certain circumstances. Based on the SOW and meetings with regulatory officials, the following training topics are provided on the project:

- Hazard Communication – as per 29 CFR 1910.1200
- CPR/AED/First aid – provided to personnel based on project activities identified in the Scope of Work (i.e., life threatening) and EMS response time (i.e., less than 15 minutes). See **Section 6.9**.
- Emergency response – only applicable to workers engaged in emergency response as per 29 CFR 1910.120(q).
- Fire Protection

If needed, the following training topics may be provided on the project as applicable:

- General – all workers engaged in activities which are potentially exposed to hazardous substances and health hazards must be trained to meet 1910.120(e)(1). Annual 8-hour refresher training as per 29 CFR 1910.120(e)(3) is required for workers and supervisors must be trained to meet 29 CFR 1910.120(e)(4).
- Asbestos – licensed asbestos firm and employees trained and certified in accordance with NYCRR Code Rule 56
- Respiratory protection – as per 29 CFR 1910.134. Medical qualification by a physician is required to wear a respirator. Annual fit testing and training is also required.
- Excavation/trenching – as per 29 CFR 1926.651.
- Respiratory protection
- Lockout/Tagout (LOTO)
- Power operated hand tools

The PM determines the necessary training and coordinates the training with the Parsons' SH&E experts certified in the topics they instruct.

7.6 Specialized Training and Orientations

Project personnel receive specialized training on client rules and requirements as well as the unique tools, equipment, and procedures used to perform the work. The project budget includes funding for the following training:

Description	Attendees	Schedule
General rules and safety requirements	All workers assigned to the site	Half-hour training session, provided to new employee on the first day of work at the site.
Honeywell Contractor Safety Handbook (**Attachment E**)	All workers assigned to the site	Handbook should be provided for review during site orientation training.
Additional To Be Determined		

EXHIBIT 7-1 INITIAL SUBCONTRACTOR EMPLOYEE TRAINING ACKNOWLEDGEMENT

Name of Trainer: ______________________________

Training Subject: ______________________________

Training materials used: ______________________________

Name of employee: ______________________________

Date of hire/assignment: ______________________________

I, ______________________________, hereby certify that I have received training as described above in the following areas:

- Names of personnel responsible for site safety and health.
- Safety, health or other hazards at the site.
- The proper use of personal protective equipment.
- The potential occupational hazards in general in the work area and associated with my job assignment.
- Work practices by which a worker can minimize risks from hazards.
- Safe use of engineering controls and equipment on the site.
- Acute effects of compounds on the site.
- Decontamination procedures.
- General safety requirements indicate the safe work conditions, safe work practices and personal protective equipment required for my work.
- The hazards of any chemicals to which I may be exposed and my right to information contained on material safety data sheets for those chemicals, and how to understand this information.
- My right to ask questions, or provide any information to the employer on safety either directly or anonymously without any fear of reprisal.
- Disciplinary procedures the employer will use to enforce compliance with general safety requirements.

I understand this training and agree to comply with general safety requirements for my work area.

______________________________ ______________________________

Employee Signature Date

EXHIBIT 7-2 SUBCONTRACTOR COMPETENT PERSON FORM

Definition

A competent person is a person having the ability to recognize existing and predictable hazards and having the authority to correct them.

Responsibility

The designated subcontractor competent person is responsible for recognizing and correcting safety risks/hazards. This person has the authority to stop work in a potential safety concern on the jobsite. This Subcontractor Manager and competent person are considered the contacts for Parsons projects.

This form must be completed by each subcontractor's manager and the subcontractor's designated competent persons. ***Where a subcontractor is responsible for multiple crafts, it will be necessary to maintain additional designated competent persons and forms.*** Each subcontractor on a Parsons project must submit this completed form to the Parsons Project Manager before beginning work on the project and must update it any time the designated representative(s) changes.

Acknowledgment

I,______________________________________ representing, ____

Subcontractor Manager **Subcontractor Company Name**

have assigned ________________________________ to be the competent person in the areas indicated and I _______________________________________ acknowledge that this individual has been thoroughly trained and is experienced in hazard recognition and has the authority to stop work and correct hazards in the event of a potential hazardous or imminent danger situation.

____ ____________________

Subcontractor Manager (Signature) **Date**

I, ____ acknowledge that I have been thoroughly trained and have the experience

Competent Person (Signature)

to perform the duties as the _________________________________competent person in the areas marked below and **Subcontractor Company Name**

I understand that I have the responsibility and authority to correct hazards and to stop work in the event of a potential hazardous or imminent danger situation.

_____ Asbestos	_____ Hearing Protection	_____ Welding/Cutting
_____ Respiratory Protection	_____ Scaffolding	_____ Rigging
_____ Cranes/Derricks	_____ Electrical	_____ Lead
_____ Fall Protection	_____ Ladders	_____ Excavations/Trenches
_____ Demolition	_____ Tunnels/Shafts	_____ First Aid/CPR
_____ Underground Const.	_____ Material/Personnel Hoists	_____ Concrete/Forms/Shoring
_____ Marine Work/Diving	_____ Bolting/Riveting/Fitting	_____ Mechanical Demolition

EXHIBIT 7-3 SAFETY MEETING SIGN-IN SHEET

Safety Meeting Presenter: ________________________________ Date: __________________

Current Weather Conditions:

Temperature (°F) = _____ Wind Direction = _______ Wind Speed = _________

Clear – Sunny – Cloudy – Rain – Snow Forecast = ___________________________________

Current Site Conditions (circle as appropriate):

Dry – Wet – Muddy – Frozen – Snow Covered – Other (describe) _________________________

1. Incidents or Injuries to report from Previous Day Activities: No↑ Yes↑- explain below:

2. Safe and/or At-Risk Observations from Previous Day Activities:_________________________

3. Activities Taking Place Today: ____

3. Anticipated Hazards: ____

4. Engineering Controls-Work Practices-PPE to Protect Against Hazards: ___________________

5. Additional Safety Topic or Comments: ____

PRINTED NAME	SIGNATURE	COMPANY

8.0 RECORD KEEPING AND POSTING

Parsons and its subcontractors must comply with the recordkeeping requirements of the regional, municipal, local, and/or OSHA regulations, Owner, Parsons Corporation, and this PSHEP, including:

- OSHA 300A logs
- Medical treatment and follow-up
- Cranes
- Heavy equipment inspection logs
- Fall protection
- Training
- Inspections
- Audits
- Others as required

Parsons Talent Management and the SH&E Manager are the official recordkeepers for files relating to Parsons' employees. Each subcontractor maintains its own files.

The project displays regional, municipal, local, and/or OSHA regulations posters in conspicuous places, as required by regional, municipal and local regulations, including one poster on the main bulletin board located outside in the H&S/State bulletin board outside of the craft labor trailer.

The OSHA 300 log for the project or the Market shall be posted from February 1 – April 30 of each calendar year.

9.0 SAFETY AND HEALTH REQUIREMENTS

Exhibit 9-1 represents regional, municipal, local, and/or OSHA regulations, owner, and Parsons corporate regulations and requirements applicable to the project. Based on the most recent risk assessments, the Parsons PM and SSO update the listed topics periodically. Training and other requirements are updated in this PSHEP as required by changes to **Exhibit 9-1**, Competent Person and Activity Hazards Analysis Requirements.

The SH&E Legal Compliance Register is included as **Attachment G**. This document identifies the SH&E legislation, standards, codes, and regulations relevant to Parson's activities during this project.

Parsons and its subcontractors are individually responsible for training their respective employees and for complying with all project requirements. Failure to comply could lead to disciplinary actions against Parsons' employees and subcontractors or their employees. Further guidance is available in the Parsons Corporate Safety and Health Manual; Pweb link is as follows: Corporate Safety and Health Manual.

EXHIBIT 9-1 COMPETENT PERSON AND ACTIVITY HAZARDS ANALYSIS REQUIREMENTS

Safety and Health Requirement	OSHA Regulation	Competent Qualified Person-Supv	Training Required	AHA Required
1. General Safety & Health	1926.20	*Yes*	*Yes*	*Yes*
2. Safety Training	1926.21	*Yes*	*Yes*	*Yes*
3. First Aid and Medical	1926.23, 50	*Yes*	*Yes*	*Yes*
4. Fire Protection and Prevention	1926.24, 150-155, 352	*Yes*	*Yes*	*Yes*
5. Housekeeping	1926.25	*N/A*	*N/A*	*N/A*
6. Sanitation	1926.27, 51	*N/A*	*N/A*	*N/A*
7. Personal Protective Equipment	1926.28, 95-98, 100-107	*Yes*	*Yes*	*Yes*
8. Emergency Employee Action Plans	1926.35	*Recommended*	*Yes*	*Yes*
9. Noise Exposure	1910.95; 1926.52	*Yes*	*Yes*	*Yes*
10. Gases, Vapors, Dusts and Mists	1926.1926.55	*Yes*	*Yes*	*Yes*
11. Hazard Communication	1926.59	*Yes*	*Yes*	*Yes*
12. Hazardous Waste Operations and Emergency Response	1910.120; 1926.65	*Yes* *Supv – 8 hr*	*Yes*	*Yes*
13. Accident prevention signs and tags	1926.200	*N/A*	*N/A*	*N/A*
14. Signaling	1926.201	*Recommended*	*N/A*	*Yes*
15. Barricades	1926.202	*N/A*	*N/A*	*N/A*
16. Material Storage	1926.250	*N/A*	*Yes*	*Yes*
17. Waste Disposal	1926.252	*Yes*	*Yes*	*Yes*
18. Tools	1926.300-307	*N/A*	*N/A*	*Yes*
19. Motor Vehicles, Mechanized Equipment	1926.600-603	*Yes*	*Yes*	*Yes*
20. Site Clearing	1926.604	*N/A*	*Yes*	*Yes*
21. Excavations	1926.650-652	*Yes*	*Yes*	*Yes*
22. Excavation Permit	N/A	*Yes*	*Yes*	*Yes*
23. Internal Traffic Control	N/A	*N/A*	*Yes*	*Yes*
24. Traffic Movement Restriction Times	N/A	*N/A*	*Yes*	*Yes*
25. Asbestos	1910.1001 and NYCRR Code Rule 56	*Yes*	*Yes*	*Yes*
26. Working on or Around Water	1926.106 Working over or Around Water 33 CFR 165 Coast Guard Regulations	*Yes*	*Yes*	*Yes*

ATTACHMENT A PARSONS REQUIREMENTS

On-Line Safety Reporting System

Policy Requirements

- Initial incident reports for all incidents, including near misses, shall be reported within 2 hours.
- Detail incident reports are required within 24 hours.
- Reporting is done via on-line (PWeb) incident report form.
- Injuries with Days Away from Work - immediate supervisor and PM must teleconference with GBU President within 4 hours.
- Projects enter hours via on-line form by FIRST Friday of new period.

Reporting Incidents

Corporate policy requires that all employees report safety incidents to their supervisor immediately. Supervisors must report all incidents to the appropriate Project Manager (Department Manager if the incident is not related to a project), who must officially report the incident to the GBU within four hours. This official reporting is done via the PWeb, unless PWeb is unavailable, in which case the incident can be reported by email, fax or telephone.

"Incidents" include work related injuries, work related illness, accidents with property damage only and near misses. "Near misses" are any unplanned event that had the potential to (but did not) result in injury or property damage.

Incident reports should reflect the best available information at the time. Where exact information is not known (recordability, days away from work, etc.) the PM's best judgment should be used when completing the initial incident report. This information can be subsequently revised when the detail incident report is submitted.

When in doubt, submit an initial report or contact the GBU Safety Manager.

On-line Reporting System

The on-line reporting system can be found on the PARCOMM Safety Page on PWeb. To locate the system, follow these steps:

1. From the Corporate PWeb Homepage, select PARCOMM from the Org Units menu
2. Locate and select "Safety" from the header
3. Select the "Online Safety Reporting" link

To create and submit a new incident report, select the orange "Add" button from the main page of the reporting system. To update and existing incident report or complete the Detail Incident page, locate and select the appropriate incident from the list.

Creating or Updating Incidents

The Initial Incident page of the report must be completed within four hours of the incident occurring. This page includes basic information needed for the first notification to our insurance carriers. If possible, all of the fields should be completed in the initial report. A list is provided at the end of this document describing all fields contained on the initial incident page.

Incident Detail Reports

Within 24 hours of the incident occurring, the Incident Detail page of the on-line report must be completed. This page includes detailed information about the injured party, the nature and extent of injuries, medical treatment provided, corrective actions taken, and witness statements. In the event of property damage, this page also includes descriptive information on the property owner. Finally, the page includes a section to include electronic attachments. These might include photographs, signed witness statements, etc.

Monthly Reporting of Hours

Hours must be entered into the on-line reporting system no later than the first Friday of the new period. If an accurate accounting of hours is not available, estimated hours are submitted into the system. The estimated hours can be revised later in the month, or the following month, when accurate data is available.

From the "Hours" page, select "PAR" from the GBU drop down menu and the period (month and year) that is being reported. The system only allows hours to be entered for the period selected. MTD and PTD figures are calculated totals based on the sum of all monthly entries. To enter or correct a prior period entry, simply select that month from the drop-down box and correct the figures for that month. If the name of your "Project" is not alphabetically listed on any of the multiple pages, then select "Field Administration/Other – Industrial".

Be sure to select the correct month and year when entering hours.

Hours must be entered for each (as applicable) of six different labor categories. The categories are as follows:

- Contractor (Field/Craft)
- Contractor (Office/Admin)
- JV Partner (Field/Craft)
- JV Partner (Office/Admin)
- Parsons Employee (Field/Craft)
- Parsons Employee (Office/Admin)

Monthly Statistics Summary Reports

The on-line reporting system automatically calculates incident rates based on incidents and hours entered into the system. To view the statistics, select the "Reports" page from the on-line system. Select "Parsons Safety Statistics Summary", the appropriate GBU, and the appropriate period. (NOTE: The system does not yet provide reports at the Division and Sector level. That enhancement is pending.) Use the checkboxes to select the labor categories desired.

Contact Brad Barber or Greg Beck for Assistance

Initial Incident Report Fields

1. GBU – Select the GBU from the drop down box. Incidents are reported primarily by project, and the GBU should reflect the unit responsible for the project. This may be different from the GBU that employees the person injured.
2. Field Project Name, Office Location or Other – if the injury occurred in the field, then select the appropriate name from the alphabetical listing in the "Field Project" drop down box. If an appropriate name does not exist, select "Field Administration/Other-Industrial". If the incident occurred in a Parsons office, select the office name from the "Office Location" drop down box. ONLY select Field Project or Office Location, not both (or Other). If the appropriate Office Location is not provided, manually enter it into the "Other" box.
3. Job and WBS Numbers – These fields should reflect the charge number responsible for the incident. In general, that will be the number that the employee was charging at the time of the incident. Projects are responsible for visitors, regardless of what charge number they use while visiting the job. For example, if the Division Manager is injured while visiting Project X, the project number is entered, not the division overhead account.
4. Near Miss – Check this box if the report is for a near miss only (no injury or property damage occurred).
5. Emergency Response Notified – Check this box if fire, police or ambulance was called as a result of the incident.
6. Three or More Employees Hospitalized – Check this box if three or more employees were injured as the result of a single incident. In this case, the GBU or Corporate Safety Manager must also be immediately notified by telephone.
7. Extent of Injury – Select the appropriate radio button. First aid cases are as defined by OSHA 1904 criteria. All other injuries are considered recordable.
8. Restricted Duty (# of days) – If the injured person was limited (by a physician) to less than normal work duration or duties, enter the number of days. Estimate the days if unknown, and correct the number later. NOTE: this is the number of CALENDAR days (not scheduled work days), and it does NOT include the day of the injury.
9. Days Away From Work (# of days) – If the injured person was ordered by a physician not to return to work, enter the number of days missed. Estimate the days if unknown, and correct the number later. NOTE: this is the number of CALENDAR days (not scheduled work days), and it does NOT include the day of the injury. Injuries with Days Away From Work require a phone call to the GBU President within 4 hours.
10. Fatality (Date of Death) – In the event of a work related fatality, enter the date of death here. NOTE: Fatalities require immediate phone notification of the Division Manager, GBU President, GBU Safety Manager, and Corporate Safety Manager.
11. Property Damage – Check the appropriate boxes if applicable.
12. Place – Describe the exact location that incident occurred. For example, "in the north stairwell of building 21, between the second and third floor."
13. Date – This field reflects the date the incident occurred, not necessarily the date it was reported. If the exact date is not known, an estimate should be used.
14. Time – This field reflects the time of day that the incident occurred. If the exact time is not known, an estimate should be used.
15. Incident Description – Provide a detailed description of the incident. This is a memo field and text will scroll down the window as it is entered. Use as much space as needed to accurately describe the incident and the resulting injuries.
16. Reported by – This field defaults to the employee login ID that was used to access PWeb. However, the field can be over-written if needed.

17. Name – First and last name of the injured party.
18. Status – Select the most appropriate category from the drop box (Employee - Field, Subcontractor - Field, Partner - Field, Employee - Office, Subcontractor - Office, Partner - Office or 3rd Party).
19. Trade/Function – Select the most appropriate category from the drop box.

Sensitive/Proprietary

To: Report Date:

Cc: Incident Date:

From: Phone:

Subject: Incident Analysis Report for *(Insert Incident Type e.g. life changing event during bridge inspection)*

I. Report Summary

Provide a narrative of the incident covering how the event occurred, details of the location and actual/potential consequences. Include objective and fact-based information only. Include pictures, as appropriate.

II. Investigation Team Members

NAME	TITLE	Email

III. Methodology

Describe the methodology of the investigation. e.g. The investigating team collected evidence in the form of interviews, documented statements, photographs and relevant SH&E records. The investigating team also visited the incident scene to determine any factors that may have contributed to the incident. Summarize the Root Cause Analysis process (e.g. 5 Whys, Taproot, etc.) used to analyze the incident. Please include the RCA in this report for sharing and retention.

IV. Project Background

Provide the background details of the project to include size, scope of work, and Parsons contractual SH&E obligations, etc.

V. Personnel Interviewed

Insert bullet list of employees that were interviewed during the analysis, their companies, and title.

VI. Timeline

Add the date and the events that occurred, including those involved, where it occurred and what evidence supports this. (e.g. interviewees, recordings, witness statements, etc).

DATE	EVENTS

VII. Immediate Cause

- Describe the immediate cause of the incident.

VIII. Root Causes and Contributing Factors

- *Insert bullet list of contributing factors. Contributing factors are the personal or job-related factors that contributed to the incident occurring but was not the actual cause.*

- *Insert bullet list of root causes, connected to why each of the contributing factors occurred. There are usually two or more root causes associated with each contributing factor identified. Root causes are the management system deficiencies that allowed the contributing factors to occur.*

IX. Corrective /Preventative Actions (CAPAs)

Add details of the corrective actions (CA) to prevent reoccurrence. Identify at least one elimination, substitution or engineering control as shown in Figure 1 for each root cause. Corrective Actions must be assigned in IndustrySafe and tracked to close out.

Root Cause(s)	Corrective Actions	Responsible Person	Due Date

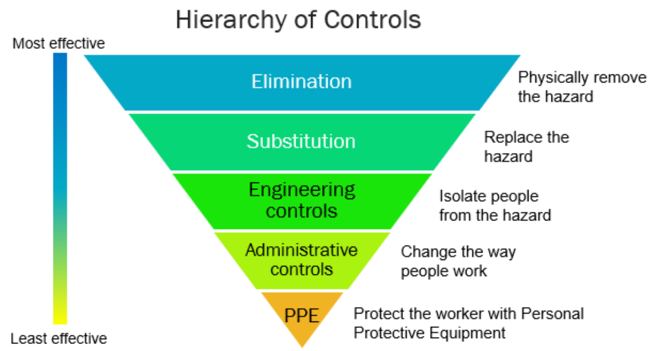


Figure 1

X. Planned Follow-Up

Summarize plan to monitor corrective action(s) completion and validate effectiveness

XI. Exhibits

List the exhibits in the order they are mentioned in the report.

Exhibit 01 - Enter Exhibit
Exhibit 02 - Enter Exhibit
Exhibit 03 - Enter Exhibit

PARSONS	NEAR MISS REPORT FORM

EMPLOYER

1. Name: ____
2. Mail Address: ____
   (No. and Street) (City or Town) (State and Zip)
3. Location :____
   (if different from mail address)

NEAR MISS DESCRIPTION

4. Location of near miss:____
   (No. and Street) (City or Town) (State and Zip)
5. Project: ____
6. Was place of near miss on employer's premises? Yes ( ) No ( )
7. Time of near miss: ________________
8. Date of near miss: ______________
9. How did the near miss occur? ____
   (Describe fully the events that resulted in the near miss.)
   ____
   Tell what happened and how. Name objects and substances involved. Give details on all factors that led to
   ____
   near miss. Use separate sheet for additional space).
10. What was employee doing when near miss occurred?______________________
    (be specific-was employee using tools or equipment
    ____
    or handling material?)
    ____

WITNESS TO MISS

____
(Name) (Affiliation) (Phone No.)

____
(Name) (Affiliation) (Phone No.)

RECOMMENDATIONS TO PREVENT NEAR MISS FROM RECURRING

____

____

PARSONS **PARCOMM®**

Field/Project Monthly Report Form

Instructions: Enter the total number of labor hours spent in the field by all Parsons employees and subcontractors during the reporting period. Cost Type (CT) “04” used for WebTime labor entries should represent these hours for Parsons employees. Labor hours spent in the office are classified as CT “01” in WebTime. Incidents/near-miss incidents, air monitoring completed and the type of PPE worn by personnel (i.e. Parsons employees and contractors) must also be reported. Submit by the 3rd working day of the following month (an estimation of the monthly field hours based on number of people working on the project each day is acceptable).

Definitions and Reporting Criteria

Field Hours - time spent by the employee working at a job site or field project, even if performing office/administrative work (i.e. in a modular trailer). Working in another Parsons office or at a client’s corporate/main office is not considered field hours for the purposes of this reporting.

Incident - any unplanned or unexpected event, including near-misses, first aid cases, personal injuries requiring medical treatment, vehicle or equipment damage or an environmental release.

Near-miss Incident (NI) - an unplanned or unexpected event that has the potential to result in a personal injury, vehicle or equipment damage, or environmental release, but does not occur (i.e. almost happened).

PPE - Personal Protective Equipment above Level D (work clothes) or Modified Level D (Tyvek or fire retardant coveralls). This includes Level C (chemical resistant suit and/or air-purifying respirator), Level B (chemical resistant suit and/or supplied air) or Level A (full encapsulation suit with SCBA).

Subcontractor - contractors hired by Parsons or a Parsons contractor, to perform activities in the field. Contractor company names should be listed and tracked separately in the Table below, followed by the hiring company in parentheses (i.e. Parsons or subcontractor).

Project Name:		Client:			
Project Location:		Client Contact:			
Parsons Contact:		Project #:		Month:	

Parsons and/or Contractor	Hours	Type of Activities	Incident or NI
Parsons			Yes No
			Yes No
			Yes No
			Yes No

Air Monitoring

Was there any air monitoring that took place during the month? No Yes - If “Yes”, indicate below the potential hazards/chemicals monitored (i.e. O2, LEL, dust, VOCs), the monitoring equipment used (i.e. PID, FID, Draeger tubes, 4-gas, DataRAM, cassettes), whether the air monitoring results exceeded an Action Level (AL) or Permissible Exposure Limit (PEL), the level of PPE worn above Level D (C, B or A) and the number of days working in the specific PPE.

Chemical Monitored	Equipment Used	Exceed AL– Exceed PEL	PPE	Days in PPE
		Yes No - Yes		
		Yes No - Yes		
		Yes No - Yes		
		Yes No - Yes		

NOTE: If an AL/PEL is exceeded or PPE above Level D is worn, a Supplemental Information Form (available in the Industrial Division Safety Folder on ParShare) must be completed. All incidents must be reported on the PWeb (PARCOMM Online Safety Reporting System).

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 HONEYWELL REQUIREMENTS

HONEYWELL EVENT REPORTING REQUIREMENTS

1. INTRODUCTION

To assure Honeywell Health, Safety and Environmental Remediation (HSER) leadership has sufficient knowledge of significant adverse events to enhance decision-making and drive improved performance, the following event reporting procedure will be followed to report Safety & Environmental Incidents and Near Misses (referred to as events in this procedure) for all Honeywell projects.

These requirements will be reviewed with project staff when they start working on the projects and on a regular basis thereafter.

2. CONTRACTOR REPORTING TO HONEYWELL SYRACUSE PERSONNEL

Event reporting to Honeywell senior management is the responsibility of Honeywell personnel. Contractor personnel should report the incident to the Syracuse Honeywell personnel per Section 2.2 as soon as it is safe to do so. When that call is made, provide the information listed below to assist in classifying the event.

2.1 INCIDENT REPORTING

The Alliance Partner PM and Safety Manager must be **notified** by the SHSO of any incident immediately.

After notification, **written incident reports** must be submitted by the SHSO in accordance with time frames shown on the following table. Honeywell representatives will be notified within prescribed time frames. Specific contact names and numbers are attached.

