

Site Management Plan

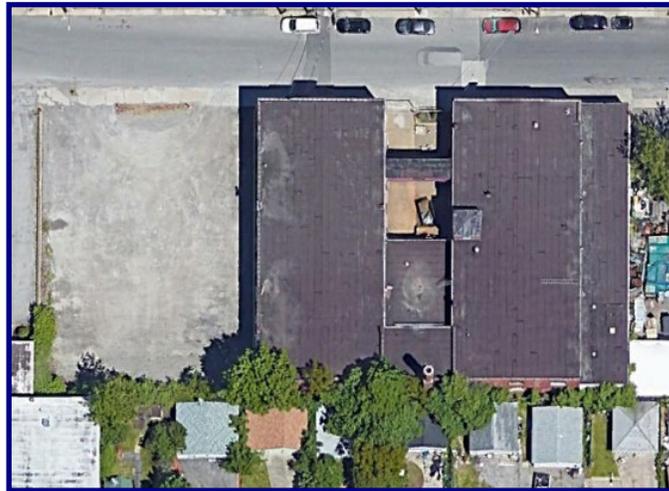
293 Grote Street Site
BCP Site No. C915368
Buffalo, New York

December 2022

0581-021-001

Prepared for:

293 Grote Street, LLC



Prepared By:



SITE MANAGEMENT PLAN

**293 GROTE STREET SITE
ERIE COUNTY
BUFFALO, NEW YORK
NYSDEC Site Number: C915368**

December 2022

B0581-021-001

Prepared for:

293 GROTE STREET, LLC

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Prepared By:



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Revisions to Final Approved Site Management Plan:

Revision No.	Date Submitted	Summary of Revision	NYSDEC Approval Date

**SITE MANAGEMENT PLAN
293 GROTE STREET SITE
BCP SITE NO. C915368**

CERTIFICATION STATEMENT

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

Thomas H. Forbes P.E.

12-22-22 DATE



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List of Acronyms

AS	Air Sparging
ASP	Analytical Services Protocol
BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CAMP	Community Air Monitoring Plan
C/D	Construction and Demolition
CFR	Code of Federal Regulation
CLP	Contract Laboratory Program
COC	Certificate of Completion
CO2	Carbon Dioxide
CP	Commissioner Policy
DER	Division of Environmental Remediation
DUSR	Data Usability Summary Report
EC	Engineering Control
ECL	Environmental Conservation Law
ELAP	Environmental Laboratory Approval Program
ERP	Environmental Restoration Program
EWP	Excavation Work Plan
GHG	Greenhouse Gas
GWE&T	Groundwater Extraction and Treatment
HASP	Health and Safety Plan
IC	Institutional Control
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYCRR	New York Codes, Rules and Regulations
O&M	Operation and Maintenance
OM&M	Operation, Maintenance and Monitoring
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
P.E. or PE	Professional Engineer
PFAS	Per- and Polyfluoroalkyl Substances
PID	Photoionization Detector
PRP	Potentially Responsible Party
PRR	Periodic Review Report
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan

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List of Acronyms

QEP	Qualified Environmental Professional
RAO	Remedial Action Objective
RAWP	Remedial Action Work Plan
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RP	Remedial Party
RSO	Remedial System Optimization
SAC	State Assistance Contract
SCG	Standards, Criteria and Guidelines
SCO	Soil Cleanup Objective
SMP	Site Management Plan
SOP	Standard Operating Procedures
SOW	Statement of Work
SPDES	State Pollutant Discharge Elimination System
SSD	Sub-slab Depressurization
SVE	Soil Vapor Extraction
SVI	Soil Vapor Intrusion
TAL	Target Analyte List
TCL	Target Compound List
TCLP	Toxicity Characteristic Leachate Procedure
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
VCA	Voluntary Cleanup Agreement
VCP	Voluntary Cleanup Program

ES EXECUTIVE SUMMARY

The following provides a brief summary of the controls implemented for the Site, as well as the inspections, monitoring, maintenance, and reporting activities required by this Site Management Plan:

Site Identification: 293 Grote Street Site – 293 Grote Street, Buffalo, NY 14207

Institutional Controls:	1. The property may be used for restricted residential, commercial, and industrial uses, although land use is subject to local zoning laws;
	2. All ECs must be operated and maintained as specified in this SMP.
	3. All ECs must be inspected at a frequency and in a manner defined in the SMP.
	4. The use of the groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the Erie County Department of Health to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department.
	5. Data and information pertinent to site management must be reported at the frequency and in a manner as defined in this SMP.
	6. All future activities that will disturb remaining contaminated material must be conducted in accordance with this SMP;
	7. All future activities that will disturb remaining contaminated material must be conducted in accordance with this SMP.
	8. Operation, maintenance, monitoring, inspection, and reporting of any physical component of the remedy shall be performed as defined in this SMP.
	9. Access to the site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by the Environmental Easement.
	10. Vegetable gardens and farming on the site are prohibited.
	11. An evaluation shall be performed to determine the need for further investigation and remediation should large scale redevelopment occur, if any of the existing structures are demolished, or if the subsurface is otherwise made accessible.

Site Identification: 293 Grote Street Site – 293 Grote Street, Buffalo, NY 14207

Engineering Controls:	1. Cover system consisting of 2-feet of clean, imported soil/stone or hardscape.	
Inspections:		Frequency
1. Cover inspection		Annually
Reporting:		
2. Periodic Review Report		Annually

Further descriptions of the above requirements are provided in detail in the latter sections of this Site Management Plan

1.0 INTRODUCTION

1.1 General

This Site Management Plan (SMP) is a required element of the remedial program for the 293 Grote Street Site located in Buffalo, New York (hereinafter referred to as the “Site”). See Figures 1 and 2. The Site is currently in the New York State (NYS) Brownfield Cleanup Program (BCP), Site No. C915368, which is administered by New York State Department of Environmental Conservation (NYSDEC or Department).

MCG Real Estate Holdings, LLC (MCG) entered into a Brownfield Cleanup Agreement (BCA, C915368-04-21) on April 22, 2021, with the NYSDEC to remediate the site. A BCA Amendment was executed on October 21, 2021 to add 293 Grote Street, LLC, as a Volunteer on the BCA. 293 Grote Street, LLC is related to MCG and took the title of the property to execute redevelopment at the Site. A figure showing the site location and boundaries of this site is provided in Figure 2. The boundaries of the site are more fully described in the metes and bounds site description that is part of the Environmental Easement provided in Appendix D.

After completion of the remedial work, some contamination was left at this site, which is hereafter referred to as “remaining contamination”. Institutional and Engineering Controls (ICs and ECs) have been incorporated into the site remedy to control exposure to remaining contamination to ensure protection of public health and the environment. An Environmental Easement granted to the NYSDEC, and recorded with the Erie County Clerk, requires compliance with this SMP and all ECs and ICs placed on the site.

This SMP was prepared to manage remaining contamination at the site until the Environmental Easement is extinguished in accordance with ECL Article 71, Title 36. This plan has been approved by the NYSDEC, and compliance with this plan is required by the grantor of the Environmental Easement and the grantor’s successors and assigns. This SMP may only be revised with the approval of the NYSDEC.

It is important to note that:

- This SMP details the site-specific implementation procedures that are required by the Environmental Easement. Failure to properly implement the SMP is a violation of the Environmental Easement, which is grounds for revocation of the Certificate of Completion (COC);
- Failure to comply with this SMP is also a violation of Environmental Conservation Law, 6 NYCRR Part 375 (Ref. 1) and the BCA (Index # C915368-04-21; Site No. C915368) for the site, and thereby subject to applicable penalties.

All reports associated with the site can be viewed by contacting the NYSDEC or its successor agency managing environmental issues in New York State. A list of contacts for persons involved with the site is provided in Appendix A of this SMP.

This SMP was prepared by Benchmark Civil/Environmental Engineering & Geology, PLLC, on behalf of 293 Grote Street, LLC, in accordance with the requirements of the NYSDEC's DER-10 ("Technical Guidance for Site Investigation and Remediation"), dated May 2010 (Ref. 2), and the guidelines provided by the NYSDEC. This SMP addresses the means for implementing the ICs and/or ECs that are required by the Environmental Easement for the site.

1.2 Revisions

Revisions to this plan will be proposed in writing to the NYSDEC's project manager. The NYSDEC can also make changes to the SMP or request revisions from the remedial party. Revisions will be necessary upon, but not limited to, the following occurring: a change in media monitoring requirements, upgrades to or shutdown of a remedial system, post-remedial removal of contaminated sediment or soil, or other significant change to the site conditions. In accordance with the Environmental Easement for the site, the NYSDEC project manager will provide a notice of any approved changes to the SMP and append these notices to the SMP that is retained in its files.

1.3 Notifications

Notifications will be submitted by the property owner to the NYSDEC, as needed, in accordance with NYSDEC's DER – 10 for the following reasons:

1. 60-day advance notice of any proposed changes in site use that are required under the terms of the BCA, 6 NYCRR Part 375 and/or Environmental Conservation Law.
2. 7-day advance notice of any field activity associated with the remedial program.
3. 15-day advance notice of any proposed ground-intrusive activity pursuant to the Excavation Work Plan. If the ground-intrusive activity qualifies as a change of use as defined in 6 NYCRR Part 375, the above mentioned 60-day advance notice is also required.
4. Notice within 48 hours of any damage or defect to the foundation, structures or EC that reduces or has the potential to reduce the effectiveness of an EC, and likewise, any action to be taken to mitigate the damage or defect.
5. Notice within 48 hours of any non-routine maintenance activities.
6. Verbal notice by noon of the following day of any emergency, such as a fire; flood; or earthquake that reduces or has the potential to reduce the effectiveness of ECs in place at the site, with written confirmation within 7 days that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.
7. Follow-up status reports on actions taken to respond to any emergency event requiring ongoing responsive action submitted to the NYSDEC within 45 days describing and documenting actions taken to restore the effectiveness of the ECs.

Any change in the ownership of the site or the responsibility for implementing this SMP will include the following notifications:

8. At least 60 days prior to the change, the NYSDEC will be notified in writing of the proposed change. This will include a certification that the prospective purchaser/Remedial Party has been provided with a copy of the BCA, and all approved work plans and reports, including this SMP.

9. Within 15 days after the transfer of all or part of the site, the new owner’s name, contact representative, and contact information will be confirmed in writing to the NYSDEC.

Table 1 below includes contact information for the above notifications. The information on this table will be updated as necessary to provide accurate contact information. A full listing of site-related contact information is provided in Appendix A. Responsibilities of the owner and remedial party are summarized in Appendix C.

Table 1: Notifications*

<u>Name</u>	<u>Contact Information</u>	<u>Required Notification**</u>
Damianos Skaros NYSDEC Project Manager	(716)851-7070 damianos.skaros@dec.ny.gov	All Notifications
Andrea Caprio NYSDEC Regional HW Engineer	716-851-7220 andrea.caprio@dec.ny.gov	All Notifications
Kelly Lewandowski NYSDEC Site Control	518-402-9543 kelly.Lewandowski@dec.ny.gov	Notifications 1 and 8
Christine Vooris NYSDOH Project Manager	(518) 402-7860 beei@health.ny.gov	Notifications 4, 6, and 7

* Note: Notifications are subject to change and will be updated as necessary.

** Note: Numbers in this column reference the numbered bullets in the notification list in this section.

2.0 SUMMARY OF PREVIOUS INVESTIGATION & REMEDIAL ACTIONS

2.1 Site Location and Description

The site is located in the City of Buffalo, Erie County, New York and is identified as Section 89.21 Block 1 and Lot 1 on the Erie County Tax Map (see Figure 3). The site is an approximately 0.746-acre area and is bounded by Grote Street to the north, residential properties to the south, and commercial properties to the east and west (see Figure 2– Site Plan). The boundaries of the site are more fully described in Appendix D –Environmental Easement. The owner(s) of the site parcel(s) at the time of issuance of this SMP is 293 Grote Street, LLC.

2.2 Physical Setting

2.2.1 Land Use

The Site consists of the following: a 2-story, approximately ±17,500 square foot brick building with an exterior courtyard and an approximate 0.3-acre parking lot to the west. The Site is zoned N-1S, Secondary Employment Center, which permits a wide range of uses including residential, lodging, retail and service, professional offices and light industrial, and is being redeveloped as residential apartments.

The properties adjoining the Site and in the neighborhood surrounding the Site, primarily include residential, commercial, and vacant properties. The properties immediately south of the Site include residential properties; the properties immediately north of the Site include commercial properties; the properties immediately east of the Site include commercial properties; and the properties to the west of the Site include vacant and commercial properties.

2.2.2 Geology

Fill material is generally present overlying native lean clay soil at the Site. The fill materials were observed from below the building slab to between 1 and 4 fbg beneath the building, from ground surface or beneath concrete to between 2 and 4 fbg in the courtyard

area, and from below the stone/asphalt surface to between 1 and 6 fbg in the parking lot area. Deeper fill areas in the parking lot were observed in the vicinity of former structures in that area. The fill is described as black fines intermingled with gray clay and man-made constituents including brick, cinders, and ash. Native clay soils were encountered below the fill material at the Site to depths to at least 45 fbg. Bedrock was not encountered during site investigations.

2.2.3 Hydrogeology

Groundwater elevation data was collected on August 11, 2021, from the three (3) monitoring wells and used to evaluate Site hydrogeology. Depth to groundwater ranged from approximately 4.6 fbg (MW-2) to 10.5 fbg (MW-3). Groundwater elevation data was collected approximately 4 weeks after well sampling. Based on the elevations measured, groundwater flow direction was estimated to be northeasterly.

The native clay soils encountered beneath the Site from approximately 3 to 45 fbg did not indicate significant water-bearing potential. The clay soils were stiff to hard from 3 to 25 fbg and from 25 to 45 fbg turned to soft conditions (i.e., peanut butter like), with no evidence of free water or specific water bearing zone (i.e., sand seams or lenses) but did produce enough water to allow for sampling and collection of elevation data.

A groundwater contour map is shown in Figure 4. The monitoring wells at the Site have been decommissioned with NYSDEC approval (included in the FER).

2.3 Investigation and Remedial History

The following narrative provides a remedial history timeline and a brief summary of the available project records to document key investigative and remedial milestones for the Site. Full titles for each of the reports referenced below are provided in Section 8.0 - References.

The Site was previously occupied by Buerk Tool, a machine shop, that had been in operation since 1919 prior to going out of business in 2019. Buerk Tool utilized various lathes, grinders, bore mill, etc. that used cutting oils in their operations. Evidence of the oil use was observed throughout the building. Oil dispensers, 55-gallon drums, 5-gallon

buckets, along with heavy staining on the concrete and wood flooring were observed within the building. A 5,000-gallon fuel oil underground storage tank was also present in the courtyard of the Site.

2.3.1 October 2020 – Interior Assessment of Floors and Walls for PCBs

Benchmark completed an interior assessment of the floors and walls of the building at 293 Grote Street for polychlorinated biphenyls (PCBs) based on its previous use as a machine shop (Ref. 3).

The 1st floor of the former machine shop areas was concrete (approximately 17,600 square feet) and heavily stained, and the 2nd floor of the building is primarily wood (approximately 13,250 square feet), also contained staining. The walls of the building were primarily painted brick, concrete block and clay tile and the interior column supports of the building are wood beams, of which the majority are painted. Office areas, restrooms, and storage areas (2nd floor) were not included as part of the assessment.

The results of the analytical samples collected and analyzed as part of the interior assessment are summarized on attached Figure 5 (1st floor samples) and Figure 6 (2nd floor samples).

Concrete Floor Samples

PCBs were detected in ten (10) of the eleven (11) concrete samples above method detection limits (MDLs). One (1) sample location, CON-4, had concentration of 1.87 mg/kg which is above the high occupancy threshold of 1 mg/kg (see Figure 5).

As discussed later in this section, the concrete 1st floor of the building was removed and disposed due to the presence of PCBs and heavy staining throughout the majority of the floor and a new concrete floor was installed, as part of an Interim Remedial Measures (IRMs).

Wood Floor Samples

PCBs were detected in the nine (9) wood samples above MDLs. Three (3) sample locations, WOOD-5, WOOD-6, and WOOD-7 had concentrations of 1.15 mg/kg, 6.58 mg/kg, and 5.14 mg/kg, respectively, above the high occupancy threshold of 1 mg/kg (see Figure 6). The PCB concentrations of the other six (6) samples were less than 1 mg/kg.

Additional 2nd floor wood floor and wood sub-floor samples were collected as part of the Remedial Investigation, as discussed later in this section. The areas of the wood floor and sub-floor with PCB concentrations greater than 1 mg/kg were removed, landfill, disposed, and rebuilt, as part of an IRM.

Wall and Column Wipe Samples

PCBs were detected above MDLs in nine (9) of the ten (10) wipe samples collected from the walls and columns on the 1st and 2nd floors. The concentrations of the wipe samples were below the 10 ug/cm² threshold for high occupancy areas for non-porous surfaces (see Figures 5 and 6).

2.3.2 October 2020 – Phase I Environmental Site Assessment

Benchmark completed a Phase I Environmental Site Assessment (Phase I) on the 293 Grote Street property (Ref. 4). Benchmark identified the following Recognized Environmental Conditions (REC):

- Historic operations (i.e., machine shop, factories, manufacturing, and automotive repair) along with the presence of remaining equipment, a floor drain, a sump, a catch basin, trenches, oil-filled voids of unknown nature, and the historic use and generation of hazardous/regulated materials (as evidenced by the RCRA Generator regulatory listing) are considered RECs as subsurface conditions are unknown.
- The black staining noted on the concrete floor throughout the Site is considered a REC due to its significant nature with visual impacts to ground surfaces and the potential for sub-slab impacts.
- Remaining electrical equipment is considered a REC due to the potential for PCBs.
- The suspect underground storage tank (UST) related vent/fill pipes noted during Benchmark's site reconnaissance and the 5,000-gallon fuel oil tank identified in municipal records (it is unknown to Benchmark whether the suspect UST noted during Benchmark's site visit is related to the tank identified in municipal records) are considered RECs as sufficient tank closure documentation is unavailable.
- Interior floor sampling conducted identified PCBs in the concrete (1st floor) and wood (2nd floors) floors at concentrations above the United States Environmental Protection Agency (USEPA) high-occupancy threshold (1 mg/kg) for PCBs that should be addressed prior to building reuse.

- The “closed” and “inactive” spill incidents identified for adjacent/nearby properties are considered historical RECs (HRECs) and as such have been addressed to the satisfaction of the NYSDEC.
- No Controlled RECs (CRECs) were identified.

2.3.3 November 2020 – Phase II Environmental Investigation

Benchmark completed a Phase II Environmental Investigation (Phase II) on the 293 Grote Street property (Ref. 5). The Phase II activities consisted of 15 soil borings (SBs), five (5) test pits (TPs), thirteen (13) subsurface soil samples for laboratory analysis, which included volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), metals, and PCBs. The soil borings were advanced using a track-mounted direct push drill rig to assess subsurface soil/fill conditions beneath the building, in the vicinity of the UST in the exterior courtyard, and in gravel parking lot west of the building. The test pits were completed with a mini-excavator and were completed in the gravel parking lot and courtyard/UST area.

The Phase II investigation locations are shown on Figure 7 and summary of analytical results (which also include the RI results) are shown on Figure 8. Findings of the Phase II are summarized below:

- Fill materials were encountered and consisted of black fines intermingled with gray clay and man-made constituents (brick, cinders, ash, metal cuttings, etc.). The fill material thickness was observed to be about 1 to 2 feet beneath the building (SB-1 through SB-9, and SB-13), about 2 (TP-4) to 4 feet below ground surface (fbgs) in the courtyard area near the UST (SB-10 through SB-12) and varied from about 1 to 6 fbgs in the parking lot area west of the building (SB-14, SB-15, TP-1, TP-2, and TP-3). Native clay soils were encountered below the fill material. Saturated subsurface soils (i.e., evidence of groundwater) were not encountered during the Phase II activities.
- During the completion of TP-5, Benchmark exposed the south end of the UST down to a depth of approximately 10 fbgs. The UST has approximate dimensions of 7 feet in diameter and 18 feet in length (an approximate 5,000-gallon tank). Along the south end of the UST, at the bottom of the excavation, a small amount of perched water was encountered in the bedding material around the UST. Petroleum odors, elevated photoionization detector (PID) readings (approximately 30 to 80 ppm), and evidence of product (globules of product on the water at the bottom of excavation at south end of the of the

UST) were noted. Due to these findings, NYSDEC was notified, and Spill No. 2007182 was assigned to the Site.

- The tank contained a mixture of residual product and water. A sample of the residual product was collected and sent to the laboratory for characterization analysis via NYSDOH 310.13, TCL VOCs, RCRA 8 metals, PCBs, and ignitibility. The results indicated that the product was a medium weight petroleum hydrocarbon as diesel fuel and the contents are acceptable for non-hazardous reclamation. We note that No. 2 fuel oil and diesel have similar characteristics, and an Assessor's record reviewed during the previous ESA indicated a 5,000-gallon fuel oil tank was present at the Site in at least 1957.
- SVOCs were detected above their respective RRSCOs, CSCOs, and/or ISCOs at six (6) sample locations: SB-7 (0.3 to 2 ft), SB-11 (0 to 3.5 ft), TP-1 (1 to 2 ft), TP-2 (2.5 to 4 ft), TP-4 (0.5 to 2 ft) and TP-5 (3 to 3.5 ft). The sample from SB-7 was representative of the fill material present beneath the western portion of the building. The samples from SB-11 and TP-4 were representative of the fill material present in the exterior courtyard. The sample from TP-5 was from the south end of the UST and samples from TP-1 and TP-2 were from the fill material present beneath the gravel parking lot in the western portion of the Site.
- Metals (arsenic, cadmium, chromium, lead and mercury) were detected above their respective 6 NYCRR Part 375 Restricted-Residential Soil Cleanup Objectives (RRSCOs), Commercial SCOs (CSCOs) and/or Industrial SCOs (ISCOs) at TP-4 (0.5 to 2 ft).
- PCBs were detected above their respective CSCO at SB-11 (0 to 3.5 ft) and their respective ISCO at TP-4 (0.5 to 2 ft) and TP-5 (3 to 3.5 ft)

2.3.4 June 2021 – Remedial Investigation/Interim Remedial Measure/Alternative Analysis

Benchmark conducted a Remedial Investigation in accordance with a NYSDEC-approved Remedial Investigation/Interim Remedial Measures/Alternatives Analysis Work Plan (RI/IRM/AA WP, Ref. 6). The RI included sampling of surface soil/fill, subsurface fill material and native soil, groundwater, indoor air, and building materials (concrete and wood). Upon receipt of the RI data for wood flooring samples, 293 Grote Street, LLC submitted the REVISED – Interim Remedial Measures Addendum for Polychlorinated Biphenyls in 2nd Floor Wood Floors (IRM Addendum; Ref. 7), which was approved by NYSDEC. The findings of the RI were documented in the Remedial Investigation/Interim

Remedial Measures/Alternatives Analysis (RI/IRM/AA) Report (Ref. 8) and are summarized below:

Soil – Based on the Phase II and RI soil/fill sampling activities, SVOC-, metals-, and PCB-impacted soil/fill was present at the Site at depths ranging from ground surface to approximately 6 fbgs. Impacted soil/fill was identified in the courtyard area proximate to the former 5,000-gallon fuel oil UST, in the southern alleyway area at depths of 10.5 fbgs after the UST was removed. Impacts identified in the courtyard area and those associated with the UST were addressed during initial IRM activities as discussed below. Remaining impacts including polycyclic aromatic hydrocarbons (PAHs), metals (arsenic and copper), and/or PCBs detected above site-specific action levels (SSALs) in the upper 2-feet of in the southern alleyway area and copper detected above SSALs at TP-10 from 0.5 to 2.5 fbgs in the parking lot were also addressed during additional IRM activities as discussed below. Soil/fill investigation location are shown on Figure 7 and the summary of the Phase II and RI soil/fill samples are summarized on Figure 8.

Groundwater – The results of the groundwater samples collected as part of the RI indicate SVOCs and metals are present in the groundwater above their respective TOGS 1.1.1 Groundwater Quality Standards/Guidance Values (GWQS/GV, Ref. 9). The detected exceedances of these analytes in the groundwater are attributable to the urban nature of the Site and are ubiquitous in urban settings and are therefore not considered a concern for Site groundwater. No VOCs, PCBs, pesticides, herbicides, or emergent contaminants were detected above their respective GWQS/GVs. Table 3 is a summary of the groundwater results.

Soil Vapor Intrusion (SVI) – Analytical results in comparison to the NYSDOH Decision Matrices indicate that no further action is required for the building. Tables 3 and 4 are a summary of the air and soil vapor samples collected as part of the SVI assessment, and a comparison to the applicable NYSDOH Decision Matrices.

Building Materials – PCBs were detected above 1 mg/kg at in a concrete sample CON-4, wood floor samples WOOD-5, WOOD-6, WOOD-7, WOOD-13, WOOD-15, WOOD-16, WOOD-17, and WOOD-18 and wood subfloor samples SUB-FLOOR WOOD-13, -15, -16, and -17. As discussed below the 1st floor concrete was removed due to the presence of PCBs and heavy staining. The areas of the 2nd floor and associated subfloor with PCBs greater than 1 mg/kg (as shown on Figure 6) were also removed and replaced, as discussed below. Areas of the 2nd floor that were not removed were sanded and coated with polyurethane.

Initial Interim Remedial Measures

The initial IRM activities were completed from November 2021 through April 2022 in accordance with the NYSDEC-approved RI/IRM/AA WP and IRM Addendum to address impacts associated with the courtyard soil, UST, and interior building materials and involved the following activities:

- Removal and disposal of 442 tons of PCB-impacted concrete flooring at Waste Management Chaffee Landfill in Chaffee, New York and removal and recycling of 100 CY of unimpacted concrete flooring from the 1st floor of the building at Swift River Associates, Inc. Concrete samples CON-11 and CON-12 were collected to confirm material could go off-site for recycling.
- Approximately 4.75 tons of asbestos was identified within the building and was removed and transported to Waste Management Chaffee Landfill.
- Removal and disposal of 18 tons of PCB-impacted wood flooring from a portion of the 2nd floor of the building where PCBs were identified above 1 mg/kg. Wood was taken to Waste Management Chaffee Landfill in Chaffee, New York.
- Removal and disposal/recycling of a 5,000-gallon steel UST, its contents, and associated vent/fill piping from the courtyard area. Approximately 2,360 gallons of #2 fuel oil and water mixture were extracted from the UST and transported to American Recyclers Company (ARC) for disposal. The steel UST was cleaned and recycled at Metalico Buffalo, Inc.
- Excavation of 284 tons of non-hazardous soil/fill from the courtyard and UST area and disposal at the Town of Tonawanda Landfill in Tonawanda, New York.
- Excavation of 905 tons of non-hazardous soil/fill from under the building for installation of the new concrete floor and interior utilities which was disposed at the Town of Tonawanda Landfill in Tonawanda, New York.

- Three (3) 55-gallon drums of oily liquids and one (1) drum of solids which were generated from removal of a interior trench proximate to SB-3. The drums were transported to ARC in Tonawanda, New York for disposal.

Post-excavation samples (see Figure 9) were collected from the soil/fill removals associated with the UST and courtyard IRM activities. Results of post-excavation samples were below the RRSCOs, the reuse criteria for the Site, as summarized on Tables 6 and 7.

The initial IRM activities associated with the building interior, courtyard and UST areas were documented in the RI/IRM/AA Report.

Alternatives Analysis

The findings of the previous investigations, RI, and IRM activities were used to develop an Alternative Analysis (AA) Report, included as part of the RI/IRM/AA Report. Based on the alternatives analysis completed, the recommended remedial approach for the Site is a Restricted Residential Use (Track 4) Cleanup. This alternative will be fully protective of public health and the environment; is significantly less disruptive to the community; is consistent with future land use; and represents a cost-effective approach while fully satisfying the RAOs for the Site. This alternative involves the following:

- Completed IRMs – Removal and disposal of PCB-impacted concrete and wood floors inside the building, UST removal and associated contents, excavation and disposal of soil/fill in the courtyard area and surrounding the UST, and excavation and disposal of soil/fill under the building for installation of new concrete floor.
- Excavation and landfill disposal of impacted soil/fill from three (3) Areas of Concern (AOCs); and collection of post-excavation samples:
 - AOC-1: Copper Area – located in the western portion of the parking lot, the results at TP-10 indicate copper above CSCOs. Soil/fill would be removed in an approximate 20 by 20 ft area to a depth of 2.5 fbs.
 - AOC-2: PAH/Copper/Arsenic/PCBs Area – located in the alleyway southwest of the building, the results at SS-1 indicate PAHs greater than 500 mg/kg, PCBs and copper above CSCOs, and arsenic above ISCOs. The results at NS-1 indicate copper above CSCOs. Soil/fill would be removed in an approximate 80 by 5 ft area to a depth of 2 fbs.
 - AOC-3: Copper Area – located in the alleyway southeast of the building, the results of SS-2 indicate copper above CSCOs. The results of NS-2 indicate all

parameters are below SSALs. Soil/fill would be removed in an approximate 80 by 5 ft area to a depth of 7-inches.

- Excavation and landfill disposal soil/fill from the upper 1 foot in the planned parking lot area west of the building to achieve design grade for import and placement of new subgrade stone for asphalt parking lot.
- Excavation and landfill disposal of soil/fill in the upper 2 feet in four (4) non-hardscape areas of the parking lot (an additional 1 foot after the parking lot cut is completed) to achieve design grade for non-hardscape cover requirements.
- Excavations and landfill disposal of soil/fill removed for installation of stormwater lines, stormwater catch basins, electrical conduits for parking lot lighting, and a new gas line service for the building.
- Managing groundwater if encountered during remedial activities.
- Backfilling and compaction of clean imported material approved by the Department.
- Placement of a Cover System, including a demarcation layer underlying DER-10 acceptable backfill in areas without hardscape (building, asphalt, concrete) to address remaining contamination above RRSCOs in soil/fill.
- Implementation of a Site Management Plan (SMP). The SMP will include:
 - **Institutional Controls and Engineering Controls (IC/EC)** Engineering controls include any physical barrier or method employed to actively or passively contain, stabilize, or monitor contaminants; restrict the movement of contaminants; or eliminate potential exposure pathways to contaminants. Institutional controls at the site will include groundwater use restrictions and use restrictions of the Site to restricted-residential use.
 - **Operation and Maintenance (O&M) Plan** that describes the measures necessary to operate, monitor, and maintain any mechanical components of the remedial work.
 - **Excavation Work Plan (EWP)** to assure that future intrusive activities and soil/fill handling at the Site are completed in a safe and environmentally responsible manner.
 - **Site Monitoring Plan** that includes provisions for a Site-wide inspection program and post-remedial groundwater monitoring to assure that the IC/ECs have not been altered and remain effective
- Environmental Easement filed with Erie County.

2.3.5 Construction Completion Report Interim Remedial Measures Parking Lot and Alleyway

Additional IRM activities were completed in the parking lot and alleyway of the Site between July and October 2022 in accordance with the NYSDEC-approved Interim Remedial Measures Work Plan Parking Lot & Alleyway (Additional IRM WP, Ref. 10). The additional IRMs involved:

- Excavation and landfill disposal of soil/fill associated with AOCs -1, -2, and -3.
- Excavation and landfill disposal of soil/fill from the upper 1 foot in the parking lot area west of the building to achieve design grade for import and placement of new subgrade stone for asphalt parking lot.
- Excavation and landfill disposal of soil/fill in the upper 2 feet in four (4) non-hardscape areas of the parking lot (an additional 1 foot after the parking lot cut is completed) to achieve design grade for non-hardscape cover requirements.
- Excavations and landfill disposal of soil/fill removed for installation of stormwater lines, stormwater catch basins, electrical conduits for parking lot lighting, and a new gas line service for the building.

In total, approximately 1,366 tons of non-hazardous soil/fill from the parking lot and alleyway areas was disposed at the Town of Tonawanda Landfill in Tonawanda, New York. Post-excavation samples were collected from the soil/fill removals associated with AOC-1, -2, and -3 and the results were below the Restricted Residential Soil Cleanup Objectives (RRSCOs), the reuse criteria for the Site, as summarized on Tables 7 and 8.

The additional IRM activities were documented in the October 2022 Construction Completion Report Interim Remedial Measure Parking Lot and Alleyway (Ref. 11).

2.3.6 Decision Document and Remedial Action Work Plan

NYSDEC issued a Decision Document (Ref. 12) in November 2022 which approved the Restricted-Residential Use (Track 4) Cleanup remedial approach for the Site proposed in the Alternative Analysis. A Remedial Action Work Plan (RAWP; Ref. 13) was submitted to NYSDEC and approved in October 2022 to incorporate the following major remedial elements:

- Installation of site cover system throughout the Site; and
- Development of a Site Management Plan (SMP) including EC/IC's for post-certificate of completion (COC) operation, maintenance and monitoring.

As outlined in the RAWP, the cover system is comprised of:

- **Hardscape Areas:** These areas will consist of a concrete building foundation and slab, concrete walkways, and an asphalt parking area.
- **Vegetated Areas:** A minimum of 24 inches of NYSDEC DER-10 compliant backfill will be imported and placed at the Site. The uppermost approximate 6-inches should be comprised of topsoil capable of sustaining plant growth, with the exception of landscaped beds which will contain mulch and/or decorative stone. The non-hardscape cover system thickness will be verified by pre- and post-cover construction elevation surveys.
- **Demarcation Layer:** A demarcation layer (e.g., snow fence, plastic mesh, etc.) will be placed beneath the cover system in non-hardscape areas of the Site.

Figure 11 shows a layout of the cover system areas that were installed.

2.4 Remedial Action Objectives

The Remedial Action Objectives (RAOs) for the Site as listed in the Decision Document dated November 2022 are as follows:

2.4.1 Groundwater:

RAOs for Public Health Protection

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.

RAOs for Environmental Protection

- Remove the source of groundwater or surface water contamination.

2.4.2 Soil:

RAOs for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil/fill.

RAOs for Environmental Protection

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

2.5 Remaining Contamination

2.5.1 Soil

The Site was remediated to a Track 4 Restricted Residential cleanup, which allows for soil/fill exceeding Unrestricted SCOs (USCOs) and RRSCOs to remain under a 2-foot soil/stone cover or hardscape. Soil/fill exceeding CSCOs or SSALs were remediated during IRM activities. Remaining contamination under the cover system is summarized below.

VOCs, PCBs, and metals were identified exceeding USCOs and/or RRSCOs and individual PAHs were identified exceeding USCOs, RRSCOs, CSCOs, and ISCOs in the fill layer under the cover system in the parking lot and under the building. PAHs and metals are the most prevalent remaining parameters and are commonly identified in urban fill material. Table 10 and Figure 10 summarize the results of all soil samples collected that exceed the Unrestricted Use SCOs at the site after completion of remedial activities.

2.5.2 Groundwater

Groundwater with concentrations of PAHs and metals exceeding GWQS/GV is identified remaining at the Site. PAHs and metals are commonly found in urban setting and are likely not sourced from the Site. The metals identified in the groundwater are naturally occurring and include magnesium and sodium. The monitoring wells at the Site were decommissioned with NYSDEC approval (included in the FER), therefore no groundwater

monitoring is required. A copy of the FADL associated with the well decommissioning activities is included in the FER.

Table 2 summarize the results of all samples of groundwater that exceed the SCGs after completion of the remedial action. The former monitoring well locations are shown on Figure 4.

3.0 INSTITUTIONAL & ENGINEERING CONTROL PLAN

3.1 General

Since remaining contamination exists at the site, Institutional Controls (ICs) and Engineering Controls (ECs) are required to protect human health and the environment. This IC/EC Plan describes the procedures for the implementation and management of all IC/ECs at the site. The IC/EC Plan is one component of the SMP and is subject to revision by the NYSDEC project manager.

This plan provides:

- A description of all IC/ECs on the site;
- The basic implementation and intended role of each IC/EC;
- A description of the key components of the ICs set forth in the Environmental Easement;
- A description of the controls to be evaluated during each required inspection and periodic review;
- A description of plans and procedures to be followed for implementation of IC/ECs, such as the implementation of the Excavation Work Plan (EWP) (as provided in Appendix B) for the proper handling of remaining contamination that may be disturbed during maintenance or redevelopment work on the site; and
- Any other provisions necessary to identify or establish methods for implementing the IC/ECs required by the site remedy, as determined by the NYSDEC project manager.

3.2 Institutional Controls

A series of ICs is required by the Decision Document to: (1) implement, maintain and monitor Engineering Control systems; (2) prevent future exposure to remaining contamination; and, (3) limit the use and development of the site to restricted-residential, commercial and/or industrial uses only. Adherence to these ICs on the site is required by the Environmental Easement and will be implemented under this SMP. ICs identified in the Environmental Easement may not be discontinued without an amendment to or extinguishment of the Environmental Easement. The IC boundaries coincide with the tax

parcel boundaries and are shown on Figure 3. A metes and bounds description and survey are included in Appendix D. These ICs are:

- The property may be used for: restricted residential, commercial and/or industrial uses although land use is subject to local zoning laws;
- All ECs must be operated and maintained as specified in this SMP;
- All ECs must be inspected at a frequency and in a manner defined in the SMP;
- The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the Erie County Department of Health to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department;
- Data and information pertinent to site management must be reported at the frequency and in a manner as defined in this SMP;
- All future activities that will disturb remaining contaminated material must be conducted in accordance with this SMP;
- Operation, maintenance, monitoring, inspection, and reporting of any physical component of the remedy shall be performed as defined in this SMP;
- Access to the site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by the Environmental Easement;
- Vegetable gardens and farming on the site are prohibited; and
- An evaluation shall be performed to determine the need for further investigation and remediation should large scale redevelopment occur, if any of the existing structures are demolished, or if the subsurface is otherwise made accessible.

3.3 Engineering Controls

3.3.1 Cover

Exposure to remaining contamination at the site is prevented by a cover system placed over the site. This cover system is comprised of a minimum of 24 inches of clean

stone/soil or hardscape consisting of asphalt pavement, concrete-covered areas, and concrete building slabs. Figure 11 presents the location of the cover system and applicable demarcation layers. The Excavation Work Plan (EWP) provided in Appendix B outlines the procedures required to be implemented in the event the cover system is breached, penetrated, or temporarily removed, and any underlying remaining contamination is disturbed. Procedures for the inspection of this cover are provided in the Monitoring and Sampling Plan included in Section 4.0 of this SMP. Procedures for collection of post remedial subsurface soil/fill samples (if required) are included in the Field Operating Procedures (FOP, Appendix E) and Quality Assurance Project Plan (QAPP, Appendix F). Any work conducted pursuant to the EWP must also be conducted in accordance with the procedures defined in a Health and Safety Plan (HASP) and associated Community Air Monitoring Plan (CAMP) prepared for the site and provided in Appendix G. Any disturbance of the site's cover system must be overseen by a qualified environmental professional as defined in 6 NYCRR Part 375, a Professional Engineer (PE) who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State.

3.3.2 Courtyard Loading Dock Enclosure

As a preventative measure, a steel façade was placed on the north face of the elevated concrete slab of the former loading dock in the south end of the courtyard to prevent access underneath the loading dock by future tenants. Prior to installing the steel façade, crushed stone was placed on soil present beneath the former loading dock. Soil sample results collected from the soil beneath the loading meet the RRSCOs for the site.

3.3.3 Criteria for Completion of Remediation/Termination of Remedial Systems

Generally, remedial processes are considered completed when monitoring indicates that the remedy has achieved the remedial action objectives identified by the decision document. The framework for determining when remedial processes are complete is provided in Section 6.4 of NYSDEC DER-10. Unless waived by the NYSDEC, confirmation samples of applicable environmental media are required before terminating any

remedial actions at the site. Confirmation samples require Category B deliverables and a Data Usability Summary Report (DUSR).

The remedial party will also conduct any needed site restoration activities, such as asphalt patching and decommissioning treatment system equipment. In addition, the remedial party will conduct any necessary restoration of vegetation coverage, trees, and wetlands, and will comply with NYSDEC and United States Army Corps of Engineers regulations and guidance. Also, the remedial party will ensure that no ongoing erosion is occurring on the site.

3.3.3.1 Cover (or Cap)

The composite cover system is a permanent control and the quality and integrity of this system will be inspected at defined, regular intervals in accordance with this SMP in perpetuity.

4.0 MONITORING AND SAMPLING PLAN

4.1 General

This Monitoring and Sampling Plan describes the measures for evaluating the overall performance and effectiveness of the remedy. This Monitoring and Sampling Plan may only be revised with the approval of the NYSDEC project manager. Details regarding the sampling procedures, data quality usability objectives, analytical methods, etc. for all samples collected as part of site management for the site are included in the Quality Assurance Project Plan provided in Appendix F.

This Monitoring and Sampling Plan describes the methods to be used for:

- Sampling and analysis of all appropriate media (e.g., soils);
- Assessing compliance with applicable NYSDEC standards, criteria and guidance (SCGs), particularly Part 375 SCOs for soil; and
- Evaluating site information periodically to confirm that the remedy continues to be effective in protecting public health and the environment;

To adequately address these issues, this Monitoring and Sampling Plan provides information on:

- Sampling locations, protocol and frequency;
- Information on all designed monitoring systems;
- Analytical sampling program requirements;
- Inspection and maintenance requirements for monitoring wells;
- Monitoring well decommissioning procedures; and
- Annual inspection and periodic certification.

Reporting requirements are provided in Section 7.0 of this SMP.

4.2 Site-Wide Inspection

Site-wide inspections will be performed annually, at a minimum of once per year. These periodic inspections must be conducted when the ground surface is visible (i.e. no snow cover). Site-wide inspections will be performed by a qualified environmental professional as defined in 6 NYCRR Part 375, a PE who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State. Modification to the frequency or duration of the inspections will require approval from the NYSDEC project manager. Site-wide inspections will also be performed after all severe weather conditions that may affect ECs or monitoring devices. During these inspections, an inspection form will be completed as provided in Appendix H – Site Management Forms. The form will compile sufficient information to assess the following:

- Compliance with all ICs, including site usage;
- An evaluation of the condition and continued effectiveness of ECs;
- General site conditions at the time of the inspection;
- Whether stormwater management systems, such as basins and outfalls, are working as designed;
- The site management activities being conducted including, where appropriate, confirmation sampling and a health and safety inspection; and
- Confirm that site records are up to date.

Inspections of all remedial components installed at the site will be conducted. A comprehensive site-wide inspection will be conducted and documented according to the SMP schedule, regardless of the frequency of the Periodic Review Report. The inspections will determine and document the following:

- Whether ECs continue to perform as designed;
- If these controls continue to be protective of human health and the environment;
- Compliance with requirements of this SMP and the Environmental Easement;
- Achievement of remedial performance criteria; and

- If site records are complete and up to date.

Reporting requirements are outlined in Section 7.0 of this plan.

Inspections will also be performed in the event of an emergency. If an emergency, such as a natural disaster or an unforeseen failure of any of the ECs occurs that reduces or has the potential to reduce the effectiveness of ECs in place at the site, verbal notice to the NYSDEC project manager must be given by noon of the following day. In addition, an inspection of the site will be conducted within 5 days of the event to verify the effectiveness of the IC/ECs implemented at the site by a qualified environmental professional, as defined in 6 NYCCR Part 375. Written confirmation must be provided to the NYSDEC project manager within 7 days of the event that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.

5.0 OPERATION & MAINTENANCE PLAN

5.1 General

The site remedy does not rely on any mechanical systems, such as groundwater treatment systems, sub-slab depressurization systems or air sparge/soil vapor extraction systems to protect public health and the environment. Therefore, the operation and maintenance of such components is not included in this SMP.

6.0 PERIODIC ASSESSMENTS/EVALUATIONS

6.1 Climate Change Vulnerability Assessment

Increases in both the severity and frequency of storms/weather events, an increase in sea level elevations along with accompanying flooding impacts, shifting precipitation patterns and wide temperature fluctuation, resulting from global climactic change and instability, have the potential to significantly impact the performance, effectiveness and protectiveness of a given site and associated remedial systems. Vulnerability assessments provide information so that the site and associated remedial systems are prepared for the impacts of the increasing frequency and intensity of severe storms/weather events and associated flooding.

This section provides a summary of vulnerability assessments that will be conducted for the site during periodic assessments, and briefly summarizes the vulnerability of the site and/or engineering controls to severe storms/weather events and associated flooding.

- Flood Plain: There are no state flood plains on the Site, therefore there is minimal risk of erosion due to flooding.
- Site Drainage and Storm Water Management: Stormwater is directed from roof drains and catch basins through stormwater pipes installed during redevelopment that connect to the main Buffalo Sewer Authority line along Grote Street.
- Erosion: The Site is mostly covered with hardscape, with minimal areas of river stone and landscaped/green space areas, which reduces the risk of erosion. No areas of the Site are showing evidence of erosion.
- High Wind: There are no remedial systems at the Site that would be susceptible to damage from the wind itself or falling objects.
- Electricity: There are no remedial systems at the Site that use electricity.
- Spill/Contaminant Release: No spills/contaminant release is expected as there are no remedial systems.

6.2 Green Remediation Evaluation

NYSDEC's DER-31 Green Remediation requires that green remediation concepts and techniques be considered during all stages of the remedial program including site management, with the goal of improving the sustainability of the cleanup and summarizing

the net environmental benefit of any implemented green technology. This section of the SMP provides a summary of any green remediation evaluations to be completed for the site during site management, and as reported in the Periodic Review Report (PRR).

The site remedy does not rely on any mechanical systems, that would generate waste, use energy, or water, or have emissions such as groundwater treatment systems, sub-slab depressurization systems or air sparge/soil vapor extraction systems to protect public health and the environment. The only engineering control is the cover system and loading dock façade enclosure.

7.0 REPORTING REQUIREMENTS

7.1 Site Management Reports

All site management inspection, maintenance, and monitoring events will be recorded on the appropriate site management forms provided in Appendix H. These forms are subject to NYSDEC revision. All site management inspection, maintenance, and monitoring events will be conducted by a qualified environmental professional as defined in 6NYCRR Part 375, a P.E. who is licensed and registered in New York State, or a qualified person who directly reports to a P.E. who is licensed and registered in New York State.

All applicable inspection forms and other records, including media sampling data and system maintenance reports, generated for the site during the reporting period will be provided in electronic format to the NYSDEC in accordance with the requirements of Table 9 and summarized in the Periodic Review Report.

Table 9: Schedule of Interim Monitoring/Inspection Reports

Task/Report	Reporting Frequency*
Annual Site Inspection	Annually.
Periodic Review Report	Annually, beginning 16 months after the Certificate of Completion (COC) or equivalent document is issued.

* The frequency of events will be conducted as specified until otherwise approved by the NYSDEC project manager.

All interim monitoring/inspections reports will include, at a minimum:

- Date of event or reporting period;
- Name, company, and position of person(s) conducting monitoring/inspection activities;
- Description of the activities performed;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet);

- Type of samples collected (i.e., subsurface soil/fill);
- Copies of all field forms completed (e.g., well sampling logs, chain-of-custody documentation);
- Sampling results in comparison to appropriate standards/criteria;
- A figure illustrating sample type and sampling locations;
- Copies of all laboratory data sheets and the required laboratory data deliverables required for all points sampled (to be submitted electronically in the NYSDEC-identified format);
- Any observations, conclusions, or recommendations; and
- A determination as to whether contaminant conditions have changed since the last reporting event.

Routine maintenance event reporting forms will include, at a minimum:

- Date of event;
- Name, company, and position of person(s) conducting maintenance activities;
- Description of maintenance activities performed;
- Any modifications to the system;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet); and,
- Other documentation such as copies of invoices for maintenance work, receipts for replacement equipment, etc., (attached to the checklist/form).

Non-routine maintenance event reporting forms will include, at a minimum:

- Date of event;
- Name, company, and position of person(s) conducting non-routine maintenance/repair activities;
- Description of non-routine activities performed;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents (included either on the form or on an attached sheet); and
- Other documentation such as copies of invoices for repair work, receipts for replacement equipment, etc. (attached to the checklist/form).

Data will be reported in digital format as determined by the NYSDEC. Currently, data is to be supplied electronically and submitted to the NYSDEC EQuIST™ database in accordance with the requirements found at this link:

<http://www.dec.ny.gov/chemical/62440.html>

7.2 Periodic Review Report

A Periodic Review Report (PRR) will be submitted to the NYSDEC project manager beginning sixteen (16) months after the Certificate of Completion or equivalent document is issued. After submittal of the initial Periodic Review Report, the next PRR shall be submitted annually to the NYSDEC project manager or at another frequency as may be required by the NYSDEC project manager. In the event that the site is subdivided into separate parcels with different ownership, a single Periodic Review Report will be prepared that addresses the site described in Appendix D - Environmental Easement. The report will be prepared in accordance with NYSDEC's DER-10 and submitted within 30 days of the end of each certification period. Media sampling results will also be incorporated into the Periodic Review Report. The report will include:

- Identification, assessment, and certification of all ECs/ICs required by the remedy for the site.
- Results of the required annual site inspections, fire inspections, and severe condition inspections, if applicable.
- All applicable site management forms and other records generated for the site during the reporting period in the NYSDEC-approved electronic format, if not previously submitted.
- Identification of any wastes generated during the reporting period, along with waste characterization data, manifests, and disposal documentation.
- A summary of any discharge monitoring data and/or information generated during the reporting period, with comments and conclusions.
- Data summary tables and graphical representations of contaminants of concern by media (groundwater, soil vapor, etc.), which include a listing of all compounds analyzed, along with the applicable standards, with all exceedances highlighted. These tables and figures will include a presentation of past data as part of an evaluation of contaminant concentration trends:

- Results of all analyses, copies of all laboratory data sheets, and the required laboratory data deliverables for all samples collected during the reporting period will be submitted in digital format as determined by the NYSDEC. Currently, data is supplied electronically and submitted to the NYSDEC EQUIS™ database in accordance with the requirements found at this link:
<http://www.dec.ny.gov/chemical/62440.html>.
- A site evaluation, which includes the following:
 - The compliance of the remedy with the requirements of the site-specific Remedial Action Work Plan (RAWP) and Decision Document;
 - The operation and the effectiveness of all treatment units, etc., including identification of any needed repairs or modifications;
 - Any new conclusions or observations regarding site contamination based on inspections or data generated by the Monitoring and Sampling Plan for the media being monitored;
 - Recommendations regarding any necessary changes to the remedy and/or Monitoring and Sampling Plan;
 - An evaluation of trends in contaminant levels in the affected media to determine if the remedy continues to be effective in achieving remedial goals as specified by the RAWP and Decision Document; and
 - The overall performance and effectiveness of the remedy.

7.2.1 Certification of Institutional and Engineering Controls

Following the last inspection of the reporting period, a Professional Engineer licensed to practice and registered in New York State will prepare, and include in the Periodic Review Report, the following certification as per the requirements of NYSDEC DER-10:

“For each institutional or engineering control identified for the site, I certify that all of the following statements are true:

- *The inspection of the site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under my direction;*
- *The institutional control and/or engineering control employed at this site is unchanged from the date the control was put in place, or last approved by the Department;*

- *Nothing has occurred that would impair the ability of the control to protect the public health and environment;*
- *Nothing has occurred that would constitute a violation or failure to comply with any site management plan for this control;*
- *Access to the site will continue to be provided to the Department to evaluate the remedy, including access to evaluate the continued maintenance of this control;*
- *If a financial assurance mechanism is required under the oversight document for the site, the mechanism remains valid and sufficient for the intended purpose under the document;*
- *Use of the site is compliant with the environmental easement;*
- *The engineering control systems are performing as designed and are effective;*
- *To the best of my knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program and generally accepted engineering practices; and*
- *The information presented in this report is accurate and complete.*

I certify that all information and statements in this certification form are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law. I, Thomas H. Forbes, of Benchmark Civil/Environmental Engineering & Geology, PLLC, 2558 Hamburg Turnpike, Buffalo, NY, am certifying as Owner's/Remedial Party's Designated Site Representative for the site."

"I certify that the New York State Education Department has granted a Certificate of Authorization to provide Professional Engineering services to the firm that prepared this Periodic Review Report."

For BCP projects which the NYSDEC has determined do not represent a significant threat to public health or the environment, but where contaminants in groundwater exceed drinking water standards, the following should also be included for both IC/EC and IC scenarios listed above:

- *No new information has come to my attention, including groundwater monitoring data from wells located at the site boundary, if any, to indicate that the assumptions made in the qualitative exposure assessment of off-site contamination are no longer valid; and*

For BCP projects, every five years the following certification will be added:

- *The assumptions made in the qualitative exposure assessment remain valid.*

The signed certification will be included in the Periodic Review Report. The Periodic Review Report will be submitted, in electronic format, to the NYSDEC project manager and

the NYSDOH project manager. The Periodic Review Report may also need to be submitted in hard-copy format if requested by the NYSDEC project manager.

7.3 Corrective Measures Work Plan

If any component of the remedy is found to have failed, or if the periodic certification cannot be provided due to the failure of an institutional or engineering control or failure to conduct site management activities, a Corrective Measures Work Plan will be submitted to the NYSDEC project manager for approval. This plan will explain the failure and provide the details and schedule for performing work necessary to correct the failure. Unless an emergency condition exists, no work will be performed pursuant to the Corrective Measures Work Plan until it has been approved by the NYSDEC project manager.

8.0 REFERENCES

1. NYSDEC. *6NYCRR Part 375, Environmental Remediation Programs*. December 14, 2006.
2. NYSDEC. *DER-10 - Technical Guidance for Site Investigation and Remediation*. May 3, 2010.
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4. Benchmark Environmental Engineering & Science, PLLC. *Phase I Environmental Site Assessment (ESA), 293 Grote Street, Buffalo, New York*. October 2020.
5. Benchmark Environmental Engineering & Science, PLLC. *Phase II Environmental Investigation Report, 293 Grote Street, Buffalo, NY (Site), Former Buerk Tool*. November 12, 2020.
6. Benchmark Environmental Engineering & Science, PLLC. *Remedial Investigation/Interim Remedial Measures/Alternatives Analysis Work Plan, BCP Site No. C915368, 293 Grote Street, Buffalo, New York*. May 2021.
7. Benchmark Civil/Environmental Engineering & Geology, PLLC. *REVISED – Interim Remedial Measures Addendum for Polychlorinated Biphenyls in 2nd Floor Wood Floors, 293 Grote Street Site (BCP Site No. C915368), 293 Grote Street, Buffalo, New York*. March 9, 2022.
8. Benchmark Civil/Environmental Engineering & Geology, PLLC. *Remedial Investigation/Interim Remedial Measures/Alternatives Analysis Report BCP Site No. C915368, 293 Grote Street, Buffalo, New York*. July 2022.
9. NYSDEC. *Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1*. June 1998 (April 2000 addendum).
10. Benchmark Civil/Environmental Engineering & Geology, PLLC. *Interim Remedial Measures Work Plan Parking Lot & Alleyway, 293 Grote Street Site, BCP Site Number: C915368, Buffalo, New York*. May 2022.
11. Benchmark Civil/Environmental Engineering & Geology, PLLC. *Construction Completion Report Interim Remedial Measures Completion Report for Parking Lot & Alleyway, 293 Grote Street Site, BCP Site Number: C915368, Buffalo, New York*. October 2022.
12. NYSDEC. *Decision Document. 293 Grote Street Site*. October 2022.
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TABLES



TABLE 2
SUMMARY OF RI GROUNDWATER ANALYTICAL RESULTS
SITE MANAGEMENT PLAN
293 GROTE STREET SITE
BCP SITE NO. C915368
BUFFALO, NEW YORK

PARAMETER ¹	GWQS ²	Sample Location		
		MW-1	MW-2	MW-3
		07/06/21	07/06/21	07/06/21
Volatiles Organic Compounds (VOCs) - ug/L				
Total VOCs	--	ND	ND	ND
Total VOC TICs	--	1.29 J	ND	ND
Semi-Volatile Organic Compounds (SVOCs) - ug/L				
2-Methylnaphthalene	--	0.02 J	ND	0.06 J
Acenaphthene	20	ND	0.02 J	ND
Anthracene	50	ND	0.02 J	ND
Benzo(a)anthracene	0.002	0.06 J	0.09 J	0.03 J
Benzo(a)pyrene	ND	0.05 J	0.07 J	ND
Benzo(b)fluoranthene	0.002	0.07 J	0.12	0.04 J
Benzo(ghi)perylene	--	ND	0.07 J	ND
Benzo(k)fluoranthene	0.002	0.03 J	0.05 J	0.02 J
Chrysene	0.002	0.06 J	0.09 J	0.03 J
Dibenz(a,h)anthracene	--	ND	0.02 J	ND
Di-n-octyl phthalate	50	ND	ND	1.6 J
Fluoranthene	50	0.14	0.23	0.06 J
Fluorene	50	ND	0.03 J	ND
Indeno(1,2,3-cd)pyrene	0.002	0.02 J	0.07 J	0.02 J
Phenanthrene	50	0.11	0.09 J	0.03 J
Pyrene	50	0.11	0.16	0.04 J
Total SVOC TICs	--	63.1 J	42.8 J	58.2 J
Semi-Volatile Organic Compounds 8270 (SIM) - ug/L				
1,4 - Dioxane	0.35	ND	0.114 J	ND
Total Metals - ug/L ³				
Aluminum	--	150 J	ND	160 J
Barium	1000	130 ^6+	110 ^6+	74 ^6+
Calcium	--	113000	90900	59400
Chromium	50	1.9 J	ND	1 J
Copper	200	3.3 J	ND	2.6 J
Iron	300	110	ND	98 J
Magnesium	35000	76000	155000	58900
Manganese	300	67	59	36
Potassium	--	13000 J	16700 F1	8700
Sodium	20000	167000	152000	138000
Zinc	2000	8.2 J	4.5 J F1	1.8 J
Dissolved Metals - ug/L ³				
Barium	1000	130 J-	94 J-	63 J-
Cadmium	5	0.5 J-	0.83 J-	0.63 J-
Calcium	--	93400 J-	92500 J-	55200 J-
Chromium	50	2.6 J-	ND	ND
Copper	200	ND	ND	1.8 J-
Magnesium	35000	74000 J-	173000 J-	59700 J-
Manganese	300	32 J-	52 J-	41 J-
Potassium	--	38700 J-	16700 J-	9100 J-
Sodium	20000	159000 J-	138000 J-	112000 J-
Zinc	2000	12 J-	ND	ND
PCB (ug/L)				
Total PCBs	0.09	ND	ND	ND
Pesticides - ug/L				
Pesticides	--	ND	ND	ND
Herbicides - ug/L				
Herbicides	--	ND	ND	ND
Perfluorinated Alkyl Acids - ng/L				
	Action Level			
Perfluorobutanoic Acid (PFBA)	100	2.69	1.09 J	4.28
Perfluoropentanoic Acid (PFPeA)	100	3.17	2.16	3.42
Perfluorohexanoic Acid (PFHxA)	100	2.09	ND	2.29
Perfluoroheptanoic Acid (PFHpA)	100	0.543 J	0.253 J	0.512 J
Perfluorooctanoic Acid (PFOA)	10	1.28 J	0.752 J	0.721 J
1H, 1H, 2H, 2H-Perfluorooctanesulfonic Acid (6:2FTS)	100	ND	2.59	ND
Perfluorononanoic Acid (PFNA)	100	0.716 J	0.334 J	ND
Perfluorooctanesulfonic Acid (PFOS)	10	ND	0.535 J	ND
PFOA + PFOS	--	1.28 J	1.29 J	0.721 J
Total PFAS	500	10.5 J	7.71 J	11.2 J

Notes:

1. Only those parameters detected at a minimum of one sample location are presented in this table; all other compounds or analytes were reported as non-detect.
2. Values per NYSDEC Division of Water Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations - Class GA (TOGS 1.1.1) or NYSDEC Action Levels for emergent contaminants.
3. Reported by the laboratory in mg/L, converted to ug/L for comparison to GWQS/GV.

Definitions:

- ND = Parameter not detected above laboratory detection limit.
- "--" = No value available for the parameter; Parameter not analysed for.
- J = Estimated value; result is less than the reporting limit but greater than zero.
- B = Compound was found in the blank and sample.
- F1 = MS and/or MSD recovery exceeds control limits.
- ^6+ = interference Check Standard (ICSA and/or ICSAB) is outside acceptable limits, high based.

BOLD

= Result exceeds GWQS.



TABLE 3
SUMMARY OF SUBSLAB VAPOR, INDOOR AIR & OUTDOOR AIR ANALYTICAL RESULTS
SITE MANAGEMENT PLAN
293 GROTE STREET SITE
BCP SITE NO. C915368
BUFFALO, NEW YORK

Parameter	Sample Location						
	IA-1	SSV-1	IA-2	SSV-2	IA-3	SSV-3	OA-1
	6/14/2021 - 6/15/2021						
Volatile Organic Compounds (VOCs, ug/m3)							
1,1,1-Trichloroethane (Matrix B)	<0.109	<1.13	<0.109	2.16	<0.109	<2.17	<0.109
1,1-Dichloroethene (Matrix A)	<0.079	<0.825	<0.079	<0.793	<0.079	<1.58	<0.079
2-Butanone	<1.47	1.67	<1.47	1.66	<1.47	<29.3	<1.47
Acetone	14.1	9.69	12	10.1	9.26	70.8	5.44
Benzene	<0.639	3.96	<0.639	1.52	<0.639	<12.7	<0.639
Carbon Disulfide	<0.623	5.01	<0.623	6.38	0.738	<12.4	<0.623
Carbon Tetrachloride (Matrix A)	0.478	<1.31	0.497	<1.26	0.522	<2.5	0.503
Chloromethane	1.16	<0.43	1.08	<0.413	1.13	<8.22	1.08
cis-1,2-Dichloroethene (Matrix A)	0.262	<0.825	<0.079	<0.793	<0.079	<1.58	<0.079
Cyclohexane	<0.688	3.61	<0.688	7.16	<0.688	<13.7	<0.688
Dichlorodifluoromethane (Freon 12)	2.77	2.82	2.81	3.8	3.38	5740	2.45
Ethanol	9.95	10.7	<9.42	10.9	<9.42	<187	<9.42
Isopropanol	<1.23	<1.28	<1.23	1.36	<1.23	<24.5	<1.23
Methylene chloride (Matrix B)	<1.74	<1.81	<1.74	<1.74	<1.74	<34.6	<1.74
n-Heptane	<0.82	2.4	<0.82	1.58	<0.82	28.4	<0.82
n-Hexane	<0.705	3.2	<0.705	1.76	<0.705	27.6	<0.705
Tertiary butyl Alcohol	<1.52	4.49	<1.52	3.03	<1.52	<30.2	<1.52
Tetrachloroethene (Matrix B)	0.156	<1.41	0.136	<1.36	0.163	<2.7	<0.136
Toluene	<0.754	3.63	<0.754	4.52	<0.754	<15	<0.754
Trichloroethene (Matrix A)	<0.107	<1.12	<0.107	<1.07	<0.107	<2.14	<0.107
Trichlorofluoromethane	1.51	1.65	1.42	1.57	1.34	<22.4	1.28
Vinyl chloride (Matrix C)	0.148	<0.532	<0.051	<0.511	<0.051	<1.02	<0.051

Notes:

- < = non-detect result and associated reporting limit.
- Only those compounds detected at a minimum of one location are presented.
- Matrix A, B and C refers to NYSDOH Soil Vapor / Indoor Air Matrices dated May 2017.

Qualifiers:

J = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte in the sample.

Color Code:

blue = one of eight compounds regulated by the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (May 2017)

ug/m3 = micrograms per cubic meter



**TABLE 4
COMPARISON OF SUBSLAB VAPOR, INDOOR AIR & OUTDOOR AIR ANALYTICAL RESULTS TO NYSDOH DECISION MATRICES
SITE MANAGEMENT PLAN
293 GROTE STREET SITE
BCP SITE NO. C915368
BUFFALO, NEW YORK**

Sample Location	Carbon Tetrachloride		Trichloroethene (TCE)		cis-1,2-Dichloroethene		1,1-Dichloroethene		Tetrachloroethene (PCE)		1,1,1-Trichloroethane		Methylene Chloride		Vinyl Chloride	
	Lab Reported Concentration (ug/m ³)	Soil Vapor / Indoor Air Matrix 1	Lab Reported Concentration (ug/m ³)	Soil Vapor / Indoor Air Matrix 1	Lab Reported Concentration (ug/m ³)	Soil Vapor / Indoor Air Matrix 2	Lab Reported Concentration (ug/m ³)	Soil Vapor / Indoor Air Matrix 2	Lab Reported Concentration (ug/m ³)	Soil Vapor / Indoor Air Matrix 2	Lab Reported Concentration (ug/m ³)	Soil Vapor / Indoor Air Matrix 2	Lab Reported Concentration (ug/m ³)	Soil Vapor / Indoor Air Matrix 2	Lab Reported Concentration (ug/m ³)	Soil Vapor / Indoor Air Matrix 1
Subslab Vapor/Indoor Air 1																
SSV-1	<1.31	NFA	<1.12	NFA	<0.825	NFA	<0.825	NFA	<1.41	NFA	<1.13	NFA	<1.81	NFA	<0.532	NFA
IA-1	0.478		<0.107		0.262		<0.079		0.156		<0.109		<1.74		0.148	
OA-1	0.503		<0.107		<0.079		<0.079		<0.136		<0.109		<1.74		<0.051	
Subslab Vapor/Indoor Air 2																
SSV-2	<1.26	NFA	<1.07	NFA	<0.793	NFA	<0.793	NFA	<1.36	NFA	2.16	NFA	<1.74	NFA	<0.511	NFA
IA-2	0.497		<0.107		<0.079		<0.079		0.136		<0.109		<1.74		<0.051	
OA-1	0.503		<0.107		<0.079		<0.079		<0.136		<0.109		<1.74		<0.051	
Subslab Vapor/Indoor Air 3																
SSV-3	<2.5	NFA	<2.14	NFA	<1.58	NFA	<1.58	NFA	<2.7	NFA	<2.17	NFA	<34.6	NFA	<1.02	NFA
IA-3	0.522		<0.107		<0.079		<0.079		0.163		<0.109		<1.74		<0.051	
OA-1	0.503		<0.107		<0.079		<0.079		<0.136		<0.109		<1.74		<0.051	

Definitions:

< = non-detect result and associated reporting limit.
 NFA = No further action.
 I, R = Take reasonable and practical actions to identify source(s) and reduce exposures and resample or mitigate.
 Monitor = Monitor soil vapor / indoor air
 Mitigate = Mitigate source of identified parameter.

Analytes Assigned:
 Trichloroethene (TCE), cis-1,2-Dichloroethene (c12-DCE), 1,1-Dichloroethene (11-DCE), Carbon Tetrachloride

SUB-SLAB VAPOR CONCENTRATION of COMPOUND (mcg/m ³)	INDOOR AIR CONCENTRATION of COMPOUND (mcg/m ³)		
	< 0.2	0.2 to < 1	1 and above
< 6	1. No further action	2. No Further Action	3. IDENTIFY SOURCE(S) and RESAMPLE or MITIGATE
6 to < 60	4. No further action	5. MONITOR	6. MITIGATE
60 and above	7. MITIGATE	8. MITIGATE	9. MITIGATE

Analytes Assigned:
 Tetrachloroethene (PCE), 1,1,1-Trichloroethane (111-TCA), Methylene Chloride

SUB-SLAB VAPOR CONCENTRATION of COMPOUND (mcg/m ³)	INDOOR AIR CONCENTRATION of COMPOUND (mcg/m ³)		
	< 3	3 to < 10	10 and above
< 100	1. No further action	2. No Further Action	3. IDENTIFY SOURCE(S) and RESAMPLE or MITIGATE
100 to < 1,000	4. No further action	5. MONITOR	6. MITIGATE
1,000 and above	7. MITIGATE	8. MITIGATE	9. MITIGATE

Analytes Assigned:
 Vinyl Chloride

SUB-SLAB VAPOR CONCENTRATION of COMPOUND (mcg/m ³)	INDOOR AIR CONCENTRATION of COMPOUND (mcg/m ³)	
	< 0.2	0.2 and above
< 6	1. No further action	2. IDENTIFY SOURCE(S) and RESAMPLE or MITIGATE
6 to < 60	3. MONITOR	4. MITIGATE
60 and above	5. MITIGATE	6. MITIGATE



**TABLE 5
SUMMARY OF COURTYARD IRM POST EXCAVATION SAMPLE RESULTS
SITE MANAGEMENT PLAN
293 GROTE STREET SITE
BCP SITE NO. C915368
BUFFALO, NEW YORK**

Parameter ¹	Unrestricted SCOs ² (mg/kg)	Restricted- Residential SCOs ² (mg/kg)	Commercial SCOs ² (mg/kg)	Industrial SCOs ² (mg/kg)	Courtyard Area Post Excavation Samples					
					CY Bottom-1 3 FT	CY Bottom -2 1.5 FT	CY SW-1 1-3 FT	CY SW-2 0.5 - 3 FT	CY SW-3 0-2.5 FT	CY SW-4 0-3 FT
					4/13/2022	4/25/2022	4/13/2022	4/13/2022	4/20/2022	4/25/2022
TCL Volatile Organic Compounds (VOCs) - mg/kg³										
1,2,4-Trimethylbenzene	3.6	52	190	380	ND	ND	ND	0.00059 J-	0.00074 J	ND
2-Butanone (MEK)	0.12	100	500	1000	0.0064 J	ND	0.035 J+	ND	ND	ND
2-Hexanone	--	--	--	--	ND	ND	0.0076 J+	ND	ND	ND
4-Methyl-2-pentanone (MIBK)	--	--	--	--	ND	ND	0.0025 J+	ND	ND	ND
Acetone	0.05	100	500	1000	0.063	ND	0.16 J+	ND	0.0089 J	0.018
Carbon disulfide	--	--	--	--	ND	ND	0.0086 J+	ND	ND	ND
Isopropylbenzene (Cumene)	--	--	--	--	ND	ND	0.00055 J+	ND	ND	ND
p-isopropyltoluene	--	--	--	--	ND	ND	ND	ND	0.00023 J	ND
Methyl acetate	--	--	--	--	ND	ND	0.006 J+	ND	ND	ND
sec-Butylbenzene	11	100	500	1000	ND	ND	ND	ND	0.00016 J	ND
TCL Semi-Volatile Organic Compounds (SVOCs) - mg/kg³										
2-Methylnaphthalene	--	--	--	--	ND	0.22 J	ND	ND	ND	ND
3-Methylphenol/4-Methylphenol	--	--	--	--	ND	0.047 J	ND	ND	ND	ND
Acenaphthene	20	100	500	1000	ND	0.32	ND	ND	ND	ND
Anthracene	100	100	500	1000	ND	0.62	ND	ND	ND	0.061 J
Benzo(a)anthracene	1	1	5.6	11	ND	0.73	ND	ND	ND	0.15
Benzo(a)pyrene	1	1	1	1.1	ND	0.59	ND	ND	ND	0.13 J
Benzo(b)fluoranthene	1	1	5.6	11	ND	0.66	ND	ND	ND	0.17
Benzo(g,h,i)perylene	100	100	500	1000	ND	0.32	ND	ND	ND	0.07 J
Benzo(k)fluoranthene	0.8	3.9	56	110	ND	0.26	ND	ND	ND	0.046 J
Biphenyl	--	--	--	--	ND	0.043 J	ND	ND	ND	ND
Cabazole	--	--	--	--	ND	0.3	ND	ND	ND	0.04 J
Chrysene	1	3.9	56	110	ND	0.59	ND	ND	ND	0.12 J
Dibenzo(a,h)anthracene	0.33	0.33	0.56	1.1	ND	0.072 J	ND	ND	ND	ND
Dibenzofuran	7	59	350	1000	ND	0.26	ND	ND	ND	ND
Fluoranthene	100	100	500	1000	ND	1.9	ND	ND	ND	0.31
Fluorene	30	100	500	1000	ND	0.37	ND	ND	ND	0.023 J
Indeno(1,2,3-cd)pyrene	0.5	0.5	5.6	11	ND	0.38	ND	ND	ND	0.088 J
Naphthalene	12	100	500	1000	ND	0.91	ND	ND	ND	ND
Phenanthrene	100	100	500	1000	ND	2.1	ND	ND	ND	0.24
Pyrene	100	100	500	1000	ND	1.4	ND	ND	ND	0.24
Total PAHs	--	500	500	--	ND	11.2	ND	ND	ND	1.6
TAL Metals - mg/kg										
Aluminum	--	--	--	--	18000	13000	14000	15000	11000	11000
Antimony	--	--	--	--	0.28 J-	0.96 J	0.27 J	0.48 J	0.76 J	ND
Arsenic	13	16	16	16	2.6 J-	8.6	3.6	5.8	7.5 J	4.9
Barium	350	400	400	10000	170 J-	130	130	130	95	90
Beryllium	7.2	72	590	2700	0.87 J-	0.64	0.68	0.73	0.52	0.61
Cadmium	2.5	4.3	9.3	60	0.19 J	0.86	0.11 J	0.09 J	0.19 J	0.12 J
Calcium	--	--	--	--	87000	43000	40000	20000	3400 J	38000
Chromium	30	180	1,500	6,800	27 J-	26	24	24	20	18
Cobalt	--	--	--	--	12 J-	10	10	10	8.6	10
Copper	50	270	270	10000	20 J-	41	25	25 J	33	19
Iron	--	--	--	--	30000	27000	28000	28000	34000 J	24000
Lead	63	400	1,000	3,900	13	37	20	21	25 J	13
Magnesium	--	--	--	--	13000	14000	11000	12000	3300	16000
Manganese	1,600	2,000	10,000	10,000	530	520	1200	390 J	480 J	620
Mercury	0.18	0.81	2.8	5.7	ND	0.092	ND	ND	0.063 J	ND
Nickel	30	310	310	10000	31 J-	28	25	27	20	23
Potassium	--	--	--	--	2200	2400 J	2000	1100	760	1100
Selenium	3.9	180	1,500	6,800	2.3 J	4.8	2 J	2.5	1.9 J	2.1 J
Silver	2	180	1,500	6,800	ND	0.06 J	ND	ND	0.26 J	ND
Sodium	--	--	--	--	160 J	240	160 J	260	200	87 J
Thallium	--	--	--	--	0.24 J	0.23 J	0.17 J	0.17 J	ND	0.13 J
Vanadium	--	--	--	--	35 J-	28	29	29	30	26
Zinc	109	10,000	10,000	10,000	58 J-	86	68	89 J	70 J	58
Polychlorinated Biphenyls (PCBs) mg/kg³										
PCB-1254	--	--	--	--	0.0866	0.0358 J	ND	0.147 J	0.17	0.217 J-
PCB-1260	--	--	--	--	ND	0.0233 J	ND	ND	ND	ND
Total PCBs	0.1	1	1	25	0.0866	0.0591	ND	0.147 J	0.17	0.217 J-

Notes:
1. Only those parameters detected at a minimum of one sample location are presented in this table; all other compounds were reported as non-detect.
2. Values per NYSDEC Part 375 Soil Cleanup Objectives (SCOs).
3. Sample results were reported by the laboratory in micrograms per kilogram (ug/kg) and converted to milligram per kilogram (mg/kg) for comparison to SCOs.

Definitions:
ND = Parameter not detected above laboratory detection limit.
-- = Sample not analyzed for parameter and/or no SCO available.
J = Estimated value; result is less than the sample quantitation limit but greater than zero.

Result exceeds Unrestricted SCOs
Result exceeds Restricted-Residential SCOs
Result exceeds Commercial SCOs
Result exceeds Industrial SCOs



**TABLE 6
SUMMARY OF UST IRM POST EXCAVATION SAMPLE RESULTS
SITE MANAGEMENT PLAN
293 GROTE STREET SITE
BCP SITE NO. C915368
BUFFALO, NEW YORK**

Parameter ¹	Unrestricted SCOs ² (mg/kg)	Restricted- Residential SCOs ² (mg/kg)	Commercial SCOs ² (mg/kg)	Industrial SCOs ² (mg/kg)	UST Area Post Excavation Samples				
					UST SW-1 7-9 FT	UST SW-2 7-10 FT	UST SW-3 7-10 FT	UST SW-4 7-10 FT	UST Bottom-1 10.5 FT
					4/15/2022	4/18/2022	4/18/2022	4/18/2022	4/18/2022
					2.2 PPM ³	0 PPM	0 PPM	0 PPM	0 PPM
TCL+CP-51 Volatile Organic Compounds (VOCs) - mg/kg⁴									
1,2-Dichlorobenzene	1.1	100	500	1000	ND	ND	ND	ND	ND
Acetone	0.05	100	500	1000	0.0088 J	ND	ND	ND	ND
CP-51 Semi-Volatile Organic Compounds (SVOCs) - mg/kg⁴									
Acenaphthene	20	100	500	1000	0.045 J	ND	ND	ND	ND
Acenaphthylene	100	100	500	1000	0.12 J	ND	ND	ND	ND
Dibenzo(a,h)anthracene	0.33	0.33	0.56	1.1	0.026 J	ND	ND	ND	ND
Fluoranthene	100	100	500	1000	0.023 J	ND	ND	ND	ND
Fluorene	30	100	500	1000	0.022 J	ND	ND	ND	ND
Phenanthrene	100	100	500	1000	0.036 J	ND	ND	0.042 J	ND
Pyrene	100	100	500	1000	0.023 J	ND	ND	ND	ND
TOTAL PAHs	--	--	--	--	0.295	ND	ND	0.042	ND

Notes:

1. Only those parameters detected at a minimum of one sample location are presented in this table; all other compounds were reported as non-detect.
2. Values per NYSDEC Part 375 Soil Cleanup Objectives (SCOs) .
3. Photoionization Detector (PID) measurements.
4. Sample results were reported by the laboratory in micrograms per kilogram (ug/kg) and converted to milligram per kilogram (mg/kg) for comparison to SCOs.

Definitions:

- ND = Parameter not detected above laboratory detection limit.
- = Sample not analyzed for parameter and/or no SCO available.
- J = Estimated value; result is less than the sample quantitation limit but greater than zero.

Result exceeds Unrestricted SCOs
Result exceeds Restricted-Residential SCOs
Result exceeds Commercial SCOs
Result exceeds Industrial SCOs



**TABLE 7
SUMMARY OF AOC-1 (TP-10) IRM POST-EXCAVATION SAMPLE RESULTS
SITE MANAGEMENT PLAN
293 GROTE STREET SITE
BCP SITE NO. C915368
BUFFALO, NEW YORK**

Parameter	Unrestricted SCOs ¹ (mg/kg)	Restricted- Residential SCOs ¹ (mg/kg)	Commercial SCOs ¹ (mg/kg)	Industrial SCOs ¹ (mg/kg)	RI Sample	Post-Excavation Samples					
					TP-10 (0.5-2.5 FT)	TP-10 NW-1	TP-10 EW-1	TP-10 SW-1	TP-10 WW-1	TP-10 B-1	
					Excavated	7/7/22	7/7/22	7/7/22	7/7/22	7/7/22	
TAL Metals - mg/kg											
Copper	50	270	270	10000	348	68.2	26.2	89	182	17.3	

Notes:
1. Values per NYSDEC Part 375 Soil Cleanup Objectives (SCOs).

Definitions:
ND = Parameter not detected above laboratory detection limit.

Result exceeds Unrestricted SCOs
Result exceeds Restricted-Residential SCOs
Result exceeds Commercial SCOs
Result exceeds Industrial SCOs

Indicates Sample was removed during IRM activities



**TABLE 8
SUMMARY OF AOC2 and AOC3 IRM POST-EXCAVATION SAMPLE RESULTS
SITE MANAGEMENT PLAN
293 GROTE STREET SITE
BCP SITE NO. C915368
BUFFALO, NEW YORK**

Parameter	Restricted-Residential SCOs ¹ (mg/kg)	Commercial SCOs ¹ (mg/kg)	Industrial SCOs ¹ (mg/kg)	RI Samples			Post-Excavation Samples					RI Sample SS-2 (0-4 IN)	Post-Excavation Samples								
				SS-1 (0-4 IN)	NS-1 (4 IN-2 FT)	AOC2 EW (0-2 FT)	AOC2 Bottom (2 FT)	AOC2 Bottom 2 (2 FT)	AOC2 SW-1 (1-2 FT)	AOC2 SW-2 (1-2 FT)	AOC2 SW-3 (1-2 FT)		AOC3 Bottom (7 IN-1 FT)	AOC3 Bottom 2 (2 FT)	AOC3 Bottom 3 (3-4 FT)	AOC3 Bottom Clay (1 FT)	AOC3 Comp Clay (1-2 FT)	AOC3 EW1 (0-1 FT)	AOC3 SW1 (0-1 FT)	AOC3 SW2 (0-1 FT)	AOC3 SW3 (0-1 FT)
				EXCAVATED	EXCAVATED	EXCAVATED	8/17/22	8/19/22	8/19/22	8/19/22	8/19/22		8/19/22	EXCAVATED	EXCAVATED	9/8/22	9/8/22	8/17/22	9/9/22	8/12/22	8/12/22
TCL Volatile Organic Compounds (VOCs) - mg/kg³																					
1,3,5-Trimethylbenzene	52	190	380	--	--	--	--	--	--	--	--	--	--	0.00035 J	0.0016 J	--	--	--	--	--	--
1,2,4-Trimethylbenzene	52	190	380	--	--	--	--	--	--	--	--	--	--	0.0012 J	0.0048	--	--	--	--	--	--
2-Butanone (MEK)	100	500	1000	--	--	--	--	--	--	--	--	--	--	ND	0.0034 J	--	--	--	--	--	--
Acetone	100	500	1000	--	--	--	--	--	--	--	--	--	--	ND	0.029	--	--	--	--	--	--
Isopropylbenzene (Cumene)	--	--	--	--	--	--	--	--	--	--	--	--	--	ND	0.00015 J	--	--	--	--	--	--
n-Butylbenzene	100	500	1000	--	--	--	--	--	--	--	--	--	--	0.00036 J	0.0004 J	--	--	--	--	--	--
n-Propylbenzene	100	500	1000	--	--	--	--	--	--	--	--	--	--	0.00028 J	0.00027 J	--	--	--	--	--	--
p-Isopropyltoluene	--	--	--	--	--	--	--	--	--	--	--	--	--	0.00017 J	0.00074 J	--	--	--	--	--	--
sec-Butylbenzene	100	500	1000	--	--	--	--	--	--	--	--	--	--	0.00031 J	0.00085 J	--	--	--	--	--	--
tert-Butylbenzene	100	500	1000	--	--	--	--	--	--	--	--	--	--	ND	0.00021 J	--	--	--	--	--	--
TCL Semi-Volatile Organic Compounds (SVOCs) - mg/kg³																					
2-Methylnaphthalene	--	--	--	7.1	0.72 J	--	--	--	--	--	--	0.48	--	0.061 J	ND	--	--	--	--	--	--
Acenaphthene	100	500	1000	38	1.1	0.034 J	ND	ND	1	1.5	4.2	0.6	35	0.26	ND	ND	ND	0.061 J	0.25 J	0.17	0.21
Acenaphthylene	100	500	1000	2.5	ND	ND	ND	ND	0.49 J	0.27 J	ND	0.083	ND	ND	ND	ND	ND	ND	0.15 J	0.1	0.11
Anthracene	100	500	1000	110	3.1 J	0.1 J	ND	0.053 J	3.1	4.5	12	1.2	110	0.55	ND	ND	ND	0.15	0.75	0.56	0.64
Benzo(a)anthracene	1	5.6	11	200	6	0.23	ND	0.13	7.3	9.2	25	3.1	200	1.1	0.083 J	0.11 J	0.025 J	0.52	2.5	2.3	1.7
Benzo(a)pyrene	1	1	1.1	160	5.3	0.21	ND	0.12 J	7.2	8.8	20	3	180	1.1	0.087 J	0.1 J	ND	0.58	2.9	2.5	1.6
Benzo(b)fluoranthene	1	5.6	11	210	6.9	0.26	ND	0.14	8.2	10	26	4.3	220	1.3	0.098 J	0.12 J	ND	0.76	3.7	3.4	2.1
Benzo(g,h,i)perylene	100	500	1000	89	2.7	0.14 J	ND	0.063 J	3.9	4.5	9.8	1.7	94	0.54	0.046 J	0.062 J	ND	0.36	1.8	1.6	0.82
Benzo(k)fluoranthene	3.9	56	110	42	2.5	0.095 J	ND	0.052 J	2.9	3.5	7.1	1.2	72	0.41	ND	0.052 J	ND	0.25	1.3	1.1	0.77
Chrysene	3.9	56	110	180	5.3	0.23	ND	0.12	6.8	8.2	22	2.9	180	1	0.074 J	0.1 J	0.022 J	0.55	2.7	2.5	1.6
Dibenzo(a,h)anthracene	0.33	0.56	1.1	22	0.78	0.032 J	ND	ND	0.87	1.1	2.3 J	0.45	23	0.14	ND	ND	ND	0.087 J	0.4 J	0.35	0.19
Fluoranthene	100	500	1000	430	14	0.48	0.034 J	0.32	20	25	56	6.8	480	2.9	0.17	0.28	0.058 J	1.3	6.4	6.5	4.4
Fluorene	100	500	1000	44	1.3	0.045 J	ND	ND	0.99	1.7	4.5 J	0.66	42	0.3	ND	ND	ND	0.062 J	0.31 J	0.19	0.25
Indeno(1,2,3-cd)pyrene	0.5	5.6	11	110	3.4	0.15	ND	0.08 J	4.7	5.8	12	2.1	120	0.72	0.057 J	0.076 J	ND	0.44	2.2	2	0.95
Naphthalene	100	500	1000	17	0.87 J	0.083 J	--	--	--	--	--	0.56	7.3 J	0.12 J	ND	ND	ND	0.079 J	0.49 J	0.64	0.58
Phenanthrene	100	500	1000	380	12	0.42	ND	0.2	12	16	42	5.5	380	2.4	0.074 J	0.12 J	0.045 J	0.65	3.2	2.90	2.9
Pyrene	100	500	1000	330	11	0.38	0.028 J	0.24	16	19	43	5.1	370	2.2	0.14	0.21	0.046 J	1	5	4.9	3.36
Total PAHs	500	--	--	2365	76.3	2.889	0.062	1.518	95.45	119.07	309.9	39.3	2513.3	15.0	0.829	1.23	0.196	6.849	34.05	31.71	22.18
Metals - mg/kg																					
Arsenic	16	16	16	27.4	11.5	17.7	3.5	4.49	37.6	15.6	23	6.96	9.98	5.32	5.36	6.01	5.8	3.4	9.97	11	15.1
Copper	270	270	10000	315	334	653	12.7	16	229	188	219	282	233	55.3	20.9	166	27.5	76.5	62.5	1430	126
Polychlorinated Biphenyls (PCBs) mg/kg³																					
PCB-1254	--	--	--	0.671	0.259	ND	ND	ND	0.391	ND	ND	0.259	0.182	0.0933	0.0594	0.0581	0.153	0.00362	0.206	0.0974	0.542
PCB-1260	--	--	--	0.54	ND	0.0108 J	ND	ND	0.203	0.18	0.482	ND	0.0939	0.0492	0.0229 J	0.0197 J	ND	0.0243 J	0.0691 J	0.062 J	ND
PCB-1268	--	--	--	ND	ND	ND	ND	ND	0.386 P	0.411	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total PCBs	1	1	25	1.211	0.259	0.0108	ND	ND	0.98	0.591	0.482	0.259	0.2759	0.143	0.0823 J	0.0778	0.153	0.02792	0.2751	0.1594	0.542

Notes:

1. Values per NYSDEC Part 375 Soil Cleanup Objectives (SCOs).

Definitions:

ND = Parameter not detected above laboratory detection limit.
 -- = Sample not analyzed for parameter and/or no SCO available.
 J = Estimated value; result is less than the sample quantitation limit but greater than zero.
 P = The RPD between the results for the two columns exceeds the method-specified criteria.

Result exceeds Unrestricted SCOs
Result exceeds Restricted-Residential SCOs
Result exceeds Commercial SCOs
Result exceeds Industrial SCOs

Indicates Sample was removed during IRM activities

**TABLE 10
SUMMARY OF UNRESTRICTED USE SOIL CLEANUP OBJECTIVE SAMPLE RESULTS
SITE MANAGEMENT PLAN
293 GROTE STREET SITE
BCP SITE NO. C915368
BUFFALO, NEW YORK**

Parameter ¹	Unrestricted SCOs ² (mg/kg)	Phase II Soil Borings							RI Soil Borings							RI Test Pits					IRM Post-Excavation Sample Locations						
		SB-1 (0.5-2 FT)	SB-6 (0.3-2 FT)	SB-7 (0.3-2 FT)	SB-15 (0.5-3.5 FT)	TP-1 (1-2 FT)	TP-2 (2.5-4 FT)	SB-16 (0.3-3 FT)	SB-18 (0.5-4 FT)	SB-22 (0.3-2 FT)	SB-25 (0.5-1.5 FT)	SB-26 (0.5-3 FT)	SB-28 (0.3-1.5 FT)	SB-31 (0.5-3 FT)	TP-7 (0.4-2 FT)	TP-9 (0.5-2.5 FT)	TP-11 (0.5-3.5 FT)	TP-12 (1.5-3 FT)	TP-13 (1-2 FT)	CY SW-1 (1-3 FT)	CY SW-2 (0.5-3 FT)	CY SW-4 (0.3 FT)	CY BOTTOM-1 (3 FT)	AOC3 BOTTOM 2 (2 FT)	AOC3 Bottom Clay (1 FT)	AOC3 Comp Clay (1.2 FT)	
		10/6/20	10/6/20	10/6/20	10/6/20	11/4/20	11/4/20	6/16/21	6/16/21	6/17/21	6/17/21	6/17/21	6/17/21	6/17/21	6/18/21	6/18/21	6/18/21	6/18/21	6/18/21	4/13/2022	4/13/2022	4/25/2022	4/13/2022	9/8/2022	8/17/22	9/9/22	
TCL Volatile Organic Compounds (VOCs) - mg/kg³																											
1,3,5-Trimethylbenzene	8.4	ND	ND	--	--	ND	ND	ND	ND	ND	ND	0.093 J+	--	0.85 J+	--	--	--	--	3.2 J+	ND	ND	ND	ND	0.00035 J	--	--	--
1,2,4-Trimethylbenzene	3.6	ND	ND	--	--	ND	ND	ND	ND	ND	ND	0.14 J+	--	3.3 J+	--	--	--	--	17 J	ND	0.00059 J-	ND	ND	0.0012 J	--	--	--
2-Butanone (MEK)	0.12	0.0052 J	0.0075 J	--	--	ND	ND	ND	ND	0.028	--	--	0.0067 J+	--	0.024 J+	--	--	--	ND	0.035 J+	ND	ND	0.0064 J	ND	--	--	--
2-Hexanone	--	ND	ND	--	--	ND	ND	ND	ND	ND	--	--	ND	--	ND	--	--	--	ND	0.0076 J+	ND	ND	ND	ND	--	--	--
4-Methyl-2-pentanone (MIBK)	--	ND	ND	--	--	ND	ND	ND	ND	ND	--	--	ND	--	ND	--	--	--	ND	0.0025 J+	ND	ND	ND	ND	--	--	--
Acetone	0.05	0.053	0.063	--	--	ND	ND	ND	ND	0.18	--	--	0.03 J+	--	1.1 J+	--	--	--	1.1 J+	0.018	ND	ND	0.063	ND	--	--	--
Benzene	0.06	ND	ND	--	--	ND	ND	ND	ND	ND	--	--	ND	--	ND	--	--	--	0.051 J+	ND	ND	ND	ND	ND	--	--	--
Carbon disulfide	--	ND	ND	--	--	ND	ND	ND	ND	ND	--	--	ND	--	ND	--	--	--	ND	0.0086 J+	ND	ND	ND	ND	--	--	--
Chloroform	0.37	ND	ND	--	--	ND	ND	0.00049 J	ND	ND	--	--	ND	--	ND	--	--	--	ND	ND	ND	ND	ND	ND	--	--	--
Cyclohexane	--	ND	ND	--	--	ND	ND	ND	ND	ND	--	--	0.00089 J+	--	ND	--	--	--	0.47 J+	ND	ND	ND	ND	ND	--	--	--
Dichlorodifluoromethane	--	ND	ND	--	--	ND	ND	ND	ND	ND	--	--	0.0069 J+	--	ND	--	--	--	ND	ND	ND	ND	ND	ND	--	--	--
Ethylbenzene	1	ND	ND	--	--	ND	ND	ND	ND	ND	--	--	0.001 J+	--	0.0014 J+	--	--	--	1.5 J+	ND	ND	ND	ND	ND	--	--	--
Isopropylbenzene (Cumene)	--	ND	ND	--	--	ND	ND	ND	ND	ND	--	--	0.0073 J+	--	0.078 J+	--	--	--	1.4 J+	0.00055 J+	ND	ND	ND	ND	--	--	--
Methyl acetate	--	ND	ND	--	--	ND	ND	ND	ND	ND	--	--	ND	--	ND	--	--	--	0.77 J+	0.006 J+	ND	ND	ND	ND	--	--	--
Methylcyclohexane	--	ND	ND	--	--	ND	ND	ND	ND	ND	--	--	0.0047 J+	--	0.0061 J+	--	--	--	1.1 J+	ND	ND	ND	ND	ND	--	--	--
Methylene Chloride	0.05	ND	ND	--	--	ND	ND	ND	ND	ND	--	--	ND	--	ND	--	--	--	ND	ND	ND	ND	ND	ND	--	--	--
m,p-Xylene	--	ND	ND	--	--	ND	ND	ND	ND	ND	--	--	0.0021 J+	--	0.0036 J+	--	--	--	2.6 J+	ND	ND	ND	ND	ND	--	--	--
n-Butylbenzene	12	ND	ND	--	--	ND	ND	ND	ND	ND	--	--	0.0072 J+	--	0.49 J+	--	--	--	7.3 J	ND	ND	ND	ND	0.00036 J	--	--	--
n-Propylbenzene	3.9	ND	ND	--	--	ND	ND	ND	ND	ND	--	--	0.0089 J+	--	0.15 J+	--	--	--	4.4 J+	ND	ND	ND	ND	0.00036 J	--	--	--
o-Xylene	--	ND	ND	--	--	ND	ND	ND	ND	ND	--	--	ND	--	ND	--	--	--	1.3 J+	ND	ND	ND	ND	ND	--	--	--
p-Isopropyltoluene	--	ND	ND	--	--	ND	ND	ND	ND	ND	--	--	0.014 J+	--	0.11 J+	--	--	--	1.5 J+	ND	ND	ND	ND	0.00017 J	--	--	--
sec-Butylbenzene	11	ND	ND	--	--	ND	ND	ND	ND	ND	--	--	0.012 J+	--	0.44 J+	--	--	--	5.9 J+	ND	ND	ND	ND	0.00031 J	--	--	--
Toluene	0.7	ND	ND	--	--	ND	ND	ND	ND	ND	--	--	ND	--	ND	--	--	--	0.39 J+	ND	ND	ND	ND	ND	--	--	--
Xylenes, Total	0.26	ND	ND	--	--	ND	ND	ND	ND	ND	--	--	ND	--	ND	--	--	--	ND	ND	ND	ND	ND	ND	--	--	--
VOC TICs	--	ND	ND	--	--	ND	ND	0.0183 J	0.0219 J	--	--	--	0.819 J	--	1.95 J	--	--	--	184 J	--	--	--	--	--	--	--	--
TCL Semi-Volatile Organic Compounds (SVOCs) - mg/kg³																											
2-Methylnaphthalene	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.047 J	ND	0.038 J	0.1 J	--	ND	0.63 J	0.14 J	ND	3	ND	ND	ND	0.61 J	ND	ND	ND
2-Methylphenol/4-Methylphenol	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.034 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthene	20	ND	ND	0.086 J	0.033 J	0.17	0.056 J	ND	0.026 J	ND	0.031 J	0.054 J	ND	--	0.043 J	1.9	0.29	ND	11	ND	ND	ND	0.26	ND	ND	ND	
Acenaphthylene	100	ND	0.044 J	0.22	ND	0.074 J	1.7	ND	0.062 J	ND	ND	0.07 J	ND	--	0.13 J	0.34 J	0.46	ND	2.6	ND	ND	ND	ND	ND	ND	ND	
Anthracene	100	ND	ND	0.44	0.073 J	0.51	1.2	ND	0.096 J	ND	0.057 J	0.11 J	0.072 J	--	0.17 J	4.3	1.5	ND	17	ND	ND	0.061 J	ND	0.55	ND	ND	
Benzaldehyde	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--	ND	ND	0.07 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Benzo(a)anthracene	1	ND	0.16	1.4	0.26	2	5.9	0.034 J	0.35	ND	0.19	0.22	0.73	--	0.71	12	3.8	ND	33	ND	ND	0.15	ND	1.1	0.11 J	0.025 J	
Benzo(a)pyrene	1	ND	0.15 J	1.4	0.3	2.4	5.6	ND	0.31	ND	0.17	0.18	0.54	--	0.62	8.9	3.1	ND	26	ND	ND	0.13 J	ND	1.1	0.1 J	ND	
Benzo(b)fluoranthene	1	ND	0.2	1.9	0.4	2.7	8.7 D	ND	0.38	ND	0.21	0.24	0.74	--	0.88	13	4.2	ND	35	ND	ND	0.17	ND	1.3	0.12 J	ND	
Benzo(g,h,i)perylene	100	ND	0.097 J	0.89	0.14 J	1.2	2.7	ND	0.2	ND	0.1 J	0.1 J	0.27	--	0.38	5.4	2.1	ND	17	ND	ND	0.07 J	ND	0.54	0.062 J	ND	
Benzo(k)fluoranthene	0.8	ND	0.08 J	0.48	0.12	0.99	2.4	ND	0.14	ND	0.09 J	0.098 J	0.3	--	0.34	5.1	1.4	ND	11	ND	ND	0.046 J	ND	0.41	0.052 J	ND	
Biphenyl	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--	ND	ND	ND	ND	1.8 J	ND	ND	ND	ND	ND	ND	ND	
Bis(2-ethylhexyl) phthalate	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.7	ND	0.073 J	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Carbazole	--	ND	ND	ND	ND	ND	ND	ND	0.027 J	ND	0.042 J	0.089 J	ND	--	0.097 J	2.2	0.59	ND	6.5	ND	ND	0.04 J	ND	ND	ND	ND	
Chrysene	1	ND	0.15	1.3	0.25	1.9	4.9	0.037 J	0.31	ND	0.18	0.22	0.6	--	0.8	9.8	3.4	ND	30	ND	ND	1	ND	1	0.1 J	0.022 J	
Dibenzo(a,h)anthracene	0.33	ND	ND	0.21	0.035 J	0.3	0.92	ND	0.052 J	ND	0.026 J	0.029 J	0.084 J	--	0.098 J	1.4	0.58	ND	4.5	ND	ND	ND	0.14	ND	ND		
Dibenzofuran	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.022 J	0.035 J	0.032 J	--	0.054 J	0.98 J	0.34	ND	9.1	ND	ND	ND	ND	ND	ND		
Fluoranthene	100	ND	0.3	2.6	0.61	4.2	11 D	0.049 J	0.62	0.028 J	0.43	0.57	1.1	--	1.9	26	5.7	ND	59	ND	ND	0.31	ND	2.9	0.28	0.058 J	
Fluorene	30	ND	0.17 J	0.032 J	0.16 J	0.11 J	ND	0.036 J	0.065 J	ND	ND	0.065 J	ND	--	0.1 J	1.6 J	0.6	ND	13	ND	ND	0.023 J	ND	0.3	ND	ND	
Indeno(1,2,3-cd)pyrene	0.5	ND	0.096 J	0.9	0.16	1.4	3.5	ND	0.21	ND	0.11 J	0.12 J	0.33	--	0.41	6.5	2.4	ND	20	ND	ND	0.088 J	ND	0.72	0.076 J	ND	
Naphthalene	12	ND	0.043 J	0.17 J	0.028 J	0.078 J	0.15 J	ND	0.032 J	0.038 J	0.024 J	0.18 J	0.047 J	--	0.061 J	0.96 J	0.23	ND	9.6	ND	ND	ND	0.12 J	ND	ND		
Phenanthrene	100	ND	0.11 J	1.9	0.37	2.1	2.4	0.081 J	0.33	0.033 J	0.29	0.48	0.16	--	0.66	16	4.6	ND	57	ND	ND	0.24	ND	2.4	0.12 J	0.045 J	
Pyrene	100	ND	0.27	2.2	0.5	3.4	6.8	0.045 J	0.56	0.026 J	0.34	0.47	0.84	--	1.6	20	5.2	ND	53	ND	ND	ND	2.2	0.21	0.046 J		
Total PAHs	--	ND	1.702 J	16.266 J	3.311 J	23.582 J	58.036 J	0.246 J	3.71 J	0.125 J	2.28 J	3.14 J	5.88 J	--	8.90 J	133 J	39.6 J	ND	399 J	ND	ND	1.65	ND	15.0	1.2	0.2	
SVOC TICs	--	--	--	--	--	--	--	0.189 J	2.26 J	ND	0.414 J	11.8 J	0.496 J	--	0.325 J	35.1 J	14.6 J	0.344 J	906 J	--	--	--	--	--	--	--	
TAL Metals - mg/kg																											



TABLE 11
SUMMARY OF RESTRICTED RESIDENTIAL SOIL CLEANUP OBJECTIVES
SITE MANAGEMENT PLAN
293 GROTE STREET SITE
BCP SITE NO. C915368
BUFFALO, NEW YORK

Parameter	Restricted Residential SCOs ¹
Volatile Organic Compounds - mg/kg	
1,1,1-Trichloroethane	100
1,1-Dichloroethane	26
1,1-Dichloroethene	100
1,2-Dichlorobenzene	100
1,2-Dichloroethane	3.1
cis-1,2-Dichloroethene	100
trans-1,2-Dichloroethene	100
1,3-Dichlorobenzene	49
1,4-Dichlorobenzene	13
1,4-Dioxane	13
Acetone	100
Benzene	4.8
Butylbenzene	100
Carbon tetrachloride	2.4
Chlorobenzene	100
Chloroform	49
Ethylbenzene	41
Hexachlorobenzene	1.2
Methyl ethyl ketone	100
Methyl tert-butyl ether	100
Methylene chloride	100
n-Propylbenzene	100
sec-Butylbenzene	100
tert-Butylbenzene	100
Tetrachloroethene	19
Toluene	100
Trichloroethene	21
1,2,4-Trimethylbenzene	52
1,3,5- Trimethylbenzene	52
Vinyl chloride	0.9
Xylene (mixed)	100
Semivolatile Organic Compounds - mg/kg	
Acenaphthene	100
Acenaphthylene	100
Anthracene	100
Benz(a)anthracene	1
Benzo(a)pyrene	1
Benzo(b)fluoranthene	1
Benzo(g,h,i)perylene	100
Benzo(k)fluoranthene	3.9
Chrysene	3.9
Dibenz(a,h)anthracene	0.33
Dibenzofuran	59
Fluoranthene	100
Fluorene	100
Indeno(1,2,3-cd)pyrene	0.5
m-Cresol	100
Naphthalene	100
o-Cresol	100
p-Cresol	100
Pentachlorophenol	6.7
Phenanthrene	100
Phenol	100
Pyrene	100



TABLE 11
SUMMARY OF RESTRICTED RESIDENTIAL SOIL CLEANUP OBJECTIVES
SITE MANAGEMENT PLAN
293 GROTE STREET SITE
BCP SITE NO. C915368
BUFFALO, NEW YORK

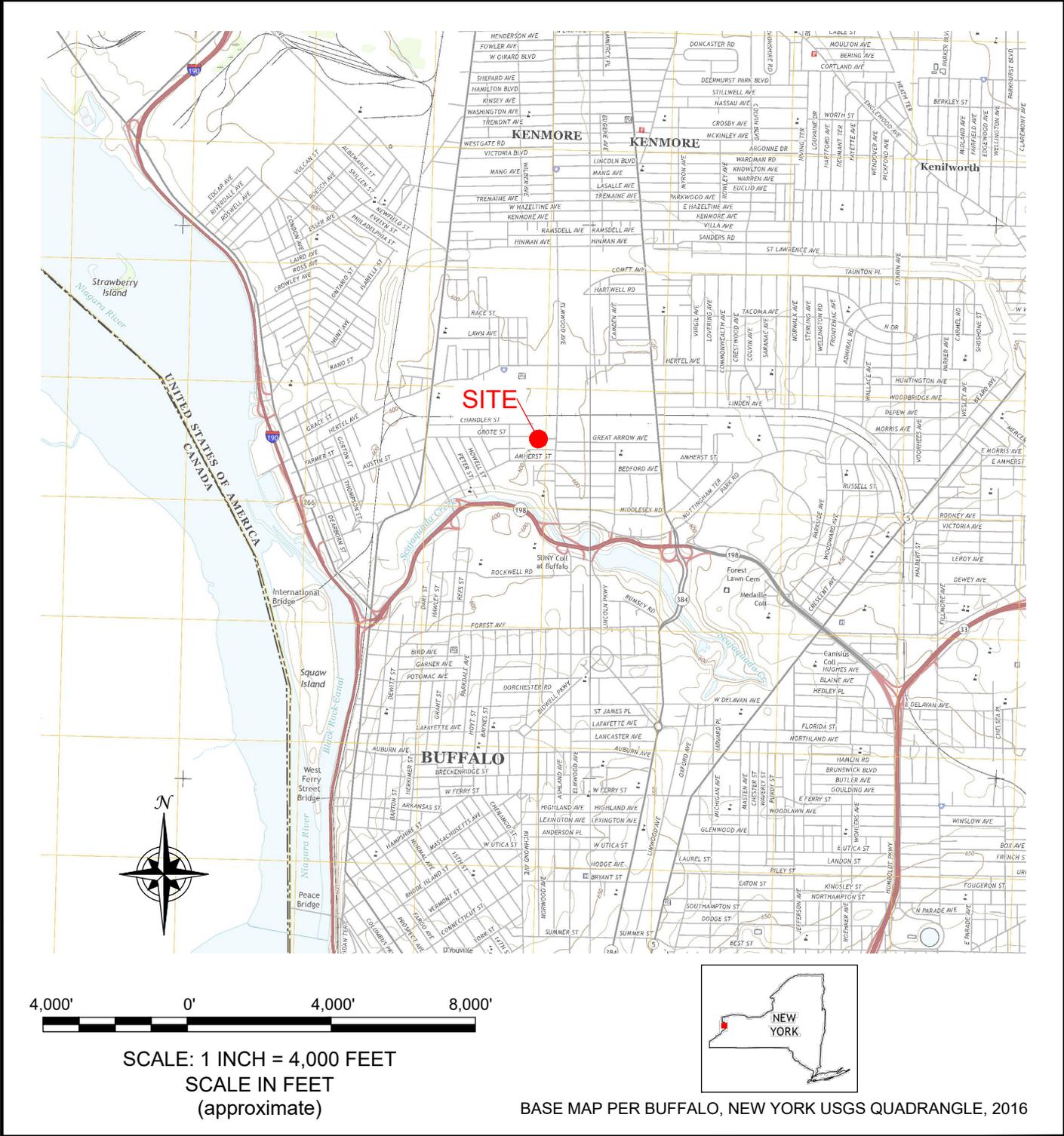
Parameter	Restricted Residential SCOs ¹
Metals - mg/kg	
Arsenic	16
Barium	400
Beryllium	72
Cadmium	4.3
Chromium, hexavalent	110
Chromium, trivalent	180
Copper	270
Total Cyanide	27
Lead	400
Manganese	2,000
Total Mercury	0.81
Nickel	310
Selenium	180
Silver	180
Zinc	10,000
PCBs/Pesticides - mg/kg	
4,4'-DDE	8.9
4,4'-DDT	7.9
4,4'-DDD	13
Aldrin	0.097
alpha-BHC	0.48
beta-BHC	0.36
Chlordane (alpha)	4.2
delta-BHC	100
Dieldrin	0.2
Endosulfan I	24
Endosulfan II	24
Endosulfan sulfate	24
Endrin	11
Heptachlor	2.1
Lindane	1.3
Herbicides - mg/kg	
2,4,5-TP Acid (Silvex)	100
Polychlorinated Biphenyls (PCBs) - mg/kg	
Total PCBs	1
Perfluorinated Alkyl Acids - ug/kg²	
Perfluorooctanoic Acid (PFOA)	33
Perfluorooctanesulfonic Acid (PFOS)	44

Notes:

1. Values per NYSDEC 6 NYCRR Part 375 Environmental Remediation Programs, Table 375-6.8(b): Restricted Use Soil Cleanup Objectives.
2. Guidance Values per NSYDEC Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS).

FIGURES

FIGURE 1



2558 HAMBURG TURNPIKE, SUITE 300, BUFFALO, NY 14218, (716) 856-0599

PROJECT NO.:	B0581-021-001
DATE:	OCTOBER 2022
DRAFTED BY:	CNK

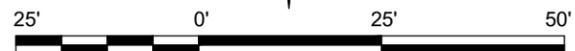
SITE LOCATION AND VICINITY MAP

SITE MANAGEMENT PLAN
293 GROTE STREET SITE
BCP SITE NO. C915368
BUFFALO, NEW YORK
 PREPARED FOR
293 GROTE STREET, LLC

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LEGEND:

- BCP BOUNDARY
- PARCEL BOUNDARY



SCALE: 1 INCH = 25 FEET
 SCALE IN FEET
 (approximate)



2558 HAMBURG TURNPIKE, SUITE 300, BUFFALO, NY 14218,
 (716) 856-0599

JOB NO.: B0581-021-001

SITE PLAN (AERIAL)

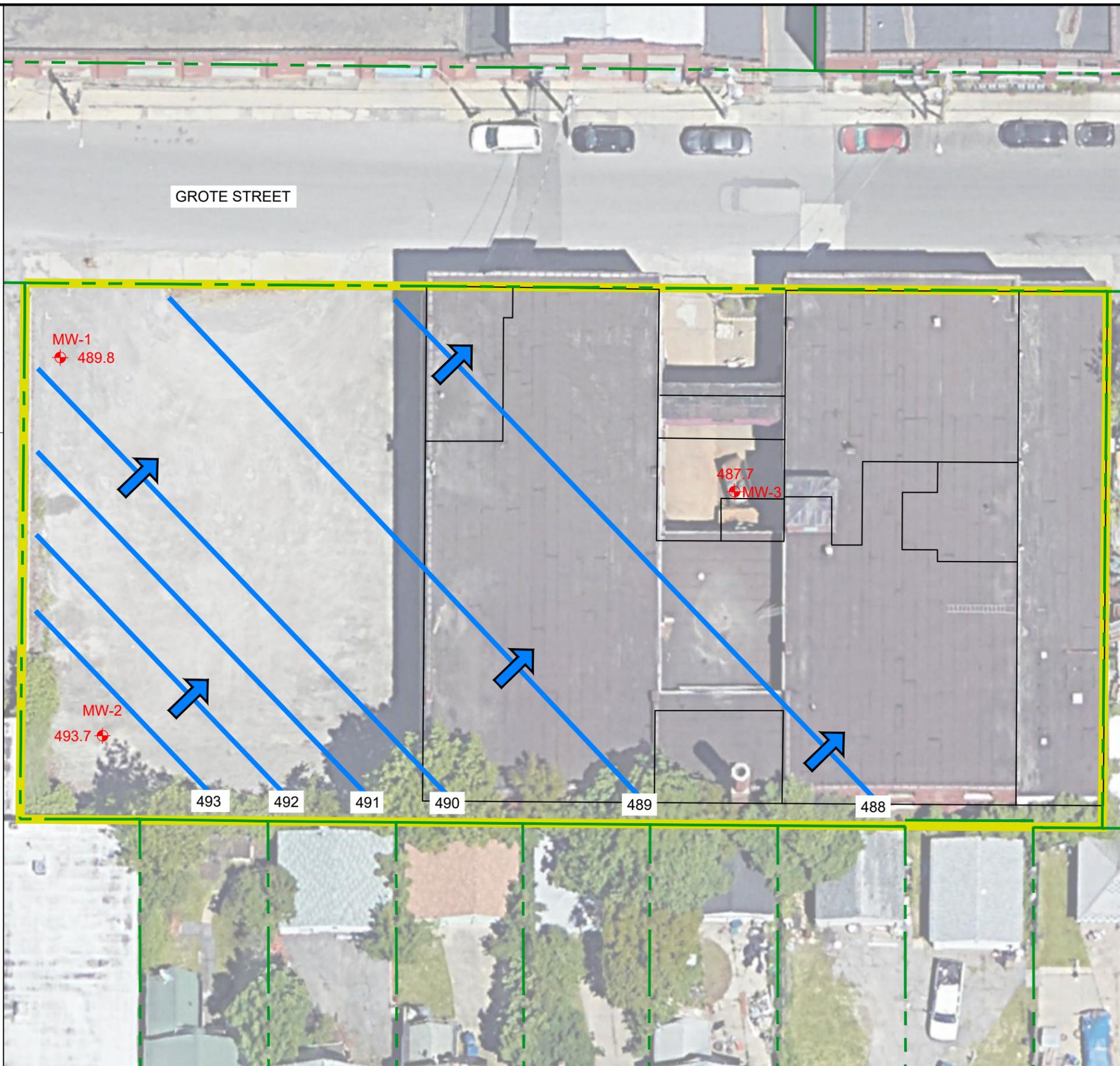
SITE MANAGEMENT PLAN
 293 GROTE STREET
 BCP SITE NO. C915368
 BUFFALO, NEW YORK
 PREPARED FOR
 293 GROTE STREET, LLC

FIGURE 2

LEGEND:

-  BCP BOUNDARY
-  PARCEL BOUNDARY
-  MW-1
489.8 RI MONITORING WELL AND GROUNDWATER ELEVATION (FT)
-  493 GROUNDWATER ELEVATION CONTOUR
-  GROUNDWATER FLOW DIRECTION

- NOTES:
1. GROUNDWATER CONTOURS BASED ON WATER LEVEL MEASUREMENTS COLLECTED AUGUST 11, 2021.
 2. ALL ELEVATIONS ARE MEASURED IN FEET AND BASED OFF OF AN ARBITRARY BENCHMARK ESTABLISHED AS THE SOUTH BONNET BOLT ON A HYDRANT LOCATED ON THE NORTH SIDE OF GROTE STREET, ACROSS THE STREET FROM THE SITE.



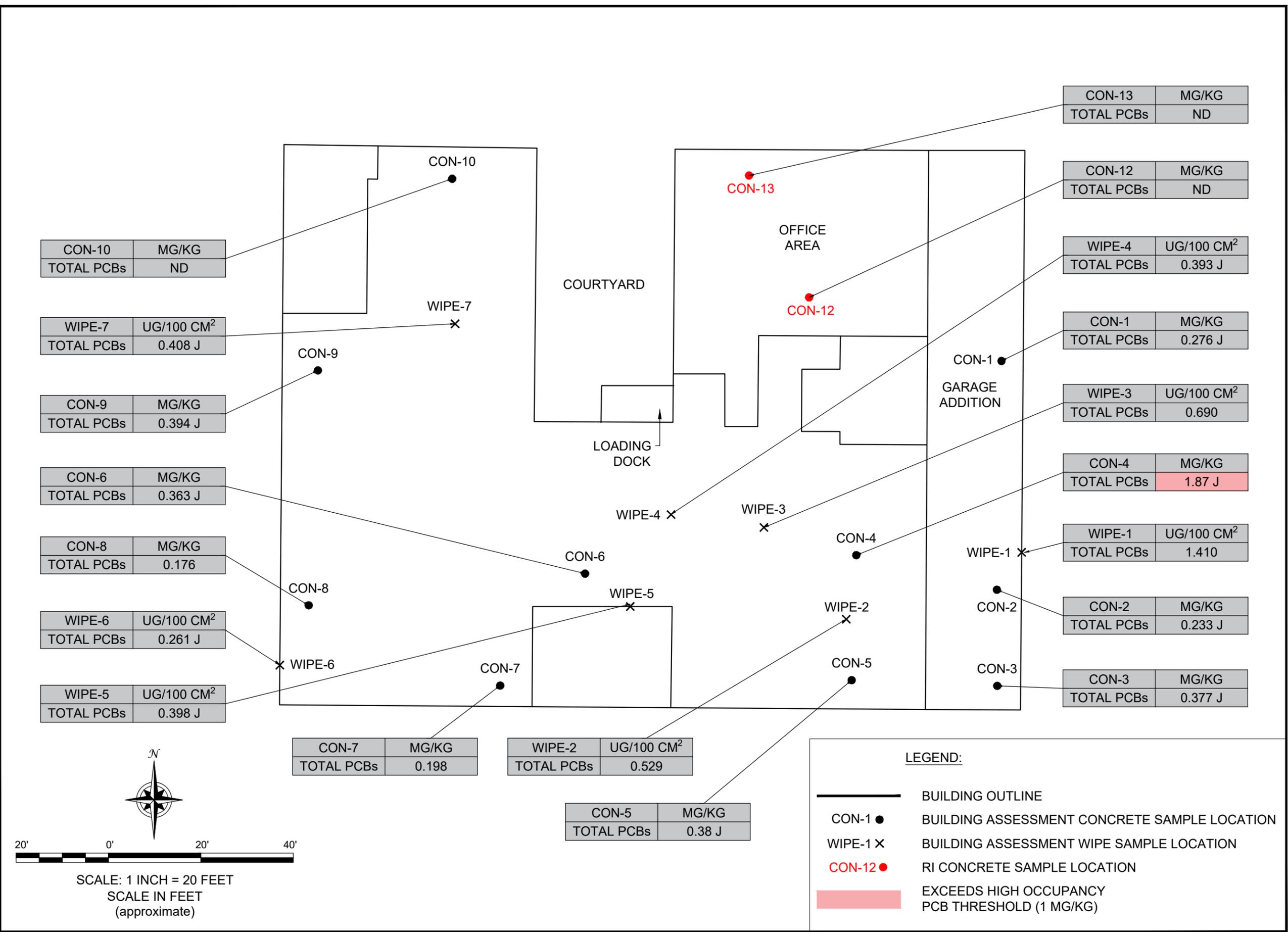
2558 HAMBURG TURNPIKE, SUITE 300, BUFFALO, NY 14218,
(716) 856-0599

JOB NO.: B0581-021-001

GROUNDWATER CONTOUR MAP

SITE MANAGEMENT PLAN
293 GROTE STREET
BCP SITE NO. C915368
BUFFALO, NEW YORK
PREPARED FOR
293 GROTE STREET, LLC

FIGURE 4





2558 HAMBURG TURNPIKE, SUITE 300, BUFFALO, NY 14218.
(716) 856-0599

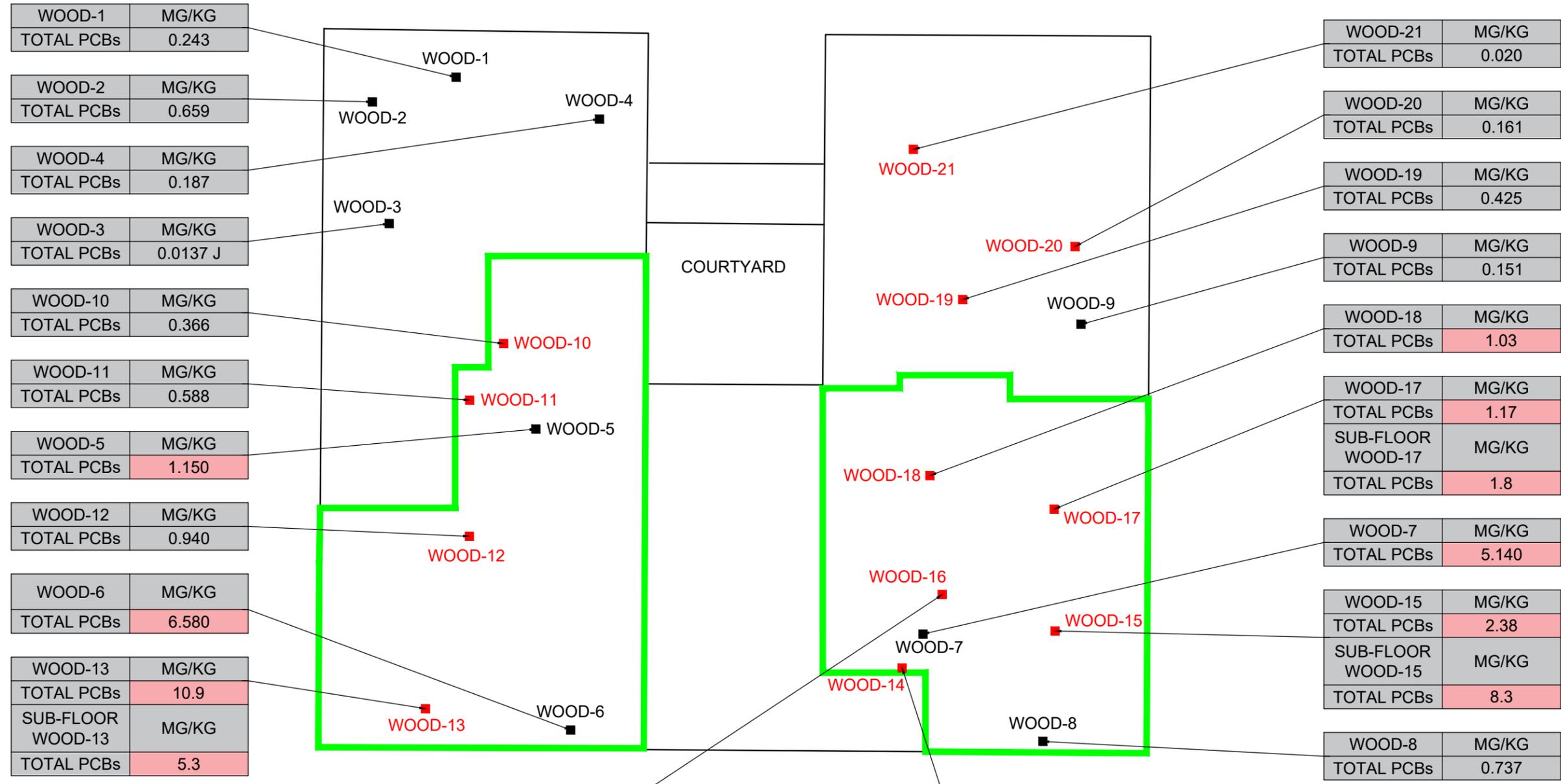
1ST FLOOR CONCRETE SAMPLE LOCATIONS AND RESULTS

SITE MANAGEMENT PLAN
293 GROTE STREET
BCP SITE NO. C915368
BUFFALO, NEW YORK
PREPARED FOR
293 GROTE STREET, LLC

FIGURE 5

JOB NO.: B0581-021-001

F:\CAD\Benchmark\McGuire Development\315 Grote Street\07-SMP\Figure 6_2nd Floor Wood Sample Locations and Results.dwg, 10/13/2022 12:09:04 PM, DWG To PDF.pcf



SCALE: 1 INCH = 20 FEET
SCALE IN FEET
(approximate)

LEGEND:

- BUILDING OUTLINE
- BUILDING ASSESSMENT WOOD SAMPLE LOCATION
- RI WOOD SAMPLE LOCATION
- EXCEEDS HIGH OCCUPANCY PCB THRESHOLD (1 MG/KG)
- AREA OF FLOOR AND SUBFLOOR REMOVED

2ND FLOOR WOOD SAMPLE LOCATIONS AND RESULTS

SITE MANAGEMENT PLAN
293 GROTE STREET
BCP SITE NO. C915368
BUFFALO, NEW YORK
PREPARED FOR
293 GROTE STREET, LLC



2558 HAMBURG TURNPIKE, SUITE 300, BUFFALO, NY 14218,
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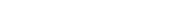
JOB NO.: B0581-021-001

FIGURE 6

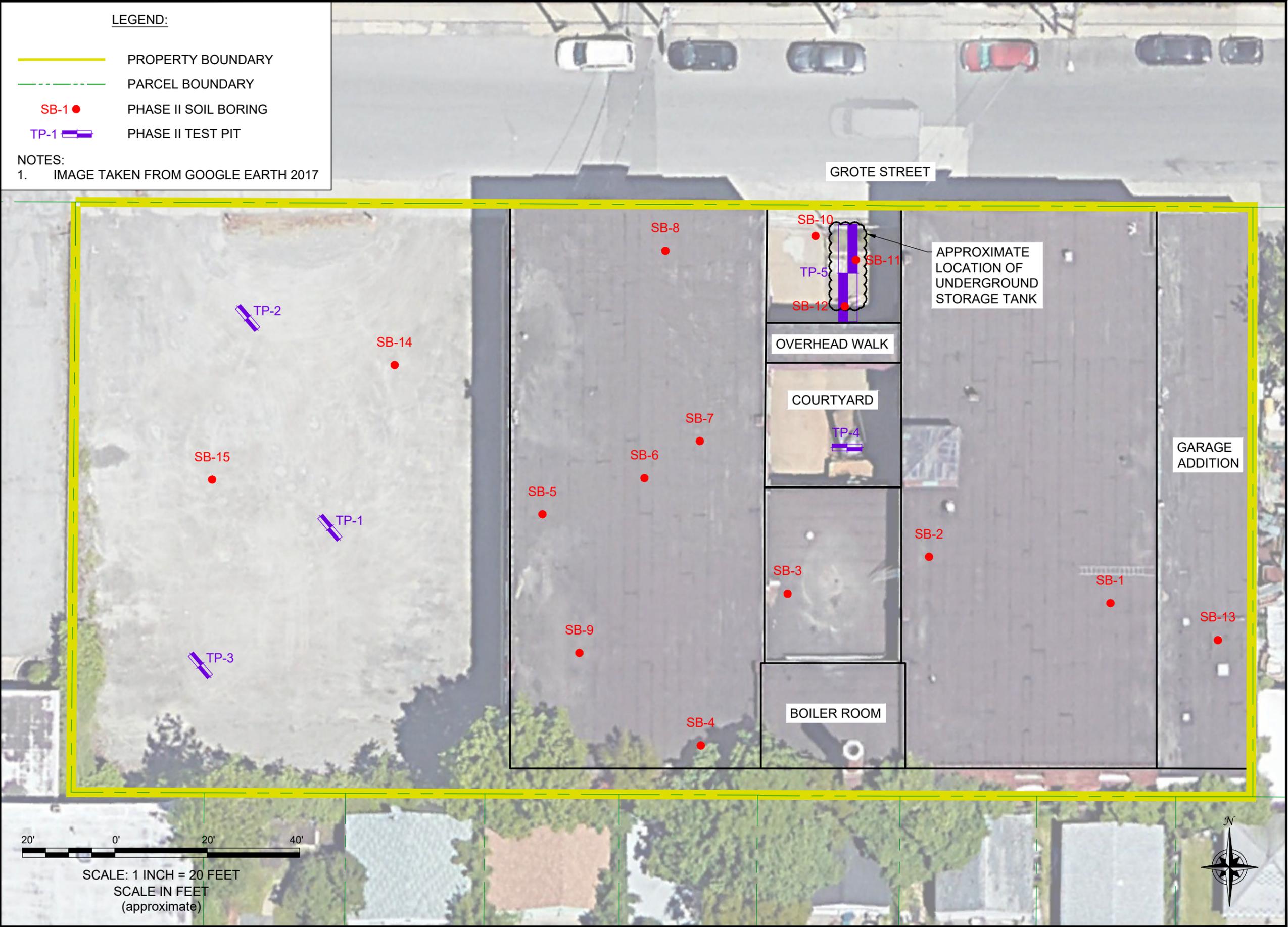
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F:\CAD\Benchmark\Development\315 Grote Street\07-SMP\Figure 7-Phase II Investigation Locations.dwg, 10/13/2022 12:12:16 PM, DWG To PDF.p3

LEGEND:

-  PROPERTY BOUNDARY
-  PARCEL BOUNDARY
-  SB-1 PHASE II SOIL BORING
-  TP-1 PHASE II TEST PIT

NOTES:
1. IMAGE TAKEN FROM GOOGLE EARTH 2017



2558 HAMBURG TURNPIKE, SUITE 300, BUFFALO, NY 14218,
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JOB NO.: B0581-021-001

PHASE II INVESTIGATION LOCATIONS

SITE MANAGEMENT PLAN
293 GROTE STREET
BCP SITE NO. C915368
BUFFALO, NEW YORK
PREPARED FOR
293 GROTE STREET, LLC

FIGURE 7

DATE: OCTOBER 2022
DRAFTED BY: CNK

SCALE: 1 INCH = 20 FEET
SCALE IN FEET
(approximate)

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LEGEND:

- BCP BOUNDARY
- PARCEL BOUNDARY
- SB-1 PHASE II SOIL BORING
- TP-1 PHASE II TEST PIT
- ⊕ MW-1 RI MONITORING WELL
- SS/NS-1 RI SURFACE/NEAR SURFACE SOIL/FILL SAMPLE
- SB-16 RI INTERIOR SOIL BORING
- TP-6 RI TEST PIT
- ↗ SVI-1 RI SOIL VAPOR INTRUSION SAMPLE
- ⊙ OA-1 OUTDOOR AIR LOCATION

EXCEEDS UNRESTRICTED SCOs
 EXCEEDS RESTRICTED-RESIDENTIAL SCOs
 EXCEEDS COMMERCIAL SCOs
 EXCEEDS INDUSTRIAL SCOs

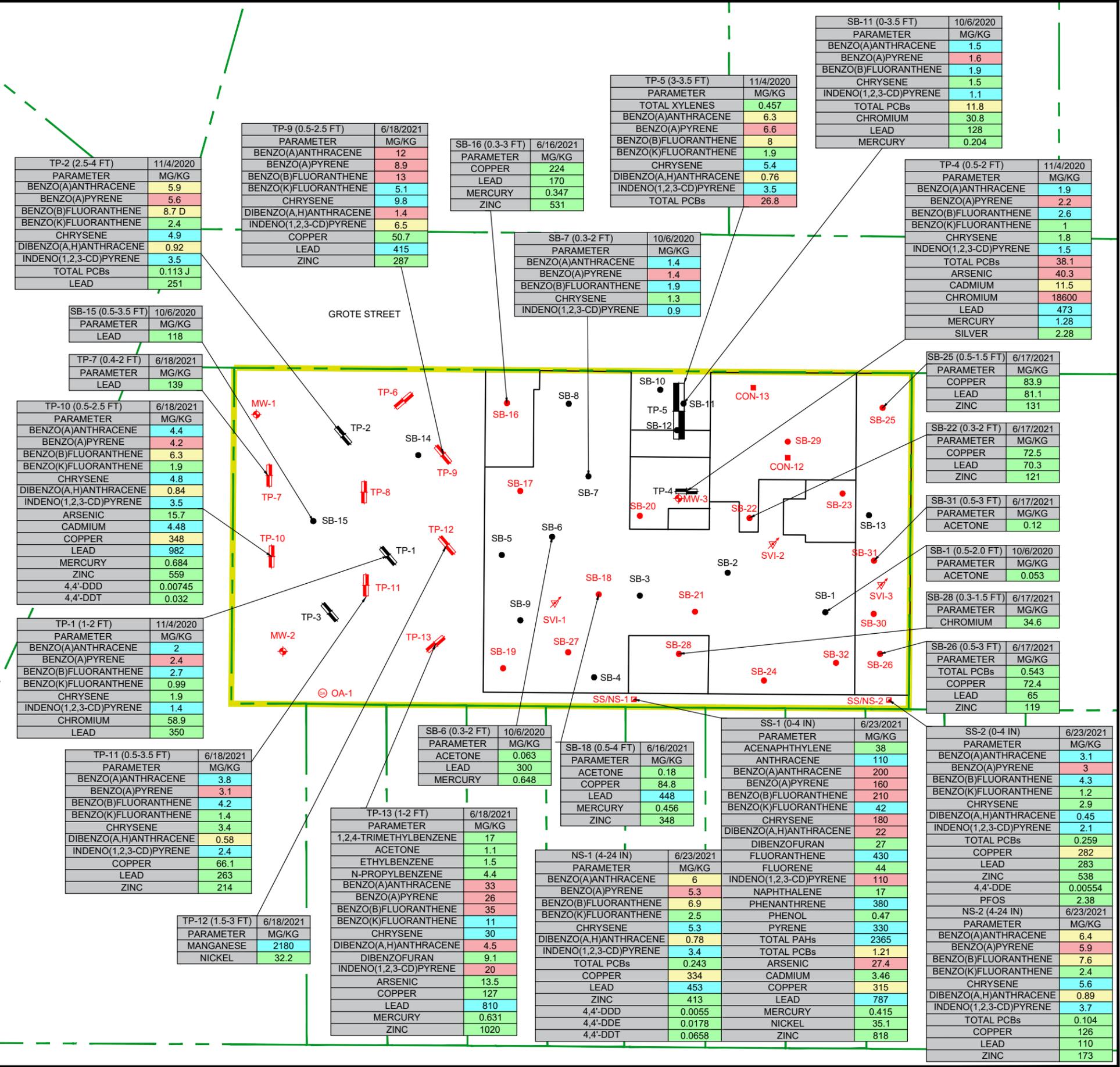
NOTES:

- RESULTS COMPARED TO 6 NYCRR PART 375 SOIL CLEANUP OBJECTIVES (SCOs).



SCALE: 1 INCH = 40 FEET
SCALE IN FEET (approximate)





TP-2 (2.5-4 FT)	11/4/2020
PARAMETER	MG/KG
BENZO(A)ANTHRACENE	5.9
BENZO(A)PYRENE	5.6
BENZO(B)FLUORANTHENE	8.7 D
BENZO(K)FLUORANTHENE	2.4
CHRYSENE	4.9
DIBENZO(A,H)ANTHRACENE	0.92
INDENO(1,2,3-CD)PYRENE	3.5
TOTAL PCBs	0.113 J
LEAD	251

TP-9 (0.5-2.5 FT)	6/18/2021
PARAMETER	MG/KG
BENZO(A)ANTHRACENE	12
BENZO(A)PYRENE	8.9
BENZO(B)FLUORANTHENE	13
BENZO(K)FLUORANTHENE	5.1
CHRYSENE	9.8
DIBENZO(A,H)ANTHRACENE	1.4
INDENO(1,2,3-CD)PYRENE	6.5
COPPER	50.7
LEAD	415
ZINC	287

SB-16 (0.3-3 FT)	6/16/2021
PARAMETER	MG/KG
COPPER	224
LEAD	170
MERCURY	0.347
ZINC	531

TP-5 (3-3.5 FT)	11/4/2020
PARAMETER	MG/KG
TOTAL XYLENES	0.457
BENZO(A)ANTHRACENE	6.3
BENZO(A)PYRENE	6.6
BENZO(B)FLUORANTHENE	8
BENZO(K)FLUORANTHENE	1.9
CHRYSENE	5.4
DIBENZO(A,H)ANTHRACENE	0.76
INDENO(1,2,3-CD)PYRENE	3.5
TOTAL PCBs	26.8

SB-11 (0-3.5 FT)	10/6/2020
PARAMETER	MG/KG
BENZO(A)ANTHRACENE	1.5
BENZO(A)PYRENE	1.6
BENZO(B)FLUORANTHENE	1.9
CHRYSENE	1.5
INDENO(1,2,3-CD)PYRENE	1.1
TOTAL PCBs	11.8
CHROMIUM	30.8
LEAD	128
MERCURY	0.204

TP-4 (0.5-2 FT)	11/4/2020
PARAMETER	MG/KG
BENZO(A)ANTHRACENE	1.9
BENZO(A)PYRENE	2.2
BENZO(B)FLUORANTHENE	2.6
BENZO(K)FLUORANTHENE	1
CHRYSENE	1.8
INDENO(1,2,3-CD)PYRENE	1.5
TOTAL PCBs	38.1
ARSENIC	40.3
CADMIUM	11.5
CHROMIUM	18600
LEAD	473
MERCURY	1.28
SILVER	2.28

SB-15 (0.5-3.5 FT)	10/6/2020
PARAMETER	MG/KG
LEAD	118

TP-7 (0.4-2 FT)	6/18/2021
PARAMETER	MG/KG
LEAD	139

TP-10 (0.5-2.5 FT)	6/18/2021
PARAMETER	MG/KG
BENZO(A)ANTHRACENE	4.4
BENZO(A)PYRENE	4.2
BENZO(B)FLUORANTHENE	6.3
BENZO(K)FLUORANTHENE	1.9
CHRYSENE	4.8
DIBENZO(A,H)ANTHRACENE	0.84
INDENO(1,2,3-CD)PYRENE	3.5
ARSENIC	15.7
CADMIUM	4.48
COPPER	348
LEAD	982
MERCURY	0.684
ZINC	559
4,4'-DDD	0.00745
4,4'-DDT	0.032

TP-1 (1-2 FT)	11/4/2020
PARAMETER	MG/KG
BENZO(A)ANTHRACENE	2
BENZO(A)PYRENE	2.4
BENZO(B)FLUORANTHENE	2.7
BENZO(K)FLUORANTHENE	0.99
CHRYSENE	1.9
INDENO(1,2,3-CD)PYRENE	1.4
CHROMIUM	58.9
LEAD	350

TP-11 (0.5-3.5 FT)	6/18/2021
PARAMETER	MG/KG
BENZO(A)ANTHRACENE	3.8
BENZO(A)PYRENE	3.1
BENZO(B)FLUORANTHENE	4.2
BENZO(K)FLUORANTHENE	1.4
CHRYSENE	3.4
DIBENZO(A,H)ANTHRACENE	0.58
INDENO(1,2,3-CD)PYRENE	2.4
COPPER	66.1
LEAD	263
ZINC	214

TP-12 (1.5-3 FT)	6/18/2021
PARAMETER	MG/KG
MANGANESE	2180
NICKEL	32.2

TP-13 (1-2 FT)	6/18/2021
PARAMETER	MG/KG
1,2,4-TRIMETHYLBENZENE	17
ACETONE	1.1
ETHYLBENZENE	1.5
N-PROPYLBENZENE	4.4
BENZO(A)ANTHRACENE	33
BENZO(A)PYRENE	26
BENZO(B)FLUORANTHENE	35
BENZO(K)FLUORANTHENE	11
CHRYSENE	30
DIBENZO(A,H)ANTHRACENE	4.5
DIBENZOFURAN	9.1
INDENO(1,2,3-CD)PYRENE	20
ARSENIC	13.5
COPPER	127
LEAD	810
MERCURY	0.631
ZINC	1020

SB-6 (0.3-2 FT)	10/6/2020
PARAMETER	MG/KG
ACETONE	0.063
LEAD	300
MERCURY	0.648

SB-18 (0.5-4 FT)	6/16/2021
PARAMETER	MG/KG
ACETONE	0.18
COPPER	84.8
LEAD	448
MERCURY	0.456
ZINC	348

NS-1 (4-24 IN)	6/23/2021
PARAMETER	MG/KG
BENZO(A)ANTHRACENE	6
BENZO(A)PYRENE	5.3
BENZO(B)FLUORANTHENE	6.9
BENZO(K)FLUORANTHENE	2.5
CHRYSENE	5.3
DIBENZO(A,H)ANTHRACENE	0.78
INDENO(1,2,3-CD)PYRENE	3.4
TOTAL PCBs	0.243
COPPER	334
LEAD	453
ZINC	413
4,4'-DDD	0.0055
4,4'-DDE	0.0178
4,4'-DDT	0.0658

SS-1 (0-4 IN)	6/23/2021
PARAMETER	MG/KG
ACENAPHTHYLENE	38
ANTHRACENE	110
BENZO(A)ANTHRACENE	200
BENZO(A)PYRENE	160
BENZO(B)FLUORANTHENE	210
BENZO(K)FLUORANTHENE	42
CHRYSENE	180
DIBENZO(A,H)ANTHRACENE	22
DIBENZOFURAN	27
FLUORANTHENE	430
FLUORENE	44
INDENO(1,2,3-CD)PYRENE	110
NAPHTHALENE	17
PHENANTHRENE	380
PHENOL	0.47
PYRENE	330
TOTAL PAHs	2365
INDENO(1,2,3-CD)PYRENE	1.21
TOTAL PCBs	1.21
ARSENIC	27.4
CADMIUM	3.46
COPPER	315
LEAD	787
MERCURY	0.415
NICKEL	35.1
ZINC	818

SB-25 (0.5-1.5 FT)	6/17/2021
PARAMETER	MG/KG
COPPER	83.9
LEAD	81.1
ZINC	131

SB-22 (0.3-2 FT)	6/17/2021
PARAMETER	MG/KG
COPPER	72.5
LEAD	70.3
ZINC	121

SB-31 (0.5-3 FT)	6/17/2021
PARAMETER	MG/KG
ACETONE	0.12

SB-1 (0.5-2.0 FT)	10/6/2020
PARAMETER	MG/KG
ACETONE	0.053

SB-28 (0.3-1.5 FT)	6/17/2021
PARAMETER	MG/KG
CHROMIUM	34.6

SB-26 (0.5-3 FT)	6/17/2021
PARAMETER	MG/KG
TOTAL PCBs	0.543
COPPER	72.4
LEAD	65
ZINC	119

SS-2 (0-4 IN)	6/23/2021
PARAMETER	MG/KG
BENZO(A)ANTHRACENE	3.1
BENZO(A)PYRENE	3
BENZO(B)FLUORANTHENE	4.3
BENZO(K)FLUORANTHENE	1.2
CHRYSENE	2.9
DIBENZO(A,H)ANTHRACENE	0.45
INDENO(1,2,3-CD)PYRENE	2.1
TOTAL PCBs	0.259
COPPER	282
LEAD	283
ZINC	538
4,4'-DDE	0.00554
PFOS	2.38
NS-2 (4-24 IN)	6/23/2021
PARAMETER	MG/KG
BENZO(A)ANTHRACENE	6.4
BENZO(A)PYRENE	5.9
BENZO(B)FLUORANTHENE	7.6
BENZO(K)FLUORANTHENE	2.4
CHRYSENE	5.6
DIBENZO(A,H)ANTHRACENE	0.89
INDENO(1,2,3-CD)PYRENE	3.7
TOTAL PCBs	0.104
COPPER	126
LEAD	110
ZINC	173



2558 HAMBURG TURNPIKE, SUITE 300, BUFFALO, NY 14218.
(716) 856-0599

SOIL/FILL ANALYTICAL RESULTS

SITE MANAGEMENT PLAN
293 GROTE STREET
BCP SITE NO. C915368
BUFFALO, NEW YORK
PREPARED FOR
293 GROTE STREET, LLC

JOB NO.: B0581-021-001

FIGURE 8

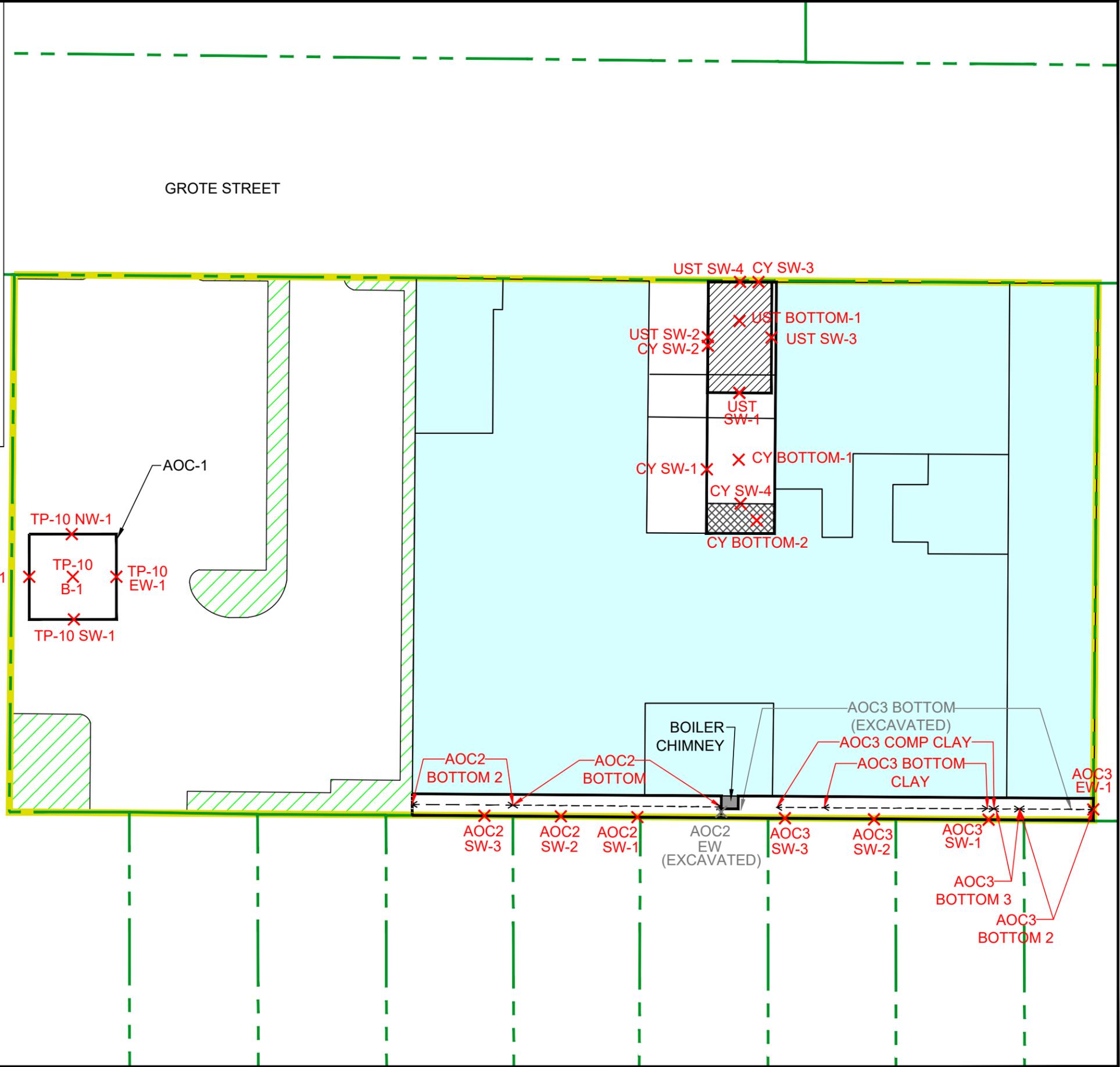
F:\CAD\Benchmark\Development\315 Grote Street\07-SMP\Figure 9:IRM Areas Completed and Post Excavation Sample Locations.dwg, 10/13/2022 12:49:12 PM, DWG To PDF.p3

LEGEND:

- BCP BOUNDARY
- PARCEL BOUNDARY
- COURTYARD AREA ADDRESSED DURING IRM ACTIVITIES
- CONCRETE REMOVAL AREA
- EXCAVATION EXTENTS
- UST EXCAVATION AREA
- POST-EXCAVATION SAMPLE LOCATION
- CONCRETE LOADING DOCK
- MINIMUM 2-FT CUT (GREENSPACE COVER)

NOTES:

1. AOC COMP CLAY WAS COLLECTED FROM FOUR LOCATIONS IN THE SHALLOW CLAY AREA OF AOC3 FROM 1 TO 2 FBGS.



SCALE: 1 INCH = 25 FEET
SCALE IN FEET (approximate)

2558 HAMBURG TURNPIKE, SUITE 300, BUFFALO, NY 14218.
(716) 856-0599

JOB NO.: B0581-021-001

IRM AREAS COMPLETED AND POST EXCAVATION SAMPLE LOCATIONS

SITE MANAGEMENT PLAN
293 GROTE STREET
BCP SITE NO. C915368
BUFFALO, NEW YORK
PREPARED FOR
293 GROTE STREET, LLC

FIGURE 9

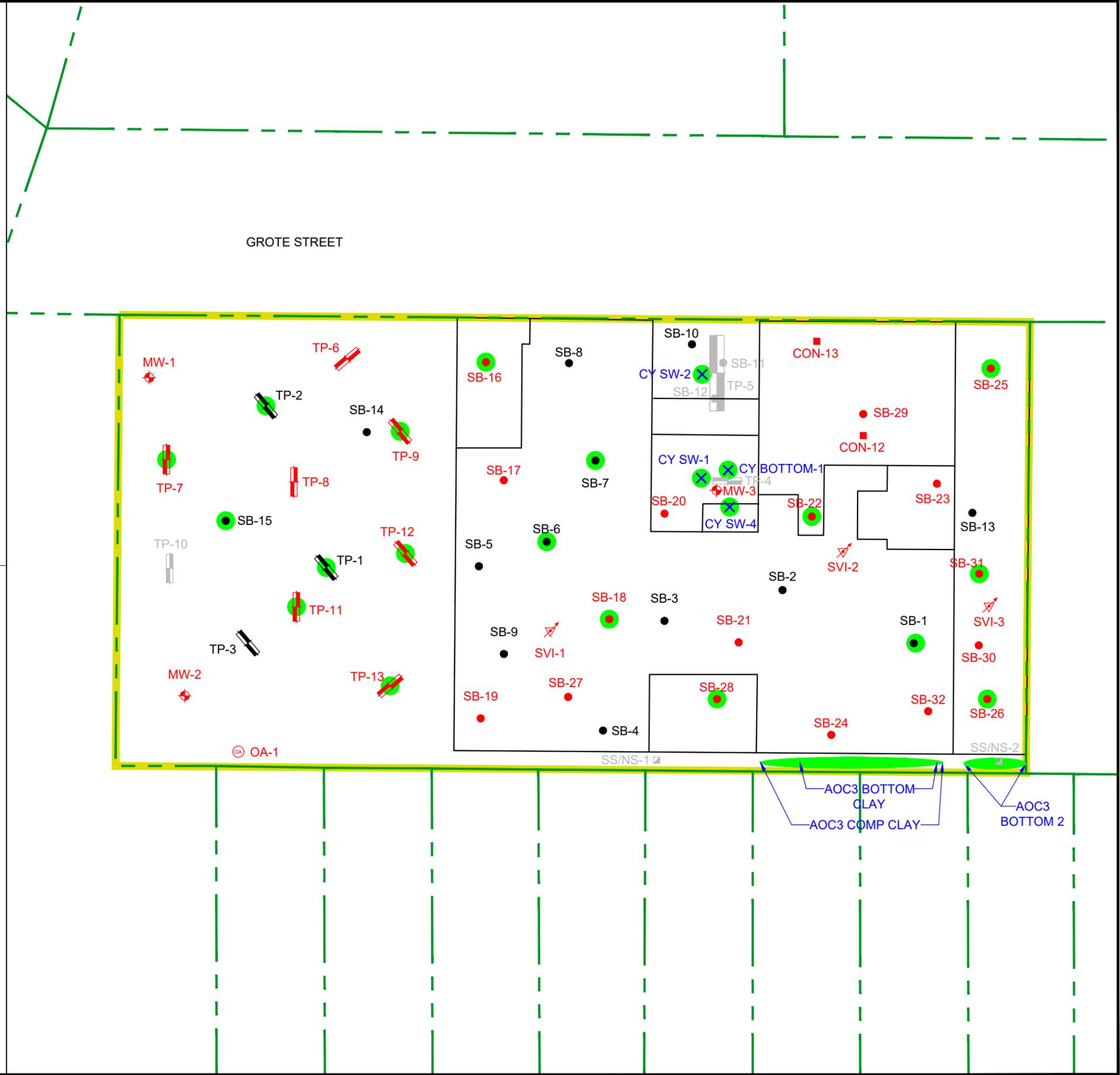
DISCLAIMER: PROPERTY OF BENCHMARK CIVIL/ENVIRONMENTAL ENGINEERING & GEOLOGY, PLLC. IMPORTANT: THIS DRAWING PRINT IS LOANED FOR MUTUAL ASSISTANCE AND AS SUCH IS SUBJECT TO RECALL AT ANY TIME. INFORMATION CONTAINED HEREON IS NOT TO BE DISCLOSED OR REPRODUCED IN ANY FORM FOR THE BENEFIT OF PARTIES OTHER THAN NECESSARY SUBCONTRACTORS & SUPPLIERS WITHOUT THE WRITTEN CONSENT OF BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC.

LEGEND:

- BCP BOUNDARY
- - - - PARCEL BOUNDARY
- SB-1 ● PHASE II SOIL BORING
- TP-1 PHASE II TEST PIT
- MW-1 RI MONITORING WELL
- SS/NS-1 RI SURFACE/NEAR SURFACE SOIL/FILL SAMPLE
- SB-16 ● RI INTERIOR SOIL BORING
- TP-6 RI TEST PIT
- SVI-1 RI SOIL VAPOR INTRUSION SAMPLE
- OA-1 OUTDOOR AIR LOCATION
- SB-10 ● SAMPLED SOIL/FILL REMOVED DURING IRM ACTIVITIES
- SW-1 POST-EXCAVATION SAMPLE LOCATION
- SOIL/FILL REMAINING EXCEEDING USCOS

NOTES:

- USCOs = 6 NYCRR PART 375 UNRESTRICTED SOIL CLEANUP OBJECTIVES



SCALE: 1 INCH = 40 FEET
SCALE IN FEET
(approximate)

2558 HAMBURG TURNPIKE, SUITE 300, BUFFALO, NY 14218.
(716) 856-0599

LOCATIONS OF USCO EXCEEDANCES

SITE MANAGEMENT PLAN
293 GROTE STREET
BCP SITE NO. C915368
BUFFALO, NEW YORK
PREPARED FOR
293 GROTE STREET, LLC

FIGURE 10

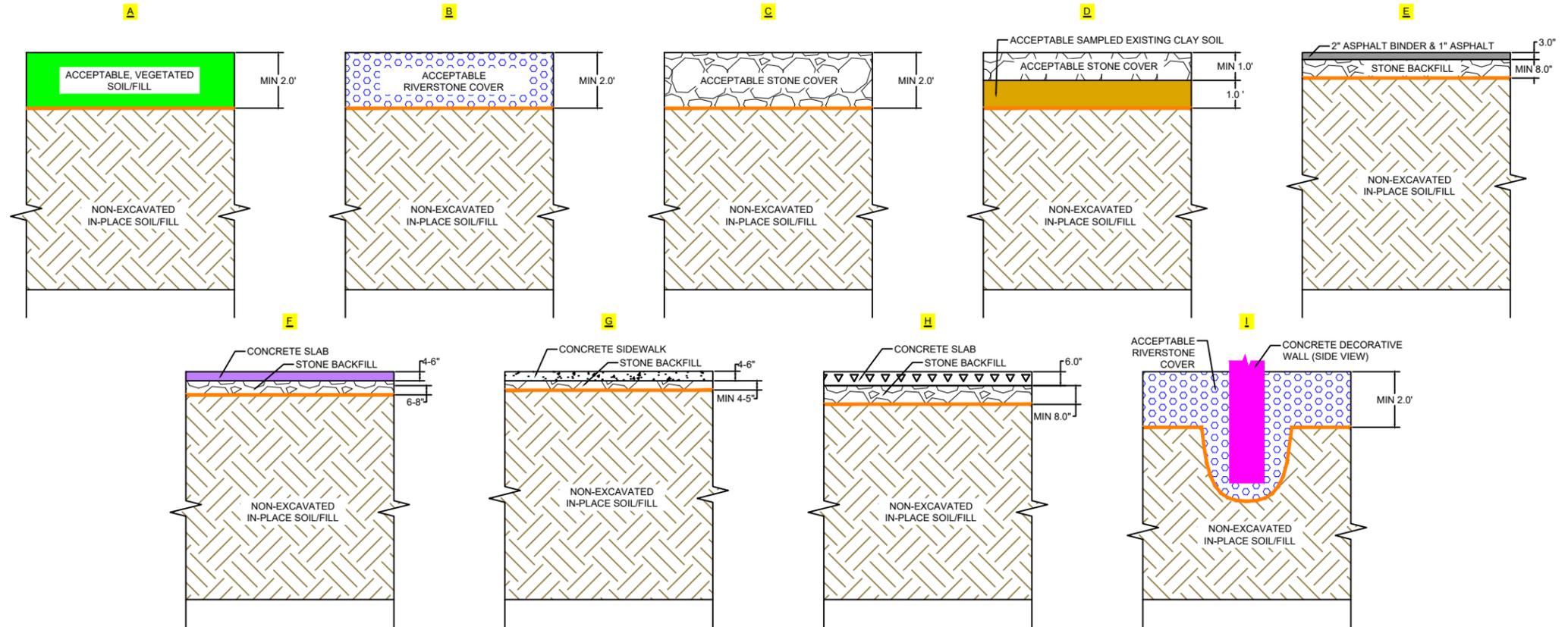
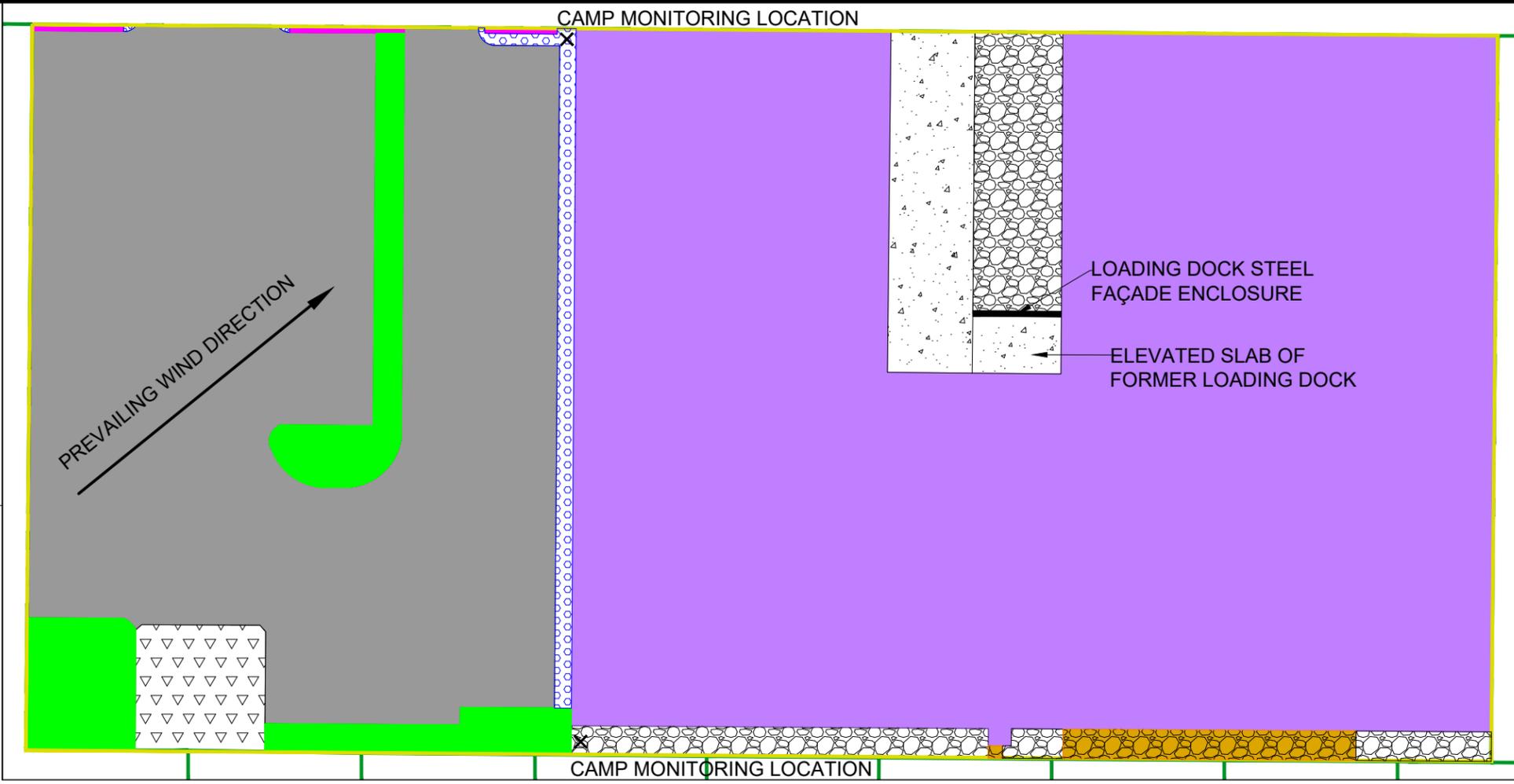
JOB NO.: B0581-021-001

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- LEGEND:**
-  BCP BOUNDARY
 -  PARCEL BOUNDARY
 -  GREENSPACE (A)
 -  RIVERSTONE COVER (B)
 -  STONE COVER (C)
 -  STONE AND CLAY COVER (D)
 -  ASPHALT COVER (E)
 -  BUILDING (F)
 -  CONCRETE SIDEWALK COVER (G)
 -  CONCRETE SLAB COVER (H)
 -  CONCRETE DECORATIVE WALL (I)
 -  DEMARCATION LAYER



SCALE: 1 INCH = 25 FEET
SCALE IN FEET
(approximate)



COVER SYSTEM
SITE MANAGEMENT PLAN
293 GROTE STREET
BCP SITE NO. C915368
BUFFALO, NEW YORK
PREPARED FOR
293 GROTE STREET, LLC



2558 HAMBURG TURNPIKE, SUITE 300, BUFFALO, NY 14218,
(716) 856-0599

JOB NO.: B0581-021-001

FIGURE 11

DATE: OCTOBER 2022
DRAFTED BY: CNK

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APPENDIX A

LIST OF SITE CONTACTS

**SITE MANAGEMENT PLAN
293 GROTE STREET SITE**

**Appendix A
List of Site Contacts**

<u>Name</u>	<u>Phone/Email Address</u>
James McGuire 293 Grote Street, LLC (Owner)	(716) 829-1900 eric@mcg-dev.com
Eric Ekman 293 Grote Street, LLC (Owner)	(716) 829-1900 eric@mcg-dev.com
Thomas Forbes, P.E. Benchmark Civil/Env. Engineering & Geology Qualified Environmental Professional	(716) 856-0599 tforbes@bm-tk.com
Damianos Skaros NYSDEC Project Manager	(716)851-7070 damianos.skaros@dec.ny.gov
Andrea Caprio NYSDEC Regional HW Engineer	716-851-7220 andrea.caprio@dec.ny.gov
Kelly Lewandowski NYSDEC Site Control	518-402-9543 kelly.Lewandowski@dec.ny.gov
Christine Vooris NYSDOH Project Manager	(518) 402-7860 beei@health.ny.gov
Marc Romanowski Rupp Baase Pfalzgraf Cunningham LLC (Attorney)	(716) 854-3400 romanowski@rubbpase.com

APPENDIX B

EXCAVATION WORK PLAN

BROWNFIELD CLEANUP PROGRAM SITE MANAGEMENT PLAN

APPENDIX B EXCAVATION WORK PLAN

**293 GROTE STREET SITE
NYSDEC SITE NUMBER: C915368
BUFFALO, NEW YORK**

November 2022

B0581-021-001

Prepared for:

293 GROTE STREET, LLC

455 Cayuga Road, Suite 100
Buffalo, New York

Prepared By:



Benchmark Civil/Environmental Engineering & Geology, PLLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716)856-0599

SITE MANAGEMENT PLAN
APPENDIX B: EXCAVATION PLAN
293 GROTE STREET SITE

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B-1: NOTIFICATION

At least 15 days prior to the start of any activity that is anticipated to encounter remaining contamination, the site owner or their representative will notify the NYSDEC. Table 1 includes contact information for the above notification. The information on this table will be updated as necessary to provide accurate contact information. A full listing of site-related contact information is provided in Appendix A.

Table B-1: Notifications*

Damianos Skaros NYSDEC Project Manager	(716)851-7070 damianos.skaros@dec.ny.gov
Andrea Caprio NYSDEC Regional HW Engineer	716-851-7220 andrea.caprio@dec.ny.gov
Kelly Lewandowski NYSDEC Site Control	518-402-9543 kelly.lewandowski@dec.ny.gov
Christine Vooris NYSDOH Project Manager	(518) 402-7860 beei@health.ny.gov

* Note: Notifications are subject to change and will be updated as necessary.

This notification will include:

- A detailed description of the work to be performed, including the location and areal extent of excavation, plans/drawings for site re-grading, intrusive elements or utilities to be installed below the soil cover, estimated volumes of contaminated soil to be excavated and any work that may impact an engineering control;
- A summary of environmental conditions anticipated to be encountered in the work areas, including the nature and concentration levels of contaminants of concern, potential presence of grossly contaminated media, and plans for any pre-construction sampling;
- A schedule for the work, detailing the start and completion of all intrusive work;
- A summary of the applicable components of this EWP;
- A statement that the work will be performed in compliance with this EWP, 29 CFR 1910.120 and 29 CFR 1926 Subpart P;

- A copy of the contractor's health and safety plan (HASP), in electronic format, if it differs from the HASP provided in Appendix G of this SMP;
- Identification of disposal facilities for potential waste streams; and
- Identification of sources of any anticipated backfill, along with all required chemical testing results.

B-2: SOIL SCREENING METHODS

Visual, olfactory and instrument-based (e.g. photoionization detector) soil screening will be performed by a qualified environmental professional during all excavations into known or potentially contaminated material (remaining contamination). Soil screening will be performed when invasive work is done and will include all excavation and invasive work performed during development, such as excavations for foundations and utility work, after issuance of the COC.

Soils will be segregated based on previous environmental data and screening results into material that requires off-site disposal and material that requires testing to determine if the material can be reused on-site as soil beneath a cover or if the material can be used as cover soil. Further discussion of off-site disposal of materials and on-site reuse is provided in Sections B-6 and B-7 of this Appendix.

B-3: SOIL STAGING METHODS

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

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

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

B-4: MATERIALS EXCAVATION AND LOAD-OUT

A qualified environmental professional or person under their supervision will oversee all invasive work and the excavation and load-out of all excavated material.

The owner of the property and remedial party (if applicable) and its contractors are responsible for safe execution of all invasive and other work performed under this Plan.

The presence of utilities and easements on the site will be investigated by the qualified environmental professional. It will be determined whether a risk or impediment to the planned work under this SMP is posed by utilities or easements on the site.

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

A truck wash will be operated on-site, as appropriate. The qualified environmental professional will be responsible for ensuring that all outbound trucks will be washed at the truck wash before leaving the site until the activities performed under this section are complete. Truck wash waters will be collected and disposed of off-site in an appropriate manner.

Locations where vehicles enter or exit the site shall be inspected daily for evidence of off-site soil tracking.

The qualified environmental professional will be responsible for ensuring that all egress points for truck and equipment transport from the site are clean of dirt and other materials derived from the site during intrusive excavation activities. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to site-derived materials.

B-5: MATERIALS TRANSPORT OFF-SITE

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

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

Trucks will access the leave the site from Elmwood Avenue to the east. All trucks loaded with site materials will exit the vicinity of the site using only these approved truck routes. This is the most appropriate route and takes into account: (a) limiting transport through residential areas and past sensitive sites; (b) use of city mapped truck routes; (c)

prohibiting off-site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport.

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

Egress points for truck and equipment transport from the site will be kept clean of dirt and other materials during site remediation and development.

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

B-6: MATERIALS DISPOSAL OFF-SITE

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

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

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

B-7: MATERIALS REUSE ON-SITE

The qualified environmental professional will ensure that procedures defined for materials reuse in this SMP are followed and that unacceptable material does not remain on-

site. Contaminated on-site material, including historic fill and contaminated soil, that is acceptable for reuse on-site will be placed below the demarcation layer or impervious surface, and will not be reused within a cover soil layer, within landscaping berms, or as backfill for subsurface utility lines.

Any demolition material proposed for reuse on-site will be sampled for asbestos and the results will be reported to the NYSDEC for acceptance. Concrete crushing or processing on-site will not be performed without prior NYSDEC approval. Organic matter (wood, roots, stumps, etc.) or other solid waste derived from clearing and grubbing of the site will not be reused on-site.

B-8: FLUIDS MANAGEMENT

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

Discharge of water generated during large-scale construction activities to surface waters (i.e. a local pond, stream, or river) will be performed under a SPDES permit.

B-9: COVER SYSTEM RESTORATION

After the completion of soil removal and any other invasive activities the cover system will be restored in a manner that complies with the Decision Document. The existing cover system is comprised of a minimum of 24 inches of clean soil, asphalt pavement, concrete covered sidewalks, and concrete building, etc.]. The demarcation layer, consisting of gray geotextile or equivalent material will be replaced to provide a visual reference to the top of the remaining contamination zone, the zone that requires adherence to special conditions for disturbance of remaining contaminated soils defined in this SMP. If the type of cover system changes from that which exists prior to the excavation (i.e., a soil cover is replaced by asphalt), this will constitute a modification of the cover element of the remedy and the upper surface of the remaining contamination. A figure showing the modified surface will be included in the subsequent Periodic Review Report and in an updated SMP.

B-10: BACKFILL FROM OFF-SITE SOURCES

All materials proposed for import onto the site will be approved by the qualified environmental professional and will be in compliance with provisions in this SMP prior to receipt at the site. A Request to Import/Reuse Fill or Soil form, which can be found at <http://www.dec.ny.gov/regulations/67386.html>, will be prepared and submitted to the NYSDEC project manager allowing a minimum of 5 business days for review.

Material from industrial sites, spill sites, or other environmental remediation sites or potentially contaminated sites will not be imported to the site.

All imported soils will meet the backfill and cover soil quality standards established in 6NYCRR 375-6.7(d). Based on an evaluation of the land use, protection of groundwater and protection of ecological resources criteria, the resulting soil quality standards are listed in Table 11. Soils that meet 'exempt' fill requirements under 6 NYCRR Part 360, but do not meet backfill or cover soil objectives for this site, will not be imported onto the site without prior approval by NYSDEC. Solid waste will not be imported onto the site.

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

B-11: STORMWATER POLLUTION PREVENTION

Barriers and hay bale checks will be installed and inspected once a week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the site and available for inspection by the NYSDEC. All necessary repairs shall be made immediately.

Accumulated sediments will be removed as required to keep the barrier and hay bale check functional.

All undercutting or erosion of the silt fence toe anchor shall be repaired immediately with appropriate backfill materials.

Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

Erosion and sediment control measures identified in the SMP shall be observed to ensure that they are operating correctly. Where discharge locations or points are accessible,

they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters.

Silt fencing or hay bales will be installed around the entire perimeter of the construction area.

B-12: EXCAVATION CONTINGENCY PLAN

If underground tanks or other previously unidentified contaminant sources are found during post-remedial subsurface excavations or development related construction, excavation activities will be suspended until sufficient equipment is mobilized to address the condition.

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

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

B-13: COMMUNITY AIR MONITORING PLAN

A figure showing the location of air sampling stations based on generally prevailing wind conditions is shown in Figure 11. These locations will be adjusted on a daily or more frequent basis based on actual wind directions to provide an upwind and at least two downwind monitoring stations.

Exceedances of action levels listed in the CAMP will be reported to NYSDEC and NYSDOH Project Managers.

B-13A: Special Requirements for Work Within 20 Feet of Potentially Exposed Individuals or Structures

When work areas are within 20 feet of potentially exposed populations or occupied structures, the continuous monitoring locations for VOCs and particulates must reflect the nearest potentially exposed individuals and the location of ventilation system intakes for nearby structures. The use of engineering controls such as vapor/dust barriers, temporary negative-pressure enclosures, or special ventilation devices should be considered to prevent exposures related to the work activities and to control dust and odors. Consideration should be given to implementing the planned activities when potentially exposed populations are at a minimum, such as during weekends or evening hours in non-residential settings.

- If total VOC concentrations opposite the walls of occupied structures or next to intake vents exceed 1 part-per-million, monitoring should occur within the occupied structure(s). Depending upon the nature of contamination, chemical-specific colorimetric tubes of sufficient sensitivity may be necessary for comparing the exposure point concentrations with appropriate pre-determined response levels (response actions should also be pre-determined). Background readings in the occupied spaces must be taken prior to commencement of the planned work. Any unusual background readings should be discussed with NYSDOH prior to commencement of the work.
- If total particulate concentrations opposite the walls of occupied structures or next to intake vents exceed 150 micrograms per cubic meter, work activities should be suspended until controls are implemented and are successful in reducing the total particulate concentration to 150 micrograms per cubic meter or less at the monitoring point.
- Depending upon the nature of contamination and remedial activities, other parameters (e.g., explosivity, oxygen, hydrogen sulfide, carbon monoxide) may also need to be monitored. Response levels and actions should be pre-determined, as necessary, for each site.

B-13B: Special Requirements for Indoor Work with Co-Located Residences or Facilities

Unless a self-contained, negative-pressure enclosure with proper emission controls will encompass the work area, all individuals not directly involved with the planned work must be absent from the room in which the work will occur. Monitoring requirements shall be as

stated above under “Special Requirements for Work Within 20 Feet of Potentially Exposed Individuals or Structures” except that in this instance “nearby/occupied structures” would be adjacent occupied rooms. Additionally, the location of all exhaust vents in the room and their discharge points, as well as potential vapor pathways (openings, conduits, etc.) relative to adjoining rooms, should be understood and the monitoring locations established accordingly. In these situations, it is strongly recommended that exhaust fans or other engineering controls be used to create negative air pressure within the work area during remedial activities. Additionally, it is strongly recommended that the planned work be implemented during hours (e.g. weekends or evenings) when building occupancy is at a minimum.

B-14: ODOR CONTROL PLAN

This odor control plan is capable of controlling emissions of nuisance odors on- and off-site. If nuisance odors are identified on-site or at the site boundary, or if odor complaints are received, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and NYSDOH will be notified of all odor events and of any other complaints about the project. Implementation of all odor controls, including the halt of work, is the responsibility of the remedial party’s Remediation Engineer, and any measures that are implemented will be discussed in the Periodic Review Report.

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

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

B-15: DUST CONTROL PLAN

Particulate monitoring must be conducted according to the Community Air Monitoring Plan (CAMP) provided in Section B-13. If particulate levels at the site exceed the thresholds listed in the CAMP or if airborne dust is observed on the site or leaving the site, the dust suppression techniques listed below will be employed. The remedial party will also take measures listed below to prevent dust production on the site.

A dust suppression plan that addresses dust management during invasive on-site work will include, at a minimum, the items listed below:

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

B-16: OTHER NUISANCES

A plan for rodent control will be developed and utilized by the contractor prior to and during site clearing and site grubbing, and during all remedial work.

A plan will be developed and utilized by the contractor for all remedial work to ensure compliance with local noise control ordinances.

APPENDIX C

RESPONSIBILITIES OF OWNER & REMEDIAL PARTY

C-1: RESPONSIBILITIES

The responsibilities for implementing the Site Management Plan (“SMP”) for the 293 Grote Street site (the “site”), number C915368, are divided between the site owner(s) and a Remedial Party, as defined below. The owner(s) is/are currently listed as:

- 293 Grote Street, LLC
455 Cayuga Road, Suite 100
Buffalo, New York
Contact: Eric Ekman

Solely for the purposes of this document and based upon the facts related to a particular site and the remedial program being carried out, the term Remedial Party (“RP”) refers to any of the following: certificate of completion holder, volunteer, applicant, responsible party, and, in the event the New York State Department of Environmental Conservation (“NYSDEC”) is carrying out remediation or site management, the NYSDEC and/or an agent acting on its behalf. The RP is:

- 293 Grote Street, LLC
455 Cayuga Road, Suite 100
Buffalo, New York
Contact: Eric Ekman
- Consultant for Owner and Responsible Party
Benchmark Civil/Environmental Engineering & Geology, PLLC
2558 Hamburg Turnpike
Buffalo, NY 14218
Contact: Thomas H. Forbes, P.E.

Nothing on this page shall supersede the provisions of an Environmental Easement, Consent Order, Consent Decree, agreement, or other legally binding document that affects rights and obligations relating to the site.

C-2: SITE OWNER'S RESPONSIBILITIES:

- 1) The owner shall follow the provisions of the SMP as they relate to future construction and excavation at the site.
- 2) In accordance with a periodic time frame determined by the NYSDEC, the owner shall periodically certify, in writing, that all Institutional Controls set forth in an Environmental Easement remain in place and continue to be complied with. The owner shall provide a written certification to the RP, upon the RP's request, in order to allow the RP to include the certification in the site's Periodic Review Report (PRR) certification to the NYSDEC.
- 3) In the event the site is delisted, the owner remains bound by the Environmental Easement, and shall submit, upon request by the NYSDEC, a written certification that the Environmental Easement is still in place and has been complied with.
- 4) The owner shall grant access to the site to the RP and the NYSDEC and its agents for the purposes of performing activities required under the SMP and assuring compliance with the SMP.
- 5) The owner is responsible for assuring the security of the remedial components located on its property to the best of its ability. In the event that damage to the remedial components or vandalism is evident, the owner shall notify the site's RP and the NYSDEC in accordance with the timeframes indicated in Section 1.3 - Notifications.
- 6) In the event some action or inaction by the owner adversely impacts the site, the owner must notify the site's RP and the NYSDEC in accordance with the time frame indicated in Section 1.3 – Notifications and (ii) coordinate the performance of necessary corrective actions with the RP.
- 7) The owner must notify the RP and the NYSDEC of any change in ownership of the site property (identifying the tax map numbers in any correspondence) and provide contact information for the new owner of the site property. 6 NYCRR Part contains notification requirements applicable to any construction or activity changes and changes in ownership. Among the notification requirements is the following: Sixty days prior written notification must be made to the NYSDEC. Notification is to be submitted to the NYSDEC Division of Environmental Remediation's Site Control Section. Notification requirements for a change in use are detailed in Section 2.4 of the SMP. A 60-Day Advance Notification Form and Instructions are found at <http://www.dec.ny.gov/chemical/76250.html>.
- 8) In accordance with the tenant notification law, within 15 days of receipt, the owner must supply a copy of any vapor intrusion data, that is produced with respect to structures and that exceeds NYSDOH or OSHA guidelines on the site, whether

produced by the NYSDEC, RP, or owner, to the tenants on the property. The owner must otherwise comply with the tenant and occupant notification provisions of Environmental Conservation Law Article 27, Title 24.

C-3: REMEDIAL PARTY RESPONSIBILITIES

- 1) The RP must follow the SMP provisions regarding any construction and/or excavation it undertakes at the site.
- 2) The RP shall report to the NYSDEC all activities required for remediation, operation, maintenance, monitoring, and reporting. Such reporting includes, but is not limited to, periodic review reports and certifications, electronic data deliverables, corrective action work plans and reports, and updated SMPs.
- 3) Before accessing the site property to undertake a specific activity, the RP shall provide the owner advance notification that shall include an explanation of the work expected to be completed. The RP shall provide to (i) the owner, upon the owner's request, (ii) the NYSDEC, and (iii) other entities, if required by the SMP, a copy of any data generated during the site visit and/or any final report produced.
- 4) If the NYSDEC determines that an update of the SMP is necessary, the RP shall update the SMP and obtain final approval from the NYSDEC. Within 5 business days after NYSDEC approval, the RP shall submit a copy of the approved SMP to the owner(s).
- 5) The RP shall notify the NYSDEC and the owner of any changes in RP ownership and/or control and of any changes in the party/entity responsible for the operation, maintenance, and monitoring of and reporting with respect to any remedial system (Engineering Controls). The RP shall provide contact information for the new party/entity. Such activity constitutes a Change of Use pursuant to 375-1.11(d) and requires 60-days prior notice to the NYSDEC. A 60-Day Advance Notification Form and Instructions are found at <http://www.dec.ny.gov/chemical/76250.html>.
- 6) The RP shall notify the NYSDEC of any damage to or modification of the systems as required under Section 1.3 – Notifications of the SMP.
- 7) Prior to a change in use that impacts the remedial system or requirements and/or responsibilities for implementing the SMP, the RP shall submit to the NYSDEC for approval an amended SMP.
- 8) Any change in use, change in ownership, change in site classification (*e.g.*, delisting), reduction or expansion of remediation, and other significant changes related to the site may result in a change in responsibilities and, therefore, necessitate an update to the SMP and/or updated legal documents. The RP shall contact the Department to discuss the need to update such documents.

Change in RP ownership and/or control and/or site ownership does not affect the RP's obligations with respect to the site unless a legally binding document executed by the NYSDEC releases the RP of its obligations.

Future site owners and RPs and their successors and assigns are required to carry out the activities set forth above.

APPENDIX D

ENVIRONMENTAL EASEMENT

MICHAEL P. KEARNS, ERIE COUNTY CLERK
REF:

DATE: 1/4/2023
TIME: 11:02:35 AM
RECEIPT: 23001085

RUPP, BAASE, PFALZGRAF
ACCOUNT #: 1776

ITEM - 01 785
RECD: 1/4/2023 11:06:10 AM
FILE: 2023001219 BK/PG D 11412/5036
Deed Sequence: ~~TT2022011330~~
293 GROTE STREET LLC
NEW YORK STATE DEPT OF ENVIRONMENTAL CONSERV
ATION

Recording Fees		90.00
TP584		10.00
Subtotal	100.00	

TOTAL DUE	\$100.00
PAID TOTAL	\$100.00
PAID ESCROW	\$100.00

REC BY: Janet H
COUNTY RECORDER

JAN 04 2023

ERIE COUNTY
CLERK'S OFFICE

**ENVIRONMENTAL EASEMENT GRANTED PURSUANT TO ARTICLE 71, TITLE 36
OF THE NEW YORK STATE ENVIRONMENTAL CONSERVATION LAW**

THIS INDENTURE made this 20th day of December, 2022, between Owner, 293 Grote Street, LLC, having an office at 455 Cayuga Rd, Suite 100, Buffalo, Erie County, State of New York (the "Grantor"), and The People of the State of New York (the "Grantee"), acting through their Commissioner of the Department of Environmental Conservation (the "Commissioner", or "NYSDEC" or "Department" as the context requires) with its headquarters located at 625 Broadway, Albany, New York 12233,

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to encourage the remediation of abandoned and likely contaminated properties ("sites") that threaten the health and vitality of the communities they burden while at the same time ensuring the protection of public health and the environment; and

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to establish within the Department a statutory environmental remediation program that includes the use of Environmental Easements as an enforceable means of ensuring the performance of operation, maintenance, and/or monitoring requirements and the restriction of future uses of the land, when an environmental remediation project leaves residual contamination at levels that have been determined to be safe for a specific use, but not all uses, or which includes engineered structures that must be maintained or protected against damage to perform properly and be effective, or which requires groundwater use or soil management restrictions; and

WHEREAS, the Legislature of the State of New York has declared that Environmental Easement shall mean an interest in real property, created under and subject to the provisions of Article 71, Title 36 of the New York State Environmental Conservation Law ("ECL") which contains a use restriction and/or a prohibition on the use of land in a manner inconsistent with engineering controls which are intended to ensure the long term effectiveness of a site remedial program or eliminate potential exposure pathways to hazardous waste or petroleum; and

WHEREAS, Grantor, is the owner of real property located at the address of 293 Grote Street in the City of Buffalo, County of Erie and State of New York, known and designated on the tax map of the County Clerk of Erie as tax map parcel number: Section 89 Block 21 Lot 1-1, being the same as that property conveyed to Grantor by deed dated June 25, 2021 and recorded in the Erie County Clerk's Office in Liber and Page 11383, 497.7. The property subject to this Environmental Easement (the "Controlled Property") comprises approximately .746 +/- acres, and is hereinafter more fully described in the Land Title Survey dated January 2021, and revised November 2022 prepared by Francis C. Dulles, which will be attached to the Site Management Plan. The Controlled Property description is set forth in and attached hereto as Schedule A; and

WHEREAS, the Department accepts this Environmental Easement in order to ensure the protection of public health and the environment and to achieve the requirements for remediation established for the Controlled Property until such time as this Environmental Easement is extinguished pursuant to ECL Article 71, Title 36; and

NOW THEREFORE, in consideration of the mutual covenants contained herein and the terms and conditions of Order on Consent Index Number: Brownfield Cleanup Agreement C915368-10-21 amended C915368.2021-04-22, Grantor conveys to Grantee a permanent Environmental Easement pursuant to ECL Article 71, Title 36 in, on, over, under, and upon the Controlled Property as more fully described herein ("Environmental Easement").

1. Purposes. Grantor and Grantee acknowledge that the Purposes of this Environmental Easement are: to convey to Grantee real property rights and interests that will run with the land in perpetuity in order to provide an effective and enforceable means of encouraging the reuse and redevelopment of this Controlled Property at a level that has been determined to be safe for a specific use while ensuring the performance of operation, maintenance, and/or monitoring requirements; and to ensure the restriction of future uses of the land that are inconsistent with the above-stated purpose.

2. Institutional and Engineering Controls. The controls and requirements listed in the Department approved Site Management Plan ("SMP") including any and all Department approved amendments to the SMP are incorporated into and made part of this Environmental Easement. These controls and requirements apply to the use of the Controlled Property, run with the land, are binding on the Grantor and the Grantor's successors and assigns, and are enforceable in law or equity against any owner of the Controlled Property, any lessees and any person using the Controlled Property.

A. (1) The Controlled Property may be used for:

**Restricted Residential as described in 6 NYCRR Part 375-1.8(g)(2)(ii),
Commercial as described in 6 NYCRR Part 375-1.8(g)(2)(iii) and Industrial
as described in 6 NYCRR Part 375-1.8(g)(2)(iv)**

(2) All Engineering Controls must be operated and maintained as specified in the Site Management Plan (SMP);

(3) All Engineering Controls must be inspected at a frequency and in a manner defined in the SMP;

(4) The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the Erie County Department of Health to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department;

(5) Groundwater and other environmental or public health monitoring must be performed as defined in the SMP;

(6) Data and information pertinent to Site Management of the Controlled Property must be reported at the frequency and in a manner defined in the SMP;

(7) All future activities on the property that will disturb remaining

contaminated material must be conducted in accordance with the SMP;

(8) Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in the SMP;

(9) Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical components of the remedy shall be performed as defined in the SMP;

(10) Access to the site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by this Environmental Easement.

B. The Controlled Property shall not be used for Residential purposes as defined in 6NYCRR 375-1.8(g)(2)(i), and the above-stated engineering controls may not be discontinued without an amendment or extinguishment of this Environmental Easement.

C. The SMP describes obligations that the Grantor assumes on behalf of Grantor, its successors and assigns. The Grantor's assumption of the obligations contained in the SMP which may include sampling, monitoring, and/or operating a treatment system, and providing certified reports to the NYSDEC, is and remains a fundamental element of the Department's determination that the Controlled Property is safe for a specific use, but not all uses. The SMP may be modified in accordance with the Department's statutory and regulatory authority. The Grantor and all successors and assigns, assume the burden of complying with the SMP and obtaining an up-to-date version of the SMP from:

Site Control Section
Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, New York 12233
Phone: (518) 402-9553

D. Grantor must provide all persons who acquire any interest in the Controlled Property a true and complete copy of the SMP that the Department approves for the Controlled Property and all Department-approved amendments to that SMP.

E. Grantor covenants and agrees that until such time as the Environmental Easement is extinguished in accordance with the requirements of ECL Article 71, Title 36 of the ECL, the property deed and all subsequent instruments of conveyance relating to the Controlled Property shall state in at least fifteen-point bold-faced type:

This property is subject to an Environmental Easement held by the New York State Department of Environmental Conservation pursuant to Title 36 of Article 71 of the Environmental Conservation

Law.

F. Grantor covenants and agrees that this Environmental Easement shall be incorporated in full or by reference in any leases, licenses, or other instruments granting a right to use the Controlled Property.

G. Grantor covenants and agrees that it shall, at such time as NYSDEC may require, submit to NYSDEC a written statement by an expert the NYSDEC may find acceptable certifying under penalty of perjury, in such form and manner as the Department may require, that:

(1) the inspection of the site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under the direction of the individual set forth at 6 NYCRR Part 375-1.8(h)(3).

(2) the institutional controls and/or engineering controls employed at such site:
(i) are in-place;
(ii) are unchanged from the previous certification, or that any identified changes to the controls employed were approved by the NYSDEC and that all controls are in the Department-approved format; and

(iii) that nothing has occurred that would impair the ability of such control to protect the public health and environment;

(3) the owner will continue to allow access to such real property to evaluate the continued maintenance of such controls;

(4) nothing has occurred that would constitute a violation or failure to comply with any site management plan for such controls;

(5) the report and all attachments were prepared under the direction of, and reviewed by, the party making the certification;

(6) to the best of his/her knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program, and generally accepted engineering practices; and

(7) the information presented is accurate and complete.

3. Right to Enter and Inspect. Grantee, its agents, employees, or other representatives of the State may enter and inspect the Controlled Property in a reasonable manner and at reasonable times to assure compliance with the above-stated restrictions.

4. Reserved Grantor's Rights. Grantor reserves for itself, its assigns, representatives, and successors in interest with respect to the Property, all rights as fee owner of the Property, including:

A. Use of the Controlled Property for all purposes not inconsistent with, or limited by the terms of this Environmental Easement;

B. The right to give, sell, assign, or otherwise transfer part or all of the underlying fee interest to the Controlled Property, subject and subordinate to this Environmental Easement;

5. Enforcement

A. This Environmental Easement is enforceable in law or equity in perpetuity by

7. Recordation. Grantor shall record this instrument, within thirty (30) days of execution of this instrument by the Commissioner or her/his authorized representative in the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

8. Amendment. Any amendment to this Environmental Easement may only be executed by the Commissioner of the New York State Department of Environmental Conservation or the Commissioner's Designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

9. Extinguishment. This Environmental Easement may be extinguished only by a release by the Commissioner of the New York State Department of Environmental Conservation, or the Commissioner's Designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

10. Joint Obligation. If there are two or more parties identified as Grantor herein, the obligations imposed by this instrument upon them shall be joint and several.

11. Consistency with the SMP. To the extent there is any conflict or inconsistency between the terms of this Environmental Easement and the SMP, regarding matters specifically addressed by the SMP, the terms of the SMP will control.

Remainder of Page Intentionally Left Blank

IN WITNESS WHEREOF, Grantor has caused this instrument to be signed in its name.

293 Grote Street, LLC:

By: F James McGuire

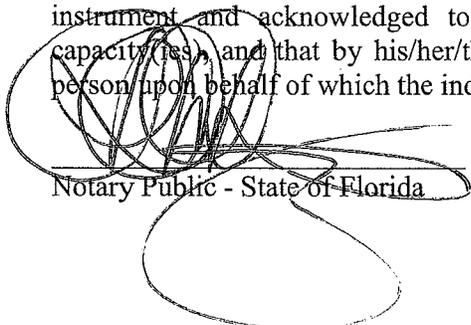
Print Name: F. JAMES McGuire

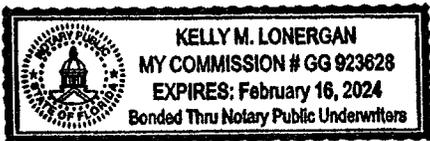
Title: MANAGING MEMBER Date: 12-31-2021

Grantor's Acknowledgment

STATE OF FLORIDA)
) ss:
COUNTY OF BROWARD)

On the 31st day of December, in the year 2021, before me, the undersigned, personally appeared F. James McGuire, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.


Notary Public - State of Florida



SCHEDULE "A" PROPERTY DESCRIPTION

ALL THAT TRACT OF PARCEL OF LAND, situate in the City of Buffalo, County of Erie and State of New York, being part of Lot No. 83, Township 11 and Range 8 of the Holland Land Company's Survey and further distinguished as the westerly one-half (1/2) of Subdivision Lot No. 29, and Subdivision Lot Nos. 30 to 37 inclusive, as shown on Map on file in the Erie County Clerk's Office under Cover No. 268 and being 255 feet front and rear by 126 feet in depth located on the south side Grote Street, beginning 293.4 feet west of Elmwood Avenue, further described as follows:

BEGINNING at a point on the southerly line of Grote Street (50 feet wide) distant 293.4 feet from the westerly line of Elmwood Avenue; running thence southerly at right angles to Grote Street, a distance of 126 feet to the southerly line of Subdivision Lot 29; thence westerly along a line drawn parallel with said southerly line of Grote Street and along the southerly line of Subdivision Lots 29 to 37 inclusive, a distance of 255 feet to the southwest corner of Subdivision Lot 37; thence northerly at right angles to Grote Street and along the westerly line of Subdivision Lot 37, a distance of 126 feet to the southerly line of Grote Street; thence easterly along the southerly line of Grote Street, a distance of 255 feet to the point of beginning. Said parcel containing an area of 32,130 square feet, more or less.



Combined Real Estate Transfer Tax Return, Credit Line Mortgage Certificate, and Certification of Exemption from the Payment of Estimated Personal Income Tax

See Form TP-584-I, Instructions for Form TP-584, before completing this form. Print or type.

Schedule A - Information relating to conveyance

Form with fields for Grantor/Transferor and Grantee/Transferee, including Name, Mailing address, City, State, ZIP code, and Social Security number (SSN).

Location and description of property conveyed

Table with columns: Tax map designation - Section, block & lot; SWIS code; Street address; City, town, or village; County.

Type of property conveyed (mark an X in applicable box)

Form with checkboxes for property types (One- to three-family house, Residential cooperative, etc.) and fields for Date of conveyance and Percentage of real property conveyed.

Form with checkboxes for Condition of conveyance (a. Conveyance of fee interest, b. Acquisition of a controlling interest, etc.)

Table for recording officer's use with columns: Amount received, Date received, Transaction number.

Schedule B – Real estate transfer tax return (Tax Law Article 31)

Part 1 – Computation of tax due

- 1 Enter amount of consideration for the conveyance (if you are claiming a total exemption from tax, mark an X in the Exemption claimed box, enter consideration and proceed to Part 3) **Exemption claimed**
- 2 Continuing lien deduction (see instructions if property is taken subject to mortgage or lien)
- 3 Taxable consideration (subtract line 2 from line 1)
- 4 Tax: \$2 for each \$500, or fractional part thereof, of consideration on line 3
- 5 Amount of credit claimed for tax previously paid (see instructions and attach Form TP-584.1, Schedule G)
- 6 Total tax due* (subtract line 5 from line 4)

1.	0	
2.		
3.		
4.		
5.		
6.		

Part 2 – Computation of additional tax due on the conveyance of residential real property for \$1 million or more

- 1 Enter amount of consideration for conveyance (from Part 1, line 1)
- 2 Taxable consideration (multiply line 1 by the percentage of the premises which is residential real property, as shown in Schedule A) ...
- 3 Total additional transfer tax due* (multiply line 2 by 1% (.01))

1.		
2.		
3.		

Part 3 – Explanation of exemption claimed on Part 1, line 1 (mark an X in all boxes that apply)

The conveyance of real property is exempt from the real estate transfer tax for the following reason:

- a. Conveyance is to the United Nations, the United States of America, New York State, or any of their instrumentalities, agencies, or political subdivisions (or any public corporation, including a public corporation created pursuant to agreement or compact with another state or Canada) a
- b. Conveyance is to secure a debt or other obligation..... b
- c. Conveyance is without additional consideration to confirm, correct, modify, or supplement a prior conveyance..... c
- d. Conveyance of real property is without consideration and not in connection with a sale, including conveyances conveying realty as bona fide gifts..... d
- e. Conveyance is given in connection with a tax sale..... e
- f. Conveyance is a mere change of identity or form of ownership or organization where there is no change in beneficial ownership. (This exemption cannot be claimed for a conveyance to a cooperative housing corporation of real property comprising the cooperative dwelling or dwellings.) Attach Form TP-584.1, Schedule F f
- g. Conveyance consists of deed of partition g
- h. Conveyance is given pursuant to the federal Bankruptcy Act..... h
- i. Conveyance consists of the execution of a contract to sell real property, without the use or occupancy of such property, or the granting of an option to purchase real property, without the use or occupancy of such property..... i
- j. Conveyance of an option or contract to purchase real property with the use or occupancy of such property where the consideration is less than \$200,000 and such property was used solely by the grantor as the grantor's personal residence and consists of a one-, two-, or three-family house, an individual residential condominium unit, or the sale of stock in a cooperative housing corporation in connection with the grant or transfer of a proprietary leasehold covering an individual residential cooperative apartment..... j
- k. Conveyance is not a conveyance within the meaning of Tax Law, Article 31, § 1401(e) (attach documents supporting such claim) k

* The total tax (from Part 1, line 6 and Part 2, line 3 above) is due within 15 days from the date of conveyance. Make check(s) payable to the county clerk where the recording is to take place. For conveyances of real property within New York City, use Form TP-584-NYC. If a recording is not required, send this return and your check(s) made payable to the **NYS Department of Taxation and Finance**, directly to the NYS Tax Department, RETT Return Processing, PO Box 5045, Albany NY 12205-0045. If not using U.S. Mail, see Publication 55, *Designated Private Delivery Services*.

Schedule C – Credit Line Mortgage Certificate (Tax Law Article 11)

Complete the following only if the interest being transferred is a fee simple interest.

This is to certify that: (mark an X in the appropriate box)

1. The real property being sold or transferred is not subject to an outstanding credit line mortgage.
2. The real property being sold or transferred is subject to an outstanding credit line mortgage. However, an exemption from the tax is claimed for the following reason:
 - a. The transfer of real property is a transfer of a fee simple interest to a person or persons who held a fee simple interest in the real property (whether as a joint tenant, a tenant in common or otherwise) immediately before the transfer.
 - b. The transfer of real property is (A) to a person or persons related by blood, marriage or adoption to the original obligor or to one or more of the original obligors or (B) to a person or entity where 50% or more of the beneficial interest in such real property after the transfer is held by the transferor or such related person or persons (as in the case of a transfer to a trustee for the benefit of a minor or the transfer to a trust for the benefit of the transferor).
 - c. The transfer of real property is a transfer to a trustee in bankruptcy, a receiver, assignee, or other officer of a court.
 - d. The maximum principal amount secured by the credit line mortgage is \$3 million or more, and the real property being sold or transferred is **not** principally improved nor will it be improved by a one- to six-family owner-occupied residence or dwelling.

Note: for purposes of determining whether the maximum principal amount secured is \$3 million or more as described above, the amounts secured by two or more credit line mortgages may be aggregated under certain circumstances. See TSB-M-96(6)-R for more information regarding these aggregation requirements.
- e. Other (attach detailed explanation).
3. The real property being transferred is presently subject to an outstanding credit line mortgage. However, no tax is due for the following reason:
 - a. A certificate of discharge of the credit line mortgage is being offered at the time of recording the deed.
 - b. A check has been drawn payable for transmission to the credit line mortgagee or mortgagee's agent for the balance due, and a satisfaction of such mortgage will be recorded as soon as it is available.
4. The real property being transferred is subject to an outstanding credit line mortgage recorded in _____ (insert liber and page or reel or other identification of the mortgage). The maximum principal amount of debt or obligation secured by the mortgage is _____. No exemption from tax is claimed and the tax of _____ is being paid herewith. (Make check payable to county clerk where deed will be recorded.)

Signature (both the grantors and grantees must sign)

The undersigned certify that the above information contained in Schedules A, B, and C, including any return, certification, schedule, or attachment, is to the best of their knowledge, true and complete, and authorize the person(s) submitting such form on their behalf to receive a copy for purposes of recording the deed or other instrument effecting the conveyance.

 _____ Grantor signature	Member _____ Title	 _____ Grantee signature	Director _____ Title
_____	_____	_____	_____
Grantor signature	Title	Grantee signature	Title

Reminder: Did you complete all of the required information in Schedules A, B, and C? Are you required to complete Schedule D? If you marked e, f, or g in Schedule A, did you complete Form TP-584.1? Have you attached your check(s) made payable to the county clerk where recording will take place? If no recording is required, send this return and your check(s), made payable to the **NYS Department of Taxation and Finance**, directly to the NYS Tax Department, RETT Return Processing, PO Box 5045, Albany NY 12205-0045. If not using U.S. Mail, see Publication 55, *Designated Private Delivery Services*.

Schedule D – Certification of exemption from the payment of estimated personal income tax (Tax Law, Article 22, § 663)

Complete the following only if a fee simple interest or a cooperative unit is being transferred by an individual or estate or trust.

If the property is being conveyed by a referee pursuant to a foreclosure proceeding, proceed to Part 2, mark an X in the second box under *Exemption for nonresident transferors/sellers*, and sign at bottom.

Part 1 – New York State residents

If you are a New York State resident transferor/seller listed in Form TP-584, Schedule A (or an attachment to Form TP-584), you must sign the certification below. If one or more transferor/seller of the real property or cooperative unit is a resident of New York State, **each** resident transferor/seller must sign in the space provided. If more space is needed, photocopy this Schedule D and submit as many schedules as necessary to accommodate all resident transferors/sellers.

Certification of resident transferors/sellers

This is to certify that at the time of the sale or transfer of the real property or cooperative unit, the transferor/seller as signed below was a resident of New York State, and therefore is not required to pay estimated personal income tax under Tax Law § 663(a) upon the sale or transfer of this real property or cooperative unit.

Signature	Print full name	Date
Signature	Print full name	Date
Signature	Print full name	Date
Signature	Print full name	Date

Note: A resident of New York State may still be required to pay estimated tax under Tax Law § 685(c), but not as a condition of recording a deed.

Part 2 – Nonresidents of New York State

If you are a nonresident of New York State listed as a transferor/seller in Form TP-584, Schedule A (or an attachment to Form TP-584) but are not required to pay estimated personal income tax because one of the exemptions below applies under Tax Law § 663(c), mark an X in the box of the appropriate exemption below. If any one of the exemptions below applies to the transferor/seller, that transferor/seller is not required to pay estimated personal income tax to New York State under Tax Law § 663. **Each** nonresident transferor/seller who qualifies under one of the exemptions below must sign in the space provided. If more space is needed, photocopy this Schedule D and submit as many schedules as necessary to accommodate all nonresident transferors/sellers.

If none of these exemption statements apply, you must complete Form IT-2663, *Nonresident Real Property Estimated Income Tax Payment Form*, or Form IT-2664, *Nonresident Cooperative Unit Estimated Income Tax Payment Form*. For more information, see *Payment of estimated personal income tax*, on Form TP-584-I, page 1.

Exemption for nonresident transferors/sellers

This is to certify that at the time of the sale or transfer of the real property or cooperative unit, the transferor/seller (grantor) of this real property or cooperative unit was a nonresident of New York State, but is not required to pay estimated personal income tax under Tax Law § 663 due to one of the following exemptions:

- The real property or cooperative unit being sold or transferred qualifies in total as the transferor's/seller's principal residence (within the meaning of Internal Revenue Code, section 121) from _____ Date _____ to _____ Date _____ (see instructions).
- The transferor/seller is a mortgagor conveying the mortgaged property to a mortgagee in foreclosure, or in lieu of foreclosure with no additional consideration.
- The transferor or transferee is an agency or authority of the United States of America, an agency or authority of New York State, the Federal National Mortgage Association, the Federal Home Loan Mortgage Corporation, the Government National Mortgage Association, or a private mortgage insurance company.

Signature	Print full name	Date
Signature	Print full name	Date
Signature	Print full name	Date
Signature	Print full name	Date

APPENDIX E

FIELD OPERATING PROCEDURES (CD ENCLOSED)

FIELD OPERATING PROCEDURES

Calibration and
Maintenance of
Portable
Photoionization
Detector (PID)

FOP 011.1

CALIBRATION AND MAINTENANCE OF PORTABLE PHOTOIONIZATION DETECTOR

PURPOSE

This procedure describes a general method for the calibration and maintenance of a portable photoionization detector (PID). The PID detects and initially quantifies a reading of the volatile organic compound (VOC) concentration in air. The PID is used as a field-screening tool for initial evaluation of soil samples and for ambient air monitoring of compounds with ionization potentials (IP) less than the PID lamp electron voltage (eV) rating. The IP is the amount of energy required to move an electron to an infinite distance from the nucleus thus creating a positive ion plus an electron. It should be noted that all of the major components of air (i.e., carbon dioxide, methane, nitrogen, oxygen etc.) have IP's above 12 eV. As a result, they will not be ionized by the 9.8, 10.6, or 11.7 eV lamps typically utilized in field PIDs. The response of the PID will then be the sum of the organic and inorganic compounds in air that are ionized by the appropriate lamp (i.e., 9.8, 10.6 or 11.7 eV). Attached to this FOP is a table summarizing common organic compounds and their respective IPs.

Calibration is performed to verify instrument accuracy and function. All field instruments will be calibrated, verified and recalibrated at frequencies required by their respective operating manuals or manufacturer's specifications, but not less than once each day that the instrument is in use. Compound-specific calibration methods should be selected on a project-by-project basis to increase the accuracy of the instrument. The best way to calibrate a PID to different compounds is to use a standard of the gas of interest. However, correction factors have been determined that enable the user to quantify a large number of chemicals using only a single calibration gas, typically isobutylene. Field personnel should have access to all operating manuals for the instruments used for the field measurements. This procedure also documents critical maintenance activities for this meter.

FOP 011.1

CALIBRATION AND MAINTENANCE OF PORTABLE PHOTOIONIZATION DETECTOR

Note: The information included below is equipment manufacturer- and model-specific, however, accuracy, calibration, and maintenance procedures for this type of portable equipment are typically similar. The information below pertains to the MiniRAE 2000 Portable VOC Monitor equipped with a 10.6 eV lamp. The actual equipment to be used in the field will be equivalent or similar. The following information is provided for general reference; the equipment-specific manufacturer's manual should be followed with precedence over this FOP.

Note: The PID indicates total VOC concentration readings that are normalized to a calibration standard, so actual quantification of individual compounds is not provided. In addition, the PID response to compounds is highly variable, dependent on ionization potential of the compound, and the presence or absence of other compounds.

ACCURACY

The MiniRAE 2000 is accurate to ± 2 ppm or 10% of the reading for concentrations ranging from 0-2,000 ppm and $\pm 20\%$ of the reading at concentrations greater than 2,000 ppm. Response time is less than two seconds to 90 percent of full-scale. The operating temperature range is 0 to 45° C and the operating humidity range is 0 to 95 % relative humidity (non-condensing).

CALIBRATION PROCEDURE

The calibration method and correction factor, if applicable, will be selected on a project-by-project basis and confirmed with the Project Manager prior to the start of field work.

1. Calibrate all field test equipment at the beginning of each sampling day. Check and recalibrate the PID according to the manufacture's specifications.

FOP 011.1

CALIBRATION AND MAINTENANCE OF PORTABLE PHOTOIONIZATION DETECTOR

2. Calibrate the PID using a compressed gas cylinder or equivalent containing the calibration standard, a flow regulator, and a tubing assembly. In addition, a compressed gas cylinder containing zero air (“clean” air) may be required if ambient air conditions do not permit calibration to “clean air”.
3. Fill two Tedlar® bags equipped with a one-way valve with zero-air (if applicable) and the calibration standard gas.
4. Assemble the calibration equipment and actuate the PID in its calibration mode.
5. Select the appropriate calibration method. Calibration may be completed with two methods: 1) where the calibration standard gas is the same as the measurement gas (no correction factor is applied) or 2) where the calibration standard gas is not the same as the measurement gas and a correction factor will be applied. An isobutylene standard gas must be used as the calibration standard gas for the use of correction factors with the MiniRAE 2000. See below for additional instructions for calibration specific to use with or without correction factors.

Calibrating Without a Correction Factor

Navigate within the menu to select the “cal memory” for the specific calibration standard gas prior to calibration. The default gas selections for the MiniRAE 2000 are as follows:

Cal Memory #0	Isobutylene
Cal Memory #1	Hexane
Cal Memory #2	Xylene
Cal Memory #3	Benzene
Cal Memory #4	Styrene
Cal Memory #5	Toluene
Cal Memory #6	Vinyl Chloride
Cal Memory #7	Custom

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The calibration standard gas for Cal Memory #1-7 may be toggled for selection of any of the approximately 100 preprogrammed calibration standard gases for use without an applied correction factor (i.e., the calibration gas must be the same as the measurement gas).

Calibrating With a Correction Factor

Navigate within the menu to select the “Cal Memory”.

Select “Cal Memory #0” and toggle for selection of any of the approximately 100 preprogrammed chemicals. During calibration, the unit requests isobutylene gas and displays the isobutylene concentration immediately following calibration, but when the unit is returned to the normal reading mode, it displays the selected chemical and applies the correction factor.

If the pre-programmed list does not include the desired chemical or a user-defined measurement gas and correction factor is desired, toggle Cal Memory #0 to “user defined custom gas”. A list of approximately 300 correction factors is attached in Technical Note 106 generated by MiniRAE.

6. Once the PID settings have been verified, connect the PID probe to the zero air calibration bag (or calibrate to ambient air if conditions permit) and wait for a stable indication.
7. Connect the PID probe to the calibration standard bag. Measure an initial reading of the standard and wait for a stable indication.
8. Keep the PID probe connected to the calibration standard bag, calibrate to applicable concentration (typically 100 ppm with isobutylene) with the standard and wait for a stable indication.
9. Document the calibration results and related information in the Project Field Book and on an **Equipment Calibration Log** (see attached sample), indicating the meter readings before and after the instrument has been adjusted. This is important, not only for data validation, but also to establish

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CALIBRATION AND MAINTENANCE OF PORTABLE PHOTOIONIZATION DETECTOR

maintenance schedules and component replacement. Information will include, at a minimum:

- Time, date and initials of the field team member performing the calibration
- The unique identifier for the meter, including manufacturer, model, and serial number
- The calibration standard and concentration
- Correction factors used, if any
- The brand and expiration date of the calibration standard gas
- The instrument readings: before and after calibration
- The instrument settings (if applicable)
- Pass or fail designation in accordance with the accuracy specifications presented above
- Corrective action taken (see Maintenance below) in the event of failure to adequately calibrate.

MAINTENANCE

- The probe and dust filter of the PID should be checked before and after every use for cleanliness. Should instrument response become unstable, recalibration should be performed. If this does not resolve the problem, access the photoionization bulb and clean with the manufacturer-supplied abrasive compound, then recalibrate.
- The PID battery must be recharged after each use. Store the PID in its carrying case when not in use. Additional maintenance details related to individual components of the PID are provided in the equipment manufacturer's instruction manual. If calibration or instrument performance is not in accordance with specifications, send the instrument to the equipment manufacturer for repair.
- Maintain a log for each monitoring instrument. Record all maintenance performed on the instrument on this log with date and name of the organization performing the maintenance.

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**CALIBRATION AND MAINTENANCE OF PORTABLE
PHOTOIONIZATION DETECTOR**

ATTACHMENTS

Table 1; Summary of Ionization Potentials
Equipment Calibration Log (sample)
Technical Note TN-106

**CALIBRATION AND MAINTENANCE OF PORTABLE
PHOTOIONIZATION DETECTOR**

TABLE 1

SUMMARY OF IONIZATION POTENTIALS

Chemical Name	Ionization Potential (eV)	Cannot be Read by 10.6 eV PID
A		
2-Amino pyridine	8	
Acetaldehyde	10.21	
Acetamide	9.77	
Acetic acid	10.69	X
Acetic anhydride	10	
Acetone	9.69	
Acetonitrile	12.2	X
Acetophenone	9.27	
Acetyl bromide	10.55	
Acetyl chloride	11.02	X
Acetylene	11.41	X
Acrolein	10.1	
Acrylamide	9.5	
Acrylonitrile	10.91	X
Allyl alcohol	9.67	
Allyl chloride	9.9	
Ammonia	10.2	
Aniline	7.7	
Anisidine	7.44	
Anisole	8.22	
Arsine	9.89	
B		
1,3-Butadiene (butadiene)	9.07	
1-Bromo-2-chloroethane	10.63	X
1-Bromo-2-methylpropane	10.09	
1-Bromo-4-fluorobenzene	8.99	
1-Bromobutane	10.13	
1-Bromopentane	10.1	
1-Bromopropane	10.18	
1-Bromopropene	9.3	
1-Butanethiol	9.14	
1-Butene	9.58	
1-Butyne	10.18	
2,3-Butadione	9.23	
2-Bromo-2-methylpropane	9.89	
2-Bromobutane	9.98	
2-Bromopropane	10.08	

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CALIBRATION AND MAINTENANCE OF PORTABLE
PHOTOIONIZATION DETECTOR

TABLE 1

SUMMARY OF IONIZATION POTENTIALS

Chemical Name	Ionization Potential (eV)	Cannot be Read by 10.6 eV PID
2-Bromothiophene	8.63	
2-Butanone (MEK)	9.54	
3-Bromopropene	9.7	
3-Butene nitrile	10.39	
Benzaldehyde	9.53	
Benzene	9.25	
Benzenethiol	8.33	
Benzonitrile	9.71	
Benzotrifluoride	9.68	
Biphenyl	8.27	
Boron oxide	13.5	X
Boron trifluoride	15.56	X
Bromine	10.54	
Bromobenzene	8.98	
Bromochloromethane	10.77	X
Bromoform	10.48	
Butane	10.63	X
Butyl mercaptan	9.15	
cis-2-Butene	9.13	
m-Bromotoluene	8.81	
n-Butyl acetate	10.01	
n-Butyl alcohol	10.04	
n-Butyl amine	8.71	
n-Butyl benzene	8.69	
n-Butyl formate	10.5	
n-Butyraldehyde	9.86	
n-Butyric acid	10.16	
n-Butyronitrile	11.67	X
o-Bromotoluene	8.79	
p-Bromotoluene	8.67	
p-tert-Butyltoluene	8.28	
s-Butyl amine	8.7	
s-Butyl benzene	8.68	
sec-Butyl acetate	9.91	
t-Butyl amine	8.64	
t-Butyl benzene	8.68	
trans-2-Butene	9.13	
C		

**CALIBRATION AND MAINTENANCE OF PORTABLE
PHOTOIONIZATION DETECTOR**

TABLE 1

SUMMARY OF IONIZATION POTENTIALS

Chemical Name	Ionization Potential (eV)	Cannot be Read by 10.6 eV PID
1-Chloro-2-methylpropane	10.66	X
1-Chloro-3-fluorobenzene	9.21	
1-Chlorobutane	10.67	X
1-Chloropropane	10.82	X
2-Chloro-2-methylpropane	10.61	X
2-Chlorobutane	10.65	X
2-Chloropropane	10.78	X
2-Chlorothiophene	8.68	
3-Chloropropene	10.04	
Camphor	8.76	
Carbon dioxide	13.79	X
Carbon disulfide	10.07	
Carbon monoxide	14.01	X
Carbon tetrachloride	11.47	X
Chlorine	11.48	X
Chlorine dioxide	10.36	
Chlorine trifluoride	12.65	X
Chloroacetaldehyde	10.61	X
α -Chloroacetophenone	9.44	
Chlorobenzene	9.07	
Chlorobromomethane	10.77	X
Chlorofluoromethane (Freon 22)	12.45	X
Chloroform	11.37	X
Chlorotrifluoromethane (Freon 13)	12.91	X
Chrysene	7.59	
Cresol	8.14	
Crotonaldehyde	9.73	
Cumene (isopropyl benzene)	8.75	
Cyanogen	13.8	X
Cyclohexane	9.8	
Cyclohexanol	9.75	
Cyclohexanone	9.14	
Cyclohexene	8.95	
Cyclo-octatetraene	7.99	
Cyclopentadiene	8.56	
Cyclopentane	10.53	
Cyclopentanone	9.26	
Cyclopentene	9.01	

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CALIBRATION AND MAINTENANCE OF PORTABLE
PHOTOIONIZATION DETECTOR

TABLE 1

SUMMARY OF IONIZATION POTENTIALS

Chemical Name	Ionization Potential (eV)	Cannot be Read by 10.6 eV PID
Cyclopropane	10.06	
m-Chlorotoluene	8.83	
o-Chlorotoluene	8.83	
p-Chlorotoluene	8.7	
D		
1,1-Dibromoethane	10.19	
1,1-Dichloroethane	11.12	X
1,1-Dimethoxyethane	9.65	
1,1-Dimethylhydrazine	7.28	
1,2-Dibromoethane	9.45	
1,2-Dichloro-1,1,2,2-tetrafluoroethane (Freon 114)	12.2	X
1,2-Dichloroethane	11.12	X
1,2-Dichloropropane	10.87	X
1,3-Dibromopropane	10.07	
1,3-Dichloropropane	10.85	X
2,2-Dimethyl butane	10.06	
2,2-Dimethyl propane	10.35	
2,3-Dichloropropene	9.82	
2,3-Dimethyl butane	10.02	
3,3-Dimethyl butanone	9.17	
cis-Dichloroethene	9.65	
Decaborane	9.88	
Diazomethane	9	
Diborane	12	X
Dibromochloromethane	10.59	
Dibromodifluoromethane	11.07	X
Dibromomethane	10.49	
Dibutylamine	7.69	
Dichlorodifluoromethane (Freon 12)	12.31	X
Dichlorofluoromethane	12.39	X
Dichloromethane	11.35	X
Diethoxymethane	9.7	
Diethyl amine	8.01	
Diethyl ether	9.53	
Diethyl ketone	9.32	
Diethyl sulfide	8.43	
Diethyl sulfite	9.68	
Difluorodibromomethane	11.07	X

**CALIBRATION AND MAINTENANCE OF PORTABLE
PHOTOIONIZATION DETECTOR**

TABLE 1

SUMMARY OF IONIZATION POTENTIALS

Chemical Name	Ionization Potential (eV)	Cannot be Read by 10.6 eV PID
Dihydropyran	8.34	
Diiodomethane	9.34	
Diisopropylamine	7.73	
Dimethoxymethane (methylal)	10	
Dimethyl amine	8.24	
Dimethyl ether	10	
Dimethyl sulfide	8.69	
Dimethylaniline	7.13	
Dimethylformamide	9.18	
Dimethylphthalate	9.64	
Dinitrobenzene	10.71	X
Dioxane	9.19	
Diphenyl	7.95	
Dipropyl amine	7.84	
Dipropyl sulfide	8.3	
Durene	8.03	
m-Dichlorobenzene	9.12	
N,N-Diethyl acetamide	8.6	
N,N-Diethyl formamide	8.89	
N,N-Dimethyl acetamide	8.81	
N,N-Dimethyl formamide	9.12	
o-Dichlorobenzene	9.06	
p-Dichlorobenzene	8.95	
p-Dioxane	9.13	
trans-Dichloroethene	9.66	
E		
Epichlorohydrin	10.2	
Ethane	11.65	X
Ethanethiol (ethyl mercaptan)	9.29	
Ethanolamine	8.96	
Ethene	10.52	
Ethyl acetate	10.11	
Ethyl alcohol	10.48	
Ethyl amine	8.86	
Ethyl benzene	8.76	
Ethyl bromide	10.29	
Ethyl chloride (chloroethane)	10.98	X
Ethyl disulfide	8.27	

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CALIBRATION AND MAINTENANCE OF PORTABLE
PHOTOIONIZATION DETECTOR

TABLE 1

SUMMARY OF IONIZATION POTENTIALS

Chemical Name	Ionization Potential (eV)	Cannot be Read by 10.6 eV PID
Ethyl ether	9.51	
Ethyl formate	10.61	X
Ethyl iodide	9.33	
Ethyl isothiocyanate	9.14	
Ethyl mercaptan	9.29	
Ethyl methyl sulfide	8.55	
Ethyl nitrate	11.22	X
Ethyl propionate	10	
Ethyl thiocyanate	9.89	
Ethylene chlorohydrin	10.52	
Ethylene diamine	8.6	
Ethylene dibromide	10.37	
Ethylene dichloride	11.05	X
Ethylene oxide	10.57	
Ethylenimine	9.2	
Ethynylbenzene	8.82	
F		
2-Furaldehyde	9.21	
Fluorine	15.7	X
Fluorobenzene	9.2	
Formaldehyde	10.87	X
Formamide	10.25	
Formic acid	11.05	X
Freon 11 (trichlorofluoromethane)	11.77	X
Freon 112 (1,1,2,2-tetrachloro-1,2-difluoroethane)	11.3	X
Freon 113 (1,1,2-trichloro-1,2,2-trifluoroethane)	11.78	X
Freon 114 (1,2-dichloro-1,1,2,2-tetrafluoroethane)	12.2	X
Freon 12 (dichlorodifluoromethane)	12.31	X
Freon 13 (chlorotrifluoromethane)	12.91	X
Freon 22 (chlorofluoromethane)	12.45	X
Furan	8.89	
Furfural	9.21	
m-Fluorotoluene	8.92	
o-Fluorophenol	8.66	
o-Fluorotoluene	8.92	
p-Fluorotoluene	8.79	
H		
1-Hexene	9.46	

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CALIBRATION AND MAINTENANCE OF PORTABLE
PHOTOIONIZATION DETECTOR

TABLE 1

SUMMARY OF IONIZATION POTENTIALS

Chemical Name	Ionization Potential (eV)	Cannot be Read by 10.6 eV PID
2-Heptanone	9.33	
2-Hexanone	9.35	
Heptane	10.08	
Hexachloroethane	11.1	X
Hexane	10.18	
Hydrazine	8.1	
Hydrogen	15.43	X
Hydrogen bromide	11.62	X
Hydrogen chloride	12.74	X
Hydrogen cyanide	13.91	X
Hydrogen fluoride	15.77	X
Hydrogen iodide	10.38	
Hydrogen selenide	9.88	
Hydrogen sulfide	10.46	
Hydrogen telluride	9.14	
Hydroquinone	7.95	
I		
1-Iodo-2-methylpropane	9.18	
1-Iodobutane	9.21	
1-Iodopentane	9.19	
1-Iodopropane	9.26	
2-Iodobutane	9.09	
2-Iodopropane	9.17	
Iodine	9.28	
Iodobenzene	8.73	
Isobutane	10.57	
Isobutyl acetate	9.97	
Isobutyl alcohol	10.12	
Isobutyl amine	8.7	
Isobutyl formate	10.46	
Isobutyraldehyde	9.74	
Isobutyric acid	10.02	
Isopentane	10.32	
Isophorone	9.07	
Isoprene	8.85	
Isopropyl acetate	9.99	
Isopropyl alcohol	10.16	
Isopropyl amine	8.72	

**CALIBRATION AND MAINTENANCE OF PORTABLE
PHOTOIONIZATION DETECTOR**

TABLE 1

SUMMARY OF IONIZATION POTENTIALS

Chemical Name	Ionization Potential (eV)	Cannot be Read by 10.6 eV PID
Isopropyl benzene	8.69	
Isopropyl ether	9.2	
Isovaleraldehyde	9.71	
m-Iodotoluene	8.61	
o-Iodotoluene	8.62	
p-Iodotoluene	8.5	
K		
Ketene	9.61	
L		
2,3-Lutidine	8.85	
2,4-Lutidine	8.85	
2,6-Lutidine	8.85	
M		
2-Methyl furan	8.39	
2-Methyl naphthalene	7.96	
1-Methyl naphthalene	7.96	
2-Methyl propene	9.23	
2-Methyl-1-butene	9.12	
2-Methylpentane	10.12	
3-Methyl-1-butene	9.51	
3-Methyl-2-butene	8.67	
3-Methylpentane	10.08	
4-Methylcyclohexene	8.91	
Maleic anhydride	10.8	X
Mesityl oxide	9.08	
Mesitylene	8.4	
Methane	12.98	X
Methanethiol (methyl mercaptan)	9.44	
Methyl acetate	10.27	
Methyl acetylene	10.37	
Methyl acrylate	9.9	
Methyl alcohol	10.85	X
Methyl amine	8.97	
Methyl bromide	10.54	
Methyl butyl ketone	9.34	
Methyl butyrate	10.07	
Methyl cellosolve	9.6	
Methyl chloride	11.28	X

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CALIBRATION AND MAINTENANCE OF PORTABLE
PHOTOIONIZATION DETECTOR

TABLE 1

SUMMARY OF IONIZATION POTENTIALS

Chemical Name	Ionization Potential (eV)	Cannot be Read by 10.6 eV PID
Methyl chloroform (1,1,1-trichloroethane)	11	X
Methyl disulfide	8.46	
Methyl ethyl ketone	9.53	
Methyl formate	10.82	X
Methyl iodide	9.54	
Methyl isobutyl ketone	9.3	
Methyl isobutyrate	9.98	
Methyl isocyanate	10.67	X
Methyl isopropyl ketone	9.32	
Methyl isothiocyanate	9.25	
Methyl mercaptan	9.44	
Methyl methacrylate	9.7	
Methyl propionate	10.15	
Methyl propyl ketone	9.39	
α -Methyl styrene	8.35	
Methyl thiocyanate	10.07	
Methylal (dimethoxymethane)	10	
Methylcyclohexane	9.85	
Methylene chloride	11.32	X
Methyl-n-amyl ketone	9.3	
Monomethyl aniline	7.32	
Monomethyl hydrazine	7.67	
Morpholine	8.2	
n-Methyl acetamide	8.9	
N		
1-Nitropropane	10.88	X
2-Nitropropane	10.71	X
Naphthalene	8.12	
Nickel carbonyl	8.27	
Nitric oxide, (NO)	9.25	
Nitrobenzene	9.92	
Nitroethane	10.88	X
Nitrogen	15.58	X
Nitrogen dioxide	9.78	
Nitrogen trifluoride	12.97	X
Nitromethane	11.08	X
Nitrotoluene	9.45	
p-Nitrochloro benzene	9.96	

**CALIBRATION AND MAINTENANCE OF PORTABLE
PHOTOIONIZATION DETECTOR**

TABLE 1

SUMMARY OF IONIZATION POTENTIALS

Chemical Name	Ionization Potential (eV)	Cannot be Read by 10.6 eV PID
O		
Octane	9.82	
Oxygen	12.08	X
Ozone	12.08	X
P		
1-Pentene	9.5	
1-Propanethiol	9.2	
2,4-Pentanedione	8.87	
2-Pentanone	9.38	
2-Picoline	9.02	
3-Picoline	9.02	
4-Picoline	9.04	
n-Propyl nitrate	11.07	X
Pentaborane	10.4	
Pentane	10.35	
Perchloroethylene	9.32	
Pheneloic	8.18	
Phenol	8.5	
Phenyl ether (diphenyl oxide)	8.82	
Phenyl hydrazine	7.64	
Phenyl isocyanate	8.77	
Phenyl isothiocyanate	8.52	
Phenylene diamine	6.89	
Phosgene	11.77	X
Phosphine	9.87	
Phosphorus trichloride	9.91	
Phthalic anhydride	10	
Propane	11.07	X
Propargyl alcohol	10.51	
Propiolactone	9.7	
Propionaldehyde	9.98	
Propionic acid	10.24	
Propionitrile	11.84	X
Propyl acetate	10.04	
Propyl alcohol	10.2	
Propyl amine	8.78	
Propyl benzene	8.72	
Propyl ether	9.27	

**CALIBRATION AND MAINTENANCE OF PORTABLE
PHOTOIONIZATION DETECTOR**

TABLE 1

SUMMARY OF IONIZATION POTENTIALS

Chemical Name	Ionization Potential (eV)	Cannot be Read by 10.6 eV PID
Propyl formate	10.54	
Propylene	9.73	
Propylene dichloride	10.87	X
Propylene imine	9	
Propylene oxide	10.22	
Propyne	10.36	
Pyridine	9.32	
Pyrrole	8.2	
Q		
Quinone	10.04	
S		
Stibine	9.51	
Styrene	8.47	
Sulfur dioxide	12.3	X
Sulfur hexafluoride	15.33	X
Sulfur monochloride	9.66	
Sulfuryl fluoride	13	X
T		
o-Terphenyls	7.78	
1,1,2,2-Tetrachloro-1,2-difluoroethane (Freon 112)	11.3	X
1,1,1-Trichloroethane	11	X
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	11.78	X
2,2,4-Trimethyl pentane	9.86	
o-Toluidine	7.44	
Tetrachloroethane	11.62	X
Tetrachloroethene	9.32	
Tetrachloromethane	11.47	X
Tetrahydrofuran	9.54	
Tetrahydropyran	9.25	
Thiolacetic acid	10	
Thiophene	8.86	
Toluene	8.82	
Tribromoethene	9.27	
Tribromofluoromethane	10.67	X
Tribromomethane	10.51	
Trichloroethene	9.45	
Trichloroethylene	9.47	
Trichlorofluoromethane (Freon 11)	11.77	X

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CALIBRATION AND MAINTENANCE OF PORTABLE
PHOTOIONIZATION DETECTOR

TABLE 1

SUMMARY OF IONIZATION POTENTIALS

Chemical Name	Ionization Potential (eV)	Cannot be Read by 10.6 eV PID
Trichloromethane	11.42	X
Triethylamine	7.5	
Trifluoromonobromo-methane	11.4	X
Trimethyl amine	7.82	
Tripropyl amine	7.23	
V		
o-Vinyl toluene	8.2	
Valeraldehyde	9.82	
Valeric acid	10.12	
Vinyl acetate	9.19	
Vinyl bromide	9.8	
Vinyl chloride	10	
Vinyl methyl ether	8.93	
W		
Water	12.59	X
X		
2,4-Xylidine	7.65	
m-Xylene	8.56	
o-Xylene	8.56	
p-Xylene	8.45	

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CALIBRATION AND MAINTENANCE OF PORTABLE PHOTOIONIZATION DETECTOR



EQUIPMENT CALIBRATION LOG

PROJECT INFORMATION:

Project Name: _____
 Project No.: _____
 Client: _____

Date: _____

Instrument Source: BM Rental

METER TYPE	UNITS	TIME	MAKE/MODEL	SERIAL NUMBER	CAL. BY	STANDARD	POST CAL. READING	SETTINGS
<input type="checkbox"/> pH meter	units		Myron L Company Ultra Meter 6P	606987		4.00 7.00 10.01		
<input type="checkbox"/> Turbidity meter	NTU		Hach 2100P Turbidimeter	9706000145		0.4 100 800		
<input type="checkbox"/> Sp. Cond. meter	uS mS		Myron L Company Ultra Meter 6P			_____ mS @ 25 °C		
<input type="checkbox"/> PID	ppm		MinRAE 20			open air zero _____ ppm Iso. Gas		MIBK response factor = 1.0
<input type="checkbox"/> Dissolved Oxygen	ppm		YSI Model 5					
<input type="checkbox"/> Particulate meter	mg/m ³					zero air		
<input type="checkbox"/> Oxygen	%					open air		
<input type="checkbox"/> Hydrogen sulfide	ppm					open air		
<input type="checkbox"/> Carbon monoxide	ppm					open air		
<input type="checkbox"/> LEL	%					open air		
<input type="checkbox"/> Radiation Meter	uR/H					background area		
<input type="checkbox"/>								

ADDITIONAL REMARKS:

PREPARED BY: _____ DATE: _____





Correction Factors, Ionization Energies*, And Calibration Characteristics

Correction Factors and Ionization Energies

RAE Systems PIDs can be used for the detection of a wide variety of gases that exhibit different responses. In general, any compound with ionization energy (IE) lower than that of the lamp photons can be measured.* The best way to calibrate a PID to different compounds is to use a standard of the gas of interest. However, correction factors have been determined that enable the user to quantify a large number of chemicals using only a single calibration gas, typically isobutylene. In our PIDs, correction factors can be used in one of three ways:

- 1) Calibrate the monitor with isobutylene in the usual fashion to read in isobutylene equivalents. Manually multiply the reading by the correction factor (CF) to obtain the concentration of the gas being measured.
- 2) Calibrate the unit with isobutylene in the usual fashion to read in isobutylene equivalents. Call up the correction factor from the instrument memory or download it from a personal computer and then call it up. The monitor will then read directly in units of the gas of interest.
- 3) Calibrate the unit with isobutylene, but input an equivalent, "corrected" span gas concentration when prompted for this value. The unit will then read directly in units of the gas of interest.

* The term "ionization energy" is more scientifically correct and replaces the old term "ionization potential." High-boiling ("heavy") compounds may not vaporize enough to give a response even when their ionization energies are below the lamp photon energy. Some inorganic compounds like H_2O_2 and NO_2 give weak response even when their ionization energies are well below the lamp photon energy.

Example 1:

With the unit calibrated to read isobutylene equivalents, the reading is 10 ppm with a 10.6 eV lamp. The gas being measured is butyl acetate, which has a correction factor of 2.6. Multiplying 10 by 2.6 gives an adjusted butyl acetate value of 26 ppm. Similarly, if the gas being measured were trichloroethylene (CF = 0.54), the adjusted value with a 10 ppm reading would be 5.4 ppm.

Example 2:

With the unit calibrated to read isobutylene equivalents, the reading is 100 ppm with a 10.6 eV lamp. The gas measured is m-xylene (CF = 0.43). After downloading this factor, the unit should read about 43 ppm when exposed to the same gas, and thus read directly in m-xylene values.

Example 3:

The desired gas to measure is ethylene dichloride (EDC). The CF is 0.6 with an 11.7 eV lamp. During calibration with 100 ppm isobutylene, insert 0.6 times 100, or 60 at the prompt for the calibration gas concentration. The unit then reads directly in EDC values.

Conversion to mg/m^3

To convert from ppm to mg/m^3 , use the following formula:

$$\text{Conc. (mg/m}^3\text{)} = \frac{[\text{Conc. (ppmv)} \times \text{mol. wt. (g/mole)}]}{\text{molar gas volume (L)}}$$

For air at 25 °C (77 °F), the molar gas volume is 24.4 L/mole and the formula reduces to:

$$\text{Conc. (mg/m}^3\text{)} = \text{Conc. (ppmv)} \times \text{mol. wt. (g/mole)} \times 0.041$$

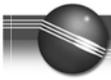
For example, if the instrument is calibrated with a gas standard in ppmv, such as 100 ppm isobutylene, and the user wants the display to read in mg/m^3 of hexane, whose m.w. is 86 and CF is 4.3, the overall correction factor would be $4.3 \times 86 \times 0.041$ equals 15.2.

Correction Factors for Mixtures

The correction factor for a mixture is calculated from the sum of the mole fractions X_i of each component divided by their respective correction factors CF_i :

$$CF_{\text{mix}} = 1 / (X_1/CF_1 + X_2/CF_2 + X_3/CF_3 + \dots X_i/CF_i)$$

Thus, for example, a vapor phase mixture of 5% benzene and 95% n-hexane would have a CF_{mix} of $CF_{\text{mix}} = 1 / (0.05/0.53 + 0.95/4.3) = 3.2$. A reading of 100 would then correspond to 320 ppm of the total mixture, comprised of 16 ppm benzene and 304 ppm hexane.



For a spreadsheet to compute the correction factor and TLV of a mixture see the appendix at the end of the CF table.

TLVs and Alarm Limits for Mixtures

The correction factor for mixtures can be used to set alarm limits for mixtures. To do this one first needs to calculate the exposure limit for the mixture. The Threshold Limit Value (TLV) often defines exposure limits. The TLV for the mixture is calculated in a manner similar to the CF calculation:

$$TLV_{mix} = 1 / (X_1/TLV_1 + X_2/TLV_2 + X_3/TLV_3 + \dots X_i/TLV_i)$$

In the above example, the 8-h TLV for benzene is 0.5 ppm and for n-hexane 50 ppm. Therefore the TLV of the mixture is $TLV_{mix} = 1 / (0.05/0.5 + 0.95/50) = 8.4$ ppm, corresponding to 8.0 ppm hexane and 0.4 ppm benzene. For an instrument calibrated on isobutylene, the reading corresponding to the TLV is:

$$Alarm\ Reading = TLV_{mix} / CF_{mix} = 8.4 / 3.2 = 2.6\ ppm$$

A common practice is to set the lower alarm limit to half the TLV, and the higher limit to the TLV. Thus, one would set the alarms to 1.3 and 2.6 ppm, respectively.

Calibration Characteristics

a) Flow Configuration. PID response is essentially independent of gas flow rate as long as it is sufficient to satisfy the pump demand. Four main flow configurations are used for calibrating a PID:

- 1) Pressurized gas cylinder (Fixed-flow regulator):** The flow rate of the regulator should match the flow demand of the instrument pump or be slightly higher.
- 2) Pressurized gas cylinder (Demand-flow regulator):** A demand-flow regulator better matches pump speed differences, but results in a slight vacuum during calibration and thus slightly high readings.
- 3) Collapsible gas bag:** The instrument will draw the calibration gas from the bag at its normal flow rate, as long as the bag valve is large enough. The bag should be filled with enough gas to allow at least one minute of flow (~ 0.6 L for a MiniRAE, ~0.3 L for MultiRAE).

4) T (or open tube) method: The T method uses a T-junction with gas flow higher than the pump draw. The gas supply is connected to one end of the T, the instrument inlet is connected to a second end of the T, and excess gas flow escapes through the third, open end of the T. To prevent ambient air mixing, a long tube should be connected to the open end, or a high excess rate should be used. Alternatively, the instrument probe can be inserted into an open tube slightly wider than the probe. Excess gas flows out around the probe.

The first two cylinder methods are the most efficient in terms of gas usage, while the bag and T methods give slightly more accurate results because they match the pump flow better.

- b) Pressure.** Pressures deviating from atmospheric pressure affect the readings by altering gas concentration and pump characteristics. It is best to calibrate with the instrument and calibration gas at the same pressure as each other and the sample gas. (Note that the cylinder pressure is not relevant because the regulator reduces the pressure to ambient.) If the instrument is calibrated at atmospheric pressure in one of the flow configurations described above, then 1) pressures slightly above ambient are acceptable but high pressures can damage the pump and 2) samples under vacuum may give low readings if air leaks into the sample train.
- c) Temperature.** Because temperature affects gas density and concentration, the temperature of the calibration gas and instrument should be as close as possible to the ambient temperature where the unit will be used. We recommend that the temperature of the calibration gas be within the instrument's temperature specification (typically 14° to 113° F or -10° to 45° C). Also, during actual measurements, the instrument should be kept at the same or higher temperature than the sample temperature to avoid condensation in the unit.
- d) Matrix.** The matrix gas of the calibration compound and VOC sample is significant. Some common matrix components, such as methane and water vapor can affect the VOC signal. PIDs are

most commonly used for monitoring VOCs in air, in which case the preferred calibration gas matrix is air. For a MiniRAE, methane, methanol, and water vapor reduce the response by about 20% when their concentration is 15,000 ppm and by about 40% at 30,000 ppm. Despite earlier reports of oxygen effects, RAE PID responses with 10.6 eV lamps are independent of oxygen concentration, and calibration gases in a pure nitrogen matrix can be used. H₂ and CO₂ up to 5 volume % also have no effect.

- e) Concentration.** Although RAE Systems PIDs have electronically linearized output, it is best to calibrate in a concentration range close to the actual measurement range. For example, 100 ppm standard gas for anticipated vapors of 0 to 250 ppm, and 500 ppm standard for expected concentrations of 250 to 1000 ppm. The correction factors in this table were typically measured at 50 to 100 ppm and apply from the ppb range up to about 1000 ppm. Above 1000 ppm the CF may vary and it is best to calibrate with the gas of interest near the concentration of interest.
- f) Filters.** Filters affect flow and pressure conditions and therefore all filters to be used during sampling should also be in place during calibration. Using a water trap (hydrophobic filter) greatly reduces the chances of drawing water aerosols or dirt particles into the instrument. Regular filter replacements are recommended because dirty filters can adsorb VOCs and cause slower response time and shifts in calibration.
- g) Instrument Design.** High-boiling (“heavy”) or very reactive compounds can be lost by reaction or adsorption onto materials in the gas sample train, such as filters, pumps and other sensors. Multi-gas meters, including EntryRAE, MultiRAE and AreaRAE have the pump and other sensors upstream of the PID and are prone to these losses. Compounds possibly affected by such losses are shown in green in the table, and may give slow response, or in extreme cases, no response at all. In many cases the multi-gas meters can still give a rough indication of the relative concentration, without giving an accurate,

quantitative reading. The ppbRAE and MiniRAE series instruments have inert sample trains and therefore do not exhibit significant loss; nevertheless, response may be slow for the very heavy compounds and additional sampling time up to a minute or more should be allowed to get a stable reading.

Table Abbreviations:

- CF** = Correction Factor (multiply by reading to get corrected value for the compound when calibrated to isobutylene)
- NR** = No Response
- IE** = Ionization Energy (values in parentheses are not well established)
- C** = Confirmed Value indicated by “+” in this column; all others are preliminary or estimated values and are subject to change
- ne** = Not Established ACGIH 8-hr. TWA
- C##** = Ceiling value, given where 8-hr.TWA is not available

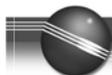
Disclaimer:

Actual readings may vary with age and cleanliness of lamp, relative humidity, and other factors. For accurate work, the instrument should be calibrated regularly under the operating conditions used. The factors in this table were measured in dry air at room temperature, typically at 50-100 ppm. CF values may vary above about 1000 ppm.

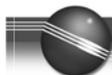
Updates:

The values in this table are subject to change as more or better data become available. Watch for updates of this table on the Internet at <http://www.raesystems.com>

IE data are taken from the CRC Handbook of Chemistry and Physics, 73rd Edition, D.R. Lide (Ed.), CRC Press (1993) and NIST Standard Ref. Database 19A, NIST Positive Ion Energetics, Vers. 2.0, Lias, et.al., U.S. Dept. Commerce (1993). Exposure limits (8-h TWA and Ceiling Values) are from the 2005 ACGIH Guide to Occupational Exposure Values, ACGIH, Cincinnati, OH 2005. Equations for exposure limits for mixtures of chemicals were taken from the 1997 TLVs and BEIs handbook published by the ACGIH (1997).



Compound Name	Synonym/Abbreviation	CAS No.	Formula	9.8	C	10.6	C	11.7	C	IE (eV)	TWA
Acetaldehyde		75-07-0	C ₂ H ₄ O	NR	+	6	+	3.3	+	10.23	C25
Acetic acid	Ethanoic Acid	64-19-7	C ₂ H ₄ O ₂	NR	+	22	+	2.6	+	10.66	10
Acetic anhydride	Ethanoic Acid Anhydride	108-24-7	C ₄ H ₆ O ₃	NR	+	6.1	+	2.0	+	10.14	5
Acetone	2-Propanone	67-64-1	C ₃ H ₆ O	1.2	+	1.1	+	1.4	+	9.71	500
Acetone cyanohydrin	2-Hydroxyisobutyronitrile	75-86-5	C ₄ H ₇ NO					4	+	11.1	C5
Acetonitrile	Methyl cyanide, Cyanomethane	75-05-8	C ₂ H ₃ N					100		12.19	40
Acetylene	Ethyne	74-86-2	C ₂ H ₂					2.1	+	11.40	ne
Acrolein	Propenal	107-02-8	C ₃ H ₄ O	42	+	3.9	+	1.4	+	10.10	0.1
Acrylic acid	Propenoic Acid	79-10-7	C ₃ H ₄ O ₂			12	+	2.0	+	10.60	2
Acrylonitrile	Propenenitrile	107-13-1	C ₃ H ₃ N			NR	+	1.2	+	10.91	2
Allyl alcohol		107-18-6	C ₃ H ₆ O	4.5	+	2.4	+	1.6	+	9.67	2
Allyl chloride	3-Chloropropene	107-05-1	C ₃ H ₅ Cl			4.3		0.7		9.9	1
Ammonia		7664-41-7	H ₃ N	NR	+	9.7	+	5.7	+	10.16	25
Amyl acetate	mix of n-Pentyl acetate & 2-Methylbutyl acetate	628-63-7	C ₇ H ₁₄ O ₂	11	+	2.3	+	0.95	+	<9.9	100
Amyl alcohol	1-Pentanol	75-85-4	C ₅ H ₁₂ O			5		1.6		10.00	ne
Aniline	Aminobenzene	62-53-3	C ₇ H ₇ N	0.50	+	0.48	+	0.47	+	7.72	2
Anisole	Methoxybenzene	100-66-3	C ₇ H ₈ O	0.89	+	0.58	+	0.56	+	8.21	ne
Arsine	Arsenic trihydride	7784-42-1	AsH ₃			1.9	+			9.89	0.05
Benzaldehyde		100-52-7	C ₇ H ₆ O					1		9.49	ne
Benzenamine, N-methyl-	N-Methylphenylamine	100-61-8	C ₇ H ₉ N			0.7				7.53	
Benzene		71-43-2	C ₆ H ₆	0.55	+	0.53	+	0.6	+	9.25	0.5
Benzonitrile	Cyanobenzene	100-47-0	C ₇ H ₅ N			1.6				9.62	ne
Benzyl alcohol	α-Hydroxytoluene, Hydroxymethylbenzene, Benzenemethanol	100-51-6	C ₇ H ₈ O	1.4	+	1.1	+	0.9	+	8.26	ne
Benzyl chloride	α-Chlorotoluene, Chloromethylbenzene	100-44-7	C ₇ H ₇ Cl	0.7	+	0.6	+	0.5	+	9.14	1
Benzyl formate	Formic acid benzyl ester	104-57-4	C ₈ H ₈ O ₂	0.9	+	0.73	+	0.66	+		ne
Boron trifluoride		7637-07-2	BF ₃	NR		NR		NR		15.5	C1
Bromine		7726-95-6	Br ₂	NR	+	1.30	+	0.74	+	10.51	0.1
Bromobenzene		108-86-1	C ₆ H ₅ Br			0.6		0.5		8.98	ne
2-Bromoethyl methyl ether		6482-24-2	C ₃ H ₇ OBr			0.84	+			~10	ne
Bromoform	Tribromomethane	75-25-2	CHBr ₃	NR	+	2.5	+	0.5	+	10.48	0.5
Bromopropane, 1-	n-Propyl bromide	106-94-5	C ₃ H ₇ Br	150	+	1.5	+	0.6	+	10.18	ne
Butadiene	1,3-Butadiene, Vinyl ethylene	106-99-0	C ₄ H ₆	0.8		0.85	+	1.1		9.07	2
Butadiene diepoxide, 1,3-	1,2,3,4-Diepoxybutane	298-18-0	C ₄ H ₆ O ₂	25	+	3.5	+	1.2		~10	ne
Butanal	1-Butanal	123-72-8	C ₄ H ₈ O			1.8				9.84	
Butane		106-97-8	C ₄ H ₁₀			67	+	1.2		10.53	800
Butanol, 1-	Butyl alcohol, n-Butanol	71-36-3	C ₄ H ₁₀ O	70	+	4.7	+	1.4	+	9.99	20
Butanol, t-	tert-Butanol, t-Butyl alcohol	75-65-0	C ₄ H ₁₀ O	6.9	+	2.9	+			9.90	100
Butene, 1-	1-Butylene	106-98-9	C ₄ H ₈			0.9				9.58	ne
Butoxyethanol, 2-	Butyl Cellosolve, Ethylene glycol monobutyl ether	111-76-2	C ₆ H ₁₄ O ₂	1.8	+	1.2	+	0.6	+	<10	25
Butoxyethanol acetate	Ethanol, 2-(2-butoxyethoxy)-, acetate	124-17-4	C ₁₀ H ₂₀ O ₄			5.6				≤10.6	
Butoxyethoxyethanol	2-(2-Butoxyethoxy)ethanol	112-34-5	C ₈ H ₁₈ O ₃			4.6				≤10.6	
Butyl acetate, n-		123-86-4	C ₆ H ₁₂ O ₂			2.6	+			10	150
Butyl acrylate, n-	Butyl 2-propenoate, Acrylic acid butyl ester	141-32-2	C ₇ H ₁₂ O ₂			1.6	+	0.6	+		10
Butylamine, n-		109-73-9	C ₄ H ₁₁ N	1.1	+	1.1	+	0.7	+	8.71	C5
Butyl cellosolve	see 2-Butoxyethanol	111-76-2									
Butyl hydroperoxide, t-		75-91-2	C ₄ H ₁₀ O ₂	2.0	+	1.6	+			<10	1
Butyl mercaptan	1-Butanethiol	109-79-5	C ₄ H ₁₀ S	0.55	+	0.52	+			9.14	0.5
Carbon disulfide		75-15-0	CS ₂	4	+	1.2	+	0.44		10.07	10
Carbon tetrachloride	Tetrachloromethane	56-23-5	CCl ₄	NR	+	NR	+	1.7	+	11.47	5
Carbonyl sulfide	Carbon oxysulfide	463-58-1	COS							11.18	
Cellosolve	see 2-Ethoxyethanol										
CFC-14	see Tetrafluoromethane										
CFC-113	see 1,1,2-Trichloro-1,2,2-trifluoroethane										



Compound Name	Synonym/Abbreviation	CAS No.	Formula	9.8	C	10.6	C	11.7	C	IE (eV)	TWA
Chlorine		7782-50-5	Cl ₂					1.0	+	11.48	0.5
Chlorine dioxide		10049-04-4	ClO ₂	NR	+	NR	+	NR	+	10.57	0.1
Chlorobenzene	Monochlorobenzene	108-90-7	C ₆ H ₅ Cl	0.44	+	0.40	+	0.39	+	9.06	10
Chlorobenzotrifluoride, 4-	PCBTf, OXSOL 100 p-Chlorobenzotrifluoride	98-56-6	C ₇ H ₄ ClF ₃	0.74	+	0.63	+	0.55	+	<9.6	25
Chloro-1,3-butadiene, 2-	Chloroprene	126-99-8	C ₄ H ₅ Cl					3			10
Chloro-1,1-difluoroethane, 1-	HCFC-142B, R-142B	75-68-3	C ₂ H ₃ ClF ₂	NR		NR		NR		12.0	ne
Chlorodifluoromethane	HCFC-22, R-22	75-45-6	CHClF ₂	NR		NR		NR		12.2	1000
Chloroethane	Ethyl chloride	75-00-3	C ₂ H ₅ Cl	NR	+	NR	+	1.1	+	10.97	100
Chloroethanol	Ethylene chlorhydrin	107-07-3	C ₂ H ₅ ClO					2.9		10.52	C1
Chloroethyl ether, 2-	bis(2-chloroethyl) ether	111-44-4	C ₄ H ₈ Cl ₂ O	8.6	+	3.0	+				5
Chloroethyl methyl ether, 2-	Methyl 2-chloroethyl ether	627-42-9	C ₃ H ₇ ClO					3			ne
Chloroform	Trichloromethane	67-66-3	CHCl ₃	NR	+	NR	+	3.5	+	11.37	10
Chloro-2-methylpropene, 3-	Methallyl chloride, Isobutenyl chloride	563-47-3	C ₄ H ₇ Cl	1.4	+	1.2	+	0.63	+	9.76	ne
Chloropicrin		76-06-2	CCl ₃ NO ₂	NR	+	~400	+	7	+	?	0.1
Chlorotoluene, o-	o-Chloromethylbenzene	95-49-8	C ₇ H ₇ Cl			0.5		0.6		8.83	50
Chlorotoluene, p-	p-Chloromethylbenzene	106-43-4	C ₇ H ₇ Cl					0.6		8.69	ne
Chlorotrifluoroethene	CTFE, Chlorotrifluoroethylene Genetron 1113	79-38-9	C ₂ ClF ₃	6.7	+	3.9	+	1.2	+	9.76	5
Chlorotrimethylsilane		75-77-4	C ₃ H ₉ ClSi	NR		NR		0.82	+	10.83	ne
Cresol, m-	m-Hydroxytoluene	108-39-4	C ₇ H ₈ O	0.57	+	0.50	+	0.57	+	8.29	5
Cresol, o-	o-Hydroxytoluene	95-48-7	C ₇ H ₈ O			1.0				8.50	
Cresol, p-	p-Hydroxytoluene	106-44-5	C ₇ H ₈ O			1.4				8.35	
Crotonaldehyde	<i>trans</i> -2-Butenal	123-73-9	C ₄ H ₆ O	1.5	+	1.1	+	1.0	+	9.73	2
		4170-30-3									
Cumene	Isopropylbenzene	98-82-8	C ₉ H ₁₂	0.58	+	0.54	+	0.4	+	8.73	50
Cyanogen bromide		506-68-3	CNBr	NR		NR		NR		11.84	ne
Cyanogen chloride		506-77-4	CNCl	NR		NR		NR		12.34	C0.3
Cyclohexane		110-82-7	C ₆ H ₁₂	3.3	+	1.4	+	0.64	+	9.86	300
Cyclohexanol	Cyclohexyl alcohol	108-93-0	C ₆ H ₁₂ O	1.5	+	0.9	+	1.1	+	9.75	50
Cyclohexanone		108-94-1	C ₆ H ₁₀ O	1.0	+	0.9	+	0.7	+	9.14	25
Cyclohexene		110-83-8	C ₆ H ₁₀			0.8	+			8.95	300
Cyclohexylamine		108-91-8	C ₆ H ₁₃ N			1.2				8.62	10
Cyclopentane 85%		287-92-3	C ₅ H ₁₀	NR	+	15	+	1.1		10.33	600
2,2-dimethylbutane 15%											
Cyclopropylamine	Aminocyclopropane	765-30-0	C ₃ H ₇ N	1.1	+	0.9	+	0.9	+		ne
Decamethylcyclopentasiloxane		541-02-6	C ₁₀ H ₃₀ O ₅ Si ₅	0.16	+	0.13	+	0.12	+		ne
Decamethyltetrasiloxane		141-62-8	C ₁₀ H ₃₀ O ₃ Si ₄	0.17	+	0.13	+	0.12	+	<10.2	ne
Decane		124-18-5	C ₁₀ H ₂₂	4.0	+	1.4	+	0.35	+	9.65	ne
Diacetone alcohol	4-Methyl-4-hydroxy-2-pentanone	123-42-2	C ₆ H ₁₂ O ₂			0.7					50
Dibromochloromethane	Chlorodibromomethane	124-48-1	CHBr ₂ Cl	NR	+	5.3	+	0.7	+	10.59	ne
Dibromo-3-chloropropane, 1,2-	DBCP	96-12-8	C ₃ H ₅ Br ₂ Cl	NR	+	1.7	+	0.43	+		0.001
Dibromoethane, 1,2-	EDB, Ethylene dibromide, Ethylene bromide	106-93-4	C ₂ H ₄ Br ₂	NR	+	1.7	+	0.6	+	10.37	ne
Dichlorobenzene, o-	1,2-Dichlorobenzene	95-50-1	C ₆ H ₄ Cl ₂	0.54	+	0.47	+	0.38	+	9.08	25
Dichlorodifluoromethane	CFC-12	75-71-8	CCl ₂ F ₂			NR	+	NR	+	11.75	1000
Dichlorodimethylsilane		75-78-5	C ₂ H ₆ Cl ₂ Si	NR		NR		1.1	+	>10.7	ne
Dichloroethane, 1,2-	EDC, 1,2-DCA, Ethylene dichloride	107-06-2	C ₂ H ₄ Cl ₂			NR	+	0.6	+	11.04	10
Dichloroethene, 1,1-	1,1-DCE, Vinylidene chloride	75-35-4	C ₂ H ₂ Cl ₂			0.82	+	0.8	+	9.79	5
Dichloroethene, c-1,2-	c-1,2-DCE, <i>cis</i> -Dichloroethylene	156-59-2	C ₂ H ₂ Cl ₂			0.8				9.66	200
Dichloroethene, t-1,2-	t-1,2-DCE, <i>trans</i> -Dichloroethylene	156-60-5	C ₂ H ₂ Cl ₂			0.45	+	0.34	+	9.65	200
Dichloro-1-fluoroethane, 1,1-	R-141B	1717-00-6	C ₂ H ₃ Cl ₂ F	NR	+	NR	+	2.0	+		ne
Dichloromethane	see Methylene chloride										



Compound Name	Synonym/Abbreviation	CAS No.	Formula	9.8	C	10.6	C	11.7	C IE (eV)	TWA	
Dichloropentafluoropropane	AK-225, mix of ~45% 3,3-dichloro-1,1,1,2,2-pentafluoropropane (HCFC-225ca) & ~55% 1,3-Dichloro-1,1,2,2,3-pentafluoropropane (HCFC-225cb)	442-56-0 507-55-1	C ₃ HCl ₂ F ₅	NR	+	NR	+	25	+	ne	
Dichloropropane, 1,2-		78-87-5	C ₃ H ₆ Cl ₂					0.7		10.87	75
Dichloro-1-propene, 1,3-		542-75-6	C ₃ H ₄ Cl ₂	1.3	+	0.96	+			<10	1
Dichloro-1-propene, 2,3-		78-88-6	C ₃ H ₄ Cl ₂	1.9	+	1.3	+	0.7	+	<10	ne
Dichloro-1,1,1-trifluoroethane, 2,2-	R-123	306-83-2	C ₂ HCl ₂ F ₃	NR	+	NR	+	10.1	+	11.5	ne
Dichloro-2,4,6-trifluoropyridine, 3,5-	DCTFP	1737-93-5	C ₅ Cl ₂ F ₃ N	1.1	+	0.9	+	0.8	+		ne
Dichlorvos *	Vapona; O,O-dimethyl O-dichlorovinyl phosphate	62-73-7	C ₄ H ₇ Cl ₂ O ₄ P			0.9	+			<9.4	0.1
Dicyclopentadiene	DCPD, Cyclopentadiene dimer	77-73-6	C ₁₀ H ₁₂	0.57	+	0.48	+	0.43	+	8.8	5
Diesel Fuel		68334-30-5	m.w. 226			0.9	+				11
Diesel Fuel #2 (Automotive)		68334-30-5	m.w. 216	1.3		0.7	+	0.4	+		11
Diethylamine		109-89-7	C ₄ H ₁₁ N			1	+			8.01	5
Diethylaminopropylamine, 3-		104-78-9	C ₇ H ₁₈ N ₂			1.3					ne
Diethylbenzene	See Dowtherm J										
Diethylmaleate		141-05-9	C ₈ H ₁₂ O ₄			4					ne
Diethyl sulfide	see Ethyl sulfide										
Diglyme	See Methoxyethyl ether	111-96-6	C ₆ H ₁₄ O ₃								
Diisobutyl ketone	DIBK, 2,2-dimethyl-4-heptanone	108-83-8	C ₉ H ₁₈ O	0.71	+	0.61	+	0.35	+	9.04	25
Diisopropylamine		108-18-9	C ₆ H ₁₅ N	0.84	+	0.74	+	0.5	+	7.73	5
Diketene	Ketene dimer	674-82-8	C ₄ H ₄ O ₂	2.6	+	2.0	+	1.4	+	9.6	0.5
Dimethylacetamide, N,N-	DMA	127-19-5	C ₄ H ₉ NO	0.87	+	0.8	+	0.8	+	8.81	10
Dimethylamine		124-40-3	C ₂ H ₇ N			1.5				8.23	5
Dimethyl carbonate	Carbonic acid dimethyl ester	616-38-6	C ₃ H ₆ O ₃	NR	+	~70	+	1.7	+	~10.5	ne
Dimethyl disulfide	DMDS	624-92-0	C ₂ H ₆ S ₂	0.2	+	0.20	+	0.21	+	7.4	ne
Dimethyl ether	see Methyl ether										
Dimethylethylamine	DMEA	598-56-1	C ₄ H ₁₁ N	1.1	+	1.0	+	0.9	+	7.74	~3
Dimethylformamide, N,N-	DMF	68-12-2	C ₃ H ₇ NO	0.7	+	0.7	+	0.8	+	9.13	10
Dimethylhydrazine, 1,1-	UDMH	57-14-7	C ₂ H ₈ N ₂			0.8	+	0.8	+	7.28	0.01
Dimethyl methylphosphonate	DMMP, methyl phosphonic acid dimethyl ester	756-79-6	C ₃ H ₉ O ₃ P	NR	+	4.3	+	0.74	+	10.0	ne
Dimethyl sulfate		77-78-1	C ₂ H ₆ O ₄ S	~23		~20	+	2.3	+		0.1
Dimethyl sulfide	see Methyl sulfide										
Dimethyl sulfoxide	DMSO, Methyl sulfoxide	67-68-5	C ₂ H ₆ OS			1.4	+			9.10	ne
Dioxane, 1,4-		123-91-1	C ₄ H ₈ O ₂			1.3				9.19	25
Dioxolane, 1,3-	Ethylene glycol formal	646-06-0	C ₃ H ₆ O ₂	4.0	+	2.3	+	1.6	+	9.9	20
Dowtherm A	see Therminol® *										
Dowtherm J (97% Diethylbenzene) *		25340-17-4	C ₁₀ H ₁₄			0.5					
DS-108F Wipe Solvent	Ethyl lactate/Isopar H/Propoxypropanol ~7:2:1	97-64-3 64742-48-9 1569-01-3	m.w. 118	3.3	+	1.6	+	0.7	+		ne
Epichlorohydrin	ECH Chloromethyloxirane, 1-chloro2,3-epoxypropane	106-89-8	C ₂ H ₅ ClO	~200	+	8.5	+	1.4	+	10.2	0.5
Ethane		74-84-0	C ₂ H ₆			NR	+	15	+	11.52	ne
Ethanol	Ethyl alcohol	64-17-5	C ₂ H ₆ O			10	+	3.1	+	10.47	1000
Ethanolamine *	MEA, Monoethanolamine	141-43-5	C ₂ H ₇ NO	5.6	+	1.6	+			8.96	3
Ethene	Ethylene	74-85-1	C ₂ H ₄			9	+	4.5	+	10.51	ne
Ethoxyethanol, 2-	Ethyl cellosolve	110-80-5	C ₄ H ₁₀ O ₂			1.3				9.6	5
Ethyl acetate		141-78-6	C ₄ H ₈ O ₂			4.6	+	3.5		10.01	400
Ethyl acetoacetate		141-97-9	C ₆ H ₁₀ O ₃	1.4	+	1.2	+	1.0	+	<10	ne
Ethyl acrylate		140-88-5	C ₅ H ₈ O ₂			2.4	+	1.0	+	<10.3	5
Ethylamine		75-04-7	C ₂ H ₇ N			0.8				8.86	5



Compound Name	Synonym/Abbreviation	CAS No.	Formula	9.8	C	10.6	C	11.7	C	IE (Ev)	TWA
Ethylbenzene		100-41-4	C ₈ H ₁₀	0.52	+	0.52	+	0.51	+	8.77	100
Ethyl caprylate	Ethyl octanoate	106-32-1	C ₁₀ H ₂₀ O ₂			+	0.52	+	0.51	+	
Ethylenediamine	1,2-Ethanediamine; 1,2-Diaminoethane	107-15-3	C ₂ H ₈ N ₂	0.9	+	0.8	+	1.0	+	8.6	10
Ethylene glycol *	1,2-Ethanediol	107-21-1	C ₂ H ₆ O ₂				16	+	6	+	10.16
Ethylene glycol, Acrylate	2-hydroxyethyl Acrylate	818-61-1	C ₅ H ₈ O ₃				8.2				≤10.6
Ethylene glycol dimethyl ether	1,2-Dimethoxyethane, Monoglyme	110-71-4	C ₄ H ₁₀ O ₂	1.1		0.86		0.7		9.2	ne
Ethylene glycol monobutyl ether acetate	2-Butoxyethyl acetate	112-07-2	C ₈ H ₁₆ O ₃			1.3				≤10.6	
Ethylene glycol, monothio	mercapto-2-ethanol	60-24-2	C ₂ H ₆ OS			1.5				9.65	
Ethylene oxide	Oxirane, Epoxyethane	75-21-8	C ₂ H ₄ O			13	+	3.5	+	10.57	1
Ethyl ether	Diethyl ether	60-29-7	C ₄ H ₁₀ O			1.1	+	1.7		9.51	400
Ethyl 3-ethoxypropionate	EEP	763-69-9	C ₇ H ₁₄ O ₃	1.2	+	0.75	+				ne
Ethyl formate		109-94-4	C ₃ H ₆ O ₂					1.9		10.61	100
Ethylhexyl acrylate, 2-	Acrylic acid 2-ethylhexyl ester	103-11-7	C ₁₁ H ₂₀ O ₂			1.1	+	0.5	+		ne
Ethylhexanol	2-Ethyl-1-hexanol	104-76-7	C ₈ H ₁₈ O			1.9				≤10.6	
Ethylidenenorbornene	5-Ethylidene bicyclo(2,2,1)hept-2-ene	16219-75-3	C ₉ H ₁₂	0.4	+	0.39	+	0.34	+	≤8.8	ne
Ethyl (S)-(-)-lactate see also DS-108F	Ethyl lactate, Ethyl (S)-(-)-hydroxypropionate	687-47-8 97-64-3	C ₅ H ₁₀ O ₃	13	+	3.2	+	1.6	+	~10	ne
Ethyl mercaptan	Ethanethiol	75-08-1	C ₂ H ₆ S	0.60	+	0.56	+			9.29	0.5
Ethyl sulfide	Diethyl sulfide	352-93-2	C ₄ H ₁₀ S			0.5	+			8.43	ne
Formaldehyde	Formalin	50-00-0	CH ₂ O	NR	+	NR	+	1.6	+	10.87	C0.3
Formamide		75-12-7	CH ₃ NO			6.9	+	4		10.16	10
Formic acid		64-18-6	CH ₂ O ₂	NR	+	NR	+	9	+	11.33	5
Furfural	2-Furaldehyde	98-01-1	C ₅ H ₄ O ₂			0.92	+	0.8	+	9.21	2
Furfuryl alcohol		98-00-0	C ₅ H ₆ O ₂			0.80	+			<9.5	10
Gasoline #1		8006-61-9	m.w. 72			0.9	+				300
Gasoline #2, 92 octane		8006-61-9	m.w. 93	1.3	+	1.0	+	0.5	+		300
Glutaraldehyde	1,5-Pentanedial, Glutaric dialdehyde	111-30-8	C ₅ H ₈ O ₂	1.1	+	0.8	+	0.6	+		C0.05
Glycidyl methacrylate	2,3-Epoxypropyl methacrylate	106-91-2	C ₇ H ₁₀ O ₃	2.6	+	1.2	+	0.9	+		0.5
Halothane	2-Bromo-2-chloro-1,1,1-trifluoroethane	151-67-7	C ₂ HBrClF ₃					0.6		11.0	50
HCFC-22	see Chlorodifluoromethane										
HCFC-123	see 2,2-Dichloro-1,1,1-trifluoroethane										
HCFC-141B	see 1,1-Dichloro-1-fluoroethane										
HCFC-142B	see 1-Chloro-1,1-difluoroethane										
HCFC-134A	see 1,1,1,2-Tetrafluoroethane										
HCFC-225	see Dichloropentafluoropropane										
Heptane, n-		142-82-5	C ₇ H ₁₆	45	+	2.8	+	0.60	+	9.92	400
Heptanol, 4-	Dipropylcarbinol	589-55-9	C ₇ H ₁₆ O	1.8	+	1.3	+	0.5	+	9.61	ne
Hexamethyldisilazane, 1,1,1,3,3,3- *	HMDS	999-97-3	C ₆ H ₁₉ NSi ₂			0.2	+	0.2	+	~8.6	ne
Hexamethyldisiloxane	HMDSx	107-46-0	C ₆ H ₁₈ OSi ₂	0.33	+	0.27	+	0.25	+	9.64	ne
Hexane, n-		110-54-3	C ₆ H ₁₄	350	+	4.3	+	0.54	+	10.13	50
Hexanol, 1-	Hexyl alcohol	111-27-3	C ₆ H ₁₄ O	9	+	2.5	+	0.55	+	9.89	ne
Hexene, 1-		592-41-6	C ₆ H ₁₂			0.8				9.44	30
HFE-7100	see Methyl nonafluorobutyl ether										
Histoclear (Histo-Clear)	Limonene/corn oil reagent		m.w. ~136	0.5	+	0.4	+	0.3	+		ne
Hydrazine *		302-01-2	H ₄ N ₂	>8	+	2.6	+	2.1	+	8.1	0.01
Hydrazoic acid	Hydrogen azide		HN ₃							10.7	
Hydrogen	Synthesis gas	1333-74-0	H ₂	NR	+	NR	+	NR	+	15.43	ne
Hydrogen cyanide	Hydrocyanic acid	74-90-8	HCN	NR	+	NR	+	NR	+	13.6	C4.7
Hydrogen iodide *	Hydriodic acid	10034-85-2	HI			~0.6*				10.39	
Hydrogen peroxide		7722-84-1	H ₂ O ₂	NR	+	NR	+	NR	+	10.54	1
Hydrogen sulfide		7783-06-4	H ₂ S	NR	+	3.3	+	1.5	+	10.45	10
Hydroxypropyl methacrylate		27813-02-1 923-26-2	C ₇ H ₁₂ O ₃	9.9	+	2.3	+	1.1	+		ne
Iodine *		7553-56-2	I ₂	0.1	+	0.1	+	0.1	+	9.40	C0.1



Compound Name	Synonym/Abbreviation	CAS No.	Formula	9.8	C	10.6	C	11.7	C	IE (eV)	TWA
Iodomethane	Methyl iodide	74-88-4	CH ₃ I	0.21	+	0.22	+	0.26	+	9.54	2
Isoamyl acetate	Isopentyl acetate	123-92-2	C ₇ H ₁₄ O ₂	10.1		2.1		1.0		<10	100
Isobutane	2-Methylpropane	75-28-5	C ₄ H ₁₀			100	+	1.2	+	10.57	ne
Isobutanol	2-Methyl-1-propanol	78-83-1	C ₄ H ₁₀ O	19	+	3.8	+	1.5		10.02	50
Isobutene	Isobutylene, Methyl butene	115-11-7	C ₄ H ₈	1.00	+	1.00	+	1.00	+	9.24	Ne
Isobutyl acrylate	Isobutyl 2-propenoate	106-63-8	C ₇ H ₁₂ O ₂			1.5	+	0.60	+		Ne
Isoflurane	1-Chloro-2,2,2-trifluoroethyl difluoromethyl ether, forane	26675-46-7	C ₃ H ₂ ClF ₅ O	NR	+	NR	+	48	+	~11.7	Ne
Isooctane	2,2,4-Trimethylpentane	540-84-1	C ₈ H ₁₈			1.2				9.86	ne
Isopar E Solvent	Isoparaffinic hydrocarbons	64741-66-8	m.w. 121	1.7	+	0.8	+				Ne
Isopar G Solvent	Photocopier diluent	64742-48-9	m.w. 148			0.8	+				Ne
Isopar K Solvent	Isoparaffinic hydrocarbons	64742-48-9	m.w. 156	0.9	+	0.5	+	0.27	+		Ne
Isopar L Solvent	Isoparaffinic hydrocarbons	64742-48-9	m.w. 163	0.9	+	0.5	+	0.28	+		Ne
Isopar M Solvent	Isoparaffinic hydrocarbons	64742-47-8	m.w. 191			0.7	+	0.4	+		Ne
Isopentane	2-Methylbutane	78-78-4	C ₅ H ₁₂			8.2					Ne
Isophorone		78-59-1	C ₉ H ₁₄ O					3		9.07	C5
Isoprene	2-Methyl-1,3-butadiene	78-79-5	C ₅ H ₈	0.69	+	0.63	+	0.60	+	8.85	Ne
Isopropanol	Isopropyl alcohol, 2-propanol, IPA	67-63-0	C ₃ H ₈ O	500	+	6.0	+	2.7		10.12	200
Isopropyl acetate		108-21-4	C ₅ H ₁₀ O ₂			2.6				9.99	100
Isopropyl ether	Diisopropyl ether	108-20-3	C ₆ H ₁₄ O			0.8				9.20	250
Jet fuel JP-4	Jet B, Turbo B, F-40 Wide cut type aviation fuel	8008-20-6 + 64741-42-0	m.w. 115			1.0	+	0.4	+		Ne
Jet fuel JP-5	Jet 5, F-44, Kerosene type aviation fuel	8008-20-6 + 64747-77-1	m.w. 167			0.6	+	0.5	+		29
Jet fuel JP-8	Jet A-1, F-34, Kerosene type aviation fuel	8008-20-6 + 64741-77-1	m.w. 165			0.6	+	0.3	+		30
Jet fuel A-1 (JP-8)	F-34, Kerosene type aviation fuel	8008-20-6 + 64741-77-1	m.w. 145			0.67					34
Jet Fuel TS	Thermally Stable Jet Fuel, Hydrotreated kerosene fuel	8008-20-6 + 64742-47-8	m.w. 165	0.9	+	0.6	+	0.3	+		30
Limonene, D-	(R)-(+)-Limonene	5989-27-5	C ₁₀ H ₁₆			0.33	+			~8.2	Ne
Kerosene C10-C16 petro.distillate	– see Jet Fuels	8008-20-6									
MDI – see 4,4'-Methylenebis(phenylisocyanate)											
Maleic anhydride	2,5-Furandione	108-31-6	C ₄ H ₂ O ₃							~10.8	0.1
Mesitylene	1,3,5-Trimethylbenzene	108-67-8	C ₉ H ₁₂	0.36	+	0.35	+	0.3	+	8.41	25
Methallyl chloride	– see 3-Chloro-2-methylpropene										
Methane	Natural gas	74-82-8	CH ₄	NR	+	NR	+	NR	+	12.61	Ne
Methanol	Methyl alcohol, carbinol	67-56-1	CH ₄ O	NR	+	NR	+	2.5	+	10.85	200
Methoxyethanol, 2-	Methyl cellosolve, Ethylene glycol monomethyl ether	109-86-4	C ₃ H ₈ O ₂	4.8	+	2.4	+	1.4	+	10.1	5
Methoxyethoxyethanol, 2-	2-(2-Methoxyethoxy)ethanol Diethylene glycol monomethyl ether	111-77-3	C ₇ H ₁₆ O	2.3	+	1.2	+	0.9	+	<10	Ne
Methoxyethyl ether, 2-	bis(2-Methoxyethyl) ether, Diethylene glycol dimethyl ether, Diglyme	111-96-6	C ₆ H ₁₄ O ₃	0.64	+	0.54	+	0.44	+	<9.8	Ne
Methyl acetate		79-20-9	C ₃ H ₆ O ₂	NR	+	6.6	+	1.4	+	10.27	200
Methyl acrylate	Methyl 2-propenoate, Acrylic acid methyl ester	96-33-3	C ₄ H ₆ O ₂			3.7	+	1.2	+	(9.9)	2
Methylamine	Aminomethane	74-89-5	CH ₅ N			1.2				8.97	5
Methyl amyl ketone	MAK, 2-Heptanone, Methyl pentyl ketone	110-43-0	C ₇ H ₁₄ O	0.9	+	0.85	+	0.5	+	9.30	50
Methyl bromide	Bromomethane	74-83-9	CH ₃ Br	110	+	1.7	+	1.3	+	10.54	1
Methyl t-butyl ether	MTBE, <i>tert</i> -Butyl methyl ether	1634-04-4	C ₅ H ₁₂ O			0.9	+			9.24	40
Methyl cellosolve	see 2-Methoxyethanol										
Methyl chloride	Chloromethane	74-87-3	CH ₃ Cl	NR	+	NR	+	0.74	+	11.22	50
Methylcyclohexane		107-87-2	C ₇ H ₁₄	1.6	+	0.97	+	0.53	+	9.64	400
Methylene bis(phenylisocyanate), 4,4'- *	MDI, Mondur M		C ₁₅ H ₁₀ N ₂ O ₂							Very slow ppb level response	0.005



Compound Name	Synonym/Abbreviation	CAS No.	Formula	9.8	C	10.6	C	11.7	C	IE (eV)	TWA
Methylene chloride	Dichloromethane	75-09-2	CH ₂ Cl ₂	NR	+	NR	+	0.89	+	11.32	25
Methyl ether	Dimethyl ether	115-10-6	C ₂ H ₆ O	4.8	+	3.1	+	2.5	+	10.03	Ne
Methyl ethyl ketone	MEK, 2-Butanone	78-93-3	C ₄ H ₈ O	0.86	+	0.9	+	1.1	+	9.51	200
Methylhydrazine	Monomethylhydrazine, Hydrazomethane	60-34-4	C ₂ H ₆ N ₂	1.4	+	1.2	+	1.3	+	7.7	0.01
Methyl isoamyl ketone	MIAK, 5-Methyl-2-hexanone	110-12-3	C ₇ H ₁₄ O	0.8	+	0.76	+	0.5	+	9.28	50
Methyl isobutyl ketone	MIBK, 4-Methyl-2-pentanone	108-10-1	C ₆ H ₁₂ O	0.9	+	0.8	+	0.6	+	9.30	50
Methyl isocyanate	CH ₃ NCO	624-83-9	C ₂ H ₃ NO	NR	+	4.6	+	1.5	+	10.67	0.02
Methyl isothiocyanate	CH ₃ NCS	551-61-6	C ₂ H ₃ NS	0.5	+	0.45	+	0.4	+	9.25	ne
Methyl mercaptan	Methanethiol	74-93-1	CH ₄ S	0.65		0.54		0.66		9.44	0.5
Methyl methacrylate		80-62-6	C ₅ H ₈ O ₂	2.7	+	1.5	+	1.2	+	9.7	100
Methyl nonafluorobutyl ether	HFE-7100DL	163702-08-7, 163702-07-6	C ₅ H ₃ F ₉ O			NR	+	~35	+		ne
Methyl-1,5-pentanediamine, 2-(coats lamp) *	Dytek-A amine, 2-Methyl pentamethylenediamine	15520-10-2	C ₆ H ₁₆ N ₂			~0.6	+			<9.0	ne
Methyl propyl ketone	MPK, 2-Pentanone	107-87-9	C ₅ H ₁₂ O			0.93	+	0.79	+	9.38	200
Methyl-2-pyrrolidinone, N-	NMP, N-Methylpyrrolidone, 1-Methyl-2-pyrrolidinone, 1-Methyl-2-pyrrolidone	872-50-4	C ₅ H ₉ NO	1.0	+	0.8	+	0.9	+	9.17	ne
Methyl salicylate	Methyl 2-hydroxybenzoate	119-36-8	C ₈ H ₈ O ₃	1.3	+	0.9	+	0.9	+	~9	ne
Methylstyrene, α-	2-Propenylbenzene	98-83-9	C ₉ H ₁₀			0.5				8.18	50
Methyl sulfide	DMS, Dimethyl sulfide	75-18-3	C ₂ H ₆ S	0.49	+	0.44	+	0.46	+	8.69	ne
Mineral spirits	Stoddard Solvent, Varsol 1, White Spirits	8020-83-5 8052-41-3 68551-17-7	m.w. 144	1.0		0.69	+	0.38	+		100
Mineral Spirits - Viscor 120B Calibration Fluid, b.p. 156-207°C		8052-41-3	m.w. 142	1.0	+	0.7	+	0.3	+		100
Monoethanolamine - see Ethanolamine											
Mustard *	HD, Bis(2-chloroethyl) sulfide	505-60-2 39472-40-7 68157-62-0	C ₄ H ₈ Cl ₂ S			0.6					0.0005
Naphtha - see VM & P Naptha											
Naphthalene	Mothballs	91-20-3	C ₁₀ H ₈	0.45	+	0.42	+	0.40	+	8.13	10
Nickel carbonyl (in CO)	Nickel tetracarbonyl	13463-39-3	C ₄ NiO ₄			0.18				<8.8	0.001
Nicotine		54-11-5	C ₁₀ H ₁₄ N ₂			2.0				≤10.6	
Nitric oxide		10102-43-9	NO	~6		5.2	+	2.8	+	9.26	25
Nitrobenzene		98-95-3	C ₆ H ₅ NO ₂	2.6	+	1.9	+	1.6	+	9.81	1
Nitroethane		79-24-3	C ₂ H ₅ NO ₂					3		10.88	100
Nitrogen dioxide		10102-44-0	NO ₂	23	+	16	+	6	+	9.75	3
Nitrogen trifluoride		7783-54-2	NF ₃	NR		NR		NR		13.0	10
Nitromethane		75-52-5	CH ₃ NO ₂					4		11.02	20
Nitropropane, 2-		79-46-9	C ₃ H ₇ NO ₂					2.6		10.71	10
Nonane		111-84-2	C ₉ H ₂₀			1.4				9.72	200
Norpar 12	n-Paraffins, mostly C ₁₀ -C ₁₃	64771-72-8	m.w. 161	3.2	+	1.1	+	0.28	+		ne
Norpar 13	n-Paraffins, mostly C ₁₃ -C ₁₄	64771-72-8	m.w. 189	2.7	+	1.0	+	0.3	+		ne
Octamethylcyclotetrasiloxane		556-67-2	C ₈ H ₂₄ O ₄ Si ₄	0.21	+	0.17	+	0.14	+		ne
Octamethyltrisiloxane		107-51-7	C ₈ H ₂₄ O ₂ Si ₃	0.23	+	0.18	+	0.17	+	<10.0	ne
Octane, n-		111-65-9	C ₈ H ₁₈	13	+	1.8	+			9.82	300
Octene, 1-		111-66-0	C ₈ H ₁₆	0.9	+	0.75	+	0.4	+	9.43	75
Pentane		109-66-0	C ₅ H ₁₂	80	+	8.4	+	0.7	+	10.35	600
Peracetic acid *	Peroxyacetic acid, Acetyl hydroperoxide	79-21-0	C ₂ H ₄ O ₃	NR	+	NR	+	2.3	+		ne
Peracetic/Acetic acid mix *	Peroxyacetic acid, Acetyl hydroperoxide	79-21-0	C ₂ H ₄ O ₃			50	+	2.5	+		ne
Perchloroethene	PCE, Perchloroethylene, Tetrachloroethylene	127-18-4	C ₂ Cl ₄	0.69	+	0.57	+	0.31	+	9.32	25
PGME	Propylene glycol methyl ether, 1-Methoxy-2-propanol	107-98-2	C ₆ H ₁₂ O ₃	2.4	+	1.5	+	1.1	+		100



Compound Name	Synonym/Abbreviation	CAS No.	Formula	9.8	C	10.6	C	11.7	C	IE (eV)	TWA
PGMEA	Propylene glycol methyl ether acetate, 1-Methoxy-2-acetoxypropane, 1-Methoxy-2-propanol acetate	108-65-6	C ₆ H ₁₂ O ₃	1.65	+	1.0	+	0.8	+		ne
Phenol	Hydroxybenzene	108-95-2	C ₆ H ₆ O	1.0	+	1.0	+	0.9	+	8.51	5
Phosgene	Dichlorocarbonyl	75-44-5	CCl ₂ O	NR	+	NR	+	8.5	+	11.2	0.1
Phosgene in Nitrogen	Dichlorocarbonyl	75-44-5	CCl ₂ O	NR	+	NR	+	6.8	+	11.2	0.1
Phosphine (coats lamp)		7803-51-2	PH ₃	28		3.9	+	1.1	+	9.87	0.3
Photocopier Toner	Isoparaffin mix					0.5	+	0.3	+		ne
Picoline, 3-	3-Methylpyridine	108-99-6	C ₆ H ₇ N			0.9				9.04	ne
Pinene, α-		2437-95-8	C ₁₀ H ₁₆			0.31	+	0.47		8.07	ne
Pinene, β-		18172-67-3	C ₁₀ H ₁₆	0.38	+	0.37	+	0.37	+	~8	100
Piperylene, isomer mix	1,3-Pentadiene	504-60-9	C ₅ H ₈	0.76	+	0.69	+	0.64	+	8.6	100
Propane		74-98-6	C ₃ H ₈			NR	+	1.8	+	10.95	2500
Propanol, n-	Propyl alcohol	71-23-8	C ₃ H ₈ O			5		1.7		10.22	200
Propene	Propylene	115-07-1	C ₃ H ₆	1.5	+	1.4	+	1.6	+	9.73	ne
Propionaldehyde	Propanal	123-38-6	C ₃ H ₆ O			1.9				9.95	ne
Propyl acetate, n-		109-60-4	C ₅ H ₁₀ O ₂			3.5		2.3		10.04	200
Propylamine, n-	1-Propylamine, 1-Aminopropane	107-10-8	C ₃ H ₉ N	1.1	+	1.1	+	0.9	+	8.78	ne
Propylene carbonate *		108-32-7	C ₄ H ₆ O ₃			62	+	1	+	10.5	ne
Propylene glycol	1,2-Propanediol	57-55-6	C ₃ H ₈ O ₂	18		5.5	+	1.6	+	<10.2	ne
Propylene glycol propyl ether	1-Propoxy-2-propanol	1569-01-3	C ₆ H ₁₄ O ₂	1.3	+	1.0	+	1.6	+		ne
Propylene oxide	Methyloxirane	75-56-9	C ₃ H ₆ O	~240		6.6	+	2.9	+	10.22	20
		16088-62-3									
		15448-47-2									
Propyleneimine	2-Methylaziridine	75-55-8	C ₃ H ₇ N	1.5	+	1.3	+	1.0	+	9.0	2
Propyl mercaptan, 2-	2-Propanethiol, Isopropyl mercaptan	75-33-2	C ₃ H ₈ S	0.64	+	0.66	+			9.15	ne
Pyridine		110-86-1	C ₅ H ₅ N	0.78	+	0.7	+	0.7	+	9.25	5
Pyrrolidine (coats lamp)	Azacyclohexane	123-75-1	C ₄ H ₉ N	2.1	+	1.3	+	1.6	+	~8.0	ne
RR7300 (PGME/PGMEA)	70:30 PGME:PGMEA (1-Methoxy-2-propanol:1-Methoxy-2-acetoxypropane)	107-98-2	C ₄ H ₁₀ O ₂ / C ₆ H ₁₂ O ₃			1.4	+	1.0	+		ne
Sarin	GB, Isopropyl methylphosphonofluoridate	107-44-8	C ₄ H ₁₀ FO ₂ P			~3					
		50642-23-4									
Stoddard Solvent - see Mineral Spirits		8020-83-5									
Styrene		100-42-5	C ₈ H ₈	0.45	+	0.40	+	0.4	+	8.43	20
Sulfur dioxide		7446-09-5	SO ₂	NR		NR	+	NR	+	12.32	2
Sulfur hexafluoride		2551-62-4	SF ₆	NR		NR		NR		15.3	1000
Sulfuryl fluoride	Vikane	2699-79-8	SO ₂ F ₂	NR		NR		NR		13.0	5
Tabun *	Ethyl N, N-dimethylphosphoramidocyanidate	77-81-6	C ₅ H ₁₁ N ₂ O ₂ P			0.8					15ppt
Tetrachloroethane, 1,1,1,2-		630-20-6	C ₂ H ₂ Cl ₄					1.3		~11.1	ne
Tetrachloroethane, 1,1,1,2,2-		79-34-5	C ₂ H ₂ Cl ₄	NR	+	NR	+	0.60	+	~11.1	1
Tetrachlorosilane		10023-04-7	SiCl ₄	NR		NR		15	+	11.79	ne
Tetraethyl lead	TEL	78-00-2	C ₈ H ₂₀ Pb	0.4		0.3		0.2		~11.1	0.008
Tetraethyl orthosilicate	Ethyl silicate, TEOS	78-10-4	C ₈ H ₂₀ O ₄ Si			0.7	+	0.2	+	~9.8	10
Tetrafluoroethane, 1,1,1,2-	HFC-134A	811-97-2	C ₂ H ₂ F ₄			NR		NR			ne
Tetrafluoroethene	TFE, Tetrafluoroethylene, Perfluoroethylene	116-14-3	C ₂ F ₄			~15				10.12	ne
Tetrafluoromethane	CFC-14, Carbon tetrafluoride	75-73-0	CF ₄			NR	+	NR	+	>15.3	ne
Tetrahydrofuran	THF	109-99-9	C ₄ H ₈ O	1.9	+	1.7	+	1.0	+	9.41	200
Tetramethyl orthosilicate	Methyl silicate, TMOS	681-84-5	C ₄ H ₁₂ O ₄ Si	10	+	1.9	+			~10	1
Therminol® D-12 *	Hydrotreated heavy naphtha	64742-48-9	m.w. 160	0.8	+	0.51	+	0.33	+		ne
Therminol® VP-1 *	Dowtherm A, 3:1 Diphenyl oxide:	101-84-8	C ₁₂ H ₁₀ O			0.4	+				1
	Biphenyl	92-52-4	C ₁₂ H ₁₀								
Toluene	Methylbenzene	108-88-3	C ₇ H ₈	0.54	+	0.50	+	0.51	+	8.82	50



Compound Name	Synonym/Abbreviation	CAS No.	Formula	9.8	C	10.6	C	11.7	C	IE (eV)	TWA
Tolylene-2,4-diisocyanate	TDI, 4-Methyl-1,3-phenylene-2,4-diisocyanate	584-84-9	C ₉ H ₆ N ₂ O ₂	1.4	+	1.4	+	2.0	+		0.002
Trichlorobenzene, 1,2,4-	1,2,4-TCB	120-82-1	C ₆ H ₃ Cl ₃	0.7	+	0.46	+			9.04	C5
Trichloroethane, 1,1,1-	1,1,1-TCA, Methyl chloroform	71-55-6	C ₂ H ₃ Cl ₃			NR	+	1	+	11	350
Trichloroethane, 1,1,2-	1,1,2-TCA	79-00-5	C ₂ H ₃ Cl ₃	NR	+	NR	+	0.9	+	11.0	10
Trichloroethene	TCE, Trichloroethylene	79-01-6	C ₂ HCl ₃	0.62	+	0.54	+	0.43	+	9.47	50
Trichloromethylsilane	Methyltrichlorosilane	75-79-6	CH ₃ Cl ₃ Si	NR		NR		1.8	+	11.36	ne
Trichlorotrifluoroethane, 1,1,2-	CFC-113	76-13-1	C ₂ Cl ₃ F ₃			NR		NR		11.99	1000
Triethylamine	TEA	121-44-8	C ₆ H ₁₅ N	0.95	+	0.9	+	0.65	+	7.3	1
Triethyl borate	TEB; Boric acid triethyl ester	150-46-9	C ₆ H ₁₅ O ₃ B			2.2	+	1.1	+	~10	ne
Triethyl phosphate	Ethyl phosphate	78-40-0	C ₆ H ₁₅ O ₄ P	~50	+	3.1	+	0.60	+	9.79	ne
Trifluoroethane, 1,1,2-		430-66-0	C ₂ H ₃ F ₃					34		12.9	ne
Trimethylamine		75-50-3	C ₃ H ₉ N			0.9				7.82	5
Trimethylbenzene, 1,3,5- - see Mesitylene		108-67-8									25
Trimethyl borate	TMB; Boric acid trimethyl ester, Boron methoxide	121-43-7	C ₃ H ₉ O ₃ B			5.1	+	1.2	+	10.1	ne
Trimethyl phosphate	Methyl phosphate	512-56-1	C ₃ H ₉ O ₄ P			8.0	+	1.3	+	9.99	ne
Trimethyl phosphite	Methyl phosphite	121-45-9	C ₃ H ₉ O ₃ P			1.1	+		+	8.5	2
Turpentine	Pinenes (85%) + other diisoprenes	8006-64-2	C ₁₀ H ₁₆	0.37	+	0.30	+	0.29	+	~8	20
Undecane		1120-21-4	C ₁₁ H ₂₄			2				9.56	ne
Varsol – see Mineral Spirits											
Vinyl acetate		108-05-4	C ₄ H ₆ O ₂	1.5	+	1.2	+	1.0	+	9.19	10
Vinyl bromide	Bromoethylene	593-60-2	C ₂ H ₃ Br			0.4				9.80	5
Vinyl chloride	Chloroethylene, VCM	75-01-4	C ₂ H ₃ Cl			2.0	+	0.6	+	9.99	5
Vinyl-1-cyclohexene, 4-	Butadiene dimer, 4-Ethenylcyclohexene	100-40-3	C ₈ H ₁₂	0.6	+	0.56	+			9.83	0.1
Vinylidene chloride - see 1,1-Dichloroethene											
Vinyl-2-pyrrolidinone, 1-	NVP, N-vinylpyrrolidone, 1-ethenyl-2-pyrrolidinone	88-12-0	C ₆ H ₉ NO	1.0	+	0.8	+	0.9	+		ne
Viscor 120B - see Mineral Spirits - Viscor 120B Calibration Fluid											
V. M. & P. Naphtha	Ligroin; Solvent naphtha; Varnish maker's & painter's naphtha	64742-89-8	m.w. 111 (C ₈ -C ₉)	1.7	+	0.97	+				300
Xylene, m-	1,3-Dimethylbenzene	108-38-3	C ₈ H ₁₀	0.50	+	0.44	+	0.40	+	8.56	100
Xylene, o-	1,2-Dimethylbenzene	95-47-6	C ₈ H ₁₀	0.56	+	0.46	+	0.43		8.56	100
Xylene, p-	1,4-Dimethylbenzene	106-42-3	C ₈ H ₁₀	0.48	+	0.39	+	0.38	+	8.44	100
None				1		1		1			
Undetectable				1E+6		1E+6		1E+6			

* Compounds indicated in green can be detected using a MiniRAE 2000 or ppbRAE/+ with slow response, but may be lost by adsorption on a MultiRAE or EntryRAE. Response on multi-gas meters can give an indication of relative concentrations, but may not be quantitative and for some chemicals no response is observed.

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**Appendix I:****Example of Automatic Calculation of Correction Factors, TLVs and Alarm Limits for Mixtures
(Calculations performed using Excel version of this database, available on request)**

Compound	CF 9.8 eV	CF 10.6 eV	CF 11.7eV	Mol. Frac	Conc ppm	TLV ppm	STEL Ppm
Benzene	0.55	0.53	0.6	0.01	1	0.5	2.5
Toluene	0.54	0.5	0.51	0.06	10	50	150
Hexane, n-	300	4.3	0.54	0.06	10	50	150
Heptane, n-	45	2.8	0.6	0.28	50	400	500
Styrene	0.45	0.4	0.42	0.06	10	20	40
Acetone	1.2	1.1	1.4	0.28	50	750	1000
Isopropanol	500	6	2.7	0.28	50	400	500
None	1	1	1	0.00	0	1	
Mixture Value:	2.1	1.5	0.89	1.00	181	56	172
TLV Alarm Setpoint when Calibrated to Isobutylene:	26 ppm	37 ppm	62 ppm		ppm	ppm	ppm
STEL Alarm Setpoint, same Calibration	86 ppm	115 ppm	193 ppm				

FIELD OPERATING PROCEDURES

Composite Sample
Collection Procedure
for Non-VOC Analysis

FOP 013.0

COMPOSITE SAMPLE COLLECTION PROCEDURE FOR NON-VOLATILE ORGANIC ANALYSIS

PURPOSE

This guideline addresses the procedure to be used when soil samples are to be composited in the field.

PROCEDURE

1. Transfer equal weighted aliquots of soil from individual split-spoon samples, excavator bucket, hand auger or surface soil sample location to a large precleaned stainless steel (or Pyrex glass) mixing bowl.
2. Thoroughly mix (homogenize) and break up the soil using a stainless steel scoop or trowel.
3. Spread the composite sample evenly on a stainless steel tray and quarter the sample.
4. Discard alternate (i.e., diagonal) quarters and, using a small stainless steel scoop or spatula, collect equal portions of subsample from the remaining two quarters until the amount required for the composite sample is acquired. Transfer these subsamples to a precleaned stainless steel (or Pyrex glass) mixing bowl and re-mix.
5. Transfer the composite sample to the laboratory provided, precleaned sample jars. Store any excess sample from the stainless steel tray in a separate, precleaned, wide-mouth sample jar and refrigerate for future use, if applicable.
6. Decontaminate all stainless steel (or Pyrex glass) equipment in accordance with Benchmark's Non-disposable and Non-dedicated Sampling Equipment Decontamination procedures.
7. Prepare samples in accordance with Benchmark's Sample Labeling, Storage and Shipment FOP.

FOP 013.0

COMPOSITE SAMPLE COLLECTION PROCEDURE FOR NON-VOLATILE ORGANIC ANALYSIS

8. Record all sampling details in the Project Field Book and on the Soil/Sediment Sample Collection Summary Log (sample attached).

ATTACHMENTS

Soil/Sediment Sample Collection Summary Log (sample)

REFERENCES

Benchmark FOPs:

040 *Non-disposable and Non-dedicated Sampling Equipment Decontamination*

046 *Sample Labeling, Storage and Shipment*

FIELD OPERATING PROCEDURES

Management of
Investigative-Derived
Waste (IDW)

FOP 032.2

MANAGEMENT OF INVESTIGATION-DERIVED WASTE (IDW)

PURPOSE

The purpose of these guidelines is to ensure the proper holding, storage, transportation, and disposal of materials generated from field investigation activities that may contain hazardous wastes. Investigation-derived waste (IDW) includes the following:

- Drill cuttings, discarded soil samples, drilling mud solids, and used sample containers.
- Well development and purge waters and discarded groundwater samples.
- Decontamination waters and associated solids.
- Soiled disposable personal protective equipment (PPE).
- Used disposable sampling equipment.
- Used plastic sheeting and aluminum foil.
- Other equipment or materials that either contain or have been in contact with potentially impacted environmental media.

Because these materials may contain regulated chemical constituents, they must be managed as a solid waste. This management may be terminated if characterization analytical results indicate the absence of these constituents.

PROCEDURE

1. Contain all investigation-derived wastes in Department of Transportation (DOT)-approved 55-gallon drums, roll-off boxes, or other containers suitable for the wastes.

FOP 032.2

MANAGEMENT OF INVESTIGATION-DERIVED WASTE (IDW)

2. Contain wastes from separate borings or wells in separate containers (i.e. do not combine wastes from several borings/wells in a single container, unless it is a container used specifically for transfer purposes, or unless specific permission to do so has been provided by the Benchmark Field Team Leader. Unused samples from surface sample locations within a given area may be combined.
3. To the extent practicable, separate solids from drilling muds, decontamination waters, and similar liquids. Place solids within separate containers.
4. Transfer all waste containers to a staging area. Access to this area will be controlled. Waste containers must be transferred to the staging area as soon as practicable after the generating activity is complete.
5. Pending transfer, all containers will be covered and secured when not immediately attended.
6. Label all containers with regard to contents, origin, date of generation, using Benchmark's IDW container label (sample attached). Use indelible ink for all labeling.
7. Complete the Investigative Derived Waste Container Log (sample attached) as waste containers are labeled in order to track and inventory project waste. Leave a copy of the log with the site manager or fax copy to the owner/operator as necessary.
8. Collect samples for waste characterization purposes, or use boring/well sample analytical data for characterization.
9. For wastes determined to be hazardous in character, **be aware of accumulation time limitations**. Coordinate the disposal of these wastes with the plant manager/owner/operator, if applicable.
10. Upon NYSDEC Project Manager approval, dispose of investigation-derived wastes as follows:

FOP 032.2

MANAGEMENT OF INVESTIGATION-DERIVED WASTE (IDW)

- Soil, water, and other environmental media for which analysis does not detect organic constituents, and for which inorganic constituents are at levels that meet the Site's cleanup objectives, may be spread on the Property or otherwise treated as a non-waste material. Disposal quantity and on-site location will be documented on Project Field Books and in the project report submittal.
- Soil, water, and other environmental media in which organic compounds are detected or metals are present above the Site's cleanup objectives will be disposed off-site in accordance with applicable state