INVENTUM ENGINEERING, PC

Interim Remedial Measure Work Plan

Fuel Oil Underground Storage Tank Removal

Brownfield Cleanup Program #C915196B

1001 East Delavan Avenue

Buffalo, New York

February 8, 2021

481 CARLISLE DRIVE
SUITE 202
HERNDON, VA 20170
WWW.INVENTUMENG.COM

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1 Introduction

A Brownfield Site Cleanup (BCP) Agreement (Index. No. C915196B-11-17) was executed on March 1, 2018 between the New York State Department of Environmental Conservation (NYSDEC) and East Delavan Property, LLC (EDP) for the New York State BCP Site (Site No. C915196B) located at 1001 East Delavan Avenue, Buffalo, New York (BCP Site; Figure 1). A Remedial Investigation Work Plan (RIWP) was prepared by Inventum Engineering, P.C. (Inventum) and submitted to the NYSDEC on June 22, 2020.

The objectives of the RI program were to complete the RI and Alternatives Analysis (AA) for the BCP Site and recommend the applicable Standards, Criteria, and Guidance (SCGs), Cleanup Objectives, Remedial Actions (RAs) and potential Interim Remedial Measures (IRMs) that, in addition to measures already taken by EDP, will address historical impacts resulting from operations by General Motors (GM) and American Axle & Manufacturing (AAM).

Four (4) No. 6 Fuel Oil underground storage tanks (USTs) were left at the site by GM and AAM. EDP is proposing to remove the tanks as an IRM under the BCP.

1.1 IRM Objectives and Activities

The RIWP included a provision for development of an IRM Work Plan for the closure and removal of up to five (5) No.6 Fuel Oil underground storage tanks (USTs) located on the southern end of the BCP Site (Figures 2 and 3). Inventum conducted a visual survey of the tank area on May 2, 2019 and noted labeling, other piping and other appurtenances that five (5) #6 Fuel Oil tanks were present in the area. Confirmed by the PBS registrations, there are four (4) 50,000-gallon #6 Fuel Oil tanks listed as Out-of-service (Tank Number 17-1, 17-2, 17-3, and 17-4). A fifth tank, a 50,000-gallon #6 Fuel Oil tank (Tank Number 17-5) was permanently closed in place in 1995; however, this tank may also be removed as part of the IRM.

A photolog of the visual survey is provided for reference in Appendix A and a summary of the known and assumed characteristics of the USTs is provided in Table 1-1 below:

Table 1-1: BCP Site UST Characteristics

Identification	Former Contents	Volume	Notes
Tank 17-1	#6 Fuel Oil	50,000 Gallons	Out-of-Service
Tank 17-2	#6 Fuel Oil	50,000 Gallons	Out-of-Service
Tank 17-3	#6 Fuel Oil	50,000 Gallons	Out-of-Service
Tank 17-4	#6 Fuel Oil	50,000 Gallons	Out-of-Service
Tank 17-5	#6 Fuel Oil	50,000 Gallons	Permanently Closed in October, 1995

1.2 Closure Criteria and Guidance

Closure of the identified USTs under the BCP will be conducted in accordance with the following criteria and guidance:

- NYSDEC DER-10 - *Technical Guidance for Site Investigation and Remediation*. May 2010
- 6 NYCRR Part 613 Petroleum Bulk Storage
- NYSDEC Memorandum; *Permanent Closure of Petroleum Storage Tanks*. December 2003
- API RP 2016, August 2001; *Guidelines and Procedures for Entering and Cleaning Petroleum Storage Tanks*
- NFA 326, 2020 Edition; *Standard for the Safeguarding of Tanks and Containers for Entry, Cleaning, or Repair*

2 Scope of Work

The IRM will be completed either by removing the tanks or closing them in place. A pre-closure inspection will be conducted to determine the appropriate approach. The NYSDEC BCP Site Project Manager will be notified at least ten (10) days prior to conducting the pre-closure inspection.

2.1 Pre-Closure Inspection

Inventum will conduct a pre-closure inspection with a qualified and experienced tank installation and removal contractor to fill in any data gaps on the location, presence, type, and content of the USTs identified in Table 1-1. The pre-closure inspection will also be conducted in order to determine the appropriate closure procedures, i.e. abandonment in place or removal. Removal of the tank is EDP's preferred method and abandonment in place will be considered when physical site constraints such as active utilities, adjacent building/site features, structural integrity (building or tank) prevent the safe excavation and removal of one or more UST.

The pre-closure inspection will include opening fill caps or vent pipes for identification, measurement, and sampling (if present) of the tank contents. Analytical testing of the contents will be dictated by the disposal facility.

All closure work will be conducted in accordance with the Health and Safety Plan (HASP) (Appendix B), Quality Assurance Project Plan (QAPP) (Appendix C), and Community Air Monitoring Plan (CAMP) (Appendix D).

Pre-closure inspection forms will be provided electronically to the NYSDEC BCP Site Project Manager within 10-days of completing the inspection. The forms shall include, at minimum:

- updated descriptions of the tanks, location, type, and contents;
- a closure determination — removal or abandonment — for each identified UST;
- tank content sampling details; and
- an updated schedule for removal.
- Petroleum Bulk Storage modification forms (6 NYCRR 613-1.9)

Inventum will provide sufficient notice to all site tenants of the impending tank closure and safety precautions. Notice will be given a minimum of 5-days prior to starting any intrusive removal activities.

2.2 Tank Closure Procedures - Removal

The following general procedures are summarized below and will be followed for removal of USTs:

- Implement Volatile Organic Compounds (VOCs) and particulate monitoring in accordance with the site HASP and CAMP.

- Determine work and material staging areas. These shall be limited as close to the UST work area as practical.
- Install temporary safety fencing around the work/staging areas.
- Gauge the tank through an opening (if present) with a non-sparking measuring tape or rod to determine the liquid volume within the tank.
- If a tank has content, vacuum liquid tank contents and pumpable tank residue(s) to the lowest achievable point through a manway or other tank opening. Potable water may be added to the tank and piping as necessary to drain and flush connected piping.
- Excavate to expose the tank, if needed, to remove the tank contents.
- Contents of the tank will be conveyed directly to a transport vehicle (e.g. Vac Truck) or container compliant for Department of Transportation (DOT) transportation to a designated disposal facility.
- If solids are present, all recovered tank contents shall be contained and disposed of in accordance with applicable regulations.
- Excavate to the top of the tank and expose the upper half of the tank.
- Remove the fill tube and disconnect, if present, the fill, gauge, product, and vent lines. Cap or plug open ends of all lines.
- Temporarily plug all tank openings and complete the excavation. The tank shall be removed and placed in a secure stable location on plastic sheeting.
- Once secured, vapors inside the tank may be displaced by purging the tank and connected pipes with nitrogen or CO_2 gas. If the tank must be entered for additional cleaning, the tank shall be made safe by the addition of dry ice at ratio of 1.5 pounds per 100 gallons of tank capacity or other alternative safe methods of degassing. If dry ice is used to degas the tank, the tank will be additionally ventilated to eliminate the risk of an oxygen deficient atmosphere that could be created by the use of the dry ice.
- The tank atmosphere shall be tested with an oxygen meter and combustible gas meter to ensure a safe condition. Confined space entry permits are required and shall be amended to the HASP. Only trained and qualified personnel or sub-contractor will enter a tank.
- Tanks may be cleaned onsite or transported offsite prior to cleaning by a licensed waste transporter in accordance with applicable regulations.
- Tanks that are cleaned onsite shall be cleaned with a high-pressure spray rinse. All rinse water shall be contained and disposed of in accordance with applicable regulations.
- Cleaning of No.6 fuel oil tanks may require manual cleaning of accumulated tar and sludge and the tank removal contractor shall be required to follow all appropriate safety precautions.
- Cleaned tanks shall be cut and either transported to a scrap yard or disposed of at a 6 NYCRR Part 360 permitted facility.
- Confirmation sampling will be completed during or after the closures as referenced in Section 2.4.1 of this work plan.
- The tank pits will be managed as referenced in Section 2.6
- All removal activities shall be documented by Inventum in a field notebook and photographic documentation of tank and pipeline conditions will be collected.

2.3 Tank Closure Procedures – Abandonment

The following general procedures are summarized below and will be followed for abandonment of USTs in place:

- Implement Volatile Organic Compounds (VOCs) and particulate monitoring in accordance with the site HASP and CAMP.
- Determine work and material staging areas. These shall be limited as close to the UST work area as practical.
- Install temporary safety fencing around the work/staging areas.
- Drain and flush piping into the tank and remove all liquid and flowable material that can be pumped or vacuumed out.
- Remove any liquids to the lowest draw-off point of the piping and within the tank. Any liquid below the draw-off point will also be pumped out for disposal.
- Contents of the tank will be conveyed directly to a transport vehicle (e.g. Vac Truck) or container compliant for Department of Transportation (DOT) transportation to a designated disposal facility.
- Remove the fill tube and disconnect any accessible fill gauges and product lines. Cap or plug open ends. The vent line shall remain connected until the tank is filled.
- Material from the ground surface to the top of the tank will excavated to expose the top of the tank as needed. It may not be necessary to expose the entire top of the tank. The excavation to expose the top of the tank will be safely benched, sloped or shored. Within the excavation, the atmosphere shall be tested with an oxygen meter and combustible gas meter to ensure a safe condition.
- The tank shall be made safe by the addition of dry ice at ratio of 1.5 pounds per 100 gallons of tank capacity. Alternative methods of degassing recommended by the tank removal contractor may be considered and implemented. The tank atmosphere shall be tested with an oxygen meter and combustible gas meter to ensure a safe condition. The explosion or oxygen meter will give a reading of % LEL (Lower Explosive Limit). For a safe condition the reading should be 10-20% LEL.
- Cut one or more large holes in the top of the tank as soon as safe conditions have been verified with the oxygen meter.
- The tank interior shall be cleaned with a high-pressure rinse to remove loose scale, corrosion, and residual product.
- Cleaning of No.6 fuel oil tanks where large amounts of sludge and/or tar maybe present may require manual entry and removal of waste. All appropriate safety precautions shall be taken by the removal contractor. Confined space entry permits are required and shall be amended to the HASP. Only trained and qualified personnel or sub-contractor will enter a tank.
- All recovered liquids and solids shall be contained and disposed of in accordance with applicable regulations.
- Visual observation(s) of the tank interior shall be made.
- If any abnormal conditions on the interior walls of the tank such as excessive pitting of the metal or soil staining indicating shallow groundwater may have entered the tank then Inventum will attempt to collect soil samples from beside the tank near the hole and screen the recovered soils with a Photo Ionization Detector (PID) equipped with a 10.6 eV lamp. The soil sample shall be analyzed for VOCs, Semi-Volatile Organic Compounds (SVOCs), Metals, and Polychlorinated Biphenyls (PCBs).
- Additional post-closure confirmation soil sampling shall be completed in accordance with Section 2.4.2 of this work plan.

- Inventum shall notify the NYSDEC BCP Site PM immediately if any non-aqueous phase liquid (NAPL) is identified in the underlying soil beneath the tank.
- The tank shall be filled with sand and/or a concrete slurry and the vent line disconnected.
- All abandonment activities shall be documented by Inventum in a field notebook and photographic documentation of tank and pipeline conditions will be collected.

2.4 Post-Closure Confirmation Soil Sampling

Confirmation sampling will be completed during or after the closures. The protocols vary depending on the method of closure.

2.4.1 Removed Tanks

After tank removal the excavation floor and sidewalls will be visually inspected for evidence of soil or groundwater contamination. The excavation floor and sidewalls soils will be screened with a PID along transects spaced no more than 5-feet apart. Post-closure excavation floor and sidewall sampling will be biased to suspected areas of contamination, if identified, based on field screening as well as visual or olfactory evidence.

If no evidence of contamination is present, then confirmation soil samples shall be collected from the bottom of the excavation. The total number of grab samples within each excavation area shall be equal to the total length of the tank divided by five feet (minimum of one sample). To the greatest extent practicable all samples shall be space equidistantly and the outermost samples obtained shall be greater than 2.5 feet from each respective end of the tank.

If groundwater or LNAPL is present in the excavation, then soil samples shall be collected following the same spacing procedures as described above from a depth of 0 to 2-feet beneath the tank. One (1) sample of the accumulated water or LNAPL in the excavation shall also be collected.

Inventum shall extend the depth of the excavation if there is evidence of grossly impacted soils based on PID screening or visual and olfactory evidence. Grossly impacted soils shall mean the presence of NAPL.

The depth of the excavation shall extend until screening indicates removal of all grossly contaminated material and/or groundwater is encountered. Confirmation samples shall be collected in accordance with the spacing procedures described previously. In addition, one (1) soil sample shall be collected from each of the excavation sidewalls. The horizontal extent of the excavation shall not extend greater than 10-feet from the initial sidewall in any direction regardless of screening. Any additional contamination identified outside these limits shall be characterized as part of the RI.

All soil and excavation water samples collected shall be analyzed for VOCs, SVOCs, Metals, and PCBs.

Excavated soils may be reused as backfill if there is no evidence of contamination based on field screening with a PID or visual observations. If evidence of contamination is present, then the soil will temporally stockpiled and staged onsite on plastic-sheeting and covered in plastic-sheeting. A soil sample will be collected and analyzed for VOCs, SVOCs, Metals, and PCBs to profile the soil for waste disposal.

Any Investigation Derived Waste (IDW) and Personal Protective Equipment (PPE) that came in contact with Fuel Oil will be drummed and managed as a non-hazardous waste. Drums will be temporarily staged onsite while a waste profile is approved with a receiving disposal facility. Waste Disposal is further explained in Section 2.7 of this work plan.

It is not EDPs intent to stage removed USTs onsite. If the tank needs to be briefly staged onsite while awaiting the arrival of a licensed waste transporter, or cleaning and cutting for transport to a recycler, the tank will be staged on plastic sheeting. Absorbent pads and material will be available to collect leaks from the tank or piping and managed as IDW.

2.4.2 Abandoned Tanks

DER-10 prescribes guidance for post-closure confirmation sampling of USTs abandoned in place. As stated in Section 2.3, Inventum will attempt to collect a soil sample from alongside the tank if there is evidence of a hole, otherwise soil samples will be collected as follows:

- Installing a test pits along accessible sides of the tank. It is likely the tanks have been installed with very minimal space between each tank. Therefore, samples will be collected on the accessible sides and ends of each tank.
- The sample frequency along the sides of the tank will be equal to the total length of the tank divided by five with the outermost samples obtained no greater than 2.5-feet from each respective end of the tank. If the total length of the tank is not evenly divisible by five, one additional sample should be obtained from any fraction remaining.
- The samples will be collected to a depth of up to 2-feet below the tank bottom, or to groundwater or bedrock.
- The presence of groundwater, if encountered, will be recorded when excavating the test pits. Inventum will consult with the NYSDEC PM on the need for additional groundwater monitoring if groundwater has been determined to be in contact with the tank. If required, these wells will be incorporated into the ongoing RI program.

2.5 Post-Closure Confirmation Groundwater Sampling

DER-10 prescribes guidance for post-closure groundwater sampling for removed and abandoned USTs that (1) contained gasoline and (2) groundwater is within 20 feet of the surface or (3) otherwise requested by NYSDEC. There is no evidence that gasoline was stored at the site. Post-closure confirmation groundwater sampling shall be addressed through the results of the comprehensive site-wide sampling program proposed in the RIWP. If additional monitoring wells are required based on field observations and consultation with the NYSDEC PM, then they will be incorporated into the ongoing RI program.

2.6 Backfill

EDP may elect to (1) backfill the excavation at the completion of tank removal and confirmation sampling or (2) stabilize and secure the excavation and leave open in anticipation of property re-development activities. Durable fencing/barricades will be installed if the tank pits are to be left without backfilling to grade. Stabilization of the open pit shall include covering the excavation bottom and sidewalls to prevent potential exposure and migration of soil contaminants. The location of the tanks and work area are within the site perimeter fence to safely secure the work area.

Offsite fill material, if utilized, shall meet Unrestricted Use SCG under 6NYCRR Part 375. Documentation of all imported material utilized as excavation backfill shall be provided with the Tank Closure Report.

2.7 Waste Disposal

All wastes generated shall be sampled and profiled in accordance with applicable regulations and the requirements of the receiving disposal facility. Manifests and/or bills of lading will be retained, and copies provided in the Tank Closure Report.

2.8 Schedule

Inventum intends to conduct the pre-closure inspection no later than 60-days after IRM Work Plan approval and, weather and contractor permitting, removal or abandonment of the identified USTs within 90-days of completing the inspection (Figure 4).

A Tank Closure Report as described in Section 3 will be submitted to the NYSDEC within 90-days of permanent closure. All IDW that were temporarily staged onsite will be removed from the site within 30-days of completion of tank removal operations in the field.

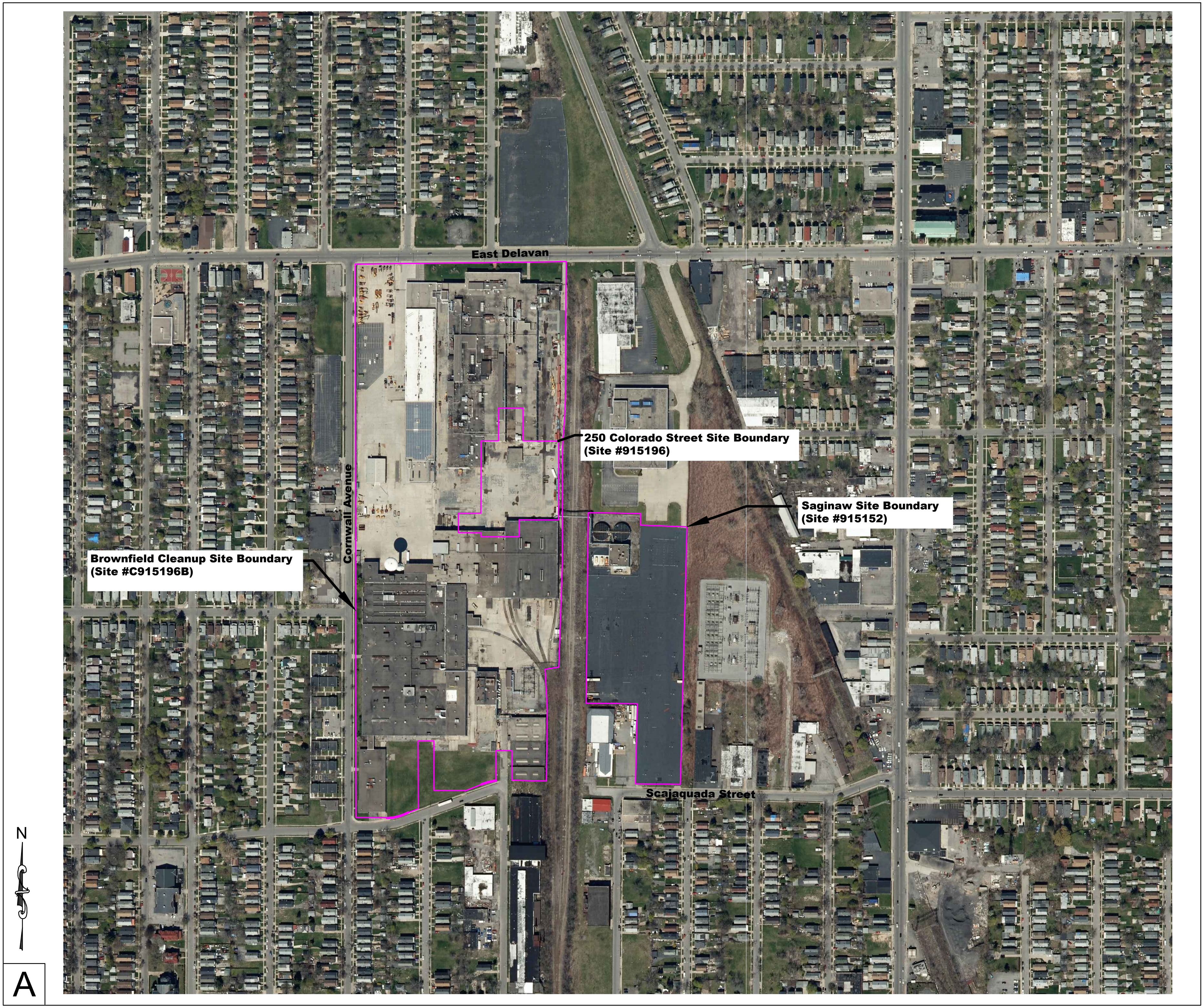
Inventum shall notify the NYSDEC BCP PM a minimum of 10-days prior to conducting the pre-closure inspection and 10-days prior to conducting any removal or abandonment activities.

3 Reporting

Inventum will prepare a Tank Closure Report for NYSDEC review and approval following receipt of all confirmation sampling results. At minimum, the Tank Closure Report shall contain the following:

- Documentation of USTs including location, size, contents (if known), and closure procedure (removal or abandonment).
- Photographic documentation.
- Field notes and PID screening documentation.
- Locations of post-closure confirmation sampling and figures depicting the extent of grossly contaminated soil excavation(s).
- Tabular summary of post-closure sample results and laboratory analytical data packages.
- Waste disposal manifests or bills of lading.
- Imported fill specifications and compliance sampling data.
- Copies of tank closure registration form(s) in accordance with 6NYCRR Part 613-1.9(f).

Figures



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CHECKED	T WALDROP
APPROVED	J BLACK

PROPERTY OF INVENTUM ENGINEERING

INTERIM REMEDIAL MEASURE
WORK PLAN
FUEL OIL TANK REMOVAL

1001 EAST DELAVAN AVE.
BUFFALO, NEW YORK
BROWNFIELD CLEANUP PROGRAM
SITE #C915196B

FIGURE 1
SITE LOCATION

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481 CARLISLE DRIVE
SUITE 202
HERNDON, VIRGINIA 20170
(703) 722-6049
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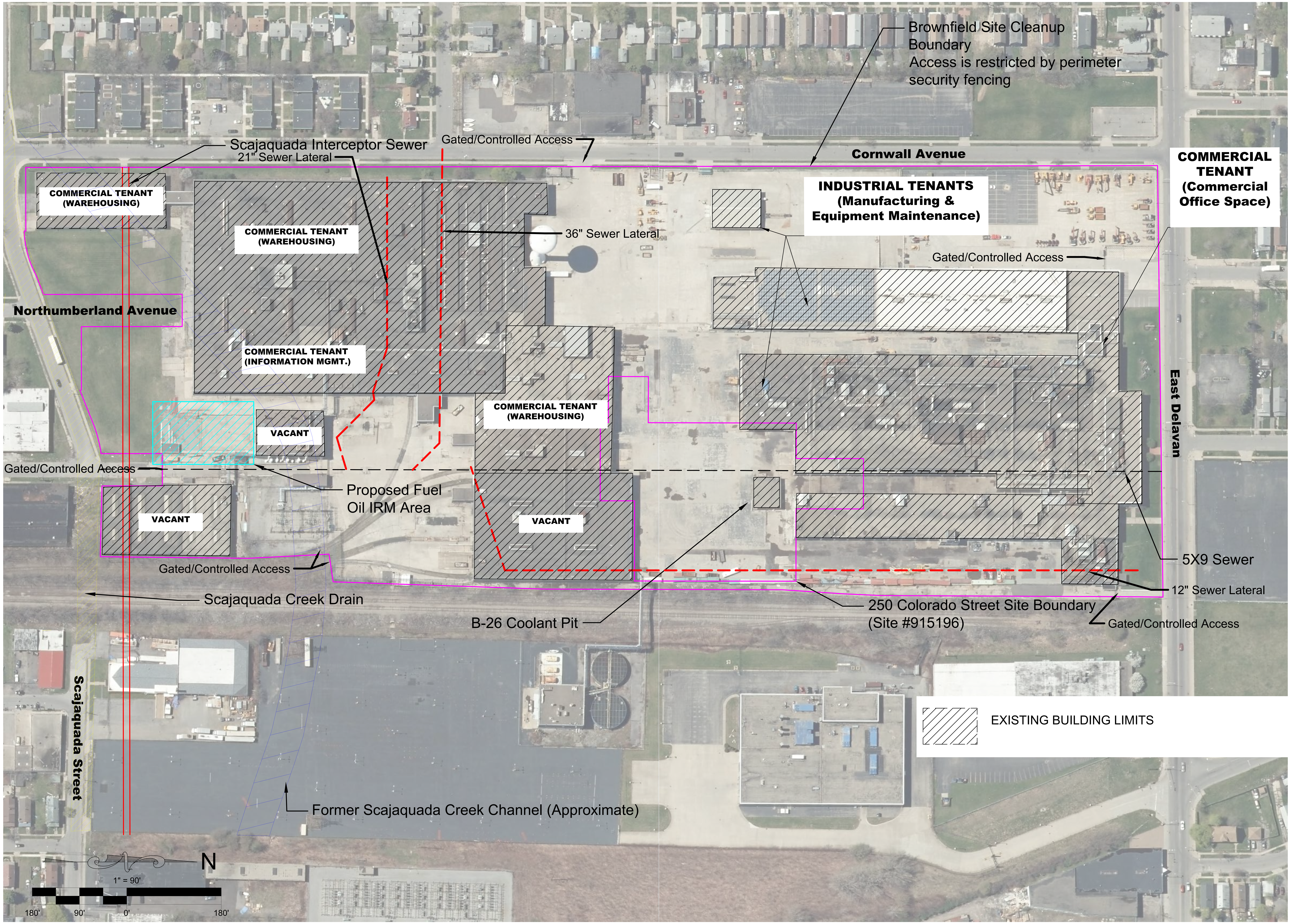
FIGURE 01

SCALE: 1" = 400'



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CHECKED	T WALDROP
APPROVED	XXX

INTERIM REMEDIAL MEASURES
WORK PLAN
1001 EAST DELAVAN AVE.
BUFFALO, NEW YORK
BROWNFIELD CLEANUP PROGRAM
SITE #C915196B

FIGURE 02A
EXISTING
OCCUPANCY

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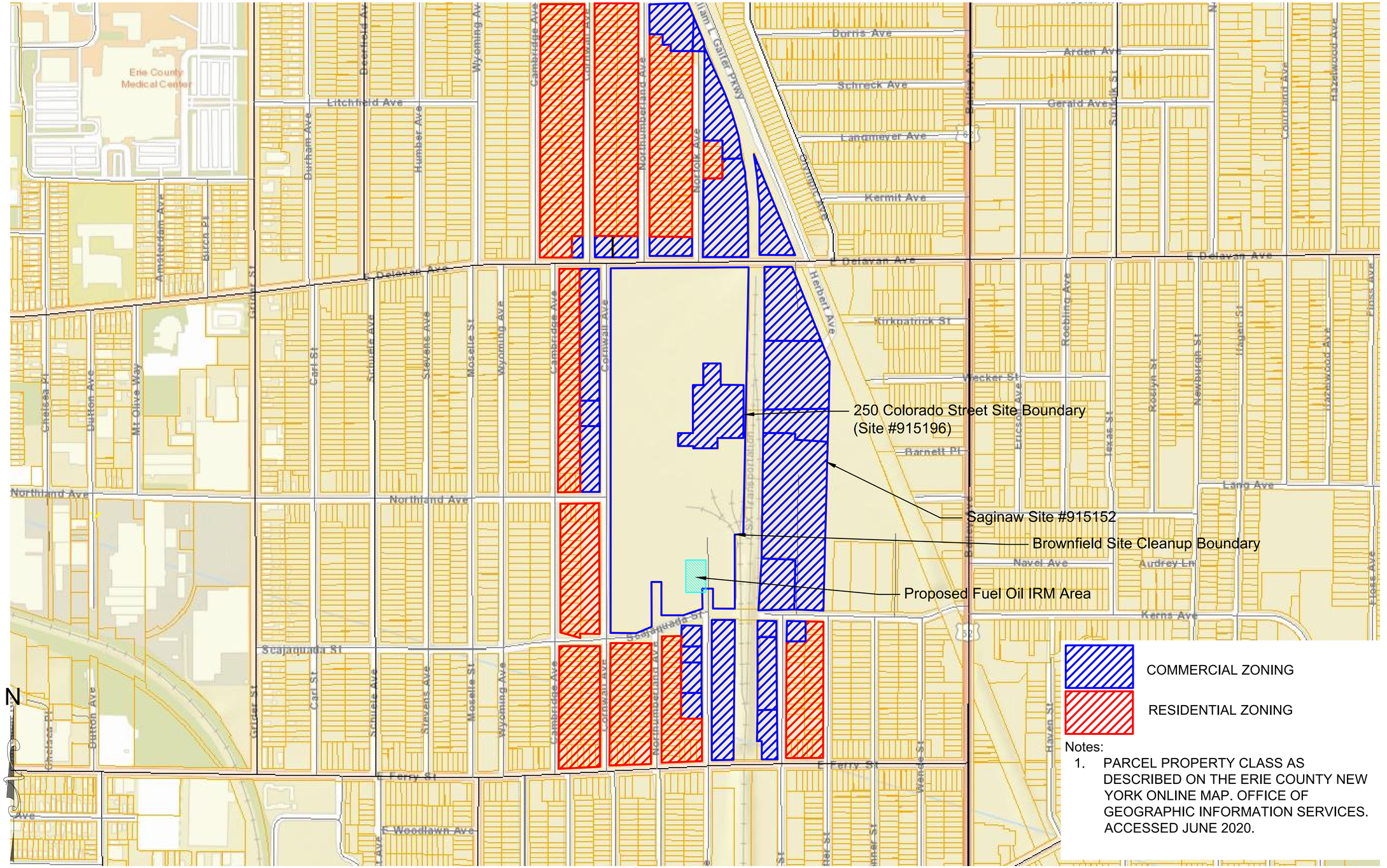
FIGURE 02A



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INTERIM REMEDIAL MEASURES
WORK PLAN

1001 EAST DELAVAN AVE.
BUFFALO, NEW YORK
BROWNFIELD CLEANUP PROGRAM
SITE #C915196B

FIGURE 02B
ADJOINING
PROPERTY USE

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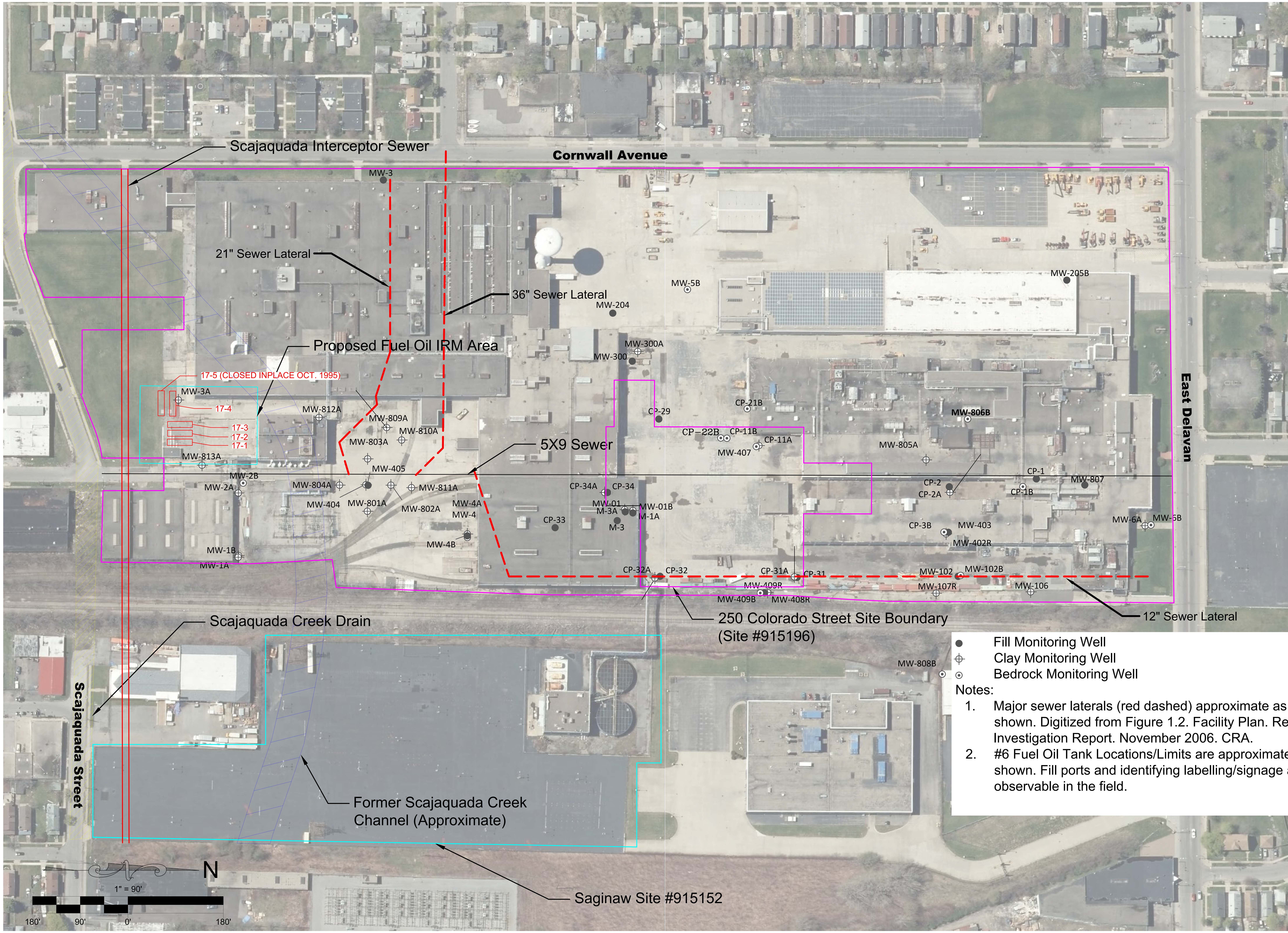
FIGURE 02B

NOT TO SCALE



Notes:

1. Major sewer laterals (red dashed) approximate as shown. Digitized from Figure 1.2. Facility Plan. Remedial Investigation Report. November 2006. CRA.
2. #6 Fuel Oil Tank Locations/Limits are approximated as shown. Fill ports and identifying labelling/signage are observable in the field.

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APPROVED	JPB

INTERIM REMEDIAL MEASURES
WORK PLAN

1001 EAST DELAVAN AVE.
BUFFALO, NEW YORK
BROWNFIELD CLEANUP PROGRAM
SITE #C915196B

FIGURE 03
FUEL TANK SITE
LAYOUT

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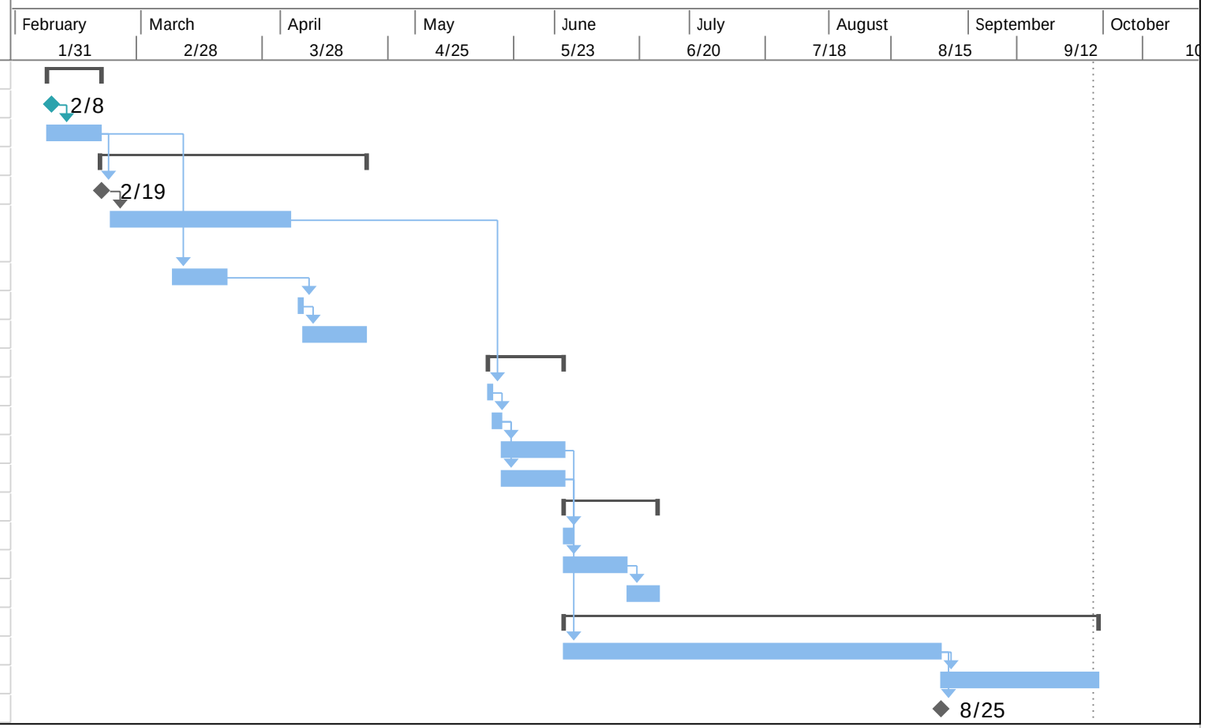
FIGURE 03

Figure 4
#6 Fuel Oil Tank Removal IRM Schedule
1001 East Delavan Avenue
NYSDEC Site No. C915196B

	Task Name	Duration	Start	Finish
1	Fuel Oil Tank Removal IRM Work Plan	10 days	Mon 2/8/21	Fri 2/19/21
2	IRM Work Plan Submittal	0 days	Mon 2/8/21	Mon 2/8/21
3	NYSDEC Review and Approval	10 days	Mon 2/8/21	Fri 2/19/21
4	Fuel Oil Tank Inspections/Closure Notifications	41 days?	Fri 2/19/21	Mon 4/19/21
5	Petroleum Bulk Storage (PBS) Tank Pre-Work Notification	0 days	Fri 2/19/21	Fri 2/19/21
6	Pre-Work Notification Period for Petroleum Bulk Storage (PBS)	30 days	Mon 2/22/21	Fri 4/2/21
7	Pre-Closure Inspection Notification to NYSDEC	10 days	Mon 3/8/21	Fri 3/19/21
8	Pre-Closure Inspection (Inventum, NYSDEC, PBS, Contractor)	1 day?	Mon 4/5/21	Mon 4/5/21
9	Pre-Closure Inspection Form Submittal	10 days	Tue 4/6/21	Mon 4/19/21
10	Fuel Oil Tank Removal Implementation	13 days	Mon 5/17/21	Wed 6/2/21
11	CAMP Station Setup	1 day	Mon 5/17/21	Mon 5/17/21
12	Residual Material Removal	2 days	Tue 5/18/21	Wed 5/19/21
13	Excavation and Tank Removal	10 days	Thu 5/20/21	Wed 6/2/21
14	Compliance Sampling and Backfilling	10 days	Thu 5/20/21	Wed 6/2/21
15	Waste Management	15 days	Thu 6/3/21	Wed 6/23/21
16	Tank Cleaning and Disposal	2 days	Thu 6/3/21	Fri 6/4/21
17	Investigation Derived Waste Profiling	10 days	Thu 6/3/21	Wed 6/16/21
18	Investigation Derived Waste Disposal	5 days	Thu 6/17/21	Wed 6/23/21
19	Reporting	85 days	Thu 6/3/21	Wed 9/29/21
20	Fuel Oil Tank Removal IRM Completion Report Preparation and Subm	60 days	Thu 6/3/21	Wed 8/25/21
21	NYSDEC Review and Approval	25 days	Thu 8/26/21	Wed 9/29/21
22	Petroleum Bulk Storage Tank Registration Modification Forms	0 days	Wed 8/25/21	Wed 8/25/21



Appendix A – Fuel Oil UST Area Photos

Client Name: East Delavan Avenue LLC	Photo Date: May 2019	Project: East Delavan Avenue BCP Site No. 915196B
Photo No. 1 Direction Photo Taken: Looking east Description: Former GM/AAM Notice in No. 6 Fuel Oil UST area.		
Client Name: East Delavan Avenue LLC	Photo Date: May 2019	Project: East Delavan Avenue BCP Site No. 915196B
Photo No. 2 Direction Photo Taken: Description: Access and sign at Tank #17-3		

Client Name: East Delavan Avenue LLC	Photo Date: May 2019	Project: East Delavan Avenue BCP Site No. 915196B
Photo No. 3		
Direction Photo Taken: N/A		
Description: Access and sign at Tank #17-2		
Client Name: East Delavan Avenue LLC	Photo Date: May 2019	Project: East Delavan Avenue BCP Site No. 915196B
Photo No. 4		
Direction Photo Taken: N/A		
Description: Access and sign at Tank #17-1		

Client Name: East Delavan Avenue LLC	Photo Date: May 2019	Project: East Delavan Avenue BCP Site No. 915196B
Photo No. 5		
Direction Photo Taken: Looking southeast		
Description: Fuel Oil UST area.		

Client Name: East Delavan Avenue LLC	Photo Date: May 2019	Project: East Delavan Avenue BCP Site No. 915196B
Photo No. 6		
Direction Photo Taken: Looking east		
Description: Fuel Oil UST area.		

Client Name: East Delavan Avenue LLC	Photo Date: May 2019	Project: East Delavan Avenue BCP Site No. 915196B
Photo No. 7		
Direction Photo Taken: Looking west		
Description: Retaining wall up to Fuel Oil UST area.		

Appendix B – Health and Safety Plan

Inventum Engineering
Site-Specific Health and Safety Plan (HASP)

(Required for all Type 2 and 3 projects.)

1. General Information

Client Name: East Delavan Properties	Project #:	Task #:
Project Name: #6 Fuel Oil Tank Removal Interim Remedial Measure (IRM)	Project Manager: John Black, PE and Todd Waldrop	

Street Address:

1001 East Delavan Avenue

Buffalo, New York

Prepared By: Todd Waldrop		Date: October 11, 2020	
Approved By:	Todd Waldrop (Partner)	Approved By:	John Black, P.E. (Managing Partner)
Date:	10/11/2020	Date:	10/11/2020

Proposed Date(s) of Work: TBD

Proposed Scope of Work On Site:

Inventum Engineering, P.C. (Inventum) will oversee permanent closure of four (4) 50,000-gallon #6 Fuel Oil underground storage tanks (USTs) as part of an Interim Remedial Measure for the East Delavan Avenue (EDP) Brownfield Cleanup Program (BCP) Site located at 1001 East Delavan Avenue, Buffalo, New York. A description of the proposed tasks included in the scope of work for the RI is provided below.

The tank removal subcontractor shall provide their own site-specific Health and Safety Plan (HASP) and all applicable local, state, and federal certifications/licenses for the work.

Task 1 – Tank Inspection

Inventum will inspect the tank with the selected tank removal subcontractor prior to conducting any intrusive site work. The amount of residual material in the tank will be gauged; however, no one or no part of anyone's body shall cross into the tank at this time. A photoionization detector (PID) will be used to check the atmosphere around the tank opening during the inspection. The depth of residual material will be gauged with a non-sparking tape or non-metallic rod.

Task 2 – Residual Material Removal

Removal of all vapors, liquids, and solids from the UST and associated piping will be completed in accordance with all applicable state and federal requirements and will follow the codes of practice outlined in the API RP 2016,

August 2001 or the NFA 326, 2010 edition. A PID will be used to check the atmosphere around the tank during residual material removal. Refer to the air monitoring action levels in Section 6 of the HASP.

Residual material will be removed by a subcontractor.

Task 3 – Excavation, Cleaning, and Removal
Excavation, cleaning, and removal shall be conducted by a qualified tank removal subcontractor in accordance with codes of practice outlined in the API RP 2016, August 2001, NFA 326, 2010 edition, NYSDEC DER-10, and the December 2003 NYSDEC guidance "Permanent Closure of Petroleum Storage Tanks".

Prior to any intrusive site work, the tank removal subcontractor shall be required to provide documentation that applicable site personnel:

- have been trained on the proper use, maintenance, and limitations of respirators,
- have the required medical qualification to wear respiratory protection in accordance with 29 CFR 1910.134,
- have passed a qualitative or quantitative fit test conducted in accordance with an OSHA-accepted fit test protocol,
- have been certified for confined space entry under 29 CFR 1910.146.

Confined space entry permits shall be included in both this HASP and the subcontractors HASP

Task 4 – Soil Sampling
Inventum will collect confirmation soil samples from the excavation bottom and along each sidewall after the tank has been removed from the excavation. Depending on the depth of the excavation samples may be collected directly from the bucket of the excavator. Material will be recovered for lithological characterization and field screening with a PID. All observations and measurements will be logged in the field notebook. Samples will be collected for VOC, SVOC, PCB, and Metals analysis.

Task 5 – Excavation Water Sampling
One (1) sample will be collected from any accumulated water within each excavation. Water samples may be collected using a bailer or peristaltic pump depending on the depth of excavation and volume of water present. Samples will be collected for VOC, SVOC, PCB, and Metals analysis.

Inventum Engineering
Site-Specific Health and Safety Plan (HASP)

(Required for all Type 2 and 3 projects.)

Inventum Role(s) On Site:

☐ Inventum Staff Will Not Be On Site (HASP and Risk Analysis is for subcontractor information only)

☒ Resident Project Representative (*e.g.,* "Observe and Document")

☐ Construction Manager (*e.g.,* CM, Managing/General Contractor)

☒ Representative for Client (*e.g.,* "Agent for Owner")

☒ General On-site Consulting/Engineering Services

☐ Other

☒ Soil Sampling	☐ Solid Waste Sampling	☐ Liquid Waste Sampling
☒ Groundwater Sampling	☐ Surface Water Sampling	☐ Wastewater Sampling
☐ Sediment Sampling	☐ Surveying	☐ Confined Space Entry

Risk Analysis (RA)

(Required for all Inventum Type 2 or Type 3 field projects.)

Major Project Tasks	Inventum Task	Subcontractor Task	Minimum PPE Level Required see HASP for details (suggested levels for Subcontractor work)
1. Tank Inspection	☐	☒	☐ N/A ☒ D ☐ C ☐ B ☐ A
2. Residual Material Removal	☒	☒	☐ N/A ☒ D ☐ C ☐ B ☐ A
3. Excavation, Cleaning, and Removal	☒	☒	☐ N/A ☒ D ☒ C ☒ B ☒ A
4. Soil Sampling	☒	☒	☐ N/A ☒ D ☐ C ☐ B ☐ A
5. Excavation Water Sampling	☒	☒	☐ N/A ☒ D ☐ C ☐ B ☐ A

2. Contingency Planning

LOCAL EMERGENCY RESOURCES:	
Ambulance: 911	Emergency Room: 716.898.3000
Police: 911 or 716.851.4444	Fire Department: 911 or 716.851.5333
NYSDEC Contact: ☒ N/A ☐ Specify:	Poison Control Center: 1-800-222-1222 ☐ Specify:
Other (client services offered, etc.):	

SITE RESOURCES:			
Drinking Water Supply	☒ Inventum	☒ Subcontractor	☒ Client
Wash Water Supply	☐ Inventum	☒ Subcontractor	☒ Client
Telephone – Land Line		☐ Subcontractor	☒ Client
Telephone - Cellular	☒ Inventum	☐ Subcontractor	
First Aid Kit	☒ Inventum	☒ Subcontractor	
Fire Extinguisher	☐ Inventum	☒ Subcontractor	☒ Client
Emergency Shower N/A	☐ Inventum	☐ Subcontractor	☐ Client
Eye Wash N/A	☐ Inventum	☐ Subcontractor	☐ Client
Other: Confined space retrieval device N/A	☐ Inventum	☐ Subcontractor	☐ Client

EMERGENCY/SAFETY CONTACTS:	
Inventum Technical Contacts	John Black (571.217.6761); Todd Waldrop (571.217.3627)
Inventum Project Manager (PM): John Black	571.217.6761
Inventum Office Safety Coordinator (OSC)	Todd Waldrop (571.217.3627)
Inventum Field Contact:	Todd Waldrop (571.217.3627); James Edwards (571.232.5048)
Contractor Contact:	Ontario Specialty Contracting; 716.856.3333
Client Contact:	Jon Williams: 716.856.3333; John Yensan (716.856.3333)
EDP Site Manager Contact	Lenny Kostelnik 716.570.9076

Risk Analysis (RA)

(Required for all Inventum Type 2 or Type 3 field projects.)

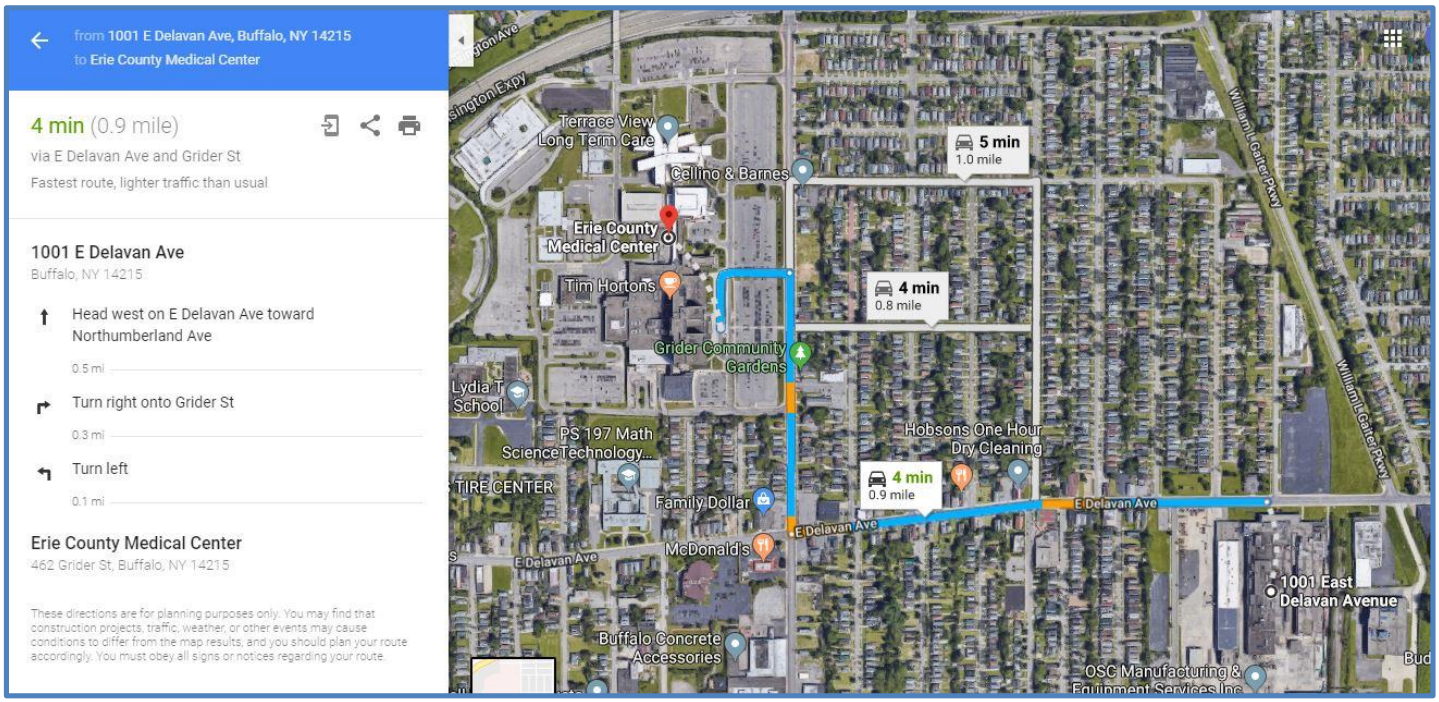
Emergency Route:

Hospitals or clinics identified for emergency medical care should be contacted, to verify that emergency care is provided at that location. Verify the exact location of the medical facility during this call. See directions and map of route to Erie County Medical Center on the following page:

Hospital: **Erie County Medical Center**
462 Grider Street
Buffalo, NY 14215
716.898.3000

Other: NA

Map to Hospital



Emergency Procedures:

If an emergency develops at the site, the first responder should take the following course of action:

- Notify the proper emergency services for assistance.
- Notify other personnel at the site.
- As soon as possible, contact the Inventum Project Manager to inform them of the incident.
- Complete the Inventum Incident Report Form (see Appendices) within 24 hours of the incident and client notifications, as required.

Risk Analysis (RA)

(Required for all Inventum Type 2 or Type 3 field projects.)

Investigation of Near Miss Incident and Initial Report of Incident/Exposure:

Inventum employees are required to report any incident, near miss, or injury, as soon as possible, by contacting the following:

☒ Inventum Managing Partner ☒ Notify supervisor ☒ Notify project manager

☐ Notify Site Manager () ☐ Complete client report: as required

(name):

(phone number):

Emergency Equipment Required On Site:

☒ First Aid Kit

☐ Emergency Eye Wash

☐ Emergency Shower

☒ Fire Extinguisher

☒ Spill Control Media

☒ Tripod/Hoist/Harness for non-entry confined space rescue

Risk Analysis (RA)

(Required for all Inventum Type 2 or Type 3 field projects.)

3. Site Classification

	Identification of Potential Hazards	YES	NO	SITE TYPE(1)
1.	Is the work a Phase I ESA (i.e., supervised plant walk-through, etc.)?	☐	☒	1
2.	Is the work being performed solely by a subcontractor (i.e., INVENTUM not on site)?	☐	☒	1
3.	Is the work just a supervised inspection for process evaluation, other inspections, meetings, records review, or a tour?	☐	☒	1
4.[1]	Is the work completely absent any chemical, physical, biological, or radiological hazards which would require a site-specific health and safety plan?	☐	☒	1
5.	Does the work include any mandatory client H&S requirements?	☐	☒	1, 2, or 3
6.	Does the project include on-site work other than office type areas?	☒	☐	2 or 3
7.	Does the proposed work scope involve any of the following:			
	Known and controlled chemical or biological hazards	☒	☐	2
	Unprotected work at elevation (fall protection required)	☐	☒	2
	Invasive activities (*i.e.,* Phase II ESA, UST Removal, sampling, etc.)	☒	☐	2 or 3
	Exposure to ionizing radiation (i.e., using nuclear gauges, etc.)	☐	☒	2 or 3
	Open excavations/trenches (Competent Person may be required on site)	☒	☐	2 or 3
	Confined space entry (permit may be required)	☒	☐	2 or 3
	The use of scaffolding (qualified inspections are required)	☐	☒	2 or 3
	Heavy equipment	☒	☐	2 or 3
	Facility maintenance (O&M, piping, electrical, lockout/tagout, etc.)	☐	☒	2 or 3
	Underground utilities may be encountered	☒	☐	2 or 3
	Overhead utilities may be encountered	☒	☐	2 or 3
	Stack testing	☐	☒	2 or 3
	Geotechnical drilling	☐	☒	2 or 3
	Demolition Activities with known or suspected contamination	☐	☒	2 or 3
	Unknown or uncontrolled chemical or biological hazards	☐	☒	3
	Known and uncontrolled chemical or biological hazards	☐	☒	3
	Waste sampling	☒	☐	3
	Construction activities with known or suspected contamination	☐	☒	3
	Remedial activities (RCRA, CERCLA, EnviroBlend®, Oxigent, etc.)	☐	☒	3
8.	Is the work regulated by 29 CFR 1910.120 (OSHA) or 30 CFR (MSHA)?	☒	☐	3
9.	Is the work regulated by NPL, CERCLA, RCRA, TSD, or SARA?	☐	☒	3

(1) Denotes typical site level (based on activities).

Risk Analysis (RA)

(Required for all Inventum Type 2 or Type 3 field projects.)

Site Type Designation:

☐ Type 1 Known and controlled hazards associated with consulting/engineering services.

☐ Type 2 Known and controlled hazards, but with invasive, hazardous activities and/or civil/mechanical construction related services, or sampling.

☒ Type 3 Unknown and/or uncontrolled hazards associated with corrective action clean-up, and/or remediation of hazardous substances.

4. Site Characterization

Client Requirement(s)[1]:	☒ None	☐ Site Orientation	☐ H&S Orientation
	☐ Permits or Other Requirements (specify and attach, if available):		
Site Information:	☒ Map/Diagram (attach)	☐ Map/Diagram Unavailable	
	☐ Inactive Site	☒ Active Site (specify below)	
General Environmental Concerns:	☒ Contaminated Water	☐ Wastewater	☒ Dust
	☒ Contaminated Soil	☒ Solid Waste	☐ Noise
	☒ Contaminated Air	☐ Waterways	☐ Other:
Site Security/Access Control:	☐ None	☒ On Site	
	☐ Other (explain):		
Amenities Available for Work:	☐ None	☒ Waste Storage	☒ Restrooms
	☐ Tools/Equipment Storage	☐ Office/Trailer Space	☒ Supplies Storage
Utilities Available For Work:	☐ None	☒ As Listed: Water, electric	
Medical Services Available:	☐ None On Site	☒ As Listed: First aid	
Facility Alarms/Signals:	☒ None	☐ As Listed:	
Traffic/Parking/Railway Issues:	☒ None	☒ As Listed (On-Site/Off-Site): On-site parking	
☐ Permits Required (specify)[2]:	☒ Confined Space Entry	☐ Local:	☒ State: RIWP Approval
	☐ Federal:	☐ Other:	☒ N/A
☒ Utility Locate Service(s):	☒ On Site	☒ Client	☐ Other:
	☐ Off Site	☐	☒ One Call
		☐	☐ N/A

[1] If relying on the client for any specific hazard identification and control, implemented control and effectiveness should be documented prior to beginning any work activities. This is recommended for all field projects.

[2] Permit examples: Utilities (electrical, water, gas, etc.); Excavations; Explosives; Cranes; Burning; Fuel storage; Traffic control; Hoists; Cutting; Welding; Demolition; Confined space; Restricted access areas; etc.

Risk Analysis (RA)

(Required for all Inventum Type 2 or Type 3 field projects.)

Detailed Physical Description of Site/Facility: ☒ Map/Diagram Attached

The BCP Site occupies an approximately 32.88-acre parcel within the limits of the property formerly known as the General Motors (GM) Axle Plant and subsequently the American Axle and Manufacturing (AAM) Site. A portion of the property is also occupied by an approximately 2.65-acre parcel that is listed in the Registry of Inactive Hazardous Waste Sites (Site Number 915196), known as the 250 Colorado Street Site. The scope of work to be completed under this IRM is the permanent closure of four (4) #6 Fuel Oil USTs (Figure 3).

Site Activities/Current Operations: ☐ None ☒ As Specified

Other Concurrent Site Activities, Work, and/or Other Adjacent Hazards or Concerns:

☐ None As Specified:

☐ Schools ☐ Daycare ☐ Hospital ☐ Airport

☐ Residential ☒ Offices ☐ Shopping ☐ Active parking lot in work space

5. Hazard Evaluation

Complete (1) Substance Name (be specific)	Specific Applicable OSHA Standard (if any)	Physical State (2) (S, L, G, Aq, Vap, F, P)	Max. (3) Conc. Level Per Physical State	General (4) Control Measures (Eng., Admin., PPE)
PCBs	1 mg/m3	S,L	LNAPL	PPE
Benzene	TWA 1 ppm ST 5 ppm	S,L,G,Aq,Vap,F,P)	LNAPL	PPE
Hydrogen sulfide	TWA 1 ppm ST 5 ppm	G,Vap		

(1) Use OSHA regulated name, not elemental forms. If available, attach SDS. Identify any sample preservative or O&M chemicals or subcontractor chemicals in this table also.

(2) S = Solids, L = Liquid, G = Gas, Aq = Aqueous, Vap = Vapor, F = Fume, P = Airborne Particulate.

(3) If available, attach laboratory results or summary tables.

(4) See the following sections for detailed control measures: personal protection equipment (PPE), Air Monitoring (Admin), or Site Control (Admin and Eng.).

(6) IP = Ionization Potential, VP = Vapor Pressure, LEL = Lower Explosive Limit, UEL = Upper Explosive Limit, N/A = Not Applicable, N.D. = Not Determined

(7) IDLH = Immediately Dangerous to Life and Health. NEVER enter IDLH conditions on site without proper respiratory protection.

(8) C = Ceiling Value, ST = Short-Term Exposure Limit, TWA = Time-Weighted Average, None Est. = None Established

(9) R = Respirable Limit, T = Total Limit

(10) Warning Properties: Good (G), Poor (P), None (N)

5. Hazard Evaluation (continued)

Site-Specific Physical Hazards

HAZARD	SPECIFIC CONTROL MEASURE
Slip/Trip/Fall Injury	— Use roads or trails whenever possible. — Occasionally reassess route to avoid dangerous terrain. — Maintain good housekeeping and keep work area clear of loose materials and equipment. — Use portable steps to mount and dismount sampling vehicle.
Ingestion of or contact with impacted soil	— Wear safety glasses. — Wear nitrile and appropriate cut-/puncture-resistant gloves (see Glove Selection Guideline) when performing tasks. — Wash hands and arms thoroughly when daily work is completed. — No eating, drinking, or smoking while conducting monitoring or sampling activities.
Pinched fingers or toes	— Where appropriate cut-/puncture-resistant gloves (see Glove Selection Guideline) when the potential for hand injury exists. — Where steel-toed safety shoes with steel shanks while on site.
Strained muscles	— Use proper lifting posture, techniques, and equipment when handling heavy objects. — Use two people for loads >40 lbs. or awkward items. — Take rests as needed during and between carries.
Cutting activities	
Flying debris/eye injuries	— Wear ANSI-approved safety glasses when the potential for flying debris and eye injuries exists.

Risk Analysis (RA)

(Required for all Inventum Type 2 or Type 3 field projects.)

Other Common Physical Hazards

(modify as needed, but include with all project hazard assessments)

☒	PHYSICAL HAZARD	GENERAL CONTROL MEASURE
☐	Aboveground Storage Tanks (AST)	Be aware of any aboveground storage tanks and the type of material being stored in them. Be aware of the potential of spills, fires, explosions, etc., while working near the tanks. Stay clear of tanks whenever possible, and be aware of any equipment operators near the tank(s).
☐	Animals (dogs, etc.)	Be aware of any animals on site or adjacent to the site. Appropriate care should be taken if any feral (wild) animals are encountered.
☐	Blasting/Explosives	INVENTUM personnel shall not handle any explosive devices or materials. INVENTUM personnel should understand the blasting procedures being used by the subcontractor, and all of the associated health & safety precautions. The subcontractor shall handle, store, and use the explosives in accordance with 29 CFR 1926.900, Subpart H and U.
☐	Boat or Barge	A boat or barge should be used that is adequately stable for the type of activity conducted. The boat or barge should have all of the appropriate and current licensing and registrations required by the applicable regulatory agencies. All applicable laws and regulations will be followed when launching the boat or barge, and when navigating to and from the work site. Personal floatation devices should always be worn while navigating the boat or barge. The boat must be equipped with the following approved United States Coast Guard (USCG) safety equipment: — A Type 1, 2, or 3 personal flotation device (PFD) for every person aboard (should be worn while navigating) The following equipment is recommended: — A Type 4 throwable PFD — Audible distress signal device (air horn, whistle) — Fire extinguisher (if engine-propelled) — Auxiliary propulsion (spare paddles, trolling motor) — Bow and stern lines — Anchor and anchor line — First aid kit — Visual distress signal device(s) (flares, dyes) — Additional PFDs Be familiar with local weather and tidal characteristics. Do not conduct sampling from a boat/barge when threatening weather is imminent, or poor visibility exists. Sampling from a boat is prohibited in water containing substances likely to cause injury upon short-term or prolonged contact. Sampling from a boat is prohibited when the temperature of the water is high or low enough to cause injury upon short-term or prolonged exposure. Avoid sampling from a boat when unsafe water turbulence (waves) exists. Avoid standing in a boat. Always use the buddy system when sampling from a boat or barge; one person should be on shore with visual contact of the barge and should be able to summon emergency assistance if needed. Be familiar with local weather and tidal characteristics. Work on a boat or barge will not be performed when threatening or severe weather is impending or present.

Risk Analysis (RA)

(Required for all Inventum Type 2 or Type 3 field projects.)

Other Common Physical Hazards

(modify as needed, but include with all project hazard assessments)

☒	PHYSICAL HAZARD	GENERAL CONTROL MEASURE
☐	Briars or Thistles	Be aware of any briars or thistles on site. Wear appropriate clothing and gloves. Avoid contact with briars or thistles whenever possible.
☒	Business Traffic	Be aware of traffic patterns associated with local businesses near the work site. Allow traffic to enter and exit the businesses in such a manner to avoid creating traffic hazards, back-ups, delays, or potential accident situations.
☐	Cement Dust	Stay clear of mixing operations and avoid contact with or breathing of the dust.
☐	Chain Saws	Stay clear of any chain saw operations. Subcontractor is responsible for the safe use of chain saws on site.
☐	Cleaning Agents	Use caution when applying cleaning agent to equipment. Use gloves, safety glasses, splash shields, and protective clothing as needed.
☒	Client Activities	Be aware of client activities at or adjacent to the site. Work activities should be coordinated with other site activities to avoid conflicts. Contact EDP offices prior to starting work.
☒	Cold Stress	Work schedules may be modified when temperatures are below 20° F as measured by the wind chill factor. Take frequent breaks to warm up. Drink plenty of fluids. Wear appropriate clothing, and monitor for cold stress symptoms (frostbite, hypothermia, etc.).
☐	Compressed Air or Gas Cylinders	Compressed air or gas cylinders should be clearly marked, and they should be stored, transported, and secured in an approved manner.
☐	Compressed Air/Gas or Pressurized Liquids Hoses, Lines & Fittings	Compressed air or gas, or pressurized liquid lines or hoses should be inspected at least daily, or in the event a leak develops, or if a line or hose is run over or crimped.
☐	Concrete/Masonry/ Foundations	No construction loads shall be placed on a concrete structure or portion of a concrete structure unless a person who is qualified in structural design has determined that the structure or portion of the structure is capable of supporting the loads. All protruding reinforcing steel, onto and into which employees could fall, shall be guarded to eliminate the hazard of impalement. No employee shall be permitted to work under concrete buckets while buckets are being elevated or lowered into position. To the extent practical, elevated concrete buckets shall be routed so that no employee, or the fewest number of employees, are exposed to the hazards associated with falling concrete buckets. A limited access zone shall be established whenever a masonry wall is being constructed. All masonry walls over eight feet in height shall be adequately braced to prevent overturning and to prevent collapse unless the wall is adequately supported so that it will not overturn or collapse. The bracing shall remain in place until permanent supporting elements of the structure are in place.
☒	Confined Spaces (tanks, vaults, vessels, trenches, manholes, some excavations, etc.)	The scope of this project does entail entry into confined spaces. Confined spaces will not be entered unless a confined space entry permit has been completed, signed, and approved, and all participating personnel are trained in confined space entry procedures, including safety, and rescue procedures. All potential hazards of confined space may not be addressed by this hazard assessment, and health and safety plan.
☒	Cutting Tools	Stay clear of contractors' cutting tools, especially saws and torches. Be aware that cutting operations could create other hazards, such as falling objects, or shifting materials, etc. Safety glasses should be worn while using cutting tools. Spark-proof tools should be used when working in areas of potential explosive or flammable conditions. Fixed-open blade knives are prohibited.

Risk Analysis (RA)

(Required for all Inventum Type 2 or Type 3 field projects.)

Other Common Physical Hazards

(modify as needed, but include with all project hazard assessments)

☒	PHYSICAL HAZARD	GENERAL CONTROL MEASURE
☐	Demolition Activities	Stay clear of walls, ceilings, roofs, etc., as they are being demolished.
☒	Demolition Debris	Demolition material should only be handled by appropriate equipment because of sharp points, edges, etc. Demolition material may also pose a trip hazard, fall, or puncture hazard, so avoid walking or climbing on debris piles, etc.
☐	Drums	If drums are used on-site, they should be clearly labeled with the name of the contents and the appropriate label. Drums should only be handled with the appropriate equipment. Drums discovered during excavations, etc., shall not be opened or moved until appropriate identification can be performed. At a minimum, Level B protection is required for sampling any unlabeled drums discovered during remediation procedures.
☒	Dust/Particulates (Particulates Not Otherwise Regulated) (PNOR) (OSHA PEL = 15 mg./m^3, total) (OSHA PEL = 5 mg./m^3, respirable)	For general dust, work should be performed up-wind if possible. If conditions warrant it, monitoring should be done with a PM-10. Monitoring should occur at least 3 times per day, and every time re-entering the site. Readings should be taken downwind from the work area or inside the equipment as indicated by the conditions on site. If the OSHA PEL is exceeded, or is likely to be exceeded, engineering or administrative controls should be used, or a dust respirator must be worn. For hazardous dusts, a detailed air monitoring plan and a respiratory protection plan should be developed for the site activities.
☐	Elevated Work	For any construction work activities elevated 6 feet or more, or other non-construction activities elevated 4 feet or more, fall protection must be provided. Caution should be taken on catwalks and ladders because of potential slippery conditions, or the potential for footwear to catch on the surfaces.
☐	Energized Sources (electrical equipment or hookups, lines, etc.,) (Lockout/Tagout)	Contractors for all electrical activities, and any facility equipment with moving parts should follow proper lock-out/tag-out procedures, and only properly trained employees will perform the work. Employees will not perform any lock-out/tag-out activities unless personnel are properly trained in lockout/tagout procedures. Heed any caution signs or labels.
☒	Equipment Exhaust	Equipment exhaust should be ventilated away from the work area while drilling inside structures. Industrial fans can be used to move exhaust out of the area.
☐	Ergonomic Issues (job hazard analysis)	Ergonomic hazards will be addressed on a site-specific basis once mobilization to the field has occurred. Workstations will be evaluated on an individual basis.
☐	Evening Work	If work is performed during the evening hours, work shall be limited by the availability and the quality of artificial lighting. Care should also be taken to avoid slip, trip, and fall hazards that are not as easy to identify during low light conditions.
☒	Excavations	Stay clear of excavation walls. INVENTUM personnel will not enter an excavation, in accordance with 1926 Sub Part P. Subcontractor must provide a Competent Person on site, if one is required by the planned activities. Side cuts should conform to 1926 Subpart P requirements, or shoring should be used. All open excavations should be secured using traffic cones, barrier tape, or barricade signs stating “Do Not Enter Excavations”, especially if left open overnight.
☐	Explosives	Be aware of potential explosive materials and how to identify them. No smoking is allowed on-site or near where potential explosive materials may be present.
☐	Facility Conveyors (product or waste lines)	Stay clear of facility conveyors, product process lines, and waste disposal lines. Be aware of any client-specific health and safety requirements to work in these areas.

Risk Analysis (RA)

(Required for all Inventum Type 2 or Type 3 field projects.)

Other Common Physical Hazards

(modify as needed, but include with all project hazard assessments)

☒	PHYSICAL HAZARD	GENERAL CONTROL MEASURE
☒	Facility Equipment/Machinery	Be aware of active and moving client equipment on site.
☒	Facility Piping - aboveground	Stay clear of aboveground pipes. Client is responsible to identify all applicable aboveground facility pipes prior to any work activities in the area. Pipes can be overhead hazards, or trip hazards. Pipes can be hazardous because of the material flowing through them, such as steam, natural gas, toxic chemicals, etc. Some pipes are also coated with hazardous material such as asbestos.
☒	Facility Piping - belowground	Client is responsible to identify all applicable underground facility pipe locations prior to any subsurface activities.
☐	Fall Hazard	Proper tie-off, harnesses, railings, etc. should be used when performing work on ladders, scaffolding, man-lifts, or on the roof of buildings, etc. Stay clear of the edges of pits, trenches, quarries, etc.
☐	Falling Objects	Be aware of any potential falling objects or materials on site. Stay clear of any areas identified as potential falling object areas.
☐	Fences	Be aware of fences in disrepair that may be trip hazards or may have materials that could cause punctures or cuts. Use caution when crossing over or under fences.
☒	Field Equipment	If field equipment is heavy or awkward to carry, get assistance or use carts to help move around the site.
☒	Field Vehicle	Inventum personnel shall follow all applicable state and federal traffic laws while traveling to and from the site, and while working on the site. In particular, the following laws should be followed: speed limits, parking restrictions, use of wipers and lights during precipitation events, limiting cell phone use, etc. It is the responsibility of the driver to verify that all safety equipment on the vehicle is working properly before driving the vehicle. In particular, the following items should be checked: tire pressure, tire tread, windshield wipers, windshield washer, headlights, tail lights, brake lights, spare tire, fire extinguisher, first aid kit, etc.
☒	Fire Hazards	Eliminate sources of ignition in work areas that have ignitable materials. Provide an ABC fire extinguisher in close proximity to the support zone.
☐	Flooded Areas	Do not drive through flooded areas or standing water. Do not wade into moving water, or water deeper than 2 feet without adequate assistance.
☒	Flying Debris/ Eye Injuries	Be aware of any flying debris on site and wear protective eyewear when necessary.
☐	Fork Lifts	Be aware of forklift patterns and stay clear of those routes.
☒	Hand Tools	Use only the appropriate tool for the task at hand. Use the tool(s) as designed, described, and intended by the manufacturer.
☒	Heat Stress	The work schedule may be modified if the ambient temperature is more than 80° F. Take breaks as necessary, and drink plenty of fluids. If necessary, wear sunscreen and sunglasses on bright days. Monitor site personnel for signs of heat stress symptoms (heat rash, heat cramps, heat exhaustion, or heat stroke).

Risk Analysis (RA)

(Required for all Inventum Type 2 or Type 3 field projects.)

Other Common Physical Hazards

(modify as needed, but include with all project hazard assessments)

☒	PHYSICAL HAZARD	GENERAL CONTROL MEASURE
☒	Heavy Equipment	Contractor is responsible for safe operation of equipment. All mobile heavy equipment must have a functioning backup alarm, and operators must comply with equipment manufacturer's instructions. Maintain proper distance and remain in line of sight of operator and out of reach of equipment. Isolate equipment swings, if possible. Make eye contact with the equipment operator before approaching the equipment. Understand and review hand signals, and wear orange safety vest, if necessary.
☒	Heavy Lifting	Use proper lifting procedures and equipment when handling heavy objects such as drums, manhole covers, tank covers, etc.
☐	High Pressure Gas Lines, etc.	Be aware of high-pressure gas lines, and follow approved safety precautions when working with or around the lines.
☐	Highway Traffic	Traffic control within the right-of-way will be in accordance with the WDOT "Work Zone Safety – Guidelines for Construction, Maintenance, and Utility Operations" procedures. Work may be restricted within specific lanes during peak traffic times. Verify peak traffic times, and review planned activities with the WDOT, so that appropriate lane closures can be coordinated.
☒	Housekeeping	All field vehicles, job trailers, and field offices will be properly cleaned and organized to prevent cluttered work and storage areas.
☐	Hunters/Firing Range, etc.	Be aware of surrounding activities that may involve hunting, firearms, etc. that may not be in your immediate area, but could create an unsafe work environment.
☐	Ice (thin)	When project activities include either crossing ice or working directly on the ice, a detailed plan should be developed that will be used to continually evaluate the ice conditions, and to determine when work should be terminated due to unsafe conditions. All staff working on the ice will wear an appropriate and approved personal floatation device. Other emergency equipment such as ropes, a throwable floatation device, a means to warm a wet and cold worker, etc. must be available. A buddy system should also be used for this type of work, such that one person is always on shore or at least on previously determined safe ice.
☒	Insects (ticks, bees, spiders, etc.)	Site workers with known allergies to insect bites should carry their own medication. In case of emergencies, inform fellow workers of any severe allergies. Use insect repellant as necessary, and as specifically allowed on site. If possible, wear long-sleeved shirts and pants. If appropriate, check for ticks at the end of each day. Have other appropriate first aid supplies handy for bites.
☐	Stakeholders	Be aware of the potential for irate neighbors or outsiders that may interfere with work activities, or that may potentially damage equipment or on-site materials, etc.
☐	Ladders	Ladders should only be used if they are in good condition, conform to OSHA requirements, and if they will be used in an appropriate manner. Be especially cautious of slipping on ladders when the ladder or footwear is wet or dirty.
☒	Landfill Gas (Methane, CO2, Hydrogen Sulfide)	Avoid breathing gas, especially in low oxygen areas (simple asphyxiant). Potentially flammable and explosive, so keep ignition sources away from gas. Explosive conditions of LEL >5% in a work area should be ventilated as soon as possible, or the area should be evacuated.

Risk Analysis (RA)

(Required for all Inventum Type 2 or Type 3 field projects.)

Other Common Physical Hazards

(modify as needed, but include with all project hazard assessments)

☒	PHYSICAL HAZARD	GENERAL CONTROL MEASURE
☐	Leachate (Municipal Solid Waste (MSW))	MSW leachate may contain hazardous biological substances, so avoid physical contact with leachate and, if possible, stay up-wind. If contact is made with leachate, wash affected areas thoroughly with soap and water. If boots contact leachate, they should be thoroughly washed with soap and water also.
☐	Lead	Wear gloves when in contact with lead contaminated soil, etc. Thoroughly wash hands and arms when daily work is completed.
☒	Long Hours/Fatigue	Long work hours can lead to fatigue, and fatigue can lead to the physical inability to perform the work in a safe manner, or travel to or from, a work site in a safe manner. If long work hours are scheduled, or if the scheduled work takes longer than planned, field staff should determine if fatigue is, or will be, an issue. Field staff should evaluate whether they are able to complete the work in a safe manner, or whether they are able to travel in a safe manner. If fatigue is an issue, appropriate breaks should be planned or taken, including overnight stays when necessary.
☒	Material Handling	Move containers and heavy material only with the proper equipment, and secure them to prevent dropping, falling, or loss of control during transport. Stay clear of material handling operations, especially near slopes. Do not stand down the slope from equipment, supplies or materials being moved above on the slope, or being deployed onto the slope.
☒	Material Storage	Stored material may be a falling hazard, or a crush hazard. Do not stand adjacent to materials stacked up, such as pipes, geosynthetic rolls, etc., or in the area of deployment.
☐	Methane Gas (Landfill Gas)	Explosive conditions (5% LEL) will be ventilated, if encountered, prior to working in an area. Methane is a simple asphyxiant.
☐	Mine or Quarry	No work shall be performed within 15 feet (or other designated client setback, whichever is greatest) of the mine or quarry walls. Be aware of the potential for falling rocks or slope failures.
☐	Municipal Solid Waste (MSW)	MSW may contain hazardous biological substances, so avoid physical contact, and if possible, stay up-wind. Wear appropriate PPE, such as gloves, safety shoes, and safety glasses. Wash hands, arms, and face after working near MSW. Reusable PPE and equipment should be thoroughly decontaminated after exposure to MSW. MSW may also contain sharp objects with the potential to puncture PPE.
☐	Natural Gas	Natural gas is flammable and explosive. Keep ignition sources away from gas sources. Use spark-proof tools when working with gas lines, etc.
☒	Noise	Hearing protection must be worn when noise levels exceed 85 dBA in the work area. If you need to raise your voice to be heard at the work site, then hearing protection should be worn. Hearing protection will be worn near drill rigs.
☒	Overhead Hazards	Pay attention to overhead equipment, piping, and structures. A hard hat must be worn at all times when overhead hazards are present on site including the operation of a drill rig.
☒	Pedestrian Traffic (public, client, workers)	Be aware of pedestrian traffic patterns and, route traffic around the exclusion zone(s), as necessary, to avoid distractions and the potential for exposures or accidents. Use appropriate barricades and caution tape to mark work areas.
☐	Poisonous Plants	Be able to identify any local poisonous plants and avoid them if possible or wear protective clothing as necessary. When removing potentially exposed clothing or PPE, the clothing or PPE should be carefully and thoroughly washed or decontaminated.
☐	Portable Heaters	Be aware of portable heater locations and stay a safe distance from them.

Risk Analysis (RA)

(Required for all Inventum Type 2 or Type 3 field projects.)

Other Common Physical Hazards

(modify as needed, but include with all project hazard assessments)

☒	PHYSICAL HAZARD	GENERAL CONTROL MEASURE
☒	Power Washing Equipment	Stay clear of the power washing nozzles and equipment.
☐	Propane Tanks	Be aware of propane tank locations, and any gas lines leading to or from the tanks.
☐	Radiation (ionizing)	Exposure to ionizing radiation can be controlled by one of three methods: time, distance, or shielding. Limit your time near the radioactive source. Keep your distance from the radioactive source. Shield yourself from the radioactive source with appropriate shielding material. If the radioactive source(s) are from INVENTUM equipment, the INVENTUM employee using the equipment needs required training to use the equipment and must be monitored using a dosimeter badge.
☐	Rock Blasting	Contractor is responsible for following safe blasting protocol. Heed all contractor warnings at time of blasting and stay well clear until safe to return to area, as indicated by the contractor.
☒	Sample Preservative Chemicals:	Wear safety glasses and nitrile gloves when adding preservative chemicals to sample bottles or vials. Have clean wash water nearby.
☐	Scaffolding	Stay clear of scaffolding. Be aware of the OSHA safety requirements for using constructing and scaffolding.
☒	Severe Weather	Work may be suspended if dangerous weather conditions (lightning, tornadoes, high winds, heavy rain, freezing rain, etc.) occur. Be aware of changing weather conditions and be prepared to take shelter as necessary. Potential shelters should be identified prior to beginning work.
☒	Sharp Objects	Wear appropriate gloves when handling sharp objects or use appropriate equipment to move objects.
☒	Slippery Ground/Surfaces	Exercise caution, especially on slopes, field trailer floors and stairs, after a precipitation event. Use slip resistant boots or implement surface preparations to eliminate the slippery nature of the surface prior to accessing the area. Spill control measures and general housekeeping should be utilized to help prevent slipping on wet floors, wet pavement, and general work areas.
☒	Slips, Trips, and Falls:	Maintain clear walkways for work areas.
☒	Snakes	Be aware of the potential for snakes in the area and wear snake boots, snake chaps, gaiters, or leggings as needed.
☒	Steam Cleaning Equipment	Stay clear of the steam cleaning nozzles and equipment.
☐	Steel Erection	All materials, equipment, and tools, which are not in use while aloft, shall be secured against accidental displacement. The controlling contractor shall bar other construction processes below steel erection unless overhead protection for the employees below is provided. Employees engaged in steel erection activities on a walking/working surface with an unprotected side or edge more than 15 feet above a lower level shall be protected from fall hazards by guardrail systems, safety net systems, personal fall arrest systems, positioning device systems or fall restraint systems.
☒	Steep Slopes or Banks	Pay attention to footing and walking. Stay a safe distance from unstable or extremely steep slopes. Wear appropriate footwear. Be aware of potential slope or bank failures. Heavy equipment should not be operated on or near unstable slopes or banks.
☐	Strong Nuisance Odors	Strong odors should be ventilated before entering a work area, or a respirator shall be worn as needed.

Risk Analysis (RA)

(Required for all Inventum Type 2 or Type 3 field projects.)

Other Common Physical Hazards

(modify as needed, but include with all project hazard assessments)

☒	PHYSICAL HAZARD	GENERAL CONTROL MEASURE
☒	Sunburn	For extended periods of time outdoors on sunny days, sunglasses, long-sleeved shirts and long pants should be worn to help prevent sunburn and eye problems. Wear sunscreen as appropriate for the project.
☒	Surface Water	Working next to or on, bodies of water shall be done using the buddy system. Staff shall wear USCG-approved personal floatation devices when on or adjacent to bodies of water.
☒	Terrain	Uneven or steep terrain can cause hazardous conditions for walking and transporting equipment around the site. Site personnel should use caution when working on uneven surfaces, and they should avoid working down-slope from heavy equipment, or materials being moved or stored.
☒	Traffic (client, contractors, public, semi-trucks, forklifts, etc.)	Obey all posted speed limits. Park in designated areas only. Be aware of traffic patterns on site, and during access to the site. Use orange traffic cones and barrier warning tape, as needed, or if within 25 feet of the right-of-way. INVENTUM personnel must wear orange safety vests when working in or near traffic areas. Class 2 traffic vests are required with traffic speeds 25 mph or higher. Class 3 traffic vests are required with traffic speeds 50 mph or higher.
☒	Trains/Railroad Tracks	Be aware of any train activities on the site, entering or leaving the site, or immediately adjacent to the site. Do not walk between the rails or on the railroad ties. When driving, stop at all railroad crossings, even if they are unmarked, and look in both directions before proceeding across the tracks.
☐	Transporting Hazardous Materials	INVENTUM personnel who transport hazardous materials shall have the required DOT training prior to transporting materials, and will comply with all applicable DOT regulations and requirements for labeling, packaging, etc.
☐	Tree Cutting	Stay clear of tree cutting activities.
☒	Trenching	INVENTUM personnel will enter trenches in accordance with 1926 Sub Part P. Be aware that some trenching conditions may result in a confined space condition.
☒	Trip Hazards (wires, cords, hoses, debris, corn stubble, uneven surfaces, etc.)	Temporary wires, cords, hoses, etc., should be properly located, marked, and protected to help prevent tripping and disruption to work activities. Trip hazards are particularly a problem early in the morning, late in the day, or under other poor lighting conditions.
☒	Underground Storage Tanks (USTs) (Septic Tanks)	If any unknown USTs are encountered, drilling or excavations will be terminated in that location until a new scope of work, Risk Assessment and Health & Safety Plan can be developed.
☒	Uneven Surfaces	Be aware of uneven walking or driving surfaces and exercise caution when moving around the site.
☒	Utilities – Overhead (electrical, telephone, cable TV, etc.)	A subcontractor, the client, or INVENTUM will locate and identify all overhead utilities. The owner or client will be responsible for identifying all applicable overhead utilities, product lines, pipes, and aboveground tanks. A minimum clearance of 20 feet must be maintained between equipment and overhead utility lines.
☒	Utilities – Underground (electric, gas, telephone, water, storm sewer, sanitary sewer, cable TV, etc.)	A subcontractor, the client, or INVENTUM will call Digger's Hotline to locate all underground utilities. The owner or client will be responsible for marking all applicable on-site underground utilities, product lines, pipes, and tanks.

Risk Analysis (RA)

(Required for all Inventum Type 2 or Type 3 field projects.)

Other Common Physical Hazards

(modify as needed, but include with all project hazard assessments)

☒	PHYSICAL HAZARD	GENERAL CONTROL MEASURE
☐	Waterways	Exercise caution near, around, or in waterways. Harnesses should be worn when working in, or within 4 feet of, the waterway, especially when attempting to sample from shore or a boat or barge. All applicable laws and regulations will be followed when navigating a boat or barge to and from a work site.
☒	Welding Tools	Stay clear of welding operations, and do not look directly at the welding process without appropriate eyewear and shield.
☐	Traffic Control	Traffic Control: Traffic control within the right-of-way will be in accordance with the local Public Right-of-Way Agency. Work may be restricted within specific lanes during peak traffic times. Verify peak traffic times and review planned activities with the local Public Right-of-Way Agency, so that appropriate lane closures can be coordinated.

Proposed Date(s) of Inventum Work: TBD

ON-SITE PROJECT TEAM MEMBER	ON-SITE PROJECT RESPONSIBILITIES
Todd Waldrop	Inventum Site Health and Safety Representative (Supervisor); Sampling and Subcontractor Oversight
James Edwards	Inventum Site Health and Safety Representative (Supervisor); Sampling and Subcontractor Oversight
Keith Adderley	Inventum Employee; Sampling and Subcontractor Oversight

Any required construction/demolition activities: ☐ No ☒ Yes If Yes, complete Section 1

Site-Specific Health and Safety Plan

(Required for all Inventum Type 2 or Type 3 field projects.)

1. Construction Tasks: work tasks to be performed by Inventum staff or Inventum subcontractors

Civil

- ☐ Sewer (utility)
- ☐ Water (utility)
- ☐ Electric (utility)
- ☐ Communications (utility)
- ☐ Siding
- ☐ Roofing
- ☐ Drywall
- ☐ Flooring
- ☐ Ceilings
- ☐ Casework
- ☐ Masonry
- ☐ Escalator

- ☐ Steel (erection)
- ☐ Pre-cast (erection)
- ☐ Concrete (erection)
- ☐ Re-bar
- ☐ Elevator
- ☐ Fireproofing
- ☐ Windows
- ☐ Landscaping
- ☐ Painting
- ☐ Insulation
- ☐ Doors
- ☐ Finish Concrete

- ☐ Others
- ☐ Others
- ☐ Others

Mechanical

- ☐ Insulation
- ☐ Millwright
- ☐ Fire Protection
- ☐ Boiler
- ☐ Industrial Ventilation
- ☐ Steel Fabrication/Erection

Other

- ☐ Electrical
- ☐ Demolition (attach a detailed "Demolition Plan")

Estimated Direct-Hire Inventum Employees:

Home Office: ☐ Not Applicable ☐ Specify:

Craft Labor: ☐ Not Applicable ☐ Specify:

Craft	Quantity
Craft	Quantity

Site-Specific Health and Safety Plan

(Required for all Inventum Type 2 or Type 3 field projects.)

2. Applicable Safety Standards or Regulations:

☒ Federal OSHA ☐ State OSHA ☐ Owner/Client

Specific Standards:	29 CFR 1910 (OSHA)	29 CFR 1926 (Other Regulations)
☒ Medical Services and First Aid	1910.151	1926.50
☒ Hazard Communication (HAZCOM)	1910.1200	1926.59
☐ Lead Exposure	1910.1025	1926.62
☒ HAZWOPER	1910.120	1926.65
☒ Personal Protective Equipment (PPE)	1910.132-138	1926.95-107
☒ Respiratory Protection	1910.134	1926.103
☒ Ventilation	1910.94	1926.57
☒ Noise Exposure	1910.95	1926.52
☐ Illumination	N/A	1926.56
☐ Fire Protection	1910.157	1926.24 and 150-155
☐ Sanitation	1910.141	1926.51
☐ Materials Handling (rigging, etc.)	1910.176	1926.250-251
☐ Welding/Cutting	1910.251-255	1926.350-354
☐ Lockout/Tagout	1910.147	1926.417
☐ Electrical (flexible cords, etc.)	1910.305	1926.400-449
☐ Scaffolding	1910.28-29	1926.450-454
☐ Fall Protection (elevated work)	1910.23-29, 1910.66-68	1926.104-107; 500-503
☐ Ladders/Stairways	1910.25-27	1926.1050 and 1060
☐ Cranes, Derricks, Hoists, Elevators, etc.	1910.179-181	1926.550-555
☐ Aerial Lifts	1910.66-68	1926.556
☒ Earthmoving Equipment	N/A	1926.602
☐ Powered Industrial Trucks (forklifts)	1910.178	1926.602
☒ Excavations and Trenching	N/A	1926.650-652
☐ Concrete and Masonry	N/A	1926.700-706
☐ Steel Erection	N/A	1926.750-761
☐ Demolition	N/A	1926.850-860
☐ Asbestos	1910.1001	1926.1101
☒ Confined Space Entry	1910.146	1926.21

Site-Specific Health and Safety Plan

(Required for all Inventum Type 2 or Type 3 field projects.)

☐ Commercial Diving	1910.401-441	1926.1071-1092
☒ Compressed Gases	1910.101-105	N/A
☐ Ionizing Radiation	1910.1096	1926.53
☒ Benzene	1910.1028	1926.1128
☐ Cadmium	1910.1027	1926.1127
☒ Tools - Hand and Power	N/A	1926.300-307
☐ Blasting and Using Explosives	N/A	1926.900-914

Site-Specific Health and Safety Plan

(Required for all Inventum Type 2 or Type 3 field projects.)

3. Training Required

(* required for all "Type 3" sites; but minimum recommended)

Check "A" if training required for everyone, and check "T" if training required for specific task.

A	T	SUBJECT	REFERENCE	
			29 CFR 1910	29 CFR 1926 or Other
☐	☒	HAZWOPER 40 hour*	1910.120	1926.65
☐	☐	3-Day HAZWOPER Supervised On-Site*	1910.120	1926.65
☐	☒	8-Hour HAZWOPER Refresher*	1910.120	1926.65
☐	☐	8-Hour Supervisor HAZWOPER*	1910.120	1926.65
☐	☐	First Aid, CPR*	1910.151	1926.23,.50
☐	☒	Respiratory Protection	1910.134	1926.103
☐	☒	Confined Space ☐ Permit attached	1910.146	1926.21
☐	☐	Mine Safety (MSHA)	N/A	30 CFR 48.8
☐	☐	Lockout/Tagout ☐ Permit attached	1910.147	1926.417
☒	☐	Bloodborne Pathogens	1910.1030	N/A
☒	☐	Noise Exposure	1910.95	1926.52
☐	☐	Competent Person	N/A	1926.32,.450,.650
☐	☐	Construction Health and Safety OSHA 10-Hour	N/A	1926.21
☐	☐	Demolition	N/A	1926.850
☐	☒	Excavations ☐ Permit attached	N/A	1926.650-652
☐	☐	Electrical Work	1910.332	1926.400-.449
☐	☐	Ladders/Stairways	N/A	1926.1050-1060
☐	☐	Scaffolding	1910.28	1926.450-454
☐	☐	Fall Protection	1910.23-29; 1910.66-68	1926.104,.501
☐	☐	Commercial Diving	1910.410	1926.1071-1092
☐	☐	Hot Work ☐ Permit attached	1910.251-255	1926.350
☐	☐	Lead Awareness	1910.1025	1926.62
☐	☐	Asbestos Awareness	1910.1001	1926.1101
☐	☐	Cadmium	1910.1027	1926.1127
☐	☐	Benzene	1910.1028	1926.1128
☐	☐	Ionizing Radiation	1910.1096	1926.53; 10 CFR 19.12
☐	☐	Troxler or NITON Gauge User	1910.1096	10 CFR 19.12
☐	☐	Radiation Safety Program	1910.1096	10 CFR 20.1101
☐	☐	Hazard Communication (HAZCOM)	1910.1200	1926.59
☐	☒	DOT Hazardous Materials Shipping	1910.1201	49 CFR 172.704

Client-specific training: ☒ Not Applicable ☐ Specify

Site-specific orientation: ☒ Not Applicable ☐ Specify

Competent person: ☒ Not Applicable ☐ Specify

Direct-hire employee training/certification: ☒ Not Applicable ☐ Specify

Site-Specific Health and Safety Plan

(Required for all Inventum Type 2 or Type 3 field projects.)

4. Medical Surveillance

Surveillance Required: * required for all "Type 3" sites; baseline is minimum recommended
** Specify frequency below

	29 CFR 1910	29 CFR 1926 or Other
☒ HAZWOPER Physical - Baseline*	1910.120	1926.65
☒ HAZWOPER Physical – Annual	1910.120	1926.65
☐ HAZWOPER Physical - Biennial*	1910.120	1926.65
☒ OSHA Respiratory Protection Questionnaire	1910.134	1926.103
☒ Respiratory Certification Exam	1910.134	1926.103
☒ Arsenic (urine) **	1910.1018	N/A
☐ Asbestos **	1910.1001	1926.1101
☒ Cadmium (blood) **	1910.1027	1926.1127
☒ Lead/ZPP (blood) **	1910.1025	1926.62
☒ Mercury (blood) **	N/A	N/A
☒ PCB **	N/A	N/A
☐ Vinyl Chloride **	1910.1017	1926.117
☐ Hepatitis B Vaccine (series) **	1910.1030	N/A
☐ Tetanus/Diphtheria	N/A	Stay Current
☐ Stress Test	N/A	Only as requested
☒ Visual Acuity Test	N/A	Only as requested
☒ Hearing Test (Audiometry)	N/A	Only as requested
☒ Pulmonary Function	N/A	Only as requested

Client-specific drug testing: ☒ Not Applicable ☐ Specify

Client-specific medical monitoring[1]: ☒ Not Applicable ☐ Specify

Site-specific medical monitoring: ☒ Not Applicable ☐ Specify

**Frequency of medical monitoring: ☒ Not Applicable ☐ Specify

Site-Specific Health and Safety Plan

(Required for all Inventum Type 2 or Type 3 field projects.)

5. Personal Protective Equipment (PPE)

Based on evaluation of potential hazards, the following levels of personal protection have been designated for the applicable work tasks:

Specific Inventum Job Task or Function	Minimum Level of Protection
Task 1 – Tank Inspection	☒ D
Level D: Hard hat, safety glasses (ANSI), safety shoes (ANSI), ear plugs (ANSI); safety vest (ANSI)	
Task 2 – Residual Materials Removal	☒ D ☒ C ☒ B ☒ A
Level D: Hard hat, safety glasses (ANSI), safety shoes (ANSI), ear plugs (ANSI); safety vest (ANSI) Level C: As required. Hard hat, Tyvek, safety glasses, safety shoes, ear plugs, safety vest, full or half-face air-purifying respirator with organic vapor cartridge Level B: Subcontractor Only. As required. Hard hat, splash protective chemical resistant suit, safety shoes, ear plugs, supplied-air respirator Level A: Subcontractor Only (Tank Entry). As required. Self-Contained Breathing Apparatus, vapor-protective fully encapsulated suit	
Task 3 – Excavation, Cleaning, and Removal	☒ D ☐ C ☐ B ☐ A
Level D: Hard hat, safety glasses (ANSI), safety shoes (ANSI), ear plugs (ANSI), nitrile gloves, appropriate cut/puncture-resistant gloves (see Glove Selection Guideline).	
Task 4 – Soil Sampling	☒ D ☐ C ☐ B ☐ A
Level D: Hard hat, safety glasses (ANSI), safety shoes (ANSI), ear plugs (ANSI), nitrile gloves, appropriate cut/puncture-resistant gloves (see Glove Selection Guideline).	
Task 5 – Excavation Water Sampling	☒ D ☐ C ☐ B ☐ A
Level D: Hard hat, safety glasses (ANSI), safety shoes (ANSI), ear plugs (ANSI), nitrile gloves, appropriate cut/puncture-resistant gloves (see Glove Selection Guideline).	

Site-Specific Health and Safety Plan

(Required for all Inventum Type 2 or Type 3 field projects.)

Criteria for changing protection levels are as follows:

EVACUATION[2] or PROTECTION LEVEL CHANGE[3] CRITERIA	APPROVALS REQUIRED [1]
	OSC
Site Evacuation Plan: ☒ Not Applicable ☐ Specify or Attach Plan:	
Change to Level D when: ☐ Not Applicable ☒	☒ OSC
Change to Level C when: ☐ Not Applicable ☒ PID readings are greater than 5 ppm in the breathing zone continuously for 5 minutes. Dust levels exceed 2.5 mg/m^3 in the breathing zone continuously for 5 minutes.	☒ OSC
Change to Level B when: ☐ Not Applicable ☒ Specify	☒ Inventum will not conduct any work in Level B. Subcontractor may be required for tank cleaning/entry. Subcontractor shall provide their own site-specific HASP and necessary certifications and documentation of training.
Change to Level A when: ☐ Not Applicable ☒ Specify	☒ Inventum will not conduct any work in Level A. Subcontractor may be required for tank cleaning/entry. Subcontractor shall provide their own site-specific HASP and necessary certifications and documentation of training.

[1] OSC: Office Safety Coordinator

[2] General Recommendations: Evacuate the area when LEL readings are >10% LEL in the atmosphere, or when PID readings are greater than the PEL in the breathing zone.

[3] General Recommendation: To Level C when PID readings are greater than the PEL in the breathing zone. To Level B or A only after detailed evaluation and planning.

Note: Changes to the level of protection shall be made only after the required approvals are obtained. All changes shall be recorded in the field log and reported to the Project Manager as soon as possible. Inventum's goal is to avoid using respiratory protection unless it is absolutely necessary or required. Administrative controls or engineering controls should always be considered as a means to reduce potential exposures, before PPE is required or considered.

Site-Specific Health and Safety Plan

(Required for all Inventum Type 2 or Type 3 field projects.)

6. Air Monitoring (1)

The following monitoring instruments shall be used on site to measure airborne contaminant concentrations in either the breathing zone, or as part of the overall site Air Monitoring Plan (attach detailed plan):

MONITORING EQUIPMENT	LOCATION OF MONITORING	FREQUENCY OF MONITORING	ACTION LEVELS
☒ Combustible Gas Indicator	☐ N/A ☐ Monitoring Plan Attached ☒ Confined Space ☐ Manhole	☒ Continuously when potential combustible gases or lack of oxygen are suspected. ☐ Specify	> 10 % LEL: vent tank until <10% LEL. Wait 15 min and retest ☐ Specify
☒ O2 Monitor ☐ CO Monitor ☐ H_2S Monitor	☐ N/A ☒ Confined Space ☐ Manhole – monitor oxygen, carbon monoxide, hydrogen sulfide , and lower explosive limit	☐ Continuously when excess oxygen (>22.5%) or lack of oxygen (<19.5%) are suspected. ☒ Test atmosphere prior to entry and continuous during confined space entry.	< 19.5% Oxygen: evacuate the area; supplied air may be needed. > 22.5% Oxygen: evacuate the area; potential fire hazard. ☐ Specify
☐ Colorimetric Tubes Type: Type: Type:	☐ N/A ☐ Specify ☐ Sample Container ☐ Confined Space ☐ Specify	☐ Periodically during sampling for analytical purposes only. ☐ Whenever noticeable odor is present. ☐ Specify	☐ Specify
☒ PID Lamp Needed: ☐ 9.8 eV ☒ 10.6 eV ☐ 11.7 eV Calibration Gas: Isobutylene Correction Factor:	☐ N/A ☒ Sample Container ☒ Confined Space ☐ Specify	☒ Periodically during sampling for analytical purposes only. ☒ Continuously within the employee breathing zone. ☐ Specify ☐ Specify	☒ None. ☒ >5 ppm above background in breathing zone for 5+ min. Stop work and reevaluate potential sources and controls.
☐ FID	☐ N/A ☐ Specify	☐ Specify	☐ Specify
☒ Mini-RAM	☐ N/A ☒ CAMP Requirement (Tasks 2, 3, and 4)	☒ Continuously at work perimeter in accordance with the CAMP	☒ >2.5 mg/m3 at work perimeter for 15 min sustained, or visible dust leaving work perimeter. Apply dust control measures.
☐ Other:	☐ Specify	☐ Specify	☐ Specify

☐ Laboratory Supported ☒ Personal ☐ Area ☐ Perimeter	☐ N/A ☒ Specify Employee breathing zone	☒ Specify continuous	☒ When visible dust is present apply dust control measures (water spray) until abated.

(1) Whenever air monitoring is required to be performed, a detailed Air-Monitoring Plan should be developed and attached to the HASP. The plan should include Monitoring Locations, Frequency of Readings, and any Action Levels being used to control the work site.

Air Monitoring Plan

Field monitoring of dust production is anticipated during excavation and tank removal.

This level of nuisance dust is visually observable. If dust is observable continuously in the breathing zone for 5 minutes, dust control methods will be used (*e.g.*, water spray will be applied) until dust is abated. Work will be temporarily discontinued until dust is reduced to acceptable levels within the breathing zone. Should particulate levels above the action level be a continual problem, relevant field personnel will reassess the situation with the project manager.

Site-Specific Health and Safety Plan

(Required for all Inventum Type 2 or Type 3 field projects.)

7. Site Controls and Work Zones (describe in detail)

Facility Alarms or Signals: ☒ Not Applicable ☐ Specify

Work Permits Required: ☐ Not Applicable ☒ Confined Space Entry Permits and Hot Work Permit (if applicable)

Work Traffic Issues: ☒ Not Applicable ☐ Specify

Parking Issues: ☒ Not Applicable ☐ Specify

Railway Traffic Issues: ☒ Not Applicable ☐ Active rail line on portion of property.
No signal is present. Proceed with caution when crossing tracks.

Support Zone(s):

☒ Field vehicle ☐ Job Trailer On Site ☐ Other:

Contamination Reduction Zone(s):

☒ Field vehicle ☐ Facility restroom/utility room ☐ Other:

Exclusion Zone(s):

☒ Area immediately surrounding work area ☐ Other:

Site Entry Procedures:

☒ Notify Site Safety Contact Representative.

☒ Read HASP Plan and sign Acknowledgment Statement.

☒ Check in with the facility contact person. ☐

☐ Check in with facility security guard. ☐ Specify

☒ Wear proper personal protective equipment.

☐ Attend facility orientation. ☐

☒ Conduct daily safety meeting (document).

☒ Other: Confined space – do not enter the confined space if LEL >10%, oxygen <21% or >23.5%, carbon monoxide >35 ppm, or hydrogen sulfide >7 ppm. Exit the confined space if the atmospheric conditions become hazards as noted.

Site-Specific Health and Safety Plan

(Required for all Inventum Type 2 or Type 3 field projects.)

Decontamination Procedures:

Personnel: (specify)	Work will be performed in Level D or Modified Level D, and minimal contamination is expected. Follow standard decontamination procedures, and good personal hygiene. Disposable PPE should be removed, contained, and disposed in an appropriate manner. Prior arrangements should be made if disposal is planned for at the project site. Site workers should plan and stage for wash water and soap at the site, prior to beginning the work. Site workers should wash hands and any exposed skin extremely well with soap and water, prior to leaving the contamination reduction zone, eating, drinking, driving, or leaving the site. Any soiled or contaminated clothing should be removed and handled appropriately, by either washing as soon as possible, or if necessary, disposing. Soiled or contaminated clothing should be carefully bagged prior to disposal or washing, to reduce potential exposure.
Equipment: (specify)	Site workers should plan and stage for the appropriate decontamination method at the site prior to beginning the work. Any contaminated single-use disposable equipment or PPE should be appropriately containerized and disposed as soon as possible in an appropriate manner. Prior arrangements should be made if disposal is planned for at the project site. Contaminated equipment or PPE that will be re-used should be handled and cleaned while wearing the appropriate PPE. Typically, equipment is decontaminated using Alconox soap and deionized water.

Disposal of Investigation-derived Material:

☒ Leave on site for disposal. Dumpster adjacent to groundwater treatment building.

☐ Other:

Work Limitations (time of day, buddy system, etc.):

☐ Buddy system required for some tasks.

☒ Work will be performed during daylight hours only.

☐ Work will be performed using artificial light.

Describe or attach a lighting plan: A lighting plan is attached.

☒ No eating, drinking, or smoking in contamination reduction zone(s) or exclusion zone(s).

☒ When temperatures are either above 80°F or below 20°F, work schedules may be modified.

☐ Other site-specific limitations:

Site-Specific Health and Safety Plan

(Required for all Inventum Type 2 or Type 3 field projects.)

Radiation Safety:

- ☒ Radiation information is not applicable to this project.
- ☐ Notify RSO.
- ☐ Wear dosimeter badge when handling gauge.
- ☐ Post applicable radiation signs and documents.
- ☐ Post emergency numbers.
- ☐ Provide at least two lock systems for overnight storage.
- ☐ Maintain storage at least 15 feet from full-time workstations.
- ☐ Block, brace, and securely lock the gauge during “all” transportation.
- ☐ Limit “public” exposure to gauge while in use.
- ☐ Provide sketch of gauge storage to RSO.

Site-Specific Health and Safety Plan

(Required for all Inventum Type 2 or Type 3 field projects.)

Acknowledgment Statement:

As an employee of Inventum, I have reviewed the Hazard Assessment (HA)/Health & Safety Plan (HASP). I hereby acknowledge that I have received the required level of training and medical surveillance as necessary, that I am knowledgeable about the contents of this site-specific RA/HSP, and that I will use personal protective equipment (PPE) and follow procedures specified in the HASP.

Signatures of Inventum Site Personnel:

	Date:	
	Date:	
	Date:	
	Date:	
	Date:	
	Date:	
	Date:	
	Date:	
	Date:	
	Date:	
	Date:	
	Date:	

INVENTUM SAFETY OBSERVATION FORM

Revised March 2019

Location/Project Name:		**Date:**	
Observer Name:			
Observee Name:		**Time:**	

Task Observed

Description of Task Observed and Background Information

Positive Comments

INVENTUM SAFETY OBSERVATION FORM

Revised March 2019

Conclusions / Why the Questionable Items Occurred?

Feedback Session Conducted By: _____ **Date:** _____

Name of Observee's Supervisor: _____ **Time:** _____

At-Risk Observations/Root Cause Analysis

Personal Factor:
(1) Lack of skill or knowledge
(2) Correct way takes more time/requires more effort
(3) Shortcutting standard procedures is rewarded or appreciated
(4) In past, did not follow procedures or acceptable practices and no incident occurred

Job Factor:
(5) Lack of or inadequate operational procedures or work standards
(6) Inadequate communication of expectations or work standards
(7) Inadequate tools or equipment

At-Risk Observation #	Root Cause Analysis #	Solution(s) To Prevent Potential Incident from Occurring	Person Responsible	Agreed Due Date	Date Completed

Results of Verification (were solutions done?) and Validation (were solutions effective?)

Reviewed by (PM/Supervisor): _____ **Date:** _____

Approved by (Practice Safety Leader): _____ **Date:** _____

INVENTUM SAFETY OBSERVATION FORM

Revised March 2019

PERSONAL PROTECTIVE EQUIPMENT	Safe	At-Risk	Comments
1. Hearing Protection (e.g., Ear Plugs)			
2. Head Protection (e.g., Hard Hat)			
3. ANSI Rated Eye Protection (e.g., Safety Glasses)			
4. Hand Protection (e.g., Kevlar Gloves)			
5. Foot Protection (e.g., Safety Shoes)			
6. Respiratory Protection			
7. Fall Protection Inspected (e.g., Harness)			
8. ANSI Rated Reflective Vest/High Visibility Clothing			
9. Other (Specify)			
BODY USE AND POSITIONING	**Safe**	**At-Risk**	**Comments**
10. Correct Body Use and Positioning When Lifting/Pushing/Pulling			
11. Pinch Points/Moving Equipment - Hands/Body Clear			
12. Mounts/Dismounts Using 3-Points of Contact			
13. Other (Specify)			

INVENTUM SAFETY OBSERVATION FORM

Revised March 2019

WORK ENVIRONMENT	Safe	At-Risk	Comments
14. Work/Walk Surface Free of Obstructions (e.g., Tripping Hazards)			
15. Housekeeping/Storage			
16. Defined and Secured (e.g., warning devices, barricades, cones, flags)			
17. Suspended Load, Swing Radius & Lift Area is Barricaded			
18. Safety Shutdown Devices			
19. Proper Storage & Labeling /Disposal of Sample & Waste Materials			
20. Cylinders Stored Upright, Secured, & Caps in Place			
21. Manhole/vault Inspected for Hazards			
22. Other (Specify)			

INVENTUM SAFETY OBSERVATION FORM

Revised March 2019

OPERATING PROCEDURES	Safe	At-Risk	Comments
23. Job Planning (HASP reviewed, JSAs, etc.)			
24. Fire Extinguishers Accessible and Inspections Current			
25. Work Permit/Authorization to Work (Hot, Cold, LOTO, Confined Space)			
26. JSA Reviewed & Followed			
27. Hazard Assessment - Hazard Hunt			
28. Interfaces with Other Functions (awareness with other personnel on site)			
29. Operators Looking Behind Prior to Backing Up			
30. Operators Wearing Seat Belts While Operating Equipment			
31. Subsurface Structures Identified			
32. Proper Trench Protective Equipment in Place			
33. Adequate Egress Is Available for Excavation & Trench (within 25 ft. if depth is <4 ft.)			
34. All Materials Set Back at Least 2 Feet From Edge of Trench/Excavation			
35. Other (Specify)			

INVENTUM SAFETY OBSERVATION FORM

Revised March 2019

TOOLS/EQUIPMENT	Safe	At-Risk	Comments
36. Hand Tools (Proper Equipment Selection, Condition, and Use)			
37. Power Tools (Proper Equipment Selection, Condition, and Use)			
38. Equipment, Including Heavy (Proper Equipment Selection, Condition, and Use)			
39. Hoses Inspected			
40. Required Monitoring Equipment Calibrated & Used			
41. Ladders Set up Correctly & Inspected			
42. Right Tools for the Job are Available and in Good Condition - No Fixed Open Blade Knives (FOBKs)			
43. Other (Specify)			
Total #	0	0	

Daily Hazard Review Topic and Sign-In:

Daily Review Topic	Date

Acknowledgment Statement:

As an affected employee of Inventum Engineering, I hereby acknowledge that I have reviewed the contents of this site-specific HSP and the daily safety meeting topic, and that I will use the applicable personal protective equipment (PPE) and follow the procedures specified in the HASP.

Signatures of all onsite Inventum Personnel, including Direct-Hires (Required):

_____ Date: _____

_____ Date: _____

_____ Date: _____

_____ Date: _____

_____ Date: _____

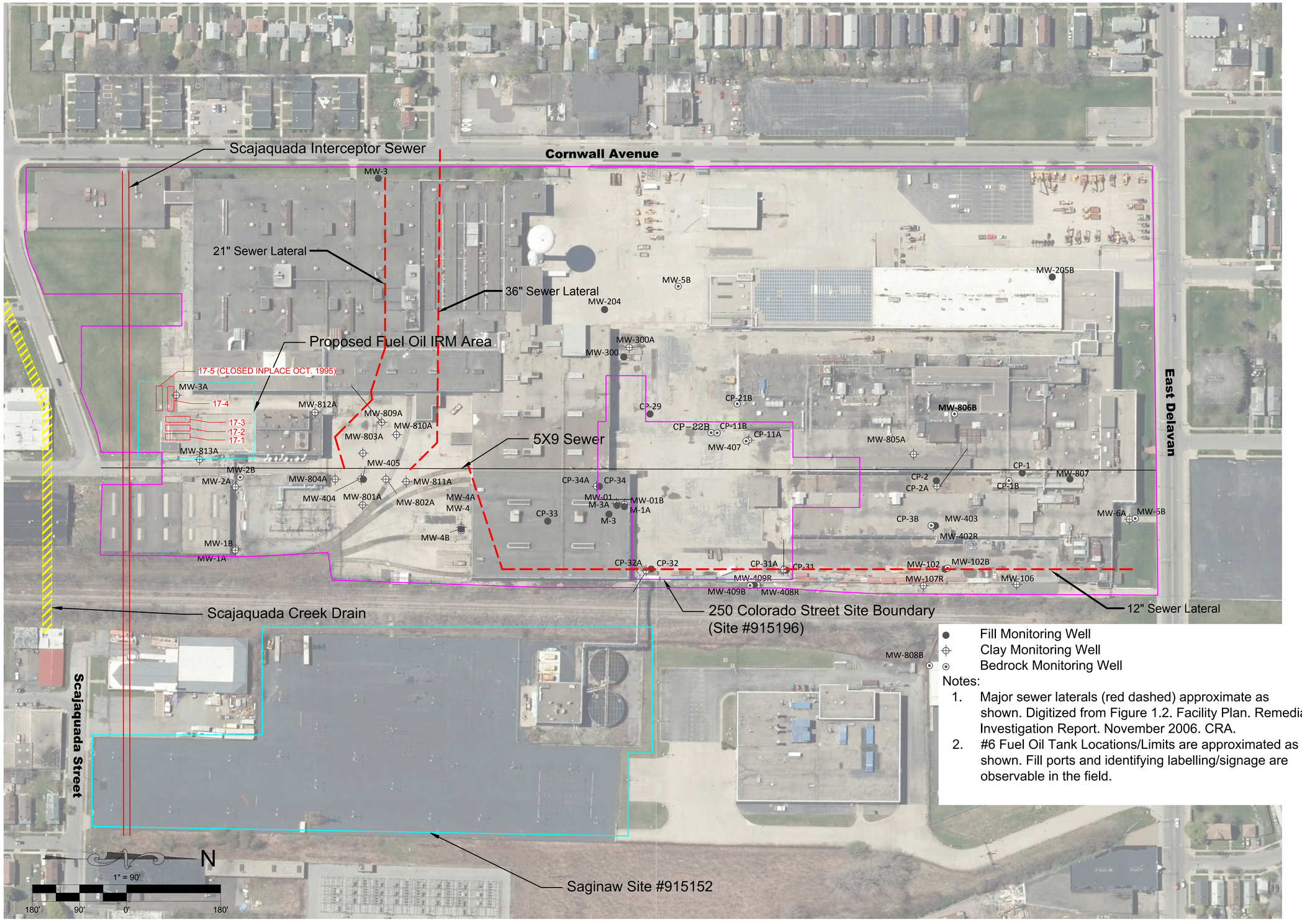
_____ Date: _____

_____ Date: _____

_____ Date: _____

_____ Date: _____

_____ Date: _____



- Fill Monitoring Well
- Clay Monitoring Well
- Bedrock Monitoring Well

Notes:

1. Major sewer laterals (red dashed) approximate as shown. Digitized from Figure 1.2. Facility Plan. Remedial Investigation Report. November 2006. CRA.
2. #6 Fuel Oil Tank Locations/Limits are approximated as shown. Fill ports and identifying labelling/signage are observable in the field.

D

DRAWING BY	TW
CHECKED	JPB
APPROVED	JPB

INTERIM REMEDIAL MEASURES WORK PLAN

1001 EAST DELAVAN AVE.
BUFFALO, NEW YORK
BROWNFIELD CLEANUP PROGRAM
SITE #C915196B

FIGURE 03
FUEL TANK SITE LAYOUT

INVENTUM ENGINEERING
481 CARLISLE DRIVE
SUITE 202
HERNDON, VIRGINIA 20170
(703) 722-6049
www.InventumEng.com

FIGURE 03

Appendix C – Quality Assurance Project Plan

INVENTUM ENGINEERING, PC

Interim Remedial Measures
Fuel Oil Storage Tank Removal
Quality Assurance Project Plan

Brownfield Cleanup Program Site #C915196B

1001 East Delavan Avenue

Buffalo, New York

October 14, 2020

481 CARLISLE DRIVE
SUITE 202
HERNDON, VA 20170
WWW.INVENTUMENG.COM

Table of Contents

1 Introduction

The purpose of this Quality Assurance Project Plan (QAPP) is to serve as a guidance document during implementation of the Fuel Oil Underground Storage Tank Interim Remedial Measure (IRM) for the East Delavan Avenue Brownfield Cleanup Program Site (BCP Site) located at 1001 East Delavan Avenue, Buffalo, Erie County, New York. This IRM is being conducted in accordance with the BCP agreement with the New York State Department of Environmental Conservation (NYSDEC) dated March 1, 2018. The BCP Site is listed as Site Number C915196B.

This QAPP is designed to provide an overview of Quality Assurance/Quality Control (QA/QC) procedures. Specific methods and QA/QC procedure for chemical testing of environmental samples obtained from the site as part of the IRM are defined.

An Inventum Engineering, P.C. (Inventum) Project Manager will be responsible for verifying that QA procedures are followed during the investigation and analysis. This will provide for the valid collection of representative samples. The Project Manager will be in direct contact with the analytical laboratory to ensure that holding times and other QA/QC requirements are met. The selected laboratory will be responsible for overseeing analytical QA/QC activities.

The estimated number of environmental samples and corresponding analytical parameters/methods are provided in Table 1 below. These sample quantities may vary depending on media availability, tank size, and routine adjustments made during the field work.

Parameter	EPA Method Reference	Excavation Water	Soils
Target Compounds List (TCL) Volatile Organic Compounds	8260C	4	72
TCL Semi-Volatile Organic Compounds	8270D	4	72
Polychlorinated Biphenyls	8082A	4	72
Target Analyte List (TAL) Metals	6010C	4	72

Field Duplicates		1 per 20 Samples Collected	1 per 20 Samples Collected
MS/MSD		1 per 20 Samples Collected	N/A
Trip Blanks	8260	One per Volatile Shipment	N/A
Rinsate (Equipment) Blanks		N/A	10% of Total Sampling Program for Non-Disposable Equipment

The analytical laboratory utilized will be a certified NYSDOH ELAP laboratory for the appropriates categories. The laboratory QA Manager will be responsible for performing project-specific audits and overseeing the quality control data generated.

2 Data Quality Objectives

Data Quality Objectives (DQOs) are qualitative and quantitative statements which specify the quality of data required to support the activities completed during the IRM. DQOs focus on the identification of the end use of the data to be collected. The project DQOs will be achieved utilizing the definitive data category, as outlined in Guidance for the Data Quality Objectives Process, EPA QA/G-4 (September 1994). All samples will provide definitive data, which are generated using rigorous analytical methods, such as the reference methods approved by the United States Environmental Protection Agency (USEPA). The purpose of this IRM is to permanently close via removal or abandonment four (4) #6 Fuel Oil underground storage tanks (USTs) that are no longer in service.

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

- To assess the current nature of contamination in subsurface soils beneath the tanks.
- To assess the current nature of contamination in groundwater that accumulate within the excavation.
- To assess the current nature contamination in LNAPL that accumulates within the excavation and beneath the tanks.

2.1 QA Objectives for Chemical Data Management

Sample analytical methodology for the medial sampled and data deliverables will meet the requirements in the most recent NYSDEC Analytical Services Protocol (ASP). Laboratories will be instructed that completed Sample Preparation and Analysis Summary forms are to be submitted with the analytical data

packages. The laboratory will also be instructed that matrix interferences must be cleaned up, to the extent practicable. Data Usability Summary Reports (DUSRs) will be generated. In order to achieve the definitive data category described above, the data quality indicators of precision, accuracy, representativeness, comparability, and completeness will be measured during offsite chemical analysis.

2.1.1 Precision

Precision examines the distribution of the reported values about their mean. The distribution of reported values refers to how different the individual reported values are from the average reported value. Precision may be affected by the natural variation of the matrix or contamination within that matrix, as well as by errors made in field and/or laboratory handling procedures. Precision is evaluated using analyses of a laboratory matrix spike/matrix spike duplicate (for organics) and matrix duplicates (for inorganics), which not only exhibit sampling and analytical precision, but indicate analytical precision through the reproducibility of the analytical results. Relative Percent Difference (RPD) is used to evaluate precision. RPD criteria must meet the method requirements identified in QAPP Section 6.1.

2.1.2 Accuracy

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

2.1.3 Representativeness

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

2.1.4 Comparability

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

2.1.5 Completeness

Completeness is defined as a measure of the amount of valid data obtainable from a measurement system compared to the amount that was expected to be obtained under normal conditions. It is important that appropriate QA procedures be maintained to verify that valid data are obtained in order to meet project needs. For the data generated, a goal of 90% is required for completeness (or usability) of the analytical

data. If this goal is not met, then NYSDEC, Inventum, and EDP project personnel will determine whether the deviations might cause the data to be rejected.

3 Sampling Locations, Custody, Holding Times, and Analysis

The procedure for determine the number and location of sampling locations are discussed in the IRM Work Plan. Procedures for chain of custody, holding times and laboratory analyses shall be followed as per SW-846 and as per the laboratory's Quality Assurance Plan. All holding times begin with validated time of sample receipt (VTSR) at the laboratory. The laboratory must meet the method required detection limits which are referenced within the EPA Methods (QAPP Table 1).

4 Calibration Procedures and Frequency

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

4.1 Analytical Support Areas

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

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

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

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

- Water Supply System - The laboratory must maintain a sufficient water supply for all project needs. The grade of the water must be of the highest quality (analyte-free) in order to eliminate false-positives from the analytical results. Ultraviolet cartridges or carbon absorption treatments are recommended for organic analyses and ion-exchange treatment is recommended for inorganic

tests. Appropriate documentation of the quality of the water supply system(s) will be performed on a regular basis.

4.2 Laboratory Instruments

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

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

Calibration of an instrument must be performed prior to the analysis of any samples and then at periodic intervals (continuing calibration) during the sample analysis to verify that the instrument is still calibrated. If the contract laboratory cannot meet the method required calibration requirements, corrective action shall be taken as discussed in QAPP Section 7. All corrective action procedures taken by the contract laboratory are to be documented, summarized within the case narrative, and submitted with the analytical results.

5 Internal Quality Control Checks

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

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

5.1 Batch QC

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

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

5.2 Matrix-Specific QC

Matrix Spike Samples - An aliquot of a matrix is spiked with known concentrations of specific compounds as stipulated by the methodology. The matrix spike (MS) and matrix spike duplicate (MSD)

are subjected to the entire analytical procedure in order to assess both accuracy and precision of the method for the matrix by measuring the percent recovery and relative percent difference of the two spiked samples. The samples are used to assess matrix interference effects on the method, as well as to evaluate instrument performance. MS/MSDs are analyzed at a frequency of one each per 20 samples per matrix.

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

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

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

6 Calculation of Data Quality Indicators

6.1 Precision

Precision is evaluated using analyses of a field duplicate and/or a laboratory MS/MSD which not only exhibit sampling and analytical precision but indicate analytical precision through the reproducibility of the analytical results. RPD is used to evaluate precision by the following formula:

$$RPD = \frac{(X1 - X2) \times 100\%}{[(X1 + X2)/2]}$$

Where:

X1= Measured value of sample or matrix spike

X2= Measured value of duplicate or matrix spike duplicate

Precision will be determined through the use of MS/MSD (for organics) and matrix duplicates (for inorganics) analyses.

6.2 Accuracy

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

$$\text{Accuracy (\%R)} = \frac{(Xs - Xu) \times 100\%}{K}$$

Where:

Xs- Measured value of the spike sample

Xu- Measured value of the unspiked sample

K - Known amount of spike in the sample

6.3 Completeness

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

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

Where:

Xv- Number of valid measurements

Xn- Number of invalid measurements

N - Number of valid measurements expected to be obtained

7 Corrective Actions

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

7.1 Incoming Samples

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

7.2 Sample Holding Times

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

7.3 Instrument Calibration

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

7.4 Reporting Limits

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

7.5 Method QC

All QC method-specified QC samples shall meet the method requirements referenced in the analytical methods. Failure of method-required QC will result in the review and possible qualification of all affected data. If the laboratory cannot find any errors, the affected sample(s) shall be reanalyzed and/or re-extracted/redigested, then reanalyzed within method-required holding times to verify the presence or absence of matrix effects. If matrix effect is confirmed, the corresponding data shall be flagged accordingly using the flagging symbols and criteria. If matrix effect is not confirmed, then the entire batch of samples may have to be reanalyzed and/or re-extracted/redigested, then reanalyzed. Inventum shall be notified as soon as possible to discuss possible corrective actions should unusually difficult sample matrices be encountered.

7.6 Calculation Errors

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

8 Data Reduction, Validation, and usability

8.1 Data Reduction

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

8.2 Data Validation

Data validation is a systematic procedure of reviewing a body of data against a set of established criteria to provide a specified level of assurance of validity prior to its intended use. All analytical samples collected will receive a Level II compliant data validation review. The Level II data validation will be limited to a review of holding times, completeness of all required deliverables, review of QC results (surrogates, spikes, duplicates) and a 10% (Level IV review) check of all samples analyzed to ensure they were analyzed properly. The methods as well as the general guidelines presented in the following documents will be used during the data review USEPA Contract Laboratory Program (CLP) Organic Data Review, SOP Nos. HW-6, Revision #11 and USEPA Evaluation of Metals Data for the Contract Laboratory Program based on 3/90, SOW, Revision XI. These documents will be used with the following exceptions:

- Technical holding times will be in accordance with NYSDEC ASP, 10/95 edition.
- Organic calibration and QC criteria will be in accordance with NYSDEC ASP, 10/95 edition. Data will be qualified if it does not meet NYSDEC ASP, 10/95 criteria.

Where possible, discrepancies will be resolved by the project manager (i.e., no letters will be written to laboratories). A complete analytical data validation is not anticipated. However, if the initial limited data audit reveals significant deviations and problems with the analytical data, project personnel may recommend a complete variation of the data.

Inventum will submit all analytical data packages for third-party data validation review. A third-party Data Usability Summary Report (DUSR) will be prepared for each laboratory data package.

9 References

- Comprehensive Environmental Response Compensation and Liability Act (CERCLA) Quality Assurance Manual, Final Copy, Revision I, October 1989.
- National Enforcement Investigations Center of USEPA Office of Enforcement. NEIC Policies and Procedures. Washington: USEPA.
- New York State Department of Environmental Conservation (NYSDEC). 1995. Analytical Services Protocol, (ASP) 10/95 Edition. Albany: NYSDEC.

Appendix D – Community Air Monitoring Plan

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

Overview

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

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

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

Community Air Monitoring Plan

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

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

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. “Periodic” monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or

overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

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

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

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

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

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

Particulate Monitoring, Response Levels, and Actions

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

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

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

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

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Appendix 1B
Fugitive Dust and Particulate Monitoring

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

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

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

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

(a) Objects to be measured: Dust, mists or aerosols;
(b) Measurement Ranges: 0.001 to 400 mg/m3 (1 to 400,000 :ug/m3);
(c) Precision (2-sigma) at constant temperature: +/- 10 :g/m3 for one second averaging; and +/- 1.5 g/m3 for sixty second averaging;
(d) Accuracy: +/- 5% of reading +/- precision (Referred to gravimetric calibration with SAE fine test dust (mmd= 2 to 3 :m, g= 2.5, as aerosolized);
(e) Resolution: 0.1% of reading or 1g/m3, whichever is larger;
(f) Particle Size Range of Maximum Response: 0.1-10;
(g) Total Number of Data Points in Memory: 10,000;
(h) Logged Data: Each data point with average concentration, time/date and data point number
(i) Run Summary: overall average, maximum concentrations, time/date of maximum, total number of logged points, start time/date, total elapsed time (run duration), STEL concentration and time/date occurrence, averaging (logging) period, calibration factor, and tag number;
(j) Alarm Averaging Time (user selectable): real-time (1-60 seconds) or STEL (15 minutes), alarms required;
(k) Operating Time: 48 hours (fully charged NiCd battery); continuously with charger;
(l) Operating Temperature: -10 to 50^{o} C (14 to 122^{o} F);
(m) Particulate levels will be monitored upwind and immediately downwind at the working site and integrated over a period not to exceed 15 minutes.

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

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

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

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

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

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

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

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

Appendix 1C
DEC Permits Subject to Exemption

In accordance with section 1.10, exemptions from the following permit programs may be granted to the person responsible for conducting the remedial programs undertaken pursuant to section 1.2:

Air - Title 5 permits
Air - State permits
Air - Registrations
Ballast Discharge
Chemical Control
Coastal Erosion Hazard Areas
Construction of Hazardous Waste Management Facilities
Construction of Solid Waste Management Facilities
Dams
Excavation and Fill in Navigatable Waters (Article 15)
Flood Hazard Area Development
Freshwater Wetland
Hazardous Waste
Long Island Wells
Mined Land Reclamation
Navigation Law - Docks
Navigation Law - Floating Objects
Navigation Law - Marinas
Non-Industrial Waste Transport
Operation of Solid Waste Management Facilities
Operation of Hazardous Waste Management Facilities
State Pollution Discharge Elimination Systems (SPDES)
Stream Disturbance
Tidal Wetlands
Water Quality Certification
Water Supply
Wild, Scenic and Recreational Rivers