	Tier 1 Incident	Tier 2 Incident	Tier 3 Incident
Notification to the Alliance Partner PM and Safety Manager	Immediate Notification		
Notify Honeywell RES Management Parsons PM	1 hr	4 Hours	12 Hours
Incident Report (written)	Written report within 24 hrs – (All known facts and updated as necessary)		
Entry into Honeywell Event Tracking System	1 Day	1 Day	1 Week

Tier 1 Examples

- One or more on-site or off-site fatalities involving an employee, contractor employee or visitor that are or may be work-related.
- A single work-related on-site or off-site incident resulting in three or more employees, contractors or visitors being admitted to a hospital.
- Any off-site fatalities to the general public that allegedly are or may be related to Honeywell.
- Any security incident that may be immediately dangerous to life or property, including, bomb threats, intentional explosions, chemical releases, radiation releases, or releases of biological/chemical agents.
- Fires that: (a) resulted in significant property damage, or, regardless of the level of damage, (b) were extinguished by a fire department using other than handheld fire extinguishers, or (c) were extinguished by a fire suppression system (other than an integrated fire suppression system within a piece of equipment) or (d) significantly halted operations.
- Suspicious materials, package or letter for which outside authorities were called in to investigate.
- Serious injuries or illnesses in the general public allegedly associated with a company-related incident, event or release to air, water or soil.
- A release to air, water or soil that has an Adverse Environmental Impact which includes a release that triggers a regulatory inquiry.
- Events generating community activism or adverse media coverage not associated with an episodic event at the national/international level.
- Government representatives alleging or suggesting criminal non-compliance of any kind.
- A regulatory agency inspection with notice of fine, penalty or corrective action that has a directive or other type of injunctive device designed or likely to halt, curtail, or restrict operations.

Tier 2 Examples

- Employee or contract employee lost workday injuries/illnesses.
- Any on-site or off-site injuries/illnesses involving an employee, contractor employee or visitor that are or may be work-related and are significant enough to be recordable (e.g., vaccination or doctor prescription).
- Minor injuries or illnesses in the general public that allegedly are associated with a company-related incident, event or release to air, water or soil.
- Suspicious activities in or around Honeywell facilities or processes that may present a potential security risk.
- Fires extinguished using handheld fire extinguisher(s) or an integrated fire suppression system internal to a piece of equipment that did minimal property damage, and did not halt operations.

- Allegations of previously unknown health or environmental effects caused by products, processes, emissions or discharges Allegations of Adverse Health Effects, Hlth-19.
- An environmental excursion that does not also trigger Tier 1 reporting.
- Discovery of potential or actual evidence of contaminated soil or groundwater from current or former operations that does not otherwise meet the definition of an adverse environmental impact.
- Written notification from a governmental agency alleging non-compliance of any kind.
- Proposal or imposition of an HSER fine, penalty or corrective action.
- Receipt of a non-routine request for information from a governmental agency.
- A regulatory agency inspection (excluding those that are Tier 1 Events) with notice of fine, penalty or corrective action.
- An excursion from a permit condition which requires a notification to be sent to an agency that results in any notice of fine, penalty or agency corrective action.
- All HSE audits, including Corporate audits, Peer review, the annual SAT (Self-assessment tool), audits for external HSE certification processes, and SBU audits or special initiatives.
- Any evaluations made by third parties such as HSE consultants or contracted HSE services. Recommendations from such evaluations must be entered as recommendations in the Event Tracking System.
- Significant community activism or adverse media coverage not associated with an episodic event at the local/state level.
- Notice of an allegation from a third party or regulatory agency of environmental impacts from operations on current or formerly operated Honeywell facilities.
- Demands, including voluntary agreements, to conduct a site investigation or remedial measures to respond to environmental impacts from operations on current or formerly operated Honeywell facilities.
- Receipt of an information request or special notice letter associated with the disposal, transportation or storage of hazardous substances by Honeywell or its predecessors.
- Identification of any condition or circumstance which falls under the criteria of "Issues requiring TRAC approval" for which TRAC approval was NOT obtained. The Risk Assessment Committee (TRAC) - HSEMS 605.

Tier 3 Examples

- On-site or off-site employee, contractor employee or visitor injuries/illnesses where first-aid treatment or evaluation is provided by a Medical or Para-Medical Professional (e.g., with no vaccination, prescription, or lost time).

- A regulatory agency inspection (which is not a Tier 1 or Tier 2 Event, and may still be underway) with no notice of fine, penalty or corrective action.
- A notification required to be sent to an agency based on an excursion from a permit condition that does not result in any notice of fine, penalty or agency corrective action as directed by the SBG for reporting:
- Employee, contractor or visitor injuries/illnesses injury/illness where first-aid treatment or evaluation is provided by someone other than a Medical or Para-Medical professional.
- Significant near misses.
- Stewardship outreach events with customers, suppliers and/or communities, Operations successes at facilities (i.e., ISO Certification, VPP, OHSAS, local or state recognition, etc.).
- An environmental excursion that does not also trigger Tier 2 reporting.

<table>
<tr><th>Event Type</th><th>Project Team Responsibility</th><th>Honeywell Responsibility</th></tr>
<tr><td>Tier 1</td><td>• Initiate local emergency response as appropriate
• Notify Honeywell as soon as possible but no later than within 1 hour of the event. Do not wait for internal management clearance before notifying Honeywell.
• Honeywell Notification Hierarchy (work down list until positive contact is made in person):
o Remediation Manager
o Remediation Portfolio Director
o Design and Construction Manager
o Director of Design and Construction
• See site-specific contact list for Names and contract information</td><td>• Coordinate Honeywell response
• Enter event or have designated person enter even into the Honeywell Management System Tool within one business day.</td></tr>
<tr><td>Tier 2</td><td>• Initiate local first aid, medical, or security response as appropriate
• Notify Honeywell within four hours of the event.
• Honeywell Notification may be by telephone or email to:
o Remediation Manager
o Design and Construction Manager
• Get positive confirmation of receipt from Remediation Manager and Design and Construction Manager within six hours of the event. If not achieved notify:
o Remediation Portfolio Director
o Director of Design and Construction
• Continue to follow up until receipt of notification is confirmed.
• See site-specific contact list for Names and contract information</td><td>• Coordinate Honeywell response
• Enter event or have designated person enter event into the Honeywell Management System Tool within one business day.</td></tr>
<tr><td>Tier 3</td><td>• Initiate local first aid, medical, or security response as appropriate
• Notify Honeywell within one day of the event.
• Honeywell Notification may be by telephone or email to:
o Remediation Manager
o Design and Construction Manager
• Get positive confirmation of receipt from Remediation Manager and Design and Construction Manager.
• Continue to follow up until receipt of notification is confirmed.
• See site-specific contact list for Names and contract information</td><td>• Coordinate Honeywell response
• Enter event or have designated person enter event into the Honeywell Management System Tool within seven business days.</td></tr>
</table>

Event Call List - Contact Information

Name	Title/Role	Office	Cell
<u>Honeywell Management</u>			
John McAuliffe	Director of Design and Construction	315.552.9782	315.440.0859
Steve Coladonato	Remediation Manager	302.791.6738	973.216.2438
Rich Galloway	Design and Construction Manager	973.455.4640	973.610.2316
Eric Christodoulatos	Alternate	973.455.2877	973.216.5272
Merry Abbott	Lead Event Report Data Entry	973.455.5821	
Michelle McDonald	Alternate Event Report Data Entry	315.552.9783	315.415.2420
<u>Honeywell Communications</u>			
Victoria Streitfield	Communications		609.218.9460
<u>Parsons</u>			
George Moreau	Project Manager	315.552.9715	315.491.6249
Greg Ertel	Safety Manager		585.465.0557
Tom Abrams	Program Manager	315.552.9670	315.263.5109
<u>NYSDEC</u>			
Ben McPerson	DEC Site Manager	716.851.7220	
24-Hour Spill Hotline		800.457.7362	

ATTACHMENT C ACTIVITY HAZARD ANALYSES

Activity Hazard Analysis Master List

(to be updated as new task/activities are required)

- Site Visit or Site Walk
- Drilling
- Monitoring Well Gauging and Sampling
- Personnel Decontamination
- Motor Vehicle Operations
- Decontamination of Portable Tools
- CAMP Operations
- IDW Management and Sampling
- Oversight of Test Pit Activities
- Well Maintenance and Repair
- Sediment Probing
- Vibracoring
- Hand Coring Sediment/Soil

ATTACHMENT C ACTIVITY HAZARD ANALYSES

Activity Hazard Analysis Master List

(to be updated as new task/activities are required)

AHA's to be developed prior to start of work:

- Site Visit or Site Walk
- Drilling
- Monitoring Well Gauging and Sampling
- Personnel Decontamination
- Motor Vehicle Operations
- Decontamination of Portable Tools
- CAMP Operations
- IDW Management and Sampling
- Oversight of Test Pit Activities
- Well Maintenance and Repair
- Sediment Probing
- Vibracoring
- Hand Coring Sediment/Soil

Activity Hazard Analysis 001

Activity/Work Task: Site Visit or Site Walk

Overall Risk Assessment Code (RAC) (Use highest code): **M**

Project Location: 3800 River Road, Tonawanda, NY

Date Prepared: 03/19/2020

Prepared by: Megan Clark

Reviewed by (Name/Title): Greg Ertel

Employer / GBU: Parsons

Notes: (Field Notes, Review Comments, etc.)
References:
ESHARP Manual

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	H	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.

"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
Site visit/walk	Slips, Trips, Falls	▪ Workers will be aware of potentially slippery surfaces and tripping hazards. Do not talk on cell phone or look at documents while walking, focus on task. ▪ Walk slowly during transit. Jumping, running, and horseplay are prohibited. ▪ Workers will keep all areas clean and free of debris to deter any unnecessary trips and falls. ▪ 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. ▪ Personnel will notify the Project Manager 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.			

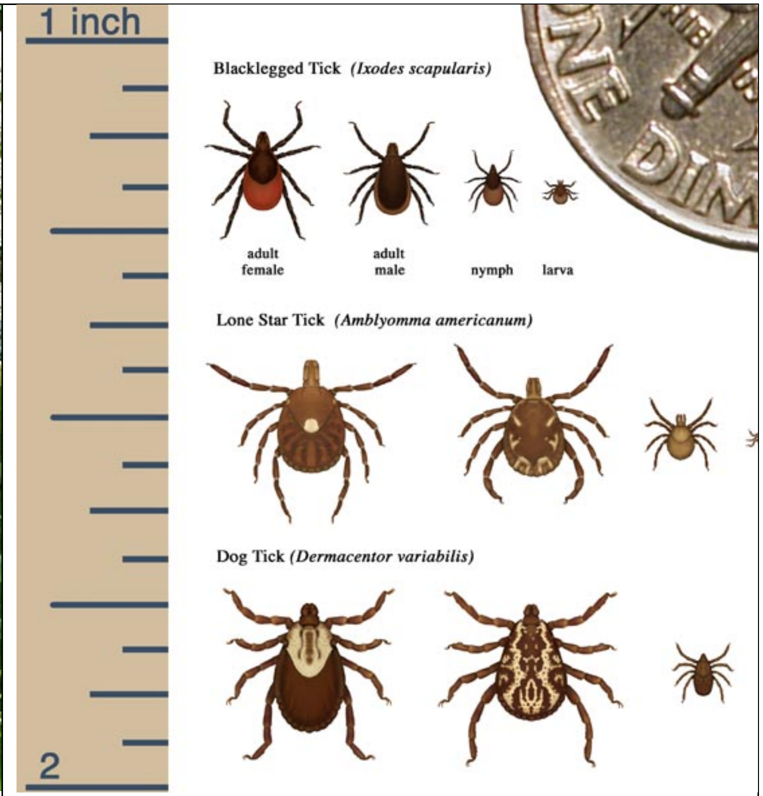
Activity Hazard Analysis AHA 001 (Cont'd)

Activity/Work Task: Site Visit or Site Walk			Overall Risk Assessment Code (RAC) (Use highest code)			M
Project Location: Greece, New York			Risk Assessment Code (RAC) Matrix			
Job Steps (Contd)	Hazards	Controls		P	S	RAC
Site visit/walk (cont'd)	Sunshine	▪ Have sunscreen and safety sunglasses available for ultraviolet protection. Have water for dehydration.		O	M	M
	Biological Hazards	▪ Know how to recognize biological hazards (see photos below) ▪ Avoid contact with poison ivy ▪ Use caution when opening wells to avoid being bit by insects ▪ Personnel will be aware of potential exposure to biological hazards. ▪ Wear appropriate clothing (hard hat, minimum short -sleeve shirt, long pants, gloves, boots etc.) and insect repellant. ▪ COVID-19: Maintain 6-ft apart from other people and wash hands with soap and water frequently. See "Biological Hazards" in PSHEP and Appendix I of PSHEP for more information.		O	M	M
	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.		O	M	M
	Cold and Heat Stress	▪ Visitors will dress accordingly to prevent injuries from extreme heat, or cold. ▪ SSHO will monitor for cold/heat stress symptoms.		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. ▪ Practice contamination avoidance, work upwind if feasible, limit contact to the extent possible, and do not eat in areas with COC's, keep drink containers covered. ▪ Appropriate PPE will be worn dependent on site conditions and actions levels. ▪ Must sign off on health and safety plan.		O	M	M

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
Level D- Long pants, safety glasses, hard hat (in presence of heavy equipment), steel-toed boots. The following safety equipment is task dependent: gloves, goggles.	<u>Training Requirements:</u> 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. <u>STOP WORK AUTHORITY</u> *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.	▪ Inspect job site and staging area and identify any concerns. ▪ Inspect job site daily.

Poison Ivy

Hogweed



Ticks

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 Site Visit or Site Walk 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) 002

Activity/Work Task: Drilling	Overall Risk Assessment Code (RAC) (Use highest code)					**M**
Project Location: 3800 River Road, Tonawanda, NY	**Risk Assessment Code (RAC) Matrix**					
Date Prepared (MM/DD/YY): 03/19/2020	**Severity**	**Probability**				
		Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name/Title): Megan Clark	Catastrophic	**E**	**E**	**H**	**H**	**M**
	Critical	**E**	**H**	**H**	**M**	**L**
Reviewed by (Name/Title): Greg Ertel	Marginal	**H**	**M**	**M**	**L**	**L**
Employer / GBU: Parsons/PE&I	Negligible	**M**	**L**	**L**	**L**	**L**

Notes: (Field Notes, Review Comments, etc.) **References:**	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
Drilling and Sampling	Injury from Failure of Equipment	• Proper site-specific safety training for operator and crew • Know the location of the drill rig kill switches. • Daily inspection to include: ▪ Vehicle/equipment condition ▪ Properly block and level machine ▪ Daily walk around inspections and pre-operation inspections ▪ Proper equipment storage ▪ Condition of all fittings, drive rods, and hydraulic lines ▪ Presence and check first aid kit and fire extinguisher	S	Cr	M

Job Steps	Hazards	Controls	P	S	R A C
	Inhalation and Contact with Hazardous Substances or Vehicle Exhaust	• Provide workers proper skin, eye, and respiratory protection based on the exposure hazards and vehicle exhaust present • Review hazardous properties of site contaminants and vehicle exhaust with workers before sampling operations begin • Orient operator cross-wind • Keep all sampling supplies and bottles upwind or cross-wind	S	M	L
	Contact with Utilities	• Use Underground Utility Avoidance procedures: ▪ Check site blueprints ▪ Use locator to mark utilities (One Call, etc.) ▪ Have emergency telephone number available ▪ Mark known utilities • Maintain safe distance from overhead electrical lines (See Table below)	S	Cr	M
	Struck by/Against Flying Particles, Protruding Objects, Liquid Splash	• Wear hard hats, safety glasses with side shields and steel-toed safety boot at all times. • Keep hands clear of rod prior to it being driven • Wear splash shields and safety goggles when cleaning, decontaminating drilling equipment	S	Cr	M
	Back injuries; musculoskeletal disorders (MSD)	• Observe proper lifting/carrying techniques – hold load close to body, turn entire body rather than twisting, and use leg muscles instead of back muscles. • Obey sensible lifting limits (50 lb. maximum per person for one-time manual lifting, 35 lb. limit for repetitive tasks). Know your limits. • Use mechanical lifting equipment (handcarts, trucks) or more than one person to move large, awkward loads. • Avoid performing the same strenuous activity for extended periods.	S	Cr	M
	Injuries from improper use of hand tools and equipment	• Maintain all tools in safe, good working condition. • Use appropriate cutting tools. • When using cutting tool, always cutting away from body and hands. • Wear adequate gloves – follow FMC glove standard. • Choose the proper tool for the job. • Provide training on proper operation of tools and equipment. • Keep guards in place during use. • All power tools will have insulated handles, be electrically grounded, or be double insulated. • Tag and take damaged or worn tools out of service.	S	Cr	M

Job Steps	Hazards	Controls	P	S	RAC
	Caught In/Between Moving Parts	• Identify and understand parts of equipment which may cause crushing, pinching, rotating, or similar injuries • Assure guards are in place to protect from these parts of equipment during operation • Provide and use proper work glove when the possibility of pinching, or other injury may be caused by moving/handling large or heavy objects • Maintain all equipment in safe condition • Keep all guards in place during use • De-energize and lock-out machinery before maintenance or service Know location of drilling rig kill switches.	U	Cr	L
	Flammable, Explosive Atmospheres, Exposure to volatile contaminants	• Monitor for explosives using a multi-gas meter • Monitor breathing zone for volatile organic compounds • Turn engine off before refueling. • Eliminate sources of ignition from the work area. • Prohibit smoking in well drilling area. • Provide ABC (or equivalent) fire extinguishers and keep nearby work area. • Store flammable liquids in well ventilated areas. • Prohibit storage of flammable liquids in plastic containers. • Store combustible materials away from flammables. • Separate flammables and oxidizers by 20 feet minimum.	U	Cr	L

Minimum Clearance from Energized Overhead Electrical Line

Nominal System Voltage	Minimum Required Clearance
0 - 50 kV	10 feet
51 - 200 kV	15 feet
201 - 300 kV	20 feet
301 - 500 kV	25 feet
501 - 750 kV	35 feet
751 - 1000 kV	45 feet

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	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 002 Drilling 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) 003

Activity/Work Task: Monitoring Well Gauging and Sampling	Overall Risk Assessment Code (RAC) (Use highest code)							M
Project Location: 3800 River Road, Tonawanda, NY	**Risk Assessment Code (RAC) Matrix**							
Project Number: 451586.02100	**Severity**	**Probability**						
Date Prepared: 03/19/2020		Frequent	Likely	Occasional	Seldom	Unlikely		
Prepared by (Name): Megan Clark	Catastrophic	E	E	H	H	M		
	Critical	E	H	H	M	L		
Reviewed by (Name/Title): Greg Ertel	Marginal	H	M	M	L	L		
Employer / GBU: Parsons	Negligible	M	L	L	L	L		
Notes: (Field Notes, Review Comments, etc.) **References:** PSHEP	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.	S	M	L

		▪ 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 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: Site Walk			
Mobilization / Staging	Slips, Trips, and Falls	▪ Refer to General/Work Area above.	S	M	L

	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 per PSHEP. If elevated readings persist for greater than 5 minutes, close-up/cap well, stop work, and leave the area. ▪ Use appropriate decontamination procedures. ▪ Wear safety glasses and nitrile gloves. ▪ Reel-up water level monitoring device slowly.	S	M	L

Groundwater Sampling	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. ▪ 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 006: Decontamination of Portable Tools				
IDW Management	Refer to AHA 008: IDW Management and Sampling				

Activity Hazard Analysis AHA 003 (Cont'd)

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	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	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)

Activity Hazard Analysis AHA 003 (Cont'd)

warning signage, cones, hi-vis markers, etc, fire extinguisher, insect repellent.	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.	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

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Activity Hazard Analysis (AHA) 004

Activity/Work Task: Personnel Decontamination	Overall Risk Assessment Code (RAC) (Use highest code)					M
Project Location: 3800 River Road, Tonawanda, NY	**Risk Assessment Code (RAC) Matrix**					
Project Number: 451586.02100	**Severity**	**Probability**				
Date Prepared: 03/19/2020		Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name): Megan Clark	Catastrophic	E	E	H	H	M
	Critical	E	H	H	M	L
Reviewed by (Name): Greg Ertel	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	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
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. ▪ 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 Walk			
	▪ 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.	O	M	M

Activity Hazard Analysis (AHA) 004 (Contd)

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

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 004 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 Hazard Analysis (AHA) 005

Activity/Work Task: Motor Vehicle Operations	**Overall Risk Assessment Code (RAC) (Use highest code)**						**L**
Project Location: 3800 River Road, Tonawanda, NY	**Risk Assessment Code Matrix**						
Job Number: 451586	**Severity**	**Probability**					
Date Prepared: 03/19/2020		Frequent	Likely	Occasional	Seldom	Unlikely	
Updated by: Megan Clark	Catastrophic	**E**	**E**	**H**	**H**	**M**	
	Critical	**E**	**H**	**H**	**M**	**L**	
Reviewed by (Name/Title): Greg Ertel	Marginal	**H**	**M**	**M**	**L**	**L**	
	Negligible	**M**	**L**	**L**	**L**	**L**	
Notes: (Field Notes, Review Comments, etc.)	**Step 1:** Review each "Hazard" with identified safety "Controls" and determine RAC (See above). The RAC is developed after correctly identifying all hazards and fully implementing all controls.						
	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**	
	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**
Travel by Automobile	Lack of awareness	• Use common sense. Don't be a target for criminals due to vulnerability. • Avoid bringing/carrying large amounts of cash and valuables (leave them home). • Put personal items out of sight in the trunk of the car. • Gather as much information as possible about the location to which you are going. • Travel during daylight hours if possible. • Allow adequate time for delays due to construction, accidents, or other unforeseen circumstances. • Drive defensively. • Complete the ParsonsU driving modules. • Drive appropriately for road, traffic, and weather conditions. Postpone travel as necessary. • Perform walk-around before driving off. • Check the weather forecast along route prior to departing. • Use lights and wipers during inclement weather. • Pay attention to unusual vehicle noises and parts that appear out-of-place or broken. Have these items/deficiencies checked out and repaired as soon as possible.	S	M	L

Job Steps	Hazards	Controls	P	S	RAC
Travel by Automobile	Operation of motor vehicle	• Stay alert for animals crossing your path and signs indicating animal crossings. • Be aware of surroundings while arriving and departing site, specifically potential truck traffic and pedestrian traffic from bike path on west side of River Road. • Drivers must have a valid driver's license and wear a seat belt at all times. • Get adequate rest prior to driving. • Walk around vehicle before getting in and driving away. • Use of communication devices (e.g., cell phone, radio) while driving is prohibited. Do not answer cell phone. • If vehicle is rented, become familiar with all controls before driving. • Ensure seat, mirrors, steering wheel, radios, and other controls are set before driving. Lock doors. • Ensure windows and mirrors are cleaned as needed throughout trip. • Wear sunglasses as necessary to reduce glare and fatigue. • Pull over and rest in a safe location if experiencing signs of fatigue or drowsiness. • Do not use cruise control on rainy, snowy, or icy roads. • Park only in approved parking spaces or safe areas not within the equipment travel path. • Use parking brake when parking on a slope or near road edge. • When exiting vehicle, observe ground surface before stepping out, watching for ice, snow, water, cracks, and uneven surfaces. If ground is slippery, hold onto secure part of vehicle. • Follow posted speed limits and other traffic controls. • Do not tailgate. • Ignore and avoid discourteous drivers. • Do not aggravate or exchange gestures with persons in other vehicles. • Consider carrying useful items in your vehicle such as extra clothing and water, snacks, rain gear, gloves, paper towels, windshield washer fluid, ice scraper/squeegee, jumper cables, first aid kit, tool kit, fire extinguisher.	U	Cr	L
	Breakdown	• Use common sense about your safety and security. • Stay with your vehicle if it is safe to do so. Otherwise move away from the vehicle. • Raise vehicle hood or attach something white to antenna or out the window to indicate help needed. • Be cautious if persons stop to assist. • Call 911 as necessary. • Use emergency flashers and safety device such as reflective triangles to indicate presence of disabled vehicle.	U	Cr	L
	Tire blowout	• Grip steering wheel at first sign of trouble. • Do not slam on brakes, but let the vehicle slow down itself as you work the vehicle off the road and out of traffic to the safest place possible. • Do not turn off vehicle because that will disable the brakes and steering. • Use emergency flashers and safety device such as reflective triangles to indicate presence of disabled vehicle.	U	Cr	L

Job Steps	Hazards	Controls	P	S	RAC
Gas Station Refueling	Fire/fuel splashes or overflow	• Shut down vehicle prior to refueling. • No smoking while refueling. • Do not use cell phones or perform other activities that may distract you while refueling. • Remain outside the vehicle. • Position dispensing nozzle correctly and watch to ensure the gas is not overflowing. • Be careful not to spill or drip fuel while refueling. • Ensure clothing does not become contaminated with flammable or combustible fluids. Change clothing if it becomes contaminated.	U	Cr	L
Jump Battery	Traffic/struck-by	• Ensure vehicles are safely positioned out of the flow of traffic. • Use emergency flashers and a safety device such as reflective triangles to indicate presence of disabled vehicle. • Do not stand between vehicles if possible, and do not stand in the line of traffic.	U	Cr	L
	Fire or explosion	• Connect red (positive) jumper cable clamp to dead battery positive (+) post. • Connect red (positive) jumper cable clamp to live battery positive (+) post. • Connect black (negative) jumper cable clamp to live battery negative (-) post. • Connect black (negative) jumper cable clamp to clean metal part of disabled vehicle, not to negative (-) post of disabled vehicle. • When the disabled vehicle starts, remove the cable in the reverse order they were placed. • Wear gloves while working on vehicles.	U	Cr	L
Tire Changing	Traffic/struck-by	• Pull over to a safe place, out of traffic, where there is sufficient room to change the flat tire, sacrificing the wheel rim if you have to. • Use emergency flashers and a safety device such as reflective triangles to indicate presence of disabled vehicle. • Call for help if necessary. • Do not attempt to change the tire yourself if it is unsafe to do so.	U	Cr	L

Tire Changing	Musculoskeletal, puncture, cuts or other bodily injury	• Read the owner's manual for your vehicle to determine how to free the jack assembly, place the jack under the vehicle, and remove the spare tire. • Call for help if necessary. • Minimize the amount of time body parts are under the vehicle. • Wear gloves and place blanket, jacket, or other item on ground to keep clean and minimize cuts and scrapes. • Chock the wheels with chocks supplied with the jack assembly or with available rocks or wood. • Loosen the lug nuts prior to jacking the tire off the ground. • Remove the nut covers or plastic wheel cover if necessary to access the lug nuts. • For trucks, be aware of pinch points when unfolding rods to lower spare tire. • Lower the tire with enough slack to make the spare easier to reach. • Check the tire pressure as soon as it is accessible to ensure it is properly inflated. • If you have trouble lifting the spare tire onto the hub, use the lug wrench as a lever to lift the tire enough to place it on the hub. • Ensure lug nuts are tightened adequately and evenly, tightening in a diagonal pattern. • Lifting carefully, place flat tire in trunk, truck bed, or under truck in the opposite order of lowering the tire. • If the spare tire is not a full-size tire, it cannot be driven as fast or far as a full-size tire. • Repair/replace the full-size tire as soon as possible.	U	M	L

Equipment to Be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
Motor vehicle	All drivers are required to have a current valid driver's license, and all vehicles must have the required state vehicle registration and/or inspection documents. All employees operating a company vehicle are required to familiarize themselves with the contents of this AHA before starting a work activity.	Perform walk-around before driving off. Inspect all fluid level and air pressure in tires, adjust mirrors and seat positions appropriately, watch fuel level and fill up when level is low.
Emergency Equipment (list type of equipment and where equipment will be located): • First aid kits-in vehicles • Fire extinguishers-vehicles • Cellular telephone	Training: site safety briefing and daily tailgate safety briefings	The contents of first aid kits should be checked prior to use on site and at least every three months to ensure they are complete, in good condition, and have not expired. First aid kit contents shall be replaced when used. Fire extinguishers should be inspected monthly and maintained as specified in NFPA 10

ACTIVITY HAZARDS ANALYSIS TRAINING ACKNOWLEDGEMENT AND SIGN OFF

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Activity Hazard Analysis (AHA) 006

Activity/Work Task: Decontamination of Portable Tools	Overall Risk Assessment Code (RAC) (Use highest code)						**M**
Project Location: 3800 River Road, Tonawanda, NY	**Risk Assessment Code (RAC) Matrix**						
	Severity	**Probability**					
Date Prepared: 03/19/2020		Frequent	Likely	Occasional	Seldom	Unlikely	
Prepared by: Megan Clark	Catastrophic	**E**	**E**	**H**	**H**	**M**	
	Critical	**E**	**H**	**H**	**M**	**L**	
Reviewed by (Name/Title): Greg Ertel	Marginal		**M**	**M**	**L**	**L**	
Employer: Parsons	Negligible	**M**	**L**	**L**	**L**	**L**	

Notes: (Field Notes, Review Comments, etc.) **References:** **PSHEP, ESHARP Manual**	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	Site Hazardous Material Exposure	▪ Training and safety awareness of potential exposure to contaminates at the site and decontamination procedures. ▪ Appropriate PPE will be worn (e.g., gloves, splash goggles, Tyvek, etc.). ▪ Personnel will follow decontamination procedures.	S	M	M
	Eye Injury	▪ PPE (safety glass, etc.) will be worn.	O	N	M
	Slips, Trips, Falls	▪ Workers will be aware of potentially slippery surfaces and tripping hazards. ▪ Workers will keep all areas clean and free of debris to deter any unnecessary trips and falls. ▪ Personnel will clean up all spills immediately. ▪ Personnel will notify the SSO of any unsafe conditions.	O	N	L

Activity Hazard Analysis (Cont'd)

Job Steps (Contd)	Hazards	Controls	P	S	RAC
Remove gross contamination with brush.	Damaging equipment or tools	▪ To clean instrumentation: follow manufacturer's instructions.	O	N	L
Place in decontamination bucket or rinse with decontamination solution	Spill/leakage	▪ Workers will have berms or spill absorbent pads nearby to prevent the spread of contaminated water. ▪ Decontamination area will be designed to minimize exposure and maintain spill containment.	O	N	L
Clean with wash solution	Chemical reaction with wash solution	▪ A fire extinguisher will be located in an accessible location on site. ▪ Review the chemicals of concern and use appropriate wash solution.	O	N	L
Rinse with water	Contamination remains	▪ Personnel will repeat proper decontamination procedure.	O	N	L

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
Level D- Long pants, safety glasses, hard hat (in presence of heavy equipment), steel-toed boots. The following safety equipment is project dependent: gloves, goggles.	<u>Training Requirements:</u> 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. <u>STOP WORK AUTHORITY</u> *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.	

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 Decontamination of Portable Tools 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 Hazard Analysis (AHA) 007

Activity/Work Task: CAMP Operations	Overall Risk Assessment Code (RAC) (Use highest code)					**M**
Project Location: 3800 River Road, Tonawanda, NY	**Risk Assessment Code (RAC) Matrix**					
Project Number: 451586	**Severity**	**Probability**				
Date Prepared: 03/19/2020		Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name): Megan Clark	Catastrophic	**E**	**E**	**H**	**H**	**M**
	Critical	**E**	**H**	**H**	**M**	**L**
Reviewed by (Name): Greg Ertel	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	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 o 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. o Use a mini RAE 3000 PID to monitor worker breathing zone during drilling activities. Refer to PSHEP for action levels. o Regularly inspect cal gas regulator, tedlar bag, and canister.	S	M	L

		o Monitor workers breathing zone at a minimum of once every 30 minutes.			
	▪ 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.	S	Cr	M
	▪ Heat/Cold Stress ▪ Biological Hazards ▪ Adverse Weather ▪ Uneven/Wet Terrain	▪ Refer to AHA 001: General Site Walk			
	▪ 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

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Activity Hazard Analysis (AHA) 008

Activity/Work Task: IDW Management and Sampling	Overall Risk Assessment Code (RAC) (Use highest code)						**M**
Project Location: 3800 River Road, Tonawanda, NY	**Risk Assessment Code (RAC) Matrix**						
Project Number: 451586	**Severity**	**Probability**					
Date Prepared: 03/19/2020		Frequent	Likely	Occasional	Seldom	Unlikely	
Prepared by (Name): Megan Clark	Catastrophic	**E**	**E**	**H**	**H**	**M**	
	Critical	**E**	**H**	**H**	**M**	**L**	
Reviewed by (Name): Greg Ertel	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	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	S	Cr	M

		▪ 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 ▪ 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 Site Walk			
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.	S	Cr	M

		▪ Wear proper PPE when lifting and moving empty drums and totes – hard hat, safet glasses, steel toed boots, and heavy work gloves.			
	▪ 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 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.	O	M	M
	▪ 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
Waste Characterization Sampling (Drums/Totes	▪ 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

		▪ 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.	S	Cr	M
	▪ 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

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,	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.	Ongoing environmental condition inspection (weather, wind, heat, cold). Ongoing personnel inspection (buddy system)

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.	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.	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

Read Carefully Before Signing Below

This is to acknowledge that I have had a chance to review a copy AHA 008 IDW Management 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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Activity Hazard Analysis (AHA) 009

Activity/Work Task: Oversight of Test Pit Activities	Overall Risk Assessment Code (RAC) (Use highest code)					**M**
Project Location: 3800 River Road, Tonawanda, NY	**Risk Assessment Code (RAC) Matrix**					
Contract Number:	**Severity**	**Probability**				
Date Prepared (MM/DD/YY): 03/19/2020		Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name/Title): Megan Clark	Catastrophic	**E**	**E**	**H**	**H**	**M**
	Critical	**E**	**H**	**H**	**M**	**L**
Reviewed by (Name/Title): Greg Ertel	Marginal	**H**	**M**	**M**	**L**	**L**
Employer / GBU: Parsons	Negligible	**M**	**L**	**L**	**L**	**L**

Notes: Oversight of contractor excavating test pits and a survey crew marking utilities **Minimum PPE includes: Hard hat, High Vis Vest, Safety Shoes and Glasses, Long sleeves FRC, gloves suitable for the task** **References:** PSHEP	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
1) Evaluation of work site, establish work zones	Traffic	**Be seen Be Aware!** Wear a brightly colored traffic vest and hard hat at all times while on site. Look around corners of vehicle, equipment or buildings before entering areas of traffic. Have designated routes of travel, post and enforce site speed Limit. Parking facing out if possible use spotters when backing.	U	Cr	L
	Working around equipment, buildings and piping	**Review Site Layout and work area:** Make sure all utilities have been identified and we maintain adequate distance	S	Cr	M
	Slips Trips and Fall	Ensure that working surface is free of debris eliminating slips, trips and falls and there is adequate room to maneuver safely. Discuss tasks at tailgate and coordinate work activities.	S	M	L

Activity/Work Task: Oversight of Test Pit Activities		Overall Risk Assessment Code (RAC) (Use highest code)			M
Project Location: 3800 River Road, Tonawanda, NY		**Risk Assessment Code (RAC) Matrix**			
	Site Security	Maintain integrity of fence, avoid confrontation with trespassers if prese Call Police if necessary. All visitors must check in before starting work.	S	M	L
2) Oversight of Excavation	Slip, trip & fall	Conduct area survey and follow plan for excavation. Continuous housekeeping during operations.	S	M	L
	Noise	Wear hearing protection (ear muffs or foam inserts) if difficult to communicate or working around high noise equipment	S	M	L
	Electrical Contact with overhead lines	Potential for contact with electrical systems. Stay out of the exclusion zone unless trained and authorized to do so. Only trained employees will be involved in electrical work. Identify and point out low OH lines to contractor as part of orientation.	S	M	L
3) Begin Test Pit Activities	Slip, trip & fall	Conduct area survey and follow plan for excavation. Continuous housekeeping during operations.	S	M	L
	Contact & entanglement with hazards and points of operation from hand or power tools	Inspect equipment before use, only use trained operators. Follow manufacturer's instructions. Be very aware of the dangers of loose clothing near rotating machinery.	S	Cr	M
	Noise	Wear hearing protection (ear muffs or foam inserts).	U	M	L
	Head bump	Wear hard hat to protect head from head bump hazards or falling equipment.	S	M	L
	Lifting – muscle/joint strain	Use proper body mechanics when carrying equipment or packages. Avoid bending at the waist, twisting or awkward postures. Get a firm grip on the load and plan your route. Use two person lift for loads greater than 50 pounds	S	M	L
	Struck-by or caught between equipment	Stay a safe distance from contractors, notify them and be sure it is safe before approaching	U	C	L
4) Soil Sampling	Cuts and Abrasions	Wear cut resistant gloves when conducting sampling activities	S	M	L
	Contaminated materials	Wear appropriate PPE, including nitrile gloves	U	M	L

Activity/Work Task: Oversight of Test Pit Activities		Overall Risk Assessment Code (RAC) (Use highest code)				**M**
Project Location: 3800 River Road, Tonawanda, NY		**Risk Assessment Code (RAC) Matrix**				
	Cuts and Abrasions Contaminated materials	Wear cut resistant gloves when conducting sampling activities Wear appropriate PPE, including nitrile gloves		U	M	L
Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	**Inspection Requirements**				
High Visibility Safety Vest, Level D with long sleeves, FRC Protective Gloves – Cut-resistant, nitriles as needed, Hearing Protection - Ear plugs or muffs as needed, Excavator and related equipment, survey equipment	Review HASP Equipment operator	Inspect equipment and site at the beginning of the day, prior to beginning work and mid-day. Daily Pre-use Equipment check and PPE				

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 Oversight of Test Pit 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.

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Activity Hazard Analysis (AHA) 010

Activity/Work Task: Well Maintenance and Repair	Overall Risk Assessment Code (RAC) (Use highest code)	**L**
Project Location: 3800 River Road, Tonawanda, NY	**Risk Assessment Code (RAC) Matrix**	
Contract Number:		
Date Prepared (MM/DD/YY): 03/19/2020		
Prepared by (Name/Title): Megan Clark		
Reviewed by (Name/Title): Greg Ertel		
Employer / GBU: Parsons		
Notes: (Field Notes, Review Comments, etc.) **References:**		

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**

Job Steps	Hazards	Controls	P	S	RAC
Access site monitoring wells	▪ Pinch points ▪ Sharp Edges ▪ Slip/trip/falls ▪ Hand Injury ▪ Splash/spill/direct contact with water	▪ Use gloves to protect hands from sharp edges and direct contact when appropriate ▪ Maintain clear vision of where you are walking, maintain good housekeeping ▪ Wear work gloves to loosen bolts and pry lid open,place pry bar between lid and ground surface before grabbing lid with gloved hand ▪ Wear appropriate safety equipment (i.e., goggles, gloves, boots) as appropriate for reducing risk of contamination.	S	M	L

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Activity Hazard Analysis (AHA) Example (Contd)

Job Steps (Contd)	Hazards	Controls	P	S	RAC
	▪ Contact with water ▪ Occasional Vehicular traffic ▪ Lifting	▪ Wear safety glasses, latex inner and nitrile outer gloves ▪ Wear brightly colored traffic vest when appropriate or use traffic cones to block off the area ▪ Prepare and think through each lift, use good body mechanics	S	M	L
Breaking concrete apron	▪ Flying debris ▪ Contact with soil ▪ Lifting ▪ Slip/trip/fall	▪ Wear safety glasses, appropriate gloves ▪ Practice good housekeeping, watch where you step ▪ Personnel will utilize proper lifting techniques or ask for assistance with moving/lifting objects.	S	M	L
Install Concrete apron	▪ Slips/trips/falls ▪ Splash and spill hazards ▪ Back strain	▪ Wear safety glasses, appropriate gloves ▪ Practice good housekeeping, watch where you step ▪ Personnel will utilize proper lifting techniques or ask for assistance with moving/lifting objects.	S	M	L
Well painting	▪ Slips/trips/falls	▪ Wear safety glasses, appropriate gloves ▪ Practice good housekeeping, watch where you step	S	M	L
General well repair	▪ Pinch points ▪ Sharp Edges ▪ Slip/trip/falls ▪ Hand Injury	▪ Use gloves to protect hands from sharp edges and direct contact when appropriate ▪ Maintain clear vision of where you are walking, maintain good housekeeping ▪ Wear work gloves to loosen bolts and pry lid open,place pry bar between lid and ground surface before grabbing lid with gloved hand	S	M	L

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
Hard hat, safety boots, protective glasses, high visibility clothing	All persons must have site specific training annually and carry card showing completion while on site.	Parsons will observe all subcontractor activities while on site. Honeywell will inspect on intervals daily.

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 Well Maintenance and Repair 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) 011

Activity/Work Task: Sediment Probing	Overall Risk Assessment Code (RAC) (Use highest code)					**M**
Project Location: 3800 River Road, Tonawanda, NY	**Risk Assessment Code (RAC) Matrix**					
Contract Number:	**Severity**	**Probability**				
Date Prepared (MM/DD/YY): 04/17/2020		Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name/Title): Megan Clark	Catastrophic	**E**	**E**	**H**	**H**	**M**
	Critical	**E**	**H**	**H**	**M**	**L**
Reviewed by (Name/Title): Greg Ertel	Marginal	**H**	**M**	**M**	**L**	**L**
Employer / GBU: Parsons	Negligible	**M**	**L**	**L**	**L**	**L**

Notes: (Field Notes, Review Comments, etc.) **References:**	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
Boat Operations	On-Water Hazard	• Stay seated (when possible) to avoid stumbling in the event of rapid deceleration/acceleration/waves • Use anchor or spuds when in place and work is being performed • Have spill pads available in case of fuel or other spills • Be aware of other boat traffic on water • Be aware of dive flag and position of other crews on-water – do NOT move boat while active dive is occurring, wait until diver surfaces and gives the ok to move vessel • File float plan every morning water work will be conducted	S	Cr	M
	Man Overboard	• Be aware of water depth in work area • Ensure all safety lines and rails on vessel are secure in place • Have throw ring with rope on the vessel • Wear personal floatation device (PFD) at all times	U	C	M
	Slips, trips, and falls	• Keep boat deck clear of clutter	U	Cr	L

Activity/Work Task: Sediment Probing	Overall Risk Assessment Code (RAC) (Use highest code)	**M**
Project Location: 3800 River Road, Tonawanda, NY	**Risk Assessment Code (RAC) Matrix**	

		• Clean any spills on boat deck immediately • Mark any potential tripping hazards • Stay seated (when possible) to avoid stumbling in the event of rapid deceleration/acceleration/waves			
Accessing sediment from boat	Slips, trips and falls, collisions, fall in water	▪ Use proper footing and handrails while boarding and disembarking from boat. Be aware of any objects that may present a tripping hazard. ▪ Check for wet or icy surfaces before stepping onto or off of the boat. ▪ Maintain three points of contact while in motion. ▪ Do not board or disembark from boat while carrying a load. Always transfer loads to persons not boarding or disembarking from boat. ▪ Ensure proper boat operation, including safe navigation, development of a float plan, assurance that operator and all passengers are wearing life vests, maintenance of gas and oil levels, availability of necessary safety equipment, proper mechanical function, and valid registration. ▪ Always wear personal floatation device (PFD) while on boat and on shore within 6 ft of water	O	M	M
Probing sediment using a probing apparatus	Pinch Points, Slips, trips, falls, muscle strain/injuries from improper lifting, Skin/eye contact with impacted materials	▪ Never place hands or fingers between boat and probe. ▪ Probe apparatus should be of appropriate length to ensure safe usage and accurate observations. ▪ Always wear safety gloves when handling probe apparatus. ▪ Always hold probe with a firm grip to minimize risk of dropping it. ▪ Rinse probe apparatus in the lake before removing from water to mitigate possible contact with impacted materials. ▪ Always wear nitrile gloves when contact with impacted materials is possible. ▪ Avoid all skin and clothing contact with lake sediments. ▪ If exposure to contaminated materials occurs, promptly wash contaminated skin using soap or mild detergent and water. ▪ Wash sediments from PPE back into the lake following each sampling location and replace soiled gloves. ▪ Have 16 oz. Eyewash on hand for all sampling activities. ▪ Have garbage bags for soiled gloves.	S	M	L

Activity/Work Task: Sediment Probing		Overall Risk Assessment Code (RAC) (Use highest code)			M
Project Location: 3800 River Road, Tonawanda, NY		**Risk Assessment Code (RAC) Matrix**			
		▪ All persons will wear the appropriate eye protection at all times.			

Activity Hazard Analysis (AHA) Example (Contd)

<table>
<tr><td colspan="2">Activity/Work Task: Sediment Probing</td><td>Overall Risk Assessment Code (RAC) (Use highest code)</td><td></td></tr>
<tr><td colspan="2">Project Location: 3800 River Road, Tonawanda, NY</td><td colspan="2">Risk Assessment Code (RAC) Matrix</td></tr>
<tr><th>Equipment to be Used</th><th>Training Requirements/Competent or Qualified Personnel name(s)</th><th colspan="2">Inspection Requirements</th></tr>
<tr><td>▪ Probe apparatus
▪ Boat
▪ PFD</td><td></td><td colspan="2">▪ Ensure that a visual inspection of the probe apparatus is performed prior to use. Ensure that probe apparatus can be adjusted to the proper length, or that multiple apparatuses are available at appropriate lengths.
▪ Inspect the boat prior to use. Look for slip, trip, and fall hazards, as well as adequate gas and oil levels, active registration, and safety equipment.</td></tr>
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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 011 Sediment Probing 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) 012

Activity/Work Task:	Vibracoring	Overall Risk Assessment Code (RAC) (Use highest code)						M
Project Location:	3800 River Road, Tonawanda, NY	Risk Assessment Code (RAC) Matrix						
Contract Number:		Severity	Probability					
Date Prepared:	04/17/2020		Frequent-F	Likely-L	Occasional-O	Seldom-S	Unlikely-U	
Prepared by:	Megan Clark	Catastrophic (C)	E	E	H	H	M	
		Critical (Cr)	E	H	H	M	L	
Reviewed by:	Greg Ertel	Marginal (M)	H	M	M	L	L	
		Negligible (N)	M	L	L	L	L	
Employer/GBU:	Parsons	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.) References : PSHEP		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	
		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
Boat Operation	On-Water Hazard	• Stay seated (when possible) to avoid stumbling in the event of rapid deceleration/acceleration/waves • Use anchor or spuds when in place and work is being performed • Have spill pads available in case of fuel or other spills • Be aware of other boat traffic on water • Be aware of dive flag and position of other crews on-water – do NOT move boat while active dive is occurring, wait until diver surfaces and gives the ok to move vessel • File float plan every morning water work will be conducted	S	Cr	M
	Man Overboard	• Be aware of water depth in work area • Ensure all safety lines and rails on vessel are secure in place • Have throw ring with rope on the vessel • Wear personal floatation device (PFD) at all times	U	C	M
	Slips, trips, and falls	• Keep boat deck clear of clutter	U	Cr	L

Job Steps	Hazards	Controls	P	S	RAC
		• Clean any spills on boat deck immediately • Mark any potential tripping hazards • Stay seated (when possible) to avoid stumbling in the event of rapid deceleration/acceleration/waves			
Vibracore Activities	Pinch Points	• Wear appropriate gloves at all times • Be aware of cables under tension and stay clear of the winch • Do not place hands or other body parts in the line of fire			
	Slips, Trips, Falls	• Be aware of placement and work slowly when around the moon pool • Keep deck clear of debris • Be aware of potential wet or slippery deck conditions			
	Core Collection	• Do NOT move vessel until diver confirmation has been made • Only perform work while spuds are down • Wear nitriles when in contact with lake sediments • Use buddy lift when item weighs over 40 pounds			

Equipment to be Used	Training Requirements / Competent or Qualified Personnel	Inspection Requirements
Minimum PPE: Goggles or Safety Glasses (clear or shaded) Steel Toe Working Boots Hard Hat (when construction activity or other overhead dangers occur onsite) High Visibility Vest Safety Gloves/Hand Protection Cotton or leather gloves when walking onsite (may be insulated in cold weather) Nitrile gloves when handling samples Cut-restistant gloves if using blades or handling glass objects (e.g., sample jars) Potable Water If conditions require (and task dependant): Rain Gear, Personal Flotation Device (USCG Approved)	All personnel performing work onsite must have received site specific orientation. All personnel must be trained on this AHA prior to performing any related work onsite. Competent FA / CPR / AED responder onsite while work is occurring. 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, 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 012 Vibracoring 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 Hazard Analysis (AHA) 013

Activity/Work Task: Hand Coring Sediment/Soil	Overall Risk Assessment Code (RAC) (Use highest code)					M
Project Location: 3800 River Road, Tonawanda, NY	**Risk Assessment Code (RAC) Matrix**					
Contract Number:	**Severity**	**Probability**				
Date Prepared (MM/DD/YY): 04/20/2020		Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name/Title): Megan Clark	Catastrophic	E	E	H	H	M
	Critical	E	H	H	M	L
Reviewed by (Name/Title): Greg Ertel	Marginal		M	M	L	L
Employer / GBU: Parsons	Negligible	M	L	L	L	L

Notes: (Field Notes, Review Comments, etc.) **References:**	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
Walking on sediment	Slips, trips and falls, sinking into sediment	▪ The surface should be tested gently with a foot before transferring your entire body weight. ▪ If the surface appears unstable or gives way, sampling should be aborted.	O	M	M
Observing sampling with hand core apparatus	Pinch Points, Slips, trips, falls, muscle strain/injuries from improper lifting, Skin/eye contact with impacted materials	▪ Always wear PFD when in, or within 6 feet of, water; ▪ Never place hands or fingers near sampler ▪ If water is greater than knee deep, oversight person should be observing from shore with a throw ring on a rope; ▪ Always wear nitrile gloves when contact with impacted materials is possible; ▪ Avoid all skin and clothing contact with ditch sediments; ▪ If exposure to contaminated materials occurs, promptly wash contaminated skin using soap or mild detergent and water.;	U	M	L

Activity/Work Task: Hand Coring Sediment/Soil		Overall Risk Assessment Code (RAC) (Use highest code)			M
Project Location: 3800 River Road, Tonawanda, NY		**Risk Assessment Code (RAC) Matrix**			
		▪ Wash sediments from PPE back into the ditch following each sampling location and replace soiled gloves; ▪ Have garbage bags for soiled gloves; ▪ All persons will wear the appropriate eye protection at all times; ▪ If utilizing winch for core retrieval, keep hands, feet, and body clear of cable.			
	Lack of Communication – resulting in struck by, laceration or similar injuries	▪ 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. Verify cell phone coverage is adequate, store phone is safe location to prevent damage or getting wet. ▪ 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	U	M	L
	Muscle strain/injuries from improper lifting	▪ Personnel will utilize proper lifting techniques or ask for assistance with moving/lifting objects. ▪ Avoid heavy lifts, use two people over 50 lbs, have stable footing, use mechanical lifting aids (hoists, dollies, carts etc) when feasible.	U	M	L

Activity Hazard Analysis (AHA) Example (Contd)

Activity/Work Task: Entering Excavation	**Overall Risk Assessment Code (RAC) (Use highest code)**	
Project Location:	**Risk Assessment Code (RAC) Matrix**	

Equipment to be Used	**Training Requirements/Competent or Qualified Personnel name(s)**	**Inspection Requirements**
▪ Slide hammer ▪ Winch		▪ Look for signs of loose or unstable surfaces (saturated/ponding) avoid these surfaces. ▪ All equipment needs to be inspected daily as well as prior to each use. ▪ Have 16 oz. Eyewash on hand for all sampling activities. ▪ Have garbage bags for soiled gloves.

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 Hand Coring Sediment/Soil 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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ATTACHMENT D CONTRACTOR MODEL SUBCONTRACTOR SAFETY, HEALTH, AND ENVIRONMENT PLAN (SSHEP)

HAZWOPER Template - Subcontractor Safety Plan (SSP)

Instructions for Completing this SSP – Delete from final version

Your actual SSP will begin with the cover/signature page

Welcome to the Honeywell Syracuse Portfolio

Health and Safety Program

(HSP²)

NOTE: The yellow highlight is used to show you where instructions are and where you are to modify this template. After providing the information requested, delete the yellow highlighted instructions. You can turn the yellow highlighting feature off or on throughout the entire document by clicking on TOOLS, OPTIONS, VIEW, HIGHLIGHT, from the toolbar.

Every Subcontractor working on a Honeywell Syracuse Portfolio Site (and their lower tier subcontractors) must establish, implement and maintain a written Subcontractor Safety Plan (SSP) and a copy must be maintained at each work site. The minimum requirements for establishing, implementing and maintaining an effective written Subcontractor Safety Plan are referenced in the contract and are described more thoroughly in the Honeywell Syracuse Portfolio Health and Safety Program (HSP²) guidance document. The Subcontractor and their lower tier subcontractors shall comply with the contract terms and shall complete their SSP to include detailed and specific descriptions relating to the following elements:

- Accountability/Responsibility/Key Line Personnel
- Statement of Subcontractor's Safety and Health Policy
- Drug and Alcohol Free Workplace
- Medical Surveillance Program
- Identification of Competent/Qualified Persons
- Scope of Work Evaluation
- Hazard/Risk/Exposure Assessment
- Hazard Control Measures/Job Safety Analyses (JSA's)
- Subcontractor Periodic Safety Audits/Inspections
- Subcontractor's Risk Mitigation – Two-Week Look Ahead Plan
- Compliance Requirements Policy

- Written Progressive Disciplinary Program
- Hazard Correction Policy
- Training and Instruction
- Project Site Orientation
- Employee Communication System
- Recordkeeping
- Incident/Near Miss Incident Investigations
- Emergency Action Plan
- Site-Specific Medical Emergency Plan
- Hazard Communication Program
- Respiratory Protection Program
- Medical Surveillance Program
- Other written programs as specified by regulatory agency or contract Requirements
- SSP Review and Modifications
- Detailed List of Tables, Forms, Appendices and Attachments

This SSP template has been prepared as an aid for use by Subcontractors and their lower tier subcontractors. Subcontractors should include the scope of work and corresponding safety requirements associated with their lower tier subcontractors in their SSP, unless the lower tiered subcontractor chooses to write a similarly detailed version themselves. This model SSP template was written for a broad spectrum of subcontractor employers so it should be modified to provide the appropriate information for your scope of work. If a section of this SSP does not apply to your project, insert “not applicable” or N/A. Do not delete any sections or change the numbering sequence.

The requirements you write into this SSP must be followed and compliance to those requirements must be audited by the Subcontractor’s Project Manager in order to be effective. In other words, “Plan your Work and Work your Plan”.

SUBCONTRACTOR SAFETY PLAN (SSP)

Prepared For:

Honeywell Syracuse Portfolio
Health and Safety Program

(Insert Office Name - Times New Roman 12 pt.)
(Insert Street Address - Times New Roman 12 pt.)
(Insert City, State and Zip Code - Times New Roman 12 pt.)

Project Name:

(Insert Client Name - Times New Roman 12 pt.)
(Insert Project Name - Times New Roman 12 pt.)
(Insert Street Address - Times New Roman 12 pt.)
(Insert City, State and Zip Code - Times New Roman 12 pt.)

Prepared By:

(Insert Subcontractor Name – Times New Roman 18 pt. Bold)

(Insert Street Address – Times New Roman 12 pt.)
(Insert City, State, and Zip Code – Times New Roman 12 pt.)
Author: (Insert Name and Title)

REVIEWED AND APPROVED BY:

Subcontractor Project Manager: ______________________________ ___________
Date

(INSERT DATE)

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TABLE OF CONTENTS
(CONTINUED)

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LIST OF ACRYNOMS

ATV	All-Terrain Vehicle
BEI	Biological Exposure Index
CPR	Cardio Pulmonary Resuscitation
HSP^2	Honeywell Syracuse Portfolio Health and Safety Program
JSA	Job Safety Analysis
MSDS	Material Safety Data Sheet
OEL	Occupational Exposure Limit
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
PM	Project Manager
PPE	Personal Protective Equipment
PSP	Project Safety Plan
SCBA	Self-Contained Breathing Apparatus
SHSO	Site Health and Safety Officer
SSP	Subcontractor Safety Plan
TLV	Threshold Limit Value

1. RESPONSIBILITY/IDENTIFICATION OF KEY LINE PERSONNEL

The following personnel have the authority and responsibility for implementing the provisions of this Subcontractor Safety Plan (SSP) for:

1.1 Site Contact Information

Project Site Location	On-site Contact No.

1.2 Key Project Personnel

Contractor:

Address:

Telephone:	Email:
Company Executive responsible for project:	Contact No.
Manager/Superintendent:	Contact No.
Safety Representative/Manager:	Contact No.
Key Foreperson(s):	Contact No.
Client Project Management Point of Contact:	Contact No.

All managers and supervisors are responsible for implementing and maintaining the SSP in their work areas and for answering worker questions about the SSP. A copy of this SSP is available for any employee to review.

2. STATEMENT OF SUBCONTRACTOR'S SAFETY AND HEALTH POLICY

(Include or attach your company' Safety and Health Policy Statement – <u>not</u> a company Health and Safety Manual or Standard Operating Procedures.)

2.1 Drug and Alcohol Free Workplace

State your company's drug and alcohol policy.

Describe your company's drug and alcohol testing requirements. At a minimum, they must meet the Honeywell Syracuse Portfolio Health and Safety Program (HSP^2) requirements, summarized below:

- Pre-work. HSP^2 requirements call for pre-work testing for drugs and alcohol within two weeks prior to initial assignment for work on Honeywell projects, or a reasonable time frame acceptable to the Project Manager. Such testing will be repeated annually.
- Reasonable Suspicion. Project personnel may be tested if observed by trained management as exhibiting signs of use or possession of illegal drugs or alcohol.
- Post Accident. Personnel involved in an accident resulting in a fatality, disabling motor vehicle accident (requiring one or more vehicle to be towed away), injury requiring off-site medical treatment or property damage expected to result in > $5,000 in loss will be tested for drugs and alcohol.
- Random. Certain projects may be selected for random testing at the discretion of the HSP^2 Safety Director.

State your company's policy on the use of legally obtained prescription drugs which may affect the safe performance of a worker.

State the disciplinary measures that will result from a positive drug test or a worker's refusal to submit to drug or alcohol testing. At a minimum, workers who test positive or refuse to be tested will immediately be removed from Honeywell projects.

3. IDENTIFICATION OF COMPETENT/QUALIFIED PERSONS

(Provide the individual names and job titles of personnel assigned to the project, including the dates of training for the topics mentioned below. Add rows as necessary, and indicate the appropriate training information. Include copies of certifications in the Appendix. Include certifications for the competent/qualified personnel, when applicable.)

(If the scope of work for lower tier subcontractors is included in this SSP, then the identification of competent/qualified persons for the lower tier subs must also be included in this section).

3.1 Competent/Qualified Personnel

Name	Job Title	40-hr HAZWOPER	8-hr HAZWOPER Supervisor	8-hr HAZWOPER refresher expires	Other training (i.e. CPR, excavation, confined space)
Insert name or "Not applicable"	Insert job title	Insert date of completion	Insert date of completion or "Not applicable"	Insert expiration date	Insert date of completion

NOTE: This table may be expanded and included as an appendix. If so, describe its location.

Training requirements include:

- 40-hour HAZWOPER and 8-hour annual refresher certificates – required for general site workers (such as equipment operators, general laborers and supervisory personnel) engaged in hazardous substance removal or other activities which expose or potentially expose workers to hazardous substances and health hazard.
- 8-hour HAZWOPER Supervisor certificate – required for on-site management and supervisors directly responsible for, or who supervise employees engaged in, hazardous waste operations.
- Respirator Clearance – required for all personnel that may need to wear a half facepiece, full facepiece or supplied air respirator, or self-contained breathing apparatus (SCBA). Provide dates of training, medical clearance and fit testing. Include copies of medical clearance and fit testing records in the Appendix.
- Excavation Competent Person certificate – required for daily inspections of excavations greater than four feet in depth, the adjacent areas, and protective systems for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. An inspection shall be conducted by the competent person prior to the start of work and as needed throughout the shift. Inspections shall also be made after every rainstorm or other hazard increasing occurrence. These inspections are required when employee exposure can be reasonably anticipated.
- CPR/First Aid certification –A person who has a valid certificate in first-aid training from the U.S. Bureau of Mines, the American Red Cross, or equivalent training that can be verified by documentary evidence, shall be available at the worksite to render first aid in the absence of an infirmary, clinic, hospital, or physician, that is reasonably accessible in terms of time and distance to the worksite. For on-the-water activities, time, rather than

distance, is the critical factor in determining whether first aid and CPR trained personnel are required. The vessel itself shall be considered the worksite.

- Confined Space Entry (Supervisor) certificate – the employer shall ensure that each entry supervisor knows the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure. Verifies, by checking that the appropriate entries have been made on the permit, that all tests specified by the permit have been conducted and that all procedures and equipment specified by the permit are in place before endorsing the permit and allowing entry to begin. Terminates the entry and cancels the permit as necessary. Verifies that rescue services are available and that the means for summoning them are operable. Removes unauthorized individuals who enter or who attempt to enter the permit space during entry operations. Determines, whenever responsibility for a permit space entry operation is transferred and at intervals dictated by the hazards and operations performed within the space that entry operations remain consistent with terms of the entry permit and that acceptable entry conditions are maintained. Entrants and attendants, before assignment to a confined space operation, must demonstrate written documentation of confined space training appropriate to their assignment.

No worker will enter the exclusion zone, be exposed to hazardous substances or conditions or be assigned work unless they are properly trained, and the up-to-date documentation of such training has been submitted in advance.

4. SCOPE OF WORK EVALUATION

The work activities that will take place are described below. Activities of lower tier subcontractors will either be included in this section, or the lower tier subcontractor will complete their own SSP.

For this project, there *(insert "will" or "will not")* be any lower tier subcontractors. Lower tier subcontractor activities *(insert "are" or "are not")* included in this section. *(If there will be lower tier subcontractors, include the statement and table below):*

4.1 The lower tier subcontractors that will be working on the project will be:

SUBCONTRACTOR	WORK ACTIVITIES	HONEYWELL EVALUATION GRADE
Insert Company Name or N/A	i.e. Groundwater Sampling	B (for example)

NOTE: Each subcontractor must complete an HSP² Contractor Safety Evaluation package before being eligible to work on a Honeywell Syracuse Portfolio Project. Your Project Manager *or contact person will have access to a database of contractors that have submitted a Contractor Safety Evaluation package to determine the Evaluation Grade. If a "C" or "D" grade contractor is listed, justification must be included why the subcontractor is being used rather than an "A" or "B" grade subcontractor. Additional oversight and controls are required for the use of "C" or "D" contractors.*

Major Activities of Contractor – describe activities in bullet format, in some degree of detail.

Major Activities of lower tier subcontractor(s) – describe activities in bullet format or insert "Not Applicable."

5. HAZARD/RISK/EXPOSURE ASSESSMENT AND CONTROL MEASURES

(Describe the major activities and identify the associated hazards, risks and exposures. Thoroughly describe the control measures that will be used to minimize the identified hazards. This may be presented as a Table in this section, or a Job Safety Analysis (JSA) may be used for each major activity and added to this SSP as an appendix.) Regardless of the format, the Risk Assessment or JSA shall be updated and communicated to all affected parties daily or as frequently as necessary.

Major hazards or risks and exposures associated with the scope of work evaluation are listed below.

5.1 Job Safety Analysis

Task	Hazards/Risks	Controls
Insert Task	Hazard or Risk	Control

5.2 Chemical Safety Analysis

Chemical or Class	PEL/TLV	Hazards, Target Organs

PEL = OSHA Permissible Exposure Limit

TLV = ACGIH Threshold Limit Value

5.3 Chemical Monitoring Requirements

Chemical	Instrument	Location	Frequency

5.4 Action Levels and Response Summary

Chemical (or Class)	Action Level	Response

Complete table in detail, or state: "For each major activity listed, a JSA has been developed and is included as an appendix."

Provide an evaluation of reasonably anticipated exposures, action limits, Permissible Exposure Limits (PEL's), other relevant Occupational Exposure Limits (OEL), and the response required when an action level or exposure limit has been reached.

Insert any applicable measures to mitigate identified risks or hazards, using the hierarchy of hazard controls:

- Elimination of hazard or substitution of safer method
- Engineering controls
- Administrative controls
- Personal Protective Equipment, and
- Emergency response equipment or supplies

Some of these measures should include methods for identification of work zones, the level of personal protective equipment (PPE) to be worn (including respiratory protection), action levels based on potential chemical exposures (i.e., personal monitoring, area monitoring, etc.) and procedures for decontaminating personnel and equipment. This section should include specifics, not broad generalities.

6. SUBCONTRACTOR PERIODIC SAFETY INSPECTIONS/AUDITS

Inspections and audits shall be performed by competent persons or observers in the various areas of our workplace. Inspections will focus on worker behaviors as well as site and equipment conditions. An inspection is not considered completed until all identified corrective actions are implemented.

Daily inspections are required by the Site Health and Safety Officer (SHSO), foreman or other responsible party. The completion of the daily inspection must be noted in the construction or safety log. Any corrective actions taken or required must be noted as well.

Periodic, documented inspections are performed according to the following schedule:

- At least weekly
- When we initially establish our SSP
- When new substances, processes, procedures or equipment which present potential new hazards are introduced into our workplace
- When new, previously unidentified hazards are recognized
- When occupational injuries and illnesses occur
- When we assign workers to unfamiliar processes, operations, or tasks, and
- Whenever workplace conditions warrant an inspection

Periodic inspections consist of identification and evaluation of workplace hazards or behaviors, and specifying corrective actions that will eliminate or mitigate the identified hazards. The corrective actions will be assigned to a responsible person with a target completion date and tracked to completion. Temporary or interim measures will be applied and documented as well.

7. SUBCONTRACTOR RISK MITIGATION: TWO-WEEK LOOK-AHEAD

The Risk Mitigation Two-Week Look-Ahead Form is used to review risk mitigation strategies for previously identified tasks at weekly progress meetings.

The addition of previously unanticipated activities that have not been evaluated for risks and mitigation strategies typically would require the completion of additional JSA(s).

8. COMPLIANCE REQUIREMENTS POLICY

Management is responsible for ensuring that all safety and health policies and procedures are clearly communicated and understood by all employees. Managers and supervisors are expected to enforce the rules fairly and uniformly.

All employees are responsible for using safe work practices, for following all directives, policies and procedures, and for assisting in maintaining a safe work environment.

Our system of ensuring that all workers comply with the rules and maintain a safe work environment includes:

- Informing workers of the provisions of our SSP
- Responding to concerns expressed by the workers
- Evaluating the safety performance of all workers
- Recognizing employees who perform safe and healthful work practices
- Providing training to workers whose safety performance is deficient
- Disciplining workers for failure to comply with safe and healthful work practices, and
- The following practices:
  - ____
    ____
    ____

9. WRITTEN PROGRESSIVE DISCIPLINARY PROGRAM

(Explain your company's program or include a written program in the Appendix)

10. HAZARD CORRECTION POLICY

Unsafe or unhealthy work conditions, practices or procedures shall be corrected in a timely manner based on the severity of the hazards. Hazards shall be corrected according to the following procedures:

- When observed or discovered
- When an imminent hazard exists which cannot be immediately abated without endangering employees or property, we will remove all exposed workers from the area except those necessary to correct the existing condition. Workers necessary to correct the hazardous condition shall be provided with the necessary protection, and
- All such actions taken and dates they are completed shall be documented on the appropriate forms

11. TRAINING AND INSTRUCTION

All workers, including managers and supervisors, shall have training and instruction on general and job-specific safety and health practices. Training and instruction shall be provided as follows:

- When the SSP is first established
- To all new workers
- To all workers with respect to hazards specific to each employee's job assignment
- To all workers given new job assignments for which training has not previously provided
- Whenever new substances, processes, procedures or equipment are introduced to the workplace and represent a new hazard
- Whenever the employer is made aware of a new or previously unrecognized hazard, and
- To supervisors to familiarize them with the safety and health hazards to which workers under their immediate direction and control may be exposed

Workplace safety and health practices for all locations include, but are not limited to, the following:

- Explanation of the employer's SSP
- HSP^2 requirements
- Honeywell Contractor's Safety Handbook
- Site Emergency Action Plan
- Measures for reporting any unsafe conditions, work practices and injuries, and
- Means for identifying when additional instruction is needed

In addition, we provide specific instructions to all workers regarding hazards unique to their job assignment, to the extent that such information was not already covered in other training.

12. PROJECT SITE EMPLOYEES ORIENTATION PROGRAM SUBJECTS

As a condition of working on a remediation project involving the potential for exposure to hazardous substances and health hazards, our workers will receive information about the following subjects:

- Names of personnel responsible for site safety and health

- Honeywell's contractor safety requirements
- Promptly reporting emergencies, incidents and unsafe conditions
- Emergency/evacuation plans
- Provisions for medical services and first aid including emergency procedures
- Safety, health and other hazards at the site
- Review of all activities on site and related Job Safety Analyses JSA's
- Proper use of personal protective equipment
- Work practices by which a worker can minimize risk from hazards
- Safe use of engineering controls and equipment on site
- Acute and chronic effects of compounds at the site
- Decontamination procedures, and
- Hygiene requirements - Availability of toilet, hand-washing, and drinking water facilities

In addition to the above-mentioned information, we also orient our employees on: (Line out or write "not applicable" – DO NOT delete - topics that are not covered in your employee orientation.)

12.1 Site Orientation Topics

Covered or N/A	Site Orientation Topic
	Good housekeeping
	Road and highway safety practices – flagging, traffic control
	Heavy equipment operation – cranes, excavators, articulating dump trucks, etc.
	Driver safety - defensive driving, operation of pick-up trucks, all-terrain vehicles (ATVs), etc.
	Ladder and scaffold inspection and safety rules;
	Use of elevated platforms – aerial lifts and scissor lifts
	Other fall protection measures
	Fire prevention including Hot Work Permits

	Cleaning, repairing and servicing equipment and machinery
	Proper use of hand and power tools
	Guarding of belts and pulleys, gears and sprockets, and conveyor nip points
	Machine, machine parts, and prime movers guarding
	Lockout/Tagout procedures
	Materials handling
	Chainsaw and other power tool operation
	Unsafe weather conditions – lightning, high winds, etc.
	Mobilization/demobilization
	Yard operations: moving vehicles and equipment, receiving and shipping
	Landing and loading areas – rigging, tag lines, landing areas, release of rigging
	Ergonomic hazards - proper lifting techniques
	Personal protective equipment
	Hazardous chemical exposures
	Hazard Communication/Right to Know
	Physical hazards
	Heat and cold stress
	Noise
	Ionizing and non-ionizing radiation
	Biological hazards – poisonous plants, animals, bloodborne pathogens, etc. and
	Other job-specific hazards, such as:
	•
	•
	•

13. EMPLOYEE COMMUNICATION SYSTEM AND POLICY

We recognize that open, two-way communication between management and staff on health and safety issues is essential to an injury-free, productive workplace. The following system of communication is designed to facilitate a continuous flow of safety and health information between management and staff in a form that is readily understandable and consists of one or more of the following checked items:

- New worker orientation including a discussion of safety and health policies and procedures
- Review of our SSP and Construction Manager's Project Safety Plan (PSP)
- Workplace safety and health training programs
- Regular daily and weekly safety meetings
- Effective communication of safety and health concerns between workers and supervisors, including translation where appropriate
- Awareness campaign: Posted or distributed safety information
- A system for workers to anonymously inform management about workplace hazards
- A labor/management safety and health committee that
  - Meets regularly
  - Keeps written records of the safety and health committees meetings
  - Reviews results of the periodic scheduled inspections
  - Reviews investigations of accidents and exposures
  - Makes suggestions to management for the prevention of future incidents
  - Reviews investigations of alleged hazardous conditions, and
  - Submits recommendations to assist in the evaluation of employee safety suggestion
- Other: ____
  ____

14. RECORDKEEPING POLICY

We have taken the following steps to document implementation of our SSP:

- Records of hazard assessment inspections, including:
  - The persons conducting the inspection

- The unsafe conditions and work practices that were identified, and
- The action(s) taken to correct the identified unsafe conditions or work practices

- Documentation of safety and health training for each worker, including:
  - The worker's name or other identifier
  - Training dates
  - Types/topics of training, and
  - Training provider
- Air monitoring and other exposure records
- Written reports describing in detail, any accidents, incidents or near misses. A root cause shall be determined for such events. Corrective actions will be implemented and communicated to all site team members.
- Other records are retained as required by contract specifications or by local, state or federal (Occupational Safety and Health Administration (OSHA) regulations). Where regulations do not specify the length of records retention, a minimum period of three years after project completion will be used.

15. INCIDENT/NEAR-MISS INCIDENT INVESTIGATIONS POLICY

Procedures for investigating workplace incidents and near-miss incidents include:

- Responding to the incident scene as soon as possible
- Implementing measures to prevent further injury or damage and to preserve evidence
- Providing First Aid or coordinating any needed medical care
- Reporting incidents and near-miss incidents immediately to the appropriate HSP² point-of-contact. DO NOT delay! Certain levels of incident require immediate communication to Honeywell's upper management, and possibly to regulatory authorities
- Interviewing injured workers and witnesses
- Examining the workplace for factors associated with the incident/near-miss incident
- Determining the root cause of the incident/near-miss incident
- Taking corrective action to prevent the incident/near-miss incident from reoccurring
- Recording the findings and corrective actions taken, and
- Coordinating post-accident substance abuse testing

16. EMERGENCY ACTION PLAN

(Use this section to describe alarm signals, reporting procedures, evacuation routes, assembly areas, head count procedure, etc.)

Suggest:

- Warning alarm: multiple horn blasts, repeated
- Assembly area: Command post/trailer area
- A head count will be performed at the assembly area. Individuals should not leave work for the day until they are accounted for and properly reassigned or dismissed
- Evacuation route: site specific

Describe the preventative measures and response for unanticipated spills or releases to the environment. Include materials to be staged (e.g., spill kits) and their locations, procedures for containment and cleanup and reporting requirements, using the chain-of-command concept.

17. SITE SPECIFIC MEDICAL EMERGENCY PLAN

(Provide the name of emergency treatment facilities (Emergency Room) including contact numbers and route to the hospital. Also provide contact information for a local Occupational Medicine Clinic (for non-emergency use) that your company has contracted with for the treatment of routine or non-emergency incidents. The Occupational Medicine Clinic is a valuable asset in post-injury management and return-to-work programs. Provide names of competent first-aid and CPR personnel with dates of training certification and expiration. Include copies of employee certificates in the Appendix.)

17.1 Emergency Medical Care

Hospital/Emergency Care	Address	Telephone Number(s)

17.2 Occupational Medicine Clinic

Occupational Medicine Clinic	Address	Telephone Number(s)

17.3 Competent First Aid/CPR Personnel

Name(s) Competent Persons	First Aid	CPR

	Expiration Date	Expiration Date

NOTE: This table may be expanded and included as an appendix. If so, describe its location.

18. HAZARD COMMUNICATION PROGRAM

(In this section provide the name of the Haz Com Officer, a program outline, a list of the hazardous chemicals to be used and a description of where material safety data sheets (MSDS's) will be located. Include the written HAZ COM program and MSDS's for all chemicals to be used on site as an Appendix.)

19. RESPIRATORY PROTECTION PROGRAM

(If applicable to this project, provide an outline or summary of your company's written Respiratory Protection Program.)

(In this SSP, provide a description of the change schedule for canisters and cartridges that is based on objective information or data that will ensure that canisters and cartridges are changed before the end of their service life must be provided in this section. The employer shall describe in the respirator program the information and data relied upon and the basis for the canister and cartridge change schedule and the basis for reliance on the data.)

(Include the written respiratory protection program and copies of individual records (i.e., medical clearance, fit test and training) as an Appendix.)

20. MEDICAL SURVEILLANCE AND RESPIRATORY PROTECTION PROGRAMS

All project personnel performing intrusive work or entering the restricted area where intrusive work is being conducted, must be involved in a medical surveillance program meeting, at a minimum, the requirements of 29 CFR 1910.120.

Describe your company's medical surveillance requirements for this project. Include any biological monitoring, the relevant Biological Exposure Indices (BEI's) and the action limits, if any, that would initiate such biological monitoring.

Written evidence of medical surveillance requirements shall be maintained on-site and submitted prior to work for each affected person.

20.1 Medical Surveillance Requirements

Name	Job Title	Respiratory Clearance	Medical Exam	Respirator Fit Test	Other Med Surveillance Requirement
Insert name"	Insert job title	Insert expiration date	Insert expiration date	Insert expiration date	Describe frequency

NOTE: This table may be expanded and included as an appendix. If so, describe its location.

21. OTHER WRITTEN PLANS OR PROGRAMS AS REQUIRED BY REGULATION AND APPLICABLE TO THIS PROJECT.

(If applicable, attach other written programs as an appendix. If a plan listed below is not applicable, write N/A or lineout. DO NOT delete.

21.1 Other Written Plans or Programs

Included or N/A	Name of Plan or Program
	Site sanitation plan
	Layout/material storage plans
	Access and haul road plan/traffic patterns
	Procedures and tests
	Wild fire prevention plan
	Diving plan
	Man overboard plan
	Fire Aboard/Abandon ship plan
	Asbestos abatement plan
	Lead abatement plan
	Abrasive blasting
	Critical lift procedures
	Dangerous weather contingency planning
	Demolition plan

	Formwork and shoring erection and removal plans
	Blasting plan
	Nighttime operations plan
	Control of Hazardous Energy (Lockout/Tagout)
	Operation of a Forklift
	Confined Space Entry
	100 % Fall Protection Plan
	Other:

(Include any of the applicable written programs as an Appendix.)

22. SUBCONTRACTOR SAFETY PLAN (SSP) REVIEW AND MODIFICATIONS

The SSP shall be submitted to the Project Manager (PM) at least ten days before commencement of any field activities. The SSP will be reviewed, and may be returned with comments or requests for more details or clarification. Fieldwork shall not commence until the PM has provided written acceptance that the SSP meets contractual requirements. The responsibility for completeness, accuracy and regulatory compliance of the SSP rests solely with the subcontractor.

Minor modifications, such as typographical corrections, changing names or updating contact information, may be made by means of a routine submittal to the PM. JSA's for a new activity or previously unanticipated methodology should be submitted to the PM for review at least ten days before commencement of the new activity, or as early as practicable. Acceptable JSA's become an appendix to the existing SSP.

23. LIST OF TABLES, FORMS, APPENDICES AND ATTACHMENTS

List in detail any tables, forms, appendices and attachments. These elements are attached to and become part of the completed PSP.

Tables

- ______________________________________
- ______________________________________
- ______________________________________
- ______________________________________

Forms

- ______________________________________
- ______________________________________
- ______________________________________
- ______________________________________

Appendices

- ______________________________________
- ______________________________________
- ______________________________________
- ______________________________________

Attachments

- ______________________________________
- ______________________________________
- ______________________________________
- ______________________________________

ATTACHMENT E HONEYWELL CONTRACTOR SAFETY HANDBOOK

Honeywell Contractor Safety Handbook

This informational Handbook is intended to provide a generic, non-exhaustive overview of a particular standards-related topic. This publication does not itself alter or determine compliance responsibilities, which are set forth in OSHA standards themselves and in the Occupational Safety and Health Act of 1970. Since the regulations, interpretations and enforcement policy may change over time, it may be necessary to seek additional guidance on OSHA compliance requirements. Any and all deviations from the guidelines and rules set forth in this Handbook shall have prior approval by Honeywell.

This Handbook serves as a guide and reference for the minimum rules and standards for contractors performing capital work, maintenance, repair, dismantlement, remediation or other activities that have the potential for an incident.

This Handbook should be issued to each contract employee working at a Honeywell facility, location or site. The perforated page at the back of the Handbook must be signed and returned to the Honeywell contact/representative prior to commencing work. After reviewing each Section of this Handbook, specific attention should be focused on the topics that will be encountered during the project/task.

Contract employees must also be familiar with their company's health, safety and environmental policies, procedures and guidelines.

Revised 12/99

Contractor Safety Excellence

Our Mission
We will achieve a premier level of safety performance for contractors working at Honeywell locations through increased safety awareness, communication of expectations, following work processes that reduce at-risk behaviors and ensuring the proper management of incidents.

Our Commitment
We recognize that outstanding safety performance is essential to the welfare of our employees, contractors and to business excellence. We will continue to improve our global competitiveness by making safety an integral part of all business activities.

Our Safety Principles
- We strive to prevent all incidents that may lead to injuries or illnesses.
- Safety performance is a responsibility of line management and every contractor.
- We design safety into the work place.
- Individual behavior is the most important factor in preventing incidents.
- We expect and require every contractor to work safely.
- Working safely is good business.
- Safety is an integral part of our culture and total quality processes.
- Our safety process must react to all incidents, not just accidents.
- We continually improve our safety process by auditing the process and correcting the root cause of deficiencies.
- We promote safety, both on and off the job.
- We prepare for emergencies.

Table of Contents

A. Introduction

- This handbook sets forth the safety requirements of Honeywell International Inc. ("Honeywell")
- At Honeywell, it is our policy to provide a safe and healthful place in which to work. It is everyone's obligation to work safely and to correct unsafe acts, practices and/or conditions for the protection of yourself and others.
- It is extremely important that you understand <u>how</u> your work is to be done in a safe manner. If you don't know, <u>stop</u> and <u>ask</u> before you begin work.
- All work must conform to plant, local, state, and federal (OSHA) regulations (CFR 29 Part 1910 and 1926).
- The information in this handbook is general in nature and is to be considered the minimum.
  S ave
  A ll
  F ellow
  E mployees
  T his
  Y ear
- During your orientation, you will be informed of the specific safety requirements for your particular site or plant.

B. General Information

Site Entry

- Personnel, vehicles, and equipment are subject to search upon entering or exiting the site premises.
- Personnel may be required to pass a drug test or show proof of passing a drug test within the past thirty (30) days prior to working at the site.

Vehicle Safety

- Operators of vehicles and equipment shall observe all site traffic regulations. Seat belts are to be worn at all times.

Pedestrians

- Pedestrians have the right of way. Pedestrians should use walkways where provided and should not take shortcuts through operating areas, buildings or other areas.

Cameras

- Cameras are not allowed on site without the proper authorization.

Running

- Running is not permitted on site except in an extreme emergency.

Smoking

- Smoking is permitted in designated areas only. Discard smoking materials in approved containers.

Conduct

- Horseplay, fighting, gambling, sexual harassment and the possession or use of firearms, alcoholic beverages and illegal substances is strictly prohibited.

Dress Code

- Pants must cover top of steel-toed leather work shoe and be in good condition. Shirts must have at least 4" of sleeve. Long sleeve shirts may be required at specific locations or for certain tasks.

C. Emergency and Disaster Procedures

In the event there is an emergency, anyone can activate
the alarm any time there is a:

- Serious injury or illness
- Fire
- Major spill or release

When an alarm sounds, the following rules are in effect:

- All flame or hot work permits for welding, cutting, and spark producing equipment will be suspended until the all-clear signal is given.
- Smoking is prohibited.
- All traffic will pull to the side of plant roads and shut off engines until the all-clear signal is given.
- Report to your assembly point / area (if previously designated), or contact your Honeywell host.

Site Specific Emergency and Disaster Procedures

- Each Honeywell plant is equipped with an emergency alarm system, designated assembly areas and emergency phone numbers. The specific guidelines for reporting emergencies and disasters should be determined in your orientation.

D. Personal Protective Equipment (PPE)

Head Protection

- Contractors are required to wear approved hard hats that meet ANSI Z89.1-1971. Hard hats must be in good condition and be worn with brim to the front.

Eyes and Ears

- Each employee should know the location of the nearest eye wash/safety shower station in their area before starting work.
- Contractors are required to wear approved ANSI Z87.1 safety glasses with rigid side shields. Additional eye/face protection will be required when performing certain tasks (e.g.: welding, burning, grinding, chipping, sawing, drilling, handling chemicals or corrosive liquids, and pouring concrete or molten materials.) Check plant procedures.
- Approved hearing protection must be worn as specified in all posted areas and while working with or around high noise level producing tools, machines or equipment.

Fingers, Hand and Wrist

- Gloves suitable for the job being performed shall be worn unless the job cannot be done with gloves or wearing gloves increases the hazard.
- Tool holders should be used when driving stakes and wedges or when holding star drills, bull pins or similar tools.

Foot Protection

- In accordance with OSHA 1910.136, all contractors must determine if hazards are present (or are likely to be present) that may require the use of safety footwear.
- Safety footwear for contractors must be in accordance with ANSI Z41-1991, constructed of industrial quality leather and without urethane soles.
- Rubber boots with safety toe protection are required on jobs subject to chemically hazardous conditions.
- Metatarsal protection should be worn when using jack hammers, tamps and similar equipment which has the potential for foot injury above the toes.

Respiratory

- Respirators used by contractors must meet NIOSH/MSHA standards.
- Respirators must be inspected regularly and stored in a dust-free container.
- Employees required to wear a respirator must have a physician's approval and be fit tested. Employees must be clean shaven in the facial area to obtain an acceptable seal.
- Contractor must keep records of qualified users.

Skin

- If the possibility of skin contact with chemicals exists, personal protective equipment required by Material Safety Data Sheets shall be worn.

E. Hazard Communication / Right To Know

Upon beginning work at a Honeywell facility, each individual has the right to know information concerning the hazardous properties of any materials he/she may come in contact with. Training regarding potential hazards must be given to each individual and will include, but not be limited to, the following:

- An explanation of the hazard communication standard and the training requirements.
- An explanation of the project hazard communication program and it's location.
- Notification of the locations of the hazardous

chemicals.
- A description of the plant labeling and hazard rating system.
- A description of the Material Safety Data Sheet (MSDS), their use and location.

F. Permits

Certain types of work are not to be started until approval is given in the form of a signed permit. A written, properly authorized permit listed below may be required before you begin any activities in any production or operating area of the plant.

- **Work Permit** - required before any work can be started on any job in any area of the plant.
- **Line Breaking Permit** - required before breaking screwed, flanged, welded or other type joints on pipelines or vessels containing hazardous materials, or breaking into (disconnecting, drilling, sawing, etc.) non-hazardous materials under pressure.
- **Confined Space or Vessel Entry Permit** - required before entering tanks, vessels, manholes or similar confined spaces that have been in service or connected to operating process equipment and may contain potentially hazardous atmospheric conditions.
- **Lockout / Tagout Permit** - required for the service and maintenance of machines and equipment in which the *unexpected* energization or start up of the machines or equipment, or release of stored energy could cause injury to workers.
- **Excavation Permit** - required to minimize hazards during excavation work and ground breaking operations, specifically when a machine or hand tools are used at a depth greater than one foot. Excavations greater than four foot in depth must be inspected and approved by a competent person and have a Confined Space permit before access by personnel.
- **Hot Work Permit** - required before any flame or spark producing activity can begin in any production, operating, or some construction areas of the plant. This includes, but is not limited to:
    - Welding / Repair of pipe lines under pressure greater than 5 PSI.
    - Welding / Repair of pipe lines containing hazardous or flammable materials.
    - Welding / Repair on any pressure vessel, fired or unfired, under pressure or in the presence of hazardous or flammable materials.
    - Work on energized circuits.
    - Cutting / Burning of pipe lines, vessels, equipment, etc. that may have contained any hazardous material.
    - Grinding
    - Any hot work on carbon steel pipe lines, vessels, equipment, etc. that may have contained sulfuric acid will not be permitted without extensive review with project and plant personnel due to the possible generation of hydrogen gas.

  Each plant may have permits that are required for other specific work procedures. Check with your supervisor for these permits.

G. Fall Protection

- 100% fall protection (i.e. two lanyards when moving in certain areas) is required for all work above six (6) feet.
- Safety full body harnesses must be arranged so the d-ring is in the rear.
- Safety belts are not to be used for support or as a lineman's belt.
- Lanyards must be secured to an anchorage point overhead that can support 5,000 lbs. using as short a line as possible, not to exceed five (5) feet..
- All fall protection equipment shall be inspected by the user prior to each use.
- Lanyards may not be tied-off to any pipe/conduit less than 2" in diameter.
- Safety harnesses shall be worn and tied off when performing work on the following:
    - Sloped roofs
    - Flat roofs without handrails, if within 6 feet of the edge of the roof or opening
    - Any suspended platform or stage
    - All scaffolding six (6) feet above supporting work surface
    - When working on the sixth step or higher

on a ladder
- Ladders near the edge of roofs or floor openings
- Any unguarded areas six (6) feet above any supporting work surface
- An aerial lift.

H. Barricades, Signs, and Floor Openings

All floor openings/penetrations (i.e. holes > 2") must be properly covered or guarded. Barricades and signs must be posted when working in or around the following:

- All manlifts and the immediate working area.
- In ceilings, pipe bridges, etc.
- Removing roofing panels, walls, etc.
- Swing radius of cranes and the area where the lift will be made and moved to.
- Any open excavation.
- Any confined space entry.

Types of Barricades

- Warning barricades call your attention to a hazard but offer no physical protection. Examples: yellow, red, blue synthetic tape on stands or posts, plastic, or wooden snow fence.
- Protective barricades warn and provide physical protection and shall withstand 200 lbs. of force in any direction with minimal deflection (3"). Examples: wood post and rail, cable and wood post and chain.

Guidelines

- Barricades shall be 42 inches high and maintained square and level.
- Barricades shall be erected before any work begins.
- Blinking lights must be used on road blocks after dark.
- An access opening or gate should be provided where practical.
- Barricades and signs shall be fully informative, legible, and visibly displayed.
- Barricades and signs shall be removed when no longer needed.

Hole Covers

- Must be installed immediately.
- Hole covers or barricades are required at any floor elevation.
- Material and equipment must not be stored on a hole cover.
- Must be secured to prevent movement and be marked with the word "HOLE" or "COVER".
- Must extend adequately beyond the edge of the opening (i.e. 3") and must not be more than 1" high.
- 3/4" plywood will be used providing the opening is less than 18". For any opening greater than 18 inches, 2 inch lumber of doubled ¾ inch plywood is required.

I. Ladders and Scaffolds

- Inspect ladders before use - identify defective ladders with "Do Not Use" tag.
- Only a "Type I" ladder with a minimum rating of 250 lbs. is acceptable.
- Metal ladders are prohibited.
- Fall protection must be worn when working on the sixth step or higher.
- When ascending and descending a ladder, face the approved side of the ladder, use at least one hand to grasp the ladder, and do not carry tools or materials in your hands.
- ***All*** ladders shall have a tie-off rope, non-skid safety feet and be tied-off.
- Never work off a ladder where the midpoint of the body (i.e. belt buckle) must be extended beyond the side rails.

Straight or Extension Ladders

- Follow the 4-to-1 rule when using an extension or straight ladder - position the base of the ladder one (1) foot from the supporting structure for every four (4) foot in height.
- If a ladder is used to reach a higher platform, the top of the ladder must extend three (3) feet past the platform.
- Do not work off of the top three (3) rungs of any straight or extension ladder.

Step Ladders

- Step ladders shall be set with all four (4) feet level.
- Ladders used in traffic areas must be secured or barricaded to prevent displacement.
- Never work off of the top two steps of step ladder.
- Never stand or sit on top of step ladders.

Scaffolding

- All scaffolds must conform to the OSHA Standard (Subpart L)
- All scaffolds are to be erected level - plumb on a firm base.
- When space allows, all scaffolds must be equipped with access ladders that extends three (3) feet past the landing gate. At landings, 42" high handrails rigidly secure, 21" high mid-rails rigidly secure, completely decked with safety planking or manufactured scaffold decking and rigidly secured toeboards on all four sides.
- A competent person must determine the feasibility and safety of providing fall protection for employees erecting and dismantling scaffolds, and train those employees accordingly.
- All scaffolds shall have a tag attached, completed by the competent person, stating what type of fall arrest system is required.
- All personnel working on scaffolds must be trained by a qualified person in the subject matter to recognize the hazards associated with the type of scaffold being used and the nature of any hazards (i.e. electrical, fall, falling objects, etc.).
- Retraining must be provided where inadequacies in an affected employee's work practices involving scaffolds are observed.
- Safety harness and tie-off required when working from scaffolding over one buck high.
- Personnel shall not climb or do any rigging from a scaffold, handrail, mid-rail or braces.
- No one may alter any scaffold member by welding, burning, cutting, drilling or bending.
- Scaffolds shall be tied off or stabilized with outriggers when its height exceeds three times the smaller dimension of its base, but tie-offs must not exceed 26 feet vertically.
- Scaffolds must be tied off horizontally every 30 feet.
- No one shall ride on a rolling scaffold when it is being moved. All tools and materials shall be removed or secured to the decking before moving the scaffold.

J. Housekeeping

Good housekeeping plays a key role in preventing accidents and fires. Good housekeeping is emphasized as a vital safety measure.

- Keep everything in its proper place - store materials and equipment in a safe and orderly manner.
- Put trash, scrap materials and other waste in the proper containers.
- Clean up tools and work areas as your job progresses - do not wait until the end of the work day.
- Keep the floor of the work area clear of tools, cords, and scrap materials.
- Insure that work tables are occupied only by work at hand and tools required for work being done.
- All work areas are to be left in orderly and clean condition at the end of each work day.
- Keep cords and hoses at least seven (7) feet overhead over walkways and work areas or lay them flat outside of walkways.
- Maintain clear access to all work areas. Do not block fire extinguishers, emergency equipment, electrical boxes or panels, or other safety/fire equipment.

K. Tools - Hand and Power

- Do not operate any tool without proper instruction.
- Only qualified persons are to use tools and equipment.
- Honeywell tools and equipment are not to be used by contractors.
- Do not use any tool or equipment for any purpose other than that for which it was designed.
- Personal tools are subject to inspection at any time.

- It is your responsibility to inspect all tools prior to each use. Do not use a tool that is deemed defective. Report and tag all defective tools.
- Do not lift electrical tools by the cord.
- Tools may be inspected and marked with color-coded tape each month. Check with your Supervisor for designations and do not use a tool without the appropriate color-coded tape.

Hand Tools

- Worn tools are dangerous! Replace or repair the tool.
- Every tool was designed to do a certain job. Use a tool for its intended use only.
- Tools subject to impact (chisels, star drills and caulking irons) tend to "mushroom." Keep them dressed to avoid flying spalls. Use tool holders.
- Don't force tools beyond their capacity or use "cheaters" to increase their capacity.

Power Tools

- Material should be secured when power tools are applied to it.
- Each power tool should be examined for damaged parts, loose fittings, and frayed or cut electrical cords before use.
- Portable electrical equipment and tools shall be grounded unless "double insulated." A ground fault circuit interrupter (G.F.C.I.) shall be used for working in damp areas when using permanent plant power or as otherwise required.
- Electrical cords shall be unplugged and air lines deactivated and bled down before adjusting, servicing, repairing, or changing bits and blades in electrical or pneumatic tools.
- Any pneumatic hoses exceeding ½ inch in diameter shall have a safety device at the source of supply or branch line to reduce pressure in case of hose failure. All hose connections shall be properly secured.
- All tools shall be used with the correct shield, guard, or attachment recommended by the manufacturer.
- Only licensed and qualified personnel shall be allowed to operate power-actuated tools.
- Power tools should be unplugged when not in use.

<u>L. Mobile Equipment</u>

- Anyone who operates any mobile equipment (cranes, manlifts, pick-ups, forklifts, etc.) must demonstrate knowledge and competency for each make of equipment.
- All equipment will be inspected daily before use to insure it is in proper operating condition. If the equipment becomes defective in any way, notify your supervisor at once and place a "DANGER - DO NOT USE" tag on it.
- All equipment is to be supplied with seat belts, back-up alarm and fire extinguishers (back-up alarm is not required on pickup trucks.)
- Use of gas/diesel equipment inside operating building is prohibited unless approved by the Safety Department.

<u>M. Cranes</u>

- All operators must be certified and licensed to operate each make and model of crane.
- The operator is solely responsible for the safe operation of the crane.
- The operator has full responsibility for the safety of a lift and may not make a lift until safety is assured.
- A copy of the load chart, manufacturer's operators' manual and inspection record must be in the crane cab or on project site.
- All cranes and the immediate work area must be barricaded at all times.
- No load shall be swung over any persons.
- Outriggers must be leveled and fully extended when making a lift.
- No part of the crane, load, hoist (load and boom) lines, boom and tag line shall come within 10 feet of energized electrical lines.
- For pick and carry operations, consult the manufacturer's operator manual.
- Riding on crane hooks and/or "headache" balls is prohibited.
- Operators are not permitted to leave the crane while holding a live load.

- The use of suspended personnel platforms (crane baskets) must meet all OSHA requirements. The use of a crane or derrick to hoist employees on a personnel platform is prohibited unless all requirements of 1926.550 (g) are met. A company plan and check list must be used.
- A lift plan is required for any critical lift.
- Lifting in high winds (e.g. greater than 20 mph) is not recommended.

N. Material Handling Equipment

- All material handling machines must have backup alarms, horns, rollover protection structures and seat belts when provided by manufacturer.
- The operator must be trained to operate each make and model of machine.

O. Personnel Lifting Equipment

- The operator must be trained to operate all personnel lifts.
- All employees are to have a safety belt or safety harness on and tied off when working out of: manual personnel lifts, power platform lifts, scissors lifts, high-reach lifts, etc.
- Tie-off shall be made to the lifting equipment.
- Personnel are not to get under lifts.
- When exiting the lifting equipment onto a proper working elevated platform, the employee must be tied off to that platform immediately prior to, and during, that exit.

P. Cars, Pickups, and Trucks

You must have a valid driver's permit to operate any vehicles on plant property. You must obey the following rules:

- Wear your seat belt.
- Obey plant speed limits and stop signs.
- Motors must be shut-off when refueling.
- Stop at all railroad crossings.
- No more than three (3) people on a front bench seat, two (2) people if bucket seats.
- Mount and dismount the vehicle only when it is stopped.
- Keep arms, feet and bodies inside the vehicle.
- Look to the rear and sound your horn before backing up.
- Inspect the vehicle each day before use.
- Riding in the rear of a truck is prohibited unless approved seating with seat belts has been provided.

Q. Rigging

- All personnel who perform or assist in rigging operations shall have received appropriate training and be competent.
- Only ONE eye in a hook. Use a shackle to hold two (2) or more eyes.
- Tag lines are required to control lifted loads made by mechanical equipment. Never put hands on a load or wrap tag lines around your hands or body.
- Never raise a load over other people.
- Know the capacities of the rigging equipment and the weights of the loads.
- Never rig from any structural member until you are sure it will support the load.
- Never use plate grips, tongs, pipe clamps, etc. as substitutes for beam clamps.
- Two slings will be used unless impractical. If one sling is used, double wrapping is required.
- Continuous synthetic slings may be used only when heat or chemicals are not a factor, and where load permits.
- Flat nylon straps should not be used for erecting steel. Wide nylon straps may be used for lifting tube bundles, fiberglass ducts or other material that could be damaged by a metal sling. The use of flat nylon strap with any visible tear or defect is strictly prohibited.
- Steel slings should be used where heat or chemicals are a potential factor. The use of steel slings with damaged strands or other defect is strictly prohibited.
- The use of a come-a-longs with cracked or damaged handles is strictly prohibited.
- Chainfalls and come-a-longs must have OSHA approved safety spring return latches on all hooks.
- Daily, weekly, and monthly inspection records will be kept by the contractor.

R. Chain Falls and Hoists

- Inspect hoists daily (operations), monthly (maintenance) and annually (3^{rd} party vendor).
- A chain hoist must be used within its rated capacity, marked on the equipment.
- Do not leave an unsecured and unattended load hanging on a hoist or chain fall.
- Do not stand or have any part of the body below a load suspended on a chain hoist.
- Do not wrap the load chain around the load to be lifted.
- Use of "cheater bars" is strictly prohibited.
- Use a shackle to connect straps to a hook.

S. Fire Protection and Prevention

- Be sure to locate the nearest fire extinguishers in your work area before starting work.
- As warranted by the project, a trained and equipped fire fighting organization (Fire Brigade) will be provided to assure adequate protection of life.
- All fire hydrants, fire extinguishers, fire blankets, etc. shall be clearly marked and not obstructed.
- Combustible materials shall be kept away from steam lines, radiators, heaters, hot process and service lines.
- For any job requiring hot work or open flame or welding, a fire extinguisher must be within 20 feet of where the work is taking place.
- Fire extinguishers shall be checked daily before starting work.
- Portable power equipment must not be refueled while running or when hot. Attach the ground wire before refueling.
- Store flammables in properly labeled metal type containers and in designated areas.
- Fire blankets must be used to protect equipment, control panels, instrumentation, etc. when welding, cutting, burning, or grinding overhead.
- "Borrowing" plant fire extinguishers is not permitted.

T. Material Handling / Stability Control

Proper material handling and stability control insures that personnel, material, and equipment are safe from unexpected movement such as falling, slipping, rolling, tripping, or any other uncontrolled motion.

- Clean up ragged metal edges.
- Pull all protruding nails and wires or bend them flush.
- Set on dunnage for ease of handling.
- Check all material and equipment to prevent rolling.
- Tie down all light, large-surface-area material that might be moved by the wind.
- Put absorbent on all grease and oil spills immediately and clean them up. Notify proper plant personnel of spills if significant.
- Salt or sand icy walk areas immediately.
- Use proper lifting techniques when moving material by hand.
- Know the weight of the object to be handled.
- Protect the area around and below you.

U. Welding and Burning

General

- Before beginning any flame or spark producing operations in the plant, check with your supervisor about any permits that may be required. Follow the requirements on the permit.
- Keep welding leads and burning hoses clear of passageways.
- Each welder is responsible for containing sparks and slag and/or removing combustibles to prevent fires. The welder is also responsible for making sure there is a fire watch and a good fire extinguisher for the duration of the operation.
- Provide adequate screens to protect vision of general public.

Welding - Electric

- All work must have a separate and adequate ground.
- Welding rods are not to be left in the electrode holder when not in use. Stub ends are to be put in proper containers - not on the floor.

- All weld arcs shall be shielded.
- All welding machines are to be shut off when not in use.
- Hard hats with the brim to the front must be worn during welding operations by the welder.
- An approved welding shield must be worn. Use no less than a No. 10 filter plate with safety plate on both sides of the filter plate.
- Powered welding machines should be operated in well ventilated area only and will be diesel fueled only, unless otherwise approved by safety.

Burning - Gas

- The operation of oxygen and fuel gas burning equipment shall only be done by trained and experienced personnel.
- Do not exceed 15 P.S.I. on the torch side of the gauge when using acetylene.
- Only an approved spark lighter should be used to light a burning torch. Do not use matches, cigarettes, lighters or hot work.
- Always clean burning tips with the proper type cleaner.
- All burning rigs must be broken down at the end of the shift with regulators removed and caps screwed down hand tight.
- Approved burning goggles must be worn and No. 4 lenses or darker must be used.
- Keep oil and grease away from oxygen regulators, hoses and fittings. Do not store wrenches, dies, cutters, or other grease covered tools in the same compartment with oxygen equipment.
- Compressed gas bottles shall be kept in bottle carts or secured in an upright position. They must be transported and stored in a secured, upright position with protective caps in place.
- Oxygen and acetylene compressed gas bottles should not be stored together. They must be stored a minimum of 20' apart or have a 5 feet high, 30 minute rated fireproof wall between the two bottles.
- All gauges, hoses, and torches should be inspected on a regular basis. A back flow preventer is required on all regulators.
- When in use, place cylinders and hoses where they are not exposed to sparks and slag from the burning operation.

- Any hot work on carbon steel pipe lines, vessels, equipment, etc. that may have contained sulfuric acid will <u>not</u> be permitted without extensive review with project and plant personnel due to the possible generation of hydrogen gas.
- Handle cylinders with care.
- Lift to upper levels with approved carts only.
- Do not strike an arc on cylinders.
- Do not use cylinders as rollers.
- Do not lift with slings or by the protective cap.

Protective Clothing

- Only cotton, woolen, leather or special fire retardant synthetic clothing should be worn when burning or welding. Synthetics are very flammable and melt and cause more serious burns when exposed to flames and high temperatures.

<u>V. Steel Erection</u>

General

- 100% tie-off is required at ALL times
- Containers shall be provided for storing or carrying rivets, bolts and drift pins, and secured against accidental displacement when aloft.
- A load shall not be released from the hoisting line until the members are secured with not less than two bolts, or equivalent at each connection and drawn up wrench tight.
- Tag lines are required for controlling loads.
- When bolts, drift pins or rivet heads are being knocked out/off, means shall be provided to keep them from falling.
- Impact wrenches shall be provided with a locking device for retaining the socket.

W. Accident / Incident Investigation

- Notify Honeywell personnel (project engineer, plant safety, construction safety, etc.) immediately after any injury (medical treatment and first aid cases), equipment or property damage, environmental excursions, or near-miss incidents.
- A Honeywell Contractor Incident Investigation Report shall be completed by the contractor company immediately upon knowledge of the incident.
- The report may be completed by an investigation team headed up by the contractor company, and assisted by the Honeywell project manager / engineer, site safety leader, the individual(s) involved and any other necessary personnel. All sections of the report are to be completed, signed and dated.

X. OSHA Reference Guide

Subject	**Reference**
Barricades	Subpart G - 1926.202 Barricades
Cars, Pickups & Trucks	Subpart O - 1926.601 Motor Vehicles
Chain Falls	Subpart H - 1926.251 Rigging Equip. for Mat. Handling
Compressed Gases	Subpart H - 1910.101 General Requirements
Concrete & Masonry	Subpart Q - 1926.700 Scope, Application & Requirements
Confined Space Entry	Subpart J - 1910.146 Permit-Required Confined Spaces
Cranes	Subpart N - 1926.550 Cranes & Derricks Subpart N - 1910.179 Overhead & Gantry Cranes
Demolition	Subpart T - 1926.850 Preparatory Operations
Egress	Subpart C - 1926.34 Means of Egress Subpart E - 1910.35 Definitions
Electrical	Subpart K - 1926.400 Introduction Subpart S - 1910.301 Introduction
Emergency Procedures	Subpart C - 1926.35 Employee Emergency Action Plans Subpart D - 1910.38 Employee Emergency Plans
Excavations	Subpart P - 1926.650 Scope, Application & Definitions
Eye Protection	Subpart E - 1926.102 Eye and Face Protection Subpart I - 1910.133 Eye and Face Protection

Subject	**Reference**
Fall Protection	Subpart E - 1926.104 Safety Belts, Lifelines & Lanyards Subpart M - 1926.500 Scope, Application & Definitions
Fire Protection	Subpart C - 1926.24 Fire Protection and Prevention Subpart F- 1926.150 Fire Protection Subpart L - 1910.155 Scope, Application & Definitions
First Aid	Subpart C - 1926.23 First Aid and

	Medical Attention Subpart D - 1926.50 Medical Services & First Aid Subpart K - 1910.151 Medical Services & First Aid
Floor Openings	Subpart M - 1926.502 Fall Protection Criteria & Practices Subpart D - 1910.23 Guarding Floor and Wall Openings
Foot Protection	Subpart E - 1926.96 Occupational Foot Protection Subpart I - 1910.136 Foot Protection
Hand Protection	Subpart I - 1910.138 Hand Protection
Hazard Communication	Subpart D - 1926.59 Hazard Communication
Hazardous Waste	Subpart D - 1926.65 Operations & Emergency Response Subpart H - 1910.120 Operations & Emerg. Response

Subject	**Reference**
Head Protection	Subpart E - 1926.100 Head Protection Subpart I - 1910.135 Head Protection
Hearing Protection	Subpart E - 1926.101 Hearing Protection Subpart G - 1910.95 Occupational Noise Exposure
Hoists	Subpart N - 1926.552 Mat. Hoist, Personnel Hoist & Elev.
Housekeeping	Subpart C - 1926.25 Housekeeping
Illumination	Subpart D - 1926.56 Illumination
Incident Investigation	Honeywell Contractor Near Miss/ Incident Investigation Report.
Ladders	Subpart X - 1926.1053 Ladders Subpart D - 1910.22 General Requirements
Lockout/ Tagout	Subpart K - 1926.417 Lockout and Tagging of Circuits Subpart J - 1910.147 Control of Hazardous Energy
Material Handling Equip.	Subpart O - 1926.602 Material Handling Equipment
Materials Handling	Subpart H - 1926.250 General Requirements for Storage
Mobile Equipment	Subpart O - 1926.600 Equipment
Permits	Per Site Specifics. Check With Your Site Contact.
Personal Protective Equip.	Subpart C - 1926.28 Personal Protective Equipment Subpart E - 1926.95 Criteria for Personal Protect. Equip.

	Subpart I - 1910.32 General Requirements

Subject	**Reference**
Personnel Lifting Equipment	Subpart L - 1926.453 Aerial Lifts Subpart N - 1926.552 Personnel Hoist & Elevators Subpart F - 1910.68 Manlifts
Respiratory Protection	Subpart E - 1926.103 Respiratory Protection Subpart I - 1910.134 Respiratory Protection
Rigging	Subpart H - 1926.251 Rigging Material Subpart N - 1910.184 Slings
Sanitation	Subpart D - 1926.51 Sanitation Subpart J - 1910.141 Sanitation
Scaffolds	Subpart L - 1926.451 Scope, Application & Definitions Subpart D - 1910.28 Safety Requirements for Scaffolding
Signaling	Subpart G - 1926.201 Signaling
Signs	Subpart G - 1926.200 Accident Prevention Signs & Tags Subpart J - 1910.145 Specifications for Signs & Tags
Stairways	Subpart X - 1926.1050 Scope, Application & Definitions
Steel Erection	Subpart R – 1926.750 Steel Erection
Tools - Hand & Power	Subpart I - 1926.300 General Requirements Subpart P - 1910.241 Definitions
Training & Orientation	Subpart C - 1926.21 Safety Training and Education Per Site Specifics. Check With Your Site Contact.
Ventilation	Subpart J - 1926.353 Ventilation and Protection Subpart G - 1910.94 Ventilation
Welding & Burning	Subpart J – 1926.350 Welding & Cutting Subpart Q - 1910.251 Definitions

Y. Acknowledgement Page - Read Carefully Before Signing Below

This is to acknowledge that I have received my copy of the Honeywell Contractor Safety Handbook and an orientation on its contents as well as other project rules and policies. I will read and abide by all rules and regulations in the handbook 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 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. In consideration of my employment, I further agree that my employment and compensation can be terminated at any time, with or without cause or notice, at the option of either the Company or myself. I understand further that this handbook and the rules and regulations it contains do not in any way constitute a contract (either expressed or implied) of employment between the Company as my employer and me for any indefinite or specified period of time. The Company reserves the right to change its policies as summarized herein.

______________________ ______________________
Print Full Name Signature

____

Contractor Company Name

____
Craft

____
Honeywell Contact/Representative

____
Date

Note: The perforated last page and the back cover of this booklet contain the same wording. After properly endorsed, the perforated page is to be removed and given to the Honeywell contact/representative.

Rev. 12/99

Y. Acknowledgement Page - Read Carefully Before Signing Below

This is to acknowledge that I have received my copy of the Honeywell Contractor Safety Handbook and an orientation on its contents as well as other project rules and policies. I will read and abide by all rules and regulations in the handbook 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 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. In consideration of my employment, I further agree that my employment and compensation can be terminated at any time, with or without cause or notice, at the option of either the Company or myself. I understand further that this handbook and the rules and regulations it contains do not in any way constitute a contract (either expressed or implied) of employment between the Company as my employer and me for any indefinite or specified period of time. The Company reserves the right to change its policies as summarized herein.

Print Full Name Signature

Contractor Company Name

Craft

Honeywell Contact/Representative

Date

Note: The perforated last page and the back cover of this booklet contain the same wording. After properly endorsed, the perforated page is to be removed and given to the Honeywell contact/representative.

Rev. 12/99

*** To be completed by the Contractor Company with assistance from Honeywell personnel**

Date Incident Reported:	Honeywell Location:	Honeywell Contact:

Date of Incident:	Time of Incident:	Name of Contractor Company:

Name of Individual(s) Involved w/Incident:	Name of Injured Worker (if applicable):	Name of Supervisor/Foreman:

If an Individual was Injured, were they working under the direct supervision of Honeywell?	Age of Individual Involved:	Job Classification/Title/Craft:

Length of Work Experience at Job Classification:	Length of Employment with Company:	Length of Time Working at Site:
Was the Individual Involved with the Incident Performing their Regular Job? If "No", explain why:	Date of Site Safety Orientation:	Last Formal/Documented Safety Meeting Attended:

Hours Worked that Day/shift Prior to the	Hours Worked that Week Prior to the Incident:	Consecutive Days/Shifts Worked Prior to the Incident:	Last Day Off Prior to the Incident:

Description of incident according to the individual(s) involved or injured (including what happened and how the incident occurred):
According to the individual(s) involved with the incident or injured, what could have been done differently to prevent this incident from occurring? Why weren't these done prior to the incident?
Describe any First Aid or Medical Treatment Provided On Site and/or at a Medical Facility. **NOTE: Any follow-up treatment at a later date must be communicated to Honeywell (Contractor Safety Leader).**

Date that the Injured Individual Returned to Work?	Any Work Restrictions or Lost Time? If "Yes", describe: **NOTE: Any work restrictions or lost time at a later date must be communicated to Honeywell (Contractor Safety Leader).**

Was there any Property Damage? If "Yes", describe:

Contractor Supervisor/Foreman should complete the information below with an Investigation Team

Team Investigation – List the Possible Causes of the Incident Below.
For Each Possible Cause Listed Above, Reply "Why" or "Why not" the Cause Occurred.
Corrective Action(s) Taken - List Person(s) Responsible and Target Date:
Contractor Investigation Team - Leader & Members:

Date Incident Reported:	Honeywell Location:	Honeywell Contact:

Approval (Individual Involved/Injured):	Title:	Date:
Supervisor Approval (Print Name):	Title:	Date:
Honeywell Site Approval (Print Name):	Title:	Date:

HONEYWELL

01620 EXHIBIT 1
MOTOR VEHICLE ACCIDENT REPORT

Report #:______________

DATE OF ACCIDENT______________ **DAY OF WEEK**____________ **TIME**___________

LOCATION OF ACCIDENT____

ACCIDENT INVOLVED: Employees, contractors, visitors, Vehicle vs. Vehicle, Vehicle vs. Property, Vehicle vs. Pedestrian

---

VEHICLE NO. 1		VEHICLE NO. 2 (or Pedestrian Info.)
	DRIVER'S NAME	
	STREET ADDRESS	
	CITY AND STATE	
	DRIVERS LICENSE NO.	
	PHONE NO. OR EXT.	
	OWNER'S NAME	
	STREET ADDRESS	
	CITY AND STATE	
	PHONE NUMBER	
	VEHICLE TYPE	
	MAKE, MODEL, YEAR	
	LICENSE PLATE	
	VEHICLE DAMAGE	
	PASSENGERS	
	VEHICLE REMOVED TO (auth.)	

INJURED (type, where taken):____

____

POLICE DEPARTMENT/REPORT #:____

WEATHER:____

ROAD CONDITION:____

ESTIMATED SPEED OF VEHICLE 1:______________ VEHICLE 2:______________

VEHICLE DEFECTS RELATING TO ACCIDENTS (Brakes, Lights, Tires, Steering)

VEHICLE 1:______________________ VEHICLE 2:______________________

STATEMENT DRIVER VEHICLE 1:____

STATEMENT DRIVER VEHICLE 2:____

INVESTIGATOR'S COMMENTS:____

PHOTOGRAPHS TAKEN?:______

DIAGRAM:

INVESTIGATOR'S SIGNATURE:______________________ DATE:______________

SUPERVISOR'S SIGNATURE:______________________ DATE:______________

(01620/EXHIB1/P)

ATTACHMENT F RISK REGISTER

Tonawanda Coke Site 108

RISK REGISTER

Revision Date: 4/28/2020

(1) (e.g., written plans, compliance programs, AHAs, monitoring, training, PPE, qualifications, certs.)

(2) (including a risk assessment before and after the risk control / risk management strategy is implemented)

Item #	Description / identity of relevant SH&E risk	Description of the risk control / risk management strategy to be used(1)	Relevant AHAs(1)	Specific risk control / risk management elements required(2)	Remarks	Uncontrolled Risk (Project Risk Assessment Code Chart)	Controlled Risk (Project Risk Assessment Code Chart)
1	Working around Heavy equipment / Drill rigs may be present and present a significant physical hazard	Understand equipment capabilities and overall site operations.	002, 009, 012	Discuss and understand the overall hazards and operation of the heavy equipment and drill rig with the contractor supervisor and operator. Understand procedures and lines of communication during operation of equipment.	Identify kill switches or procedure for de-energizing equipment in the event of an incident.	Extremely High Severity: Catastrophic Frequency: Likely	Moderate Severity: Critical Frequency: Seldom
	Overhead/dropped objects hazards around drill rig.	Identify potential overhead/dropped objects hazards and required PPE.		Discuss and review overhead hazards with contractor supervisor and operator. Survey overhead area of the drill rig prior to approaching to identify and obvious hazards. Wear hardhat and steel toe boots.	Understand site emergency signals and sirens from equipment.		
	Line-of-Fire of potential energy.	Identify and avoid line-of-fire areas.		Discuss and review areas of heavy equipment and drill rig operations where stored energy poses a line-of-fire risk and hazard. Avoid personnel being present in those areas during operations that pose a line-of-fire risk or hazard.			
	Blind Spots of various equipment	Identify and avoid blind spots of equipment.		Discuss and review blind spots of various equipment and drill rig. Understand lines of communication (line-of-sight, hand signals, etc.) to the operator of such equipment. Avoid blind spots during operations.			

2	Hazardous Vapors/Atmosphere	Employ 5-gas meter and understand action levels.	002, 003, 007, 008, 009	Employ multi-gas meter and action levels as described in Exhibit 2-1 of the PSHEP		Extremely High Severity: Catastrophic Frequency: Likely	Moderate Severity: Critical Frequency: Seldom
3	Driving to/from Sites and Vehicle Operation on Sites	Review and discuss routes to/from site and associated/potential hazards.	005	Identify road conditions, speed limits, blind turns, hidden driveways.	**Do not engage in distracted driving. Turn phone off or in driving mode to avoid distracting notifications.**	Extremely High Severity: Catastrophic Frequency: Likely	Moderate Severity: Critical Frequency: Seldom
		Monitor Weather		Monitor for problematic areas during severe weather (e.g., icy spots, puddle/flooding areas).			
		Observe Pedestrians		Identify pedestrian areas.			
		Observe School buses and children		Identify school bus/public transit times of operation and adjust schedule or driving operations as needed. Be vigilant for children.			
		Identify On-site hazards.		Conduct a 360 walk around prior to operating. Follow access routes.			
		Maintain Vehicle.		Identify and implement maintenance status and schedule of vehicle.			
4	Severe Weather	Monitor weather forecast and adjust planning.	001	Check weather forecast prior to starting work, reschedule work as needed. Stop work immediately upon the visual observation of lightning and/or audible sound of thunder. Stop work for 30 minutes from most recent observation. Rig down for wind gusts over 35 mph.		Extremely High Severity: Catastrophic Frequency: Likely	Moderate Severity: Critical Frequency: Seldom
	Hot Temperatures	Schedule periodic breaks and provide drinks for hydration.		Schedule regular breaks in cooled or shaded areas and provide plenty of water for hydration. Train or review personnel for signs of heat exhaustion/stroke. Adjust work schedule accordingly.			
	Cold Temperatures	Schedule periodic breaks and provide drinks for hydration and warming.		Schedule regular breaks in warm areas or vehicles and provide plenty of water for hydration. Train or review personnel for signs of cold stress/frost bite/hypothermia. Wear warm clothing and adjust work schedule accordingly.			
5	Working on or around water - in Niagara River	Prepare and follow a Float Plan. Have PFDs and buddy system when workin near or around water.	11	Prepare and follow a Float Plan. Have PFDs and buddy system when workin near or around water.	Trained boat operator with USCG course	Extremely High Severity: Catastrophic Frequency: Likely	Moderate Severity: Critical Frequency: Seldom

6	Biological Hazards	Identify and avoid areas of high vegetation. Train employees on identification and control of bio hazards. Post check of work area and self for exposure to poisonous plants or animals.	001	Clear areas with high vegetation prior to mobilization if feasible and identify any poisonous plants or animals that could be in the area. Review and discuss common plants and animals in the area that pose a threat or risk. Avoid areas with increased risk of these plants or animals. Apply DEET or Permetherin as needed for high risk areas. Wear light colored clothing to easily identify insects/ticks. Conduct a thorough Tick check and refer to the Workcare handout. Review and discuss symptoms of exposure to the various plants and animal bites that could occur in area of work.		**High** **Severity: Critical** **Frequency: Likely**	**Moderate** **Severity: Critical** **Frequency: Seldom**

ATTACHMENT G LEGAL COMPLIANCE REGISTER

Attachment G
Tonawanda Coke Legal Compliance Registry
Content Revision Date: 4/6/2018

Item #	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
1	General Safety & Health	• US OSHA 29 CFR 1926.20 • US ACE EM 385-1-1 01.A	• www.osha.gov • www.usace.army.mil/SafetyandOccupationalHealth.aspx	
2	Safety Training	• US OSHA 29 CFR 1926.21 • US ACE EM 385-1-1 01.B.01	• www.osha.gov • www.usace.army.mil/SafetyandOccupationalHealth.aspx	
3	First Aid and Medical	• US OSHA 29 CFR 1926.23 • US OSHA 29 CFR 1926.50 • US ACE EM 385-1-1 03.A	• www.osha.gov • www.usace.army.mil/SafetyandOccupationalHealth.aspx	
4	Fire Protection and Prevention	• US OSHA 29 CFR 1926.24 • US OSHA 29 CFR 1926.150-155 • US OSHA 29 CFR 1926.352 • US ACE EM 385-1-1 09.A	• www.osha.gov • www.usace.army.mil/SafetyandOccupationalHealth.aspx	
5	Housekeeping	• US OSHA 29 CFR 1926.25 • US ACE EM 385-1-1 14.C	• www.osha.gov • www.usace.army.mil/SafetyandOccupationalHealth.aspx	
6	Sanitation	• US OSHA 29 CFR 1926.27 • US OSHA 29 CFR 1926.51 • US ACE EM 385-1-1 02.A	• www.osha.gov • www.usace.army.mil/SafetyandOccupationalHealth.aspx	
7	Personal Protective Equipment	• US OSHA 29 CFR 1926.28 • US OSHA 29 CFR 1926.95-98 • US OSHA 29 CFR 1926.100-107 • US ACE EM 385-1-1 05.A	• www.osha.gov • www.usace.army.mil/SafetyandOccupationalHealth.aspx	
8	Emergency Employee Action Plans	• US OSHA 29 CFR 1926.35 • US ACE EM 385-1-1 01.E	• www.osha.gov • www.usace.army.mil/SafetyandOccupationalHealth.aspx	
9	Noise Exposure	• US OSHA 29 CFR 1910.95 • US OSHA 29 CFR 1926.52 • US ACE EM 385-1-1 05.C	• www.osha.gov • www.usace.army.mil/SafetyandOccupationalHealth.aspx	
10	Gases, Vapors, Dusts and Mists	• US OSHA 29 CFR 1926.55	• www.osha.gov	
11	Hazard Communication	• US OSHA 29 CFR 1926.59 • US ACE EM 385-1-1 1.B.06	• www.osha.gov • www.usace.army.mil/SafetyandOccupationalHealth.aspx	
12	Hazardous Waste Operations and Emergency Response	• US OSHA 29 CFR 1910.120 • US OSHA 29 CFR 1926.65 • US ACE EM 385-1-1 28.A	• www.osha.gov • www.usace.army.mil/SafetyandOccupationalHealth.aspx	
13	Accident prevention signs and tags	• US OSHA 29 CFR 1926.200 • US ACE EM 385-1-1 08.A	• www.osha.gov • www.usace.army.mil/SafetyandOccupationalHealth.aspx	
14	Signaling	• US OSHA 29 CFR 1926.201 • US ACE EM 385-1-1 08.B	• www.osha.gov • www.usace.army.mil/SafetyandOccupationalHealth.aspx	
15	Barricades	• US OSHA 29 CFR 1926.202	• www.osha.gov	
16	Material Storage	• US OSHA 29 CFR 1926.250 • US ACE EM 385-1-1 14.B	• www.osha.gov • www.usace.army.mil/SafetyandOccupationalHealth.aspx	
17	Waste Disposal	• US OSHA 29 CFR 1926.252 • US ACE EM 385-1-1 14.D	• www.osha.gov • www.usace.army.mil/SafetyandOccupationalHealth.aspx	
18	Tools	• US OSHA 29 CFR 1926.300-307	• www.osha.gov	

		• US ACE EM 385-1-1 13.A	• www.usace.army.mil/SafetyandOccupationalHealth.aspx	
19	Motor Vehicles, Mechanized Equipment	• US OSHA 29 CFR 1926.600-603 • US ACE EM 385-1-1 18.A	• www.osha.gov • www.usace.army.mil/SafetyandOccupationalHealth.aspx	
20	Site Clearing	• US OSHA 29 CFR 1926.604 • US ACE EM 385-1-1 31.A	• www.osha.gov • www.usace.army.mil/SafetyandOccupationalHealth.aspx	
21	Excavations	• US OSHA 29 CFR 1926.650-652 • US ACE EM 385-1-1 25.A	• www.osha.gov • www.usace.army.mil/SafetyandOccupationalHealth.aspx	
22	Internal Traffic Control	• US ACE EM 385-1-1 8.D	• www.usace.army.mil/SafetyandOccupationalHealth.aspx	
23	Traffic Movement Restriction Times	• US ACE EM 385-1-1 8.C	• www.usace.army.mil/SafetyandOccupationalHealth.aspx	
25	Boating	• OSH Act of 1970 SEC. 5. Duties	• www.osha.gov	

ATTACHMENT H TRAINING MATRIX

Employee Name / Employee Title / Employee Function	Required Compliance / Risk Control / Risk Management Training	Required Licenses / Designations of Authority / Competencies / Qualifications / Certifications	Frequency of Required Refresher Training / Assessment of Continuing Competency
Field Team Leaders/Construction Manager	Basic orientation	ESHARP/PSHEP	On initial assignment, reviewed annually
	First Aid / CPR / AED	Designated provider of first aid / CPR provider	Every 2 years (with bloodborne pathogens training)
	PPE: Hardhats, Gloves, Eye Protection, Safety Boots	ESHARP/PSHEP	On initial assignment; upon changes to PPE use
	Parsons Fleet Driver Training		Training is required when personnel are required to operate a Parsons Owned or Leased vehicle on public roadways
Field Technicians	Basic orientation	ESHARP/PSHEP	On initial assignment, reviewed annually
	PPE: Hardhats, Gloves, Eye Protection, Safety Boots	ESHARP/PSHEP	On initial assignment; upon changes to PPE use
	Parsons Fleet Driver Training		Training is required when personnel are required to operate a Parsons Owned or Leased vehicle on public roadways

Current Training Certificates Database: P:\H&S_18\Training Certificates

ATTACHMENT I COVID-19 PREVENTION PROCEDURES

Purpose

This document provides guidance to reduce the potential for contracting or spreading Coronavirus Disease 2019 (COVID-19).

Document Version

This document is an addendum to the Project Safety, Health and Environmental Plan (PSHEP) dated September 2019. Below is the version history for the COVID-19 Management Plan developed for the Tonawanda Coke Site 108.

Revision 1: Original version, issued August 12, 20200.

Project Location and Description

Site 108 is located at 3800 River Road in Tonawanda, New York. Site 108 extends from River Road to the Niagara River. Site access is restricted with a locked gate on the property boundary along River Road. Background information indicates the site was primarily used for main plant (the Tonawanda Coke facility located across River Road) shipping and deliveries by way of the Niagara River, including coke, coal, and coal tar. A removal action consisting of tank demolition and soil and tar removal was completed in February 2020. Covered activities consist of site restoration that was deferred to Spring of 2020 because of weather and site conditions, including import of material for final site grading and hydroseeding.

Project Team

A list of key team members, their company and contact information are provided below.

Client:

- Project Manager: Steve Coladonato, Steven.Coladonato@Honeywell.com, (302) 791-6738

Parsons:

- Project Manager: Tom Abrams, Tom.Abrams@Parsons.com, (315) 263-5109

Contractor: Precision Environmental

- Project Manager: Daniel Eureka, deureka@precision-env.com, (216) 386-6580

Local Health Department

The project site is located in Erie County. Contact information for the Erie County Department of Health (ECDOH) is listed below.

- (716) 858-7690

The local health department recommends all COVID testing be coordinated through primary care physicians. ECDOH offers diagnostic testing. A prescription or doctor's referral is not required. Call

(716) 858-2929 to schedule a test. In the event, a worker develops symptoms they are instructed to call their primary care provider for further instructions.

Potential Exposure Pathways, Risks and Symptoms

COVID-19 spreads mainly between people who are in close contact with one another (within about 6 feet) through respiratory droplets produced when an infected person coughs or sneezes. COVID-19 can also be transmitted by touching a surface or object that has the virus on it and then touching one's own mouth, nose, or possibly eyes. Risk of infection for the virus that causes COVID-19 is higher for people who are close contacts of someone known to have COVID-19 and those who live in or have recently been in an area with ongoing spread of COVID-19. Patients with COVID-19 have had mild to severe respiratory illness with symptoms of fever, cough, shortness of breath, difficulty breathing, chills, repeated shaking with chills, muscle pain, headache, sore throat, and new loss of taste and smell. These symptoms may reveal themselves 2 to 14 days after exposure to the virus.

Exposure Mitigation

Exposure mitigation will be managed at the Site by first implementing administrative controls and then by using personal protective equipment (PPE) as described below. A visual reminder is included in ***Attachment 1***, as well. The following administrative controls will be implemented based on risk levels and local guidelines at the time of work.

<u>Administrative Controls:</u>

- **Symptom identification and tracking. All project staff will be required to complete and submit the attached Screening Questionnaire (Attachment 2) and self-report any of the following symptoms:**
  - **Shortness of breath**
  - **Coughing**
  - **Fever**
  - **Unexplained Runny Nose**
  - **Body Aches or Excessive Fatigue**
  - **Headache**
  - **Sore Throat**
  - **Loss of taste or smell**

  The questionnaire will be completed daily with copies maintained on file.
- Anyone with signs or symptoms of COVID 19 will not be allowed to enter the site and is required to report to self-isolate and seek medical attention and testing as needed.
- Dedicated staffing will be used by all on-site contractors and Parsons to the extent practical to reinforce this control among all work groups in all work zones.
- Avoid unnecessary overnight travel, bring food and other supplies to reduce need to enter public businesses

- Ensure on-site personnel are effectively isolated from COVID-19 exposure when possible utilizing social distancing. Social distancing means contractors and Parsons employees are able to maintain a distance of at least 6 feet between people.
- Tailgate meetings will be held each morning with all on-site contractors and stakeholders to review scheduled activities and to evaluate whether tasks can be completed using social distancing. If social distancing can't be maintained, personal protective equipment (PPE, face coverings) is required.
- Since there is no running water at the site, contractors and Parsons employees will use an alcohol-based hand rub that contains at least 60% if hand sanitizer is ethyl alcohol or 70% if isopropanol-based alcohol frequently throughout the day, but particularly after going to the bathroom, before/after eating, after blowing nose/coughing/sneezing in hands, and arriving/departing from the Site. Appropriately maintained bathroom facilities are available at the main plant (guard shack and breakroom) hand washing stations will be available.
- Contractors and Parsons employees should avoid touching their eyes, nose, or mouth with unwashed hands. Face washing is recommended prior to smoking or eating.
- Avoid handshakes.
- Cough and sneeze into your elbow. If you use a tissue to blow your nose, dispose of the tissue promptly and use hand sanitizer to cleanse your hands.
- Utilize disinfectants from the EPA list (https://www.epa.gov/pesticide-registration/list-n-disinfectants-use-against-sars-cov-2) by wiping down surfaces you touch prior to starting work and routinely throughout the day, including shared vehicles as appropriate.
- Clean and disinfect all supplies (pens, clipboards, etc.), tablets, cellphones, reusable equipment (meters, pumps, etc.), and non-disposable PPE (hardhats, safety glasses, earmuffs) at the end of each day. Avoid using other employee's phones and personal work items, when possible.
- Do not come to work if you are sick or exhibiting any symptoms of COVID-19. Symptomatic employees will not be allowed to enter the Site, no exceptions. If a person comes to the site sick, isolate them, and send them home.
- All on-site workers must complete COVD-19 awareness training before being allowed to work on-site.

Personal Protective Equipment (PPE):

- Where social distancing guidelines (staying 6 feet apart) cannot be adhered to or as mandated by local guidelines, an appropriate face covering as defined by current CDC-guidance must be worn at the Site.
- Every contractor and Parsons employee entering the site must have a face covering available for use or entry may be refused.

Community Safety

Site 108 is unoccupied and a gate and fencing that restricts public access.

Procedure if Personnel is Diagnosed

This section details the procedures in the event a member of the project team is diagnosed with COVID-19, is suspected of having COVID-19 or has been in close proximity to someone who has contracted COVID-19.

1. If a contractor or a Parsons employee is sick/symptomatic, stay home and do not return to work until you are well.
2. If a contractor's or a Parsons' employee symptoms align to COVID-19 as described in the Symptom Questionnaire, please seek medical attention for guidance.
3. Call 911 immediately, if someone develops any emergency warning signs/symptoms. Emergency symptoms may include trouble breathing, persistent pain or pressure in the chest, new confusion or inability to arouse and bluish lips or face. Notify the operator or Parsons Site Safety Officer the ill person has or may have, COVID-19. If possible, put on a cloth face covering before medical help arrives.
4. If a contractor or a Parsons employee has been in close proximity to (i.e., at risk of direct or indirect exposure to the virus) someone who has contracted the virus, please stay home 14 days to ensure the worker is not sick/symptomatic before returning to work.

If a contractor or a Parsons employee has been diagnosed **with COVID-19 or has been symptomatic and has not received negative results, this person** can stop home isolation under the following conditions:

OPTION 1: If the contractor or a Parsons employee will not have a test to determine if they are still contagious, the contractor or a Parsons employee can leave home after these three things have happened: the person has had no fever for at least 72 hours (that is three full days of no fever without the use of medicine that reduces fevers) AND other symptoms have improved (for example, when the worker's cough or shortness of breath has improved) AND at least 7 days have passed since the worker's symptoms first appeared.

OPTION 2: If the contractor or a Parsons employee will be tested to determine if they are still contagious, the contractor or a Parsons employee can leave home after these three things have happened: the person no longer has a fever (without the use of medicine that reduces fevers) AND other symptoms have improved (for example, when the person's cough or shortness of breath have improved AND has received two negative tests in a row, 24 hours apart.

In all cases, contractors or Parsons employees should follow the guidance of their healthcare provider and local health department. **Attachment 3** contains guidance and procedures for self-isolation and return to work from ECDOH. The decision to stop home isolation should be made in consultation with their healthcare provider and state and local health departments.

Daily Cleaning Schedules and Disinfection Procedures

Common surfaces, community objects (pens, clipboards, field notebooks, tablets, etc.) and equipment (bulldozer, skid steer, etc.) will be disinfected between users and/or at minimum once daily. Non-disposable PPE (hardhats, safety glasses, earmuffs, etc.), which are person specific will be disinfected/cleaned at the end of each day. All contractors and Parsons employees will make every effort to avoid using other personnel's phones and personal work items.

Contractors and Parsons employees will use disinfectants from the EPA list to do so (https://www.epa.gov/pesticide-registration/list-n-disinfectants-use-against-sars-cov-2). Labels contain instructions for safe and effective use of the product including precautions taken when applying the product, such as wearing gloves and using good ventilation during use of the product. Gloves should be discarded after each cleaning and disinfection. If available, contractors and Parsons should provide their staff with disposable disinfecting wipes to use on commonly used surfaces. Throw disinfecting wipes away after one use.

Hand sanitizer should be made available at common areas for employee use.

In the event there is/are suspected COVID-19 cases among site personnel, work will stop. All site personnel will gather at pre-marked spaces, 6 feet apart at the site support area. A collaborative discussion amongst all site personnel will be used to identify where the person was working, surfaces encountered, etc. The cleaning and disinfection procedures identified above will be implemented.

Training

Each company must train their own employees at length with respect to COVID-19 and provide their employees with appropriate PPE including disinfectants, hand sanitizers, face coverings, etc. Parsons in collaboration with Ontario Specialty Contracting will provide general COVID-19 awareness training including a review of the contents of this plan and best management practices for completing each phase of work to all contractors and Parsons employees working at the Site. Training will be documented and retained in the project HSE files.

At a minimum, the following information and training will be provided:

1. Sources of exposure to the COVID-19.
2. The hazards associated with that exposure, and appropriate workplace protocols in place to prevent or reduce the likelihood of exposure.
3. Information regarding where employees can go to obtain more knowledge.

Supervisors must brief employees on any applicable updates to internal COVID-19 guidance during daily huddles/toolbox meetings before beginning work.

Attachments

1 – Prevent Infection (for posting)

2 – Self Declaration Questionnaire

3 – ECDOH Covid-19 Packet

ATTACHMENT J COVID-19 MANAGEMENT PLAN

1. Purpose

This document provides guidance to reduce the potential for contracting or spreading Coronavirus Disease 2019 (COVID-19).

2. Procedure

2.1. Parsons Corporate Response Management Team (CRMT) actively monitors the outbreak and impacts the COVID-19 may have on our employees and customers.

2.2. Project Managers are asked to refer to Parsons internal COVID-19 Crisis Responses site and Company News Group updates for the latest directives on travel, working/returning to work and other relevant documents/resources. Project Managers shall modify this procedure as updates are made to internal guidance.

2.3. Managers are encouraged to collaborate with customers, subcontractors, and partners on crisis guidelines and contingency/preparedness plans. Our customers, subcontractors, and partners may provide different guidelines to their employees, ultimately impacting Parsons employees. In cases where local site guidelines are stricter, the strictest will apply.

2.4. The potential exposure to COVID-19 will be incorporated into each project's risk register, risk planning meetings and mitigation documents, as appropriate.

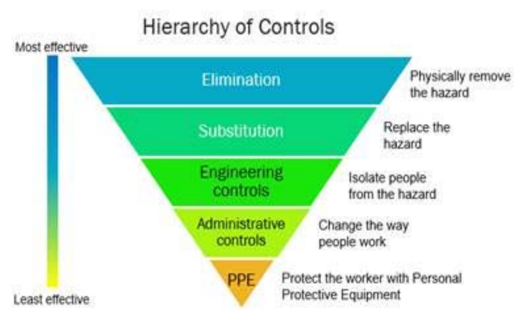
2.5. Exposure mitigations will be based on the hierarchy of controls with PPE serving as the last line of protection.

2.5.1. **Elimination:** We must eliminate all non-critical path work until further notice.

2.5.2. **Administrative Control**: We must ensure that our people are effectively isolated from COVID-19 exposure when possible utilizing social distancing and perimeter barricading. Symptomatic employees must not be allowed to enter the work zone with no exceptions.

2.5.3. **Administrative control:** All employees must be required to frequently wash and disinfect their hands per CDC guidelines. This will require dedicated staffing to reinforce this control among all work groups in all work zones.

2.5.4. **Administrative control:** All common areas, breakrooms, restrooms, and working surfaces used by Parsons employees must be cleaned and disinfected per CDC guidelines. Each project should establish their own sanitation schedule based upon usage but no less than daily.



2.5.5. **Administrative Control:** All onsite workers must complete COVID-19 awareness training before being allowed to work on site.

2.5.6. **Administrative Control:** Breaks and lunches can be staggered in order to minimize employee contact and interaction. Site specific guidelines must implemented to ensure that guidelines related to social distancing, handwashing and sanitation are adhered to.

2.5.7. **PPE:** Where social distancing guidelines, general hygiene and surface sanitation practices cannot be adhered to then appropriate respiratory protection must be provided and worn. Additionally, workers and worksite visitors must always wear medical grade gloves. All OSHA requirements related to the use of respiratory protection training (e.g. training, fit testing, medical screening, etc.) must be followed.

2.6. For additional information, please refer to the Centers for Disease Control - Interim Guidance for Businesses and Employers (https://www.cdc.gov/coronavirus/2019-ncov/community/guidance-business-response.html).

3. Personal Hygiene

3.1. Frequently wash your hands with soap and water for at least 20 seconds and always before/after eating and arriving/departing the site.

3.2. If soap and running water are not available, use an alcohol-based hand rub that contains at least 60% alcohol.

3.3. Avoid touching your eyes, nose, or mouth with unwashed hand.

3.4. Use respiratory etiquette, including covering coughs and sneezes. Wash hands or use hand sanitizer after each time you cough or sneeze.

3.5. Minimize contact among employees, contractors, and other stakeholders by replacing face-to-face meetings with virtual communications and implementing telework if feasible.

3.6. Utilize disinfectants from the EPA list (https://www.epa.gov/pesticide-registration/list-n-disinfectants-use-against-sars-cov-2) by wiping down surfaces you touch prior to starting work and routinely throughout the day, including shared vehicles as appropriate.

3.7. Clean and disinfect all supplies (pens, clipboards, etc.), tablets, cellphones, reusable equipment (meters, pumps, etc.), and non-disposable PPE (hardhats, safety glasses, earmuffs) at the end of each day. Avoid using other employee’s phones and personal work items, when possible.

3.8. Practice social distancing –stay 6’ away from other people. Avoid handshakes.

3.9. Do not come to work if you are sick or exhibiting any symptoms of COVID-19. Refer to internal COVID-19 site for additional guidance on returning to work.

3.10. If another person on site does come into work or to the site sick, isolate them, and send them home, if Parsons is the controlling employer. If Parsons is not the controlling employer, isolate employees from the person, and inform the controlling employer accordingly.

3.11. For additional guidance on hygiene and hand washing best practices, please refer to the Centers for Disease Control COVID—19 How to Protect Yourself (https://www.cdc.gov/coronavirus/2019-ncov/prepare/prevention.html).

4. Field Trailer Cleaning/Sanitation

The following steps should be taken if site employees are utilizing common areas for meetings and breaks.

4.1. Each Parsons managed location must designate responsible person(s) for cleaning all common areas within a field trailer. This includes tables, doorknobs, light switches, countertops, handles, desks, phones, keyboards, toilets, faucets, and sinks.

4.2. If Parsons employees have work areas in a shared field trailer controlled by others, obtain information from controlling employer on sanitation practices.

4.3. To clean common areas, use disinfectants found on the EPA list.

4.4. Labels contain instructions for safe and effective use of the product including precautions taken when applying the product, such as wearing gloves (Personal Protective Equipment) and using good ventilation during use of the product. Gloves should be discarded after each cleaning and disinfection.

4.5. Provide disposable disinfecting wipes for staff to use on commonly used surfaces (for example, keyboards, desks, etc.), which can be wiped down by staff at their own workstations. Throw disinfecting wipes away after one use.

4.6. Have hand sanitizer available at common areas for employee use. Post the World Health Organization Hand Rubbing poster (https://www.who.int/gpsc/5may/How_To_HandRub_Poster.pdf) near shared sanitizers.

5. Screening Employees – Pandemic Conditions

Parsons may encounter Customer requests or higher risk field locations (e.g. craft projects, multi-employer) that require additional steps to support the separation of symptomatic employees from the healthy population. The objective is to reduce risk and potential COVID-19 exposures to those entering the facility and/or field location.

5.1. Self-declaration questionnaires (See Attachment I-3) can be used as a means to pre-screen employees prior to accessing a locations point of entry. **Note:** Project Managers may need to update this questionnaire as local conditions and requirements change (e.g., updates to Customer quarantine requirements). Any changes to the self-declaration questionnaire must be cleared by Parsons Legal. Employees are encouraged to self-monitor their body temperature at home prior to completing the self-declaration questionnaire when feasible.

5.2. Onsite temperature screenings are permitted under the following conditions:

5.2.1. The agent conducting the screening has a health service background with the requisite training, equipment, and knowledge necessary to effectively assess worker suitability to enter the work zone. For Parsons controlled sites, this will require contracting through a local health service provider.

5.2.2. A visible barricade has been established around the perimeter of all Parsons work areas to ensure that no “non-cleared” personnel enter these work zones at any time. Cleared personnel are those who have been assessed as asymptomatic for COVID-19 infection by an agent who has been expressly trained to recognize and test persons for symptoms.

5.2.3. All workers must be assessed and cleared prior to entering these work zones.

5.2.4. Workers must line up a minimum of 6 ft. apart in advance of these work zones prior to being assessed.

6. Training

6.1. COVID-19 awareness training is included on the project training matrix. Subcontractors must train their own employees.

6.2. At a minimum, the following information and training is provided:

6.2.1. Sources of exposure to the COVID-19

6.2.2. The hazards associated with that exposure, and appropriate workplace protocols in place to prevent or reduce the likelihood of exposure

6.2.3. Information regarding where employees can go to obtain more knowledge

Project Managers can utilize Attachment I-1 COVID-19 Factsheet to assist with employee awareness training.

6.3. Supervisors must brief employees on any applicable updates to internal COVID-19 guidance during daily huddles/toolbox meetings before beginning work.

6.4. Using an acceptable training form, the records custodian maintains a record of all training or instruction given to employees.

7. Responsibilities

7.1. **Corporate SH&E:** Responsible for developing and maintaining this procedure and conducting periodic reviews and updates to ensure alignment and integration with related or referenced policies and procedure; support and guidance to help ensure the success of this procedure; and auditing its effectiveness.

7.2. **Project Manager (PM):** Ultimately responsible for delivering the project and assigning roles and responsibilities to discipline managers and the Project Management Team; implementing and enforcing this procedure, and designating a records custodian for the project.

7.3. **Records Custodian:** Responsible for documenting and maintaining employee training.

7.4. **Subcontractor:** Complies with all Parsons' requirements. Submit subcontractor COVID-19 preparedness documentation. Trains subcontractor employees.

8. Exceptions

8.1. The Project Manager may request or require a more stringent process if required by the contract or is beneficial to the project.

9. Appendices

9.1. COVID-19 Factsheet

9.2. Business Travel COVID-19 Pandemic

9.3. COVID 19 Self-declaration Form

Revision History

Revision	Changes	Approver	Approval Date
0	Original Issue	Barker, John	3/20/2020
1	Added Section 2.5 and Section 5. Added Attachments I-2 and I-3	Barker, John	3/31/2020

ATTACHMENT I-1

Coronavirus Disease 2019 (COVID-19)

OWN ZERO

PARSONS

What is Coronavirus disease 2019?

Coronavirus disease 2019 (COVID-19) is a respiratory illness that can spread from person to person. The virus that causes COVID-19 is a novel coronavirus that was first identified during an investigation into an outbreak in Wuhan, China.

Can I get COVID-19?

Yes. COVID-19 is spreading from person to person in many parts of the world. Risk of infection from the virus that causes COVID-19 is higher for people who are close contacts of someone known to have COVID-19, for example healthcare workers, or household members. Other people at higher risk for infection are those who live in or have recently been in an area with ongoing spread of COVID-19.

How does COVID-19 spread?

The virus is thought to spread mainly between people who are in close contact with one another (within about 6 feet) through respiratory droplets produced when an infected person coughs or sneezes. It also may be possible that a person can get COVID-19 by touching a surface or object that has the virus on it and then touching their own mouth, nose, or possibly their eyes, but this is not thought to be the main way the virus spreads.

What are the symptoms of COVID-19?

Patients with COVID-19 have had mild to severe respiratory illness with symptoms of:

- fever
- cough
- shortness of breath
- pneumonia in both lungs and other severe complications

People can help protect themselves from respiratory illness with everyday preventive actions.

- Avoid close contact with people who are sick.
- Avoid touching your eyes, nose, and mouth with unwashed hands.
- Wash your hands often with soap and water for at least 20 seconds.
- Use an alcohol-based hand sanitizer that contains at least 60% alcohol if soap and water are not available.
- Practice social distancing –stay 6' away from other people. Avoid handshakes.

If you are sick, to keep from spreading respiratory illness to others, you should

- Stay home when you are sick.
- Cover your cough or sneeze with a tissue, then throw the tissue in the trash.
- Clean and disinfect frequently touched objects and surfaces.

What workplace guidance is available to help protect employees and prevent the spread of COVID-19?

- Employees are asked to review Parsons internal COVID-19 Crisis Response site and Company News Group updates for the latest directives on travel, working/returning to work and other relevant documents.
- A COVID-19 Prevention Procedure has been developed to offer additional field guidance covering personal hygiene practices, cleaning/sanitation, training and other relevant information.

Are there additional resources to learn more about COVID-19?

- Centers for Disease Control - Interim Guidance for Businesses and Employers (https://www.cdc.gov/coronavirus/2019-ncov/community/guidance-business-response.html).
- For hygiene and hand washing best practices, Centers for Disease Control COVID—19 How to Protect Yourself. (https://www.cdc.gov/coronavirus/2019-ncov/prepare/prevention.html).
- World Health Organization Hand Rubbing poster (https://www.who.int/gpsc/5may/How_To_HandRub_Poster.pdf)
- EPA list of disinfectants (https://www.epa.gov/pesticide-registration/list-n-disinfectants-use-against-sars-cov-2)

ATTACHMENT I-2

BUSINESS TRAVEL COVID-19 PANDEMIC

Parsons Corporate Response Management Team (CRMT) is actively monitoring the outbreak caused by COVID-19 (coronavirus). Updates are being announced in the Company News Workplace group regularly as conditions change. This Attachment is intended to provide managers with additional information to help manage the crisis during business travel activities.

TRAVEL

All employees are advised to postpone all non-essential business travel, domestic or international, until further notice. This includes non-essential attendance at meetings, conferences, and events.

Essential Travel is defined as:

- Travel to and from client meetings when it is not feasible to conduct the meeting virtually or postpone the meeting.
- Travel required to prevent immediate impacts to the health and safety of the employee and family.
- Travel, that if postponed or cancelled, would cause material impacts to the financial, operational, business development, safety, reputational, legal or compliance status of Parsons.
- When in doubt about what is essential, contact your leadership team.

In general, COVID-19 is believed to be most commonly transmitted via person-to-person contact. There's certainly the chance of contracting the virus through contact with contaminated surfaces, but according to the CDC, this is "not thought to be the main way the virus spreads."

There are several great resources on the CDC and WHO websites about precautions we can take to stay healthy and limit exposure to COVID-19. Traveling employees are encouraged to take preventative actions to help stop the spread of germs:

- Wash hands frequently using soap and water.
- Use alcohol-based hand sanitizer frequently as recommended
- **Avoid touching your eyes, nose, and mouth** with an unwashed hand
- Wearing masks: Are you sick? If so, wearing a mask will protect others. If not, wearing a mask may or may not protect you. Masks are much more effective when placed on an infected person
- Practice social distancing when possible
- Avoid areas of known infection or interactions with known infected

Control Measures are provided in the table below to reduce the likelihood of infection during essential business travel.

Table 1: Protection Against COVID-19 During Business Related Travel

ACTIVITY	HAZARD	CONTROL
Airline Travel	Transmission Through Person to Person Contact • Between people who are in close contact with one another (within about 6 feet). • Through respiratory droplets produced when an infected person coughs or sneezes. • Contact with Contaminated Surfaces and Objects	Airline travel is permitted if considered essential (see definition above) Employees are encouraged to wash their hands after passing through the security checkpoint and before eating or drinking Avoid touching your eyes, nose or mouth with unwashed hands Travel with disinfecting wipes if possible and clean frequently touched surfaces (tray table, armrest, and seatback display) If carrying hand sanitized, apply before takeoff and after disinfecting surfaces Avoid aisle seats as you are exposed to more passengers during the flight.
Staying in Hotels	Transmission Through Person to Person Contact • Between people who are in close contact with one another (within about 6 feet). • Through respiratory droplets produced when an infected person coughs or sneezes. • Contact with Contaminated Surfaces and Objects	Top tier and other hotel chains have established COVID-19 response plans for protecting guests. Employees should not stay in hotels or hotel chains in which a COVID-19 response plan has not been published Employees are encouraged to wash their hands immediately upon entering the room Travel with disinfecting wipes if possible and clean frequently touched surfaces in room (remote control, light switches, bedside lamp switches, the alarm clock, the phone, the bathroom sink) Remove the comforter to avoid potential contact with lingering bodily fluids that can harbor germs Employees are asked to practice social distancing when possible and should discuss accommodation options (e.g. kitchenette) with their manager prior to booking.
Carpooling (Parsons Vehicles)	Transmission Through Person to Person Contact • Between people who are in close contact with one	Carpooling in Parsons vehicles is permitted if travel is considered essential (see definition above). Carpooling or ridesharing with strangers or non-essential passengers *in Parsons vehicles* is prohibited.

ACTIVITY	HAZARD	CONTROL
Carpooling (Parsons Vehicles)	another (within about 6 feet). • Through respiratory droplets produced when an infected person coughs or sneezes. • Contact with Contaminated Surfaces and Objects	Don't carpool if you or other passengers are symptomatic (fever, cough, or shortness of breath) or have been in close proximity to someone who has contracted the virus within the last 14 days. <u>Regularly clean and disinfect your vehicle:</u> • The steering wheel is constantly touched. They should be wiped down with a disinfectant wipe or spray daily. • Don't forget the exterior and interior door handles, your gear shifter, the climate control buttons and radio knobs or buttons, the rearview mirror, and your center console including the cupholders. • Look for specific wipes available made for cleaning your car's leather. • Use microfiber cloths to wipe down touchscreens. <u>Things to keep in your vehicle:</u> • Box of tissues along with a small trash bag to gather the used tissues. Empty it daily. • Hand sanitizer: According to the Centers for Disease Control, use a hand sanitizer that contains at least 60% alcohol. • Sanitary wipes or spray
Traveling to Remote Locations	Transmission Through Person to Person Contact • Between people who are in close contact with one another (within about 6 feet). • Through respiratory droplets produced when an infected person coughs or sneezes. • Contact with Contaminated Surfaces and Objects	Work in remote locations is permitted if travel is considered essential (see definition above). Employees should never perform remote field activities alone Ensure reasonable quantities of food, water, medicines and essentials in the event of travel restrictions, quarantine or limited local supplies. For field work, pack adequate supplies of disinfectants, sanitizing products, trash bags, and nitrile gloves. Disinfect equipment and shared tools before and after use Identify nearest healthcare providers along route and at designation to assist with any medical needs or severe sickness prior to trip Ensure availability and/or ability to use communication devices. Contact Parsons Global Hotline: 1-667-225-6153 for business travel emergencies

ATTACHMENT I-3

COVID-19 SELF-DECLARATION FORM

To prevent the spread of COVID-19 and reduce the potential risk of exposure to our employees and others, we are conducting a simple screening questionnaire. Your participation is important to help us take precautionary measures to protect you and everyone at your project location. Thank you for your time.

Name:	Contact Number:
Company/Organization:	Parsons POC:
Project Name:	City/State:

Self-Declaration

1. Have you returned from any of the Level 3 countries listed on the CDC website https://www.cdc.gov/coronavirus/2019-ncov/travelers/after-travel-precautions.html within the last 14 days?

   Yes No

2. Have you had close contact with or cared for someone diagnosed with COVID-19 within the last 14 days?

   Yes No

3. Have you been in close contact with anyone who has traveled within the last 14 days to one of the Level 3 countries listed on https://www.cdc.gov/coronavirus/2019-ncov/travelers/after-travel-precautions.html .

   Yes No

4. Have you experienced any cold or flu-like symptoms in the last 14 days (including fever, cough, sore throat, respiratory illness, difficulty breathing)?

   Yes No

If the answer is "yes" to any of the following questions, access to the field project location is not permitted.

Signature (visitor): ____ Date: ________________

ATTACHMENT K U.S. COAST GUARD FLOAT PLAN

FLOAT PLAN

INSTRUCTIONS: Complete this plan before you go boating and leave it with a reliable person who can be depended upon to notify the Coast Guard, or other rescue organization, should you not return or check-in as planned. If you have a change of plans after leaving, be sure to notify the person holding your Float Plan. For additional copies of this plan, visit: **www.floatplancentral.org**

www.cgaux.org

Do NOT file this plan with the U.S. Coast Guard

www.uscgboating.org

VESSEL

IDENTIFICATION:

Name & Hailing Port ______________________________

Document / Registration No. ______________ HIN ______________

Year & Make ______________________________

Length _____ Type ______________ Draft _____ Hull Mat. __________

Color ______________________________

Prominent Features ______________________________

COMMUNICATION:

Radio Call Sign ______________________________

DSC MMSI No. ______________________________

Radio-1: Type ______________ Ch./ Freq. Monitored __________

Radio-2: Type ______________ Ch./ Freq. Monitored __________

Cell / Satellite No. ______________________________

E-mail ______________________________

PROPULSION:

Primary-- Type ______________ No. Eng. ___ Fuel Capacity ________

Auxiliary--Type ______________ No. Eng. ___ Fuel Capacity ________

NAVIGATION: **(Check all on board)**

☐ Maps ☐ Charts ☐ Compass ☐ GPS / DGPS

☐ Radar ☐ Sounder ☐ ______________________

SAFETY & SURVIVAL

VISUAL DISTRESS SIGNALS:

☐ Electric S-O-S Light

☐ Orange Flag

☐ Orange Smoke

☐ Red Flares

PFDs: (Do not count Type IV devices)

_____ Quantity On Board

AUDIBLE DISTRESS SIGNALS:

☐ Bell

☐ Horn / Siren

☐ Whistle

GROUND TACKLE:

☐ Anchor: Line Length ________

OTHER GEAR:

☐ Drogue / Sea Anchor

☐ EPIRB ______________

☐ Fire Extinguisher

☐ Flashlight / Searchlight

☐ Food & Water for _____ days

☐ Foul Weather Gear

☐ Life raft / Dinghy

☐ Personal Locator Beacon

☐ Signal Mirror

☐ ______________________

☐ ______________________

☐ ______________________

PERSONS ONBOARD

OPERATOR:

Name ______________________________ Age ____ Gender ____ Notes (Special medical condition, can't swim, etc.) ______________________________

Address ______________________________

Has experience: ☐ with this Vessel ☐ with Area

City ______________________ State _____ Zip Code ________

Home phone ______________________________

Vehicle (Year, Make & Model) ______________________________

Vehicle License No. ______________________________

Trailer will be parked at: ______________________________

Trailer License No. ______________________________

PASSENGERS / CREW: Name & Address — Age — Gender — Notes (Special medical condition, can't swim, etc.)

1. ______________________________ ____ ____ ______________________________
2. ______________________________ ____ ____ ______________________________
3. ______________________________ ____ ____ ______________________________
4. ______________________________ ____ ____ ______________________________
5. ______________________________ ____ ____ ______________________________

Attach "Supplemental Passenger List" if additional passengers or crew on board.

ITINERARY

	DATE	TIME	LOCATION / WAYPOINT	MODE OF TRAVEL	REASON FOR STOP	CHECK-IN TIME
Depart						
Arrive						
Depart						
Arrive						
Depart						
Arrive						
Depart						
Arrive						
Depart						
Arrive						

Attach "Supplemental Itinerary" if there are additional locations or waypoints.

Contact 1: ______________________________ Phone Number ______________________

Contact 2: ______________________________ Phone Number ______________________

If you have a genuine concern for the safety or welfare of any persons on board the Vessel described above, who have not returned or checked-in in a reasonable amount of time, then follow the step-by-step instructions on the *Boating Emergency Guide™* included with this float plan, or on the Internet at:

www.floatplancentral.org/help/BoatingEmergencyGuide.htm

BOATING EMERGENCY GUIDE™

You will need the following items before you begin: 1) the **Float Plan** if one was given to you, 2) **Pen** or **Pencil**, 3) Clean sheet of **Paper** or **Writing Tablet**, and 4) your local **Telephone Directory**. Begin with Step 1 below.

Step 1: Do you have a genuine concern for the safety or welfare of any persons who have not returned or checked-in in a reasonable amount of time?

If YES, then continue with **Step 2**, otherwise **STOP**, no further action is required.

Step 2: Were you given a prepared Float Plan by anyone on board the vessel?

If YES, then continue with **Step 3**, otherwise got to **Step 5**.

Step 3: On the Float Plan, locate the two Contact lines at the bottom of the page. Call Contact number 1…

IF CONTACT #1	THEN
Answers phone	Take notes during your conversation. 1. Let the person know you are responding to a late return or check-in by the individuals designated on the Float Plan. 2. Determine if the person you are talking to, or anyone else at that location, has recently had contact with anyone on the vessel, and when and where that contact occurred. 3. Are you still concerned about the safety or welfare of any persons on board the vessel? IF Yes → THEN Continue with **Step 4**. IF No → THEN **STOP**. No further action is required.
Does not answer phone	Continue with **Step 4**.

Step 4: Call Contact number 2…

IF CONTACT #2	THEN
Answers phone	Take notes during your conversation. 1. Let the person know you are responding to a late return or check-in by the individuals designated on the Float Plan. 2. Determine if the person you are talking to, or anyone else at that location, has recently had contact with anyone on the vessel, and when and where that contact occurred. 3. Are you still concerned about the safety or welfare of any persons on board the vessel? IF Yes → THEN Continue with **Step 6**. IF No → THEN **STOP**. No further action is required.
Does not answer phone	Continue with **Step 6**.

Step 5: Take a moment to jot down the facts you know about each item in the checklist below.

> DO NOT SPECULATE. Speculation about a detail may mislead Search And Rescue personnel, add to the overall search and rescue time, and adversely affect the outcome.

- ❑ Period of time the vessel has been overdue.
- ❑ Purpose of the trip or voyage.
- ❑ Description of the Vessel (type, size, color, features, etc.)
- ❑ Vessels departure point and destination.
- ❑ Places the Vessel planned to stop during transit.
- ❑ Navigation equipment on board (such as GPS, Loran C, Radar, Compass, Sounder, etc.)
- ❑ Number of people aboard the Vessel, as well as personal habits e.g. dependability, reliability, etc.
- ❑ Was the Vessel already moored, or did a vehicle tow it to the launch point?
- ❑ License plate number and description of the tow vehicle, and/or passenger transport vehicle.
- ❑ Communications equipment aboard, including type of radio and frequencies monitored, cellular or satellite telephone numbers of individuals, etc.
- ❑ Additional points of contact along the vessels planned route.
- ❑ Where there any pending commitments e.g. work, appointments, etc.

Continue with **Step 6**.

Step 6:

1. Contact your local Law Enforcement agency (Police or Sheriff).
2. Let the dispatcher know that you are responding to a late return or check-in by the persons on board the vessel.
3. The dispatcher will instruct you from here.

> **Note:** The dispatcher will provide you with the necessary contact or agency connection to get a search and rescue mission started. This is usually handled this way because it puts you closest to the agency conducting the actual search and rescue, eliminating an unnecessary middleman.
>
> If the dispatcher would like a follow-up call from you on the outcome of the rescue, they will let you know.

4. Continue with **Step 7**.

Step 7: Be patient… you've done everything you can possibly do for now. It is important to keep the telephone available, so emergency personnel can contact you with additional information and/or questions concerning the search and rescue effort.

STOP -- End of Guide

Float Plan Central™ is a service of the U.S. Coast Guard Auxiliary
www.floatplancentral.org

APPENDIX E – COMMUNITY AIR MONITORING PLAN

COMMUNITY AIR MONITORING PLAN (CAMP)
SITE 108
TONAWANDA COKE SITE
3800 RIVER ROAD
TONAWANDA, NEW YORK

Prepared For:

Honeywell

115 Tabor Road
Morris Plains, NJ 09750

Prepared By:

PARSONS

301 Plainfield Road
Suite 350
Syracuse, New York 13212

OCTOBER 2020

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CAMP	Community Air Monitoring Plan
mcg/m3	Micrograms per cubic meter
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
OU	Operable Unit
PID	photoionization detection
PPM	Parts per million
QA/QC	Quality Assurance/Quality Control
RI	Remedial Investigation
VOC	Volatile Organic Compound

1.0 INTRODUCTION

1.1 CAMP Overview

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each Operable Unit (OU) when certain activities are in progress at contaminated sites. This CAMP presents the monitoring program that will be followed at Tonawanda Coke Site 108 during Remedial Investigation (RI) activities. RI work will include excavation of test pits, installation of soil borings and monitoring wells, groundwater, surface water, soil, and sediment sampling, and surveying.

The CAMP is not intended for use in establishing action levels for worker respiratory protection (which will be covered under a worker health and safety plan). Rather, its intent is to provide 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. Exceedance of the action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP will confirm that work activities did not spread contamination off-site through the air.

The CAMP presented herein is consistent with guidance provided by New York State Department of Health (NYSDOH) in the generic CAMP contained in DER-10 (NYSDEC 2010), and has been modified based on specific circumstances for this site. No sensitive receptors are located on the property and the nearest residences are approximately 0.3 miles from the property boundary. No special requirements are necessary because work will not take place within 20 feet of potentially exposed individuals or structures and no indoor work will be performed. An evaluation was made of the nature of site contamination and it is confirmed there are no specific individual chemicals expected to be observed in air during work activities. Concentrations of VOCs in surface soils were below industrial and commercial SCOs at all Site 108 sampling locations during prior investigations. One VOC (benzene) was detected above the commercial SCO in subsurface soil. This exceedance occurred at one location and from a sample taken from a layer of wet vegetative mud in the northeast portion of the site. Based on other test pits, this layer of mud is not continuous throughout the site. Proposed work does not involve any intrusive work in the area where the mud was previously encountered, so the material from which the benzene exceedance originated is not anticipated to be disturbed or otherwise exposed at the surface during RI activities. Additionally, the monitoring and response levels provided in the CAMP guidance are appropriate based on the proximity of potentially exposed individuals. The RI elements will involve limited, short-term and very localized soil disturbance. Reliance on the CAMP will not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

2.0 COMMUNITY AIR MONITORING PLAN

2.1 Monitoring Frequency and Location

Based on potential contaminants at the site, real-time air monitoring for VOCs and particulate levels will be performed at the upwind and downwind perimeter of the OU during intrusive work. Example CAMP station locations are shown in **Figure 1**. Actual CAMP station locations will be determined based on wind direction and work location. Monitoring frequencies are detailed below in the following sections.

2.1.1 Continuous Monitoring

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

2.1.2 Periodic Monitoring

Periodic monitoring for VOCs will be performed during non-intrusive activities such as the collection of surface soil and sediment samples or the collection of groundwater samples from monitoring wells. Periodic monitoring during sample collection will consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well purging, and taking a reading prior to leaving a sample location. All readings will be recorded in the field log. Periodic monitoring is anticipated to be sufficient during non-intrusive activities because sampling locations are not in close proximity to potentially exposed individuals. Activities will be taking place on a currently inactive site that is closed to the public, thus eliminating receptors in close proximity to proposed work areas.

2.2 VOC Monitoring, Response Levels, and Actions

VOCs will be monitored at the upwind (background) and downwind perimeter of the OU on a continuous basis (**Figure 1**). The VOC monitoring work will be performed using a MiniRae 3000 (or similar) photoionization detector (PID). The PID will be calibrated at least daily using 100 parts per million (ppm) isobutylene as a surrogate calibration gas. Isobutylene is an appropriate calibration gas because the response of most VOCs is reasonably close to and consistent with it. The PID will be set to calculate 15-minute running average concentrations, which will be compared to the levels specified below.

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 ppm above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.
- If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.
- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shut down and the exceedance will be reported to New York State Department of Environmental Conservation (NYSDEC) and NYSDOH project managers.
- All 15-minute readings will be recorded and be available for State (NYSDEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes will also be recorded.
- Maximum upwind and downwind concentrations will be provided to NYSDEC and NYSDOH on a daily basis.

2.3 Particulate Monitoring Response Levels, and Actions

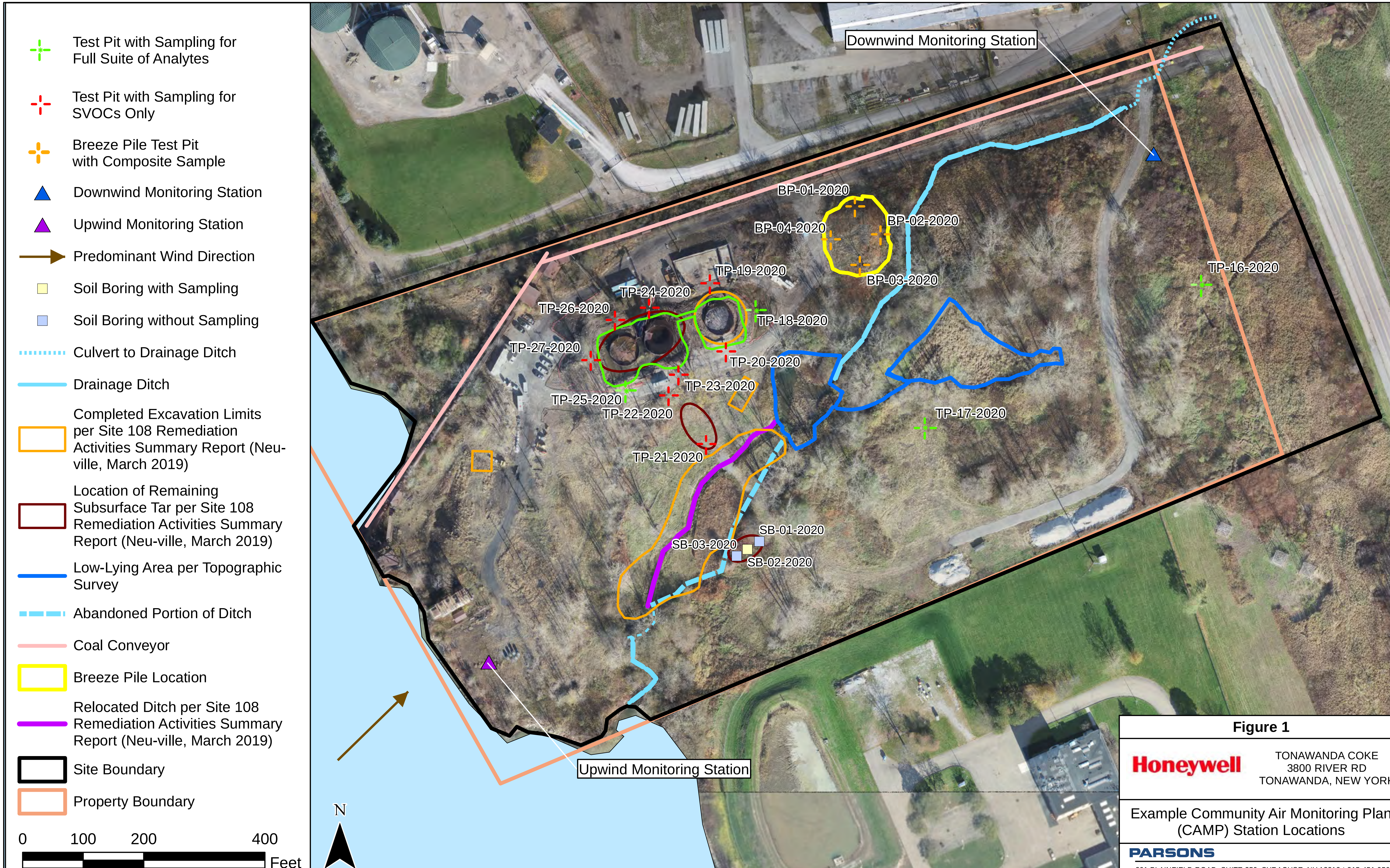
Particulate concentrations will be monitored continuously at the upwind and downwind perimeters of the OU at temporary particulate monitoring stations (**Figure 1**). Additional details regarding particulate monitoring are contained in **Appendix A**. The particulate monitoring will be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) such as a TSI DustTrak Aerosol Monitor (or similar). The monitoring equipment will be capable of integrating over a period of 15 minutes for comparison to the airborne particulate action level. The equipment will be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration will be visually assessed during all work activities. The following action levels and responses will be followed:

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques will be employed. Work will continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m3 above the upwind level and provided that no visible dust is migrating from the work area.
- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m3 above the upwind level, work will be stopped, and a re-evaluation of activities initiated. Work will resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m3 of the upwind level and in preventing visible dust migration. Exceedances will be reported to NYSDEC and NYSDOH project managers.
- All 15-minute readings will be recorded and be available for State (NYSDEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes will also be recorded.
- Maximum upwind and downwind concentrations will be provided to NYSDEC and NYSDOH on a daily basis.

3.0 REFERENCES

NYSDEC DER-10. 2010. *Technical Guidance for Site Investigation and Remediation*, May 2010.

FIGURES



Plot Date: 5/21/2020 Plotted By: Sisson, Evan

Document Path: Q:\GIS\Hon_Syracuse\Tonawanda Coke\Tonawanda CAMP Figure 1.mxd

APPENDIX A FUGITIVE DUST AND PARTICULATE MONITORING

APPENDIX A FUGITIVE DUST AND PARTICULATE MONITORING

A program for suppressing fugitive dust and particulate matter monitoring during intrusive investigation work is presented below. The fugitive dust and particulate monitoring program presented herein has been modified from the generic program contained in DER-10 (NYSDEC 2010). The following fugitive dust suppression and particulate monitoring program will be employed during intrusive activities which warrant its use:

1. Reasonable fugitive dust suppression techniques will be employed during all site activities which may generate fugitive dust.
2. Particulate monitoring will be employed during the handling of waste or contaminated soil or when activities on site may generate fugitive dust from exposed waste or contaminated soil. Excavation, grading, or placement of clean fill do not necessitate use of these control measures.
3. Particulate monitoring will be performed using real-time particulate monitors and will monitor particulate matter less than ten microns (PM10) with the following minimum performance standards:
   - Objects to be measured: Dust, mists or aerosols;
   - Measurement Ranges: 0.001 to 400 mg/m3 (1 to 400,000 :ug/m3);
   - Precision (2-sigma) at constant temperature: +/- 10 :g/m3 for one second averaging; and +/- 1.5 g/m3 for sixty second averaging;
   - Accuracy: +/- 5% of reading +/- precision (referred to gravimetric calibration with SAE fine test dust (mmd= 2 to 3 :m, g= 2.5, as aerosolized);
   - Resolution: 0.1% of reading or 1g/m3, whichever is larger;
   - Particle Size Range of Maximum Response: 0.1-10;
   - Total Number of Data Points in Memory: 10,000;
   - Logged Data: Each data point with average concentration, time/date and data point number;
   - Run Summary: overall average, maximum concentrations, time/date of maximum, total number of logged points, start time/date, total elapsed time (run duration), STEL concentration and time/date occurrence, averaging (logging) period, calibration factor, and tag number;
   - Alarm Averaging Time (user selectable): real-time (1-60 seconds) or STEL (15 minutes), alarms required;
   - Operating Time: 48 hours (fully charged NiCd battery); continuously with charger;
   - Operating Temperature: -10 to 50o C (14 to 122o F); and
   - Particulate levels will be monitored upwind and immediately downwind at the working site and integrated over a period not to exceed 15 minutes.
4. In order to ensure the validity of the fugitive dust measurements performed, there will be appropriate Quality Assurance/Quality Control (QA/QC). The monitoring instrument will be calibrated periodically, all persons operating the instruments will be trained in doing so, daily instrument performance (span) checks will be performed, and all records including monitoring data, exceedances, suppression actions, fugitive dust observations, and other pertinent information will be kept with field documentation.
5. The action level will be established at 150 ug/m3 (15 minutes average).
6. While conservative, this short-term interval will provide a real-time assessment of on-site air quality to assure both health and safety. If particulate levels are detected in excess of 150 ug/m3, the upwind background level must be confirmed immediately. If the working site particulate measurement is greater than 100 ug/m3 above the background level, additional dust suppression techniques must be

implemented to reduce the generation of fugitive dust and corrective action taken to protect site personnel and reduce the potential for contaminant migration. Corrective measures may include increasing the level of personal protection for on-site personnel and implementing additional dust suppression techniques (see paragraph 7). Should the action level of 150 ug/m3 continue to be exceeded work must stop and DER must be notified as provided in the site design or remedial work plan. The notification shall include a description of the control measures implemented to prevent further exceedances.

7. It must be recognized that the generation of dust from waste or contaminated soil that migrates off-site has the potential for transporting contaminants off-site. There may be situations when dust is being generated and leaving the site and the monitoring equipment does not measure PM10 at or above the action level. Since this situation has the potential to allow for the migration of contaminants off-site, it is unacceptable. While it is not practical to quantify total suspended particulates on a real-time basis, it is appropriate to rely on visual observation. If dust is observed leaving the working site, additional dust suppression techniques must be employed. Activities that have a high dusting potential will require the need for special measures to be considered.
8. The following techniques have been shown to be effective for the controlling of the generation and migration of dust during construction activities:
   - Applying water on haul roads;
   - Wetting equipment and excavation faces;
   - Spraying water on buckets during excavation and dumping;
   - Hauling materials in properly tarped or watertight containers;
   - Restricting vehicle speeds to 10 mph;
   - Covering excavated areas and material after excavation activity ceases; and
   - Reducing the excavation size and/or number of excavations.

   Experience has shown that the chance of exceeding the 150ug/m3 action level is remote when the above-mentioned techniques are used. When techniques involving water application are used, care must be taken not to use excess water, which can result in unacceptably wet conditions. Using atomizing sprays will prevent overly wet conditions, conserve water, and provide an effective means of suppressing the fugitive dust.
9. The evaluation of weather conditions is necessary for proper fugitive dust control. When extreme wind conditions make dust control ineffective, as a last resort remedial actions may need to be suspended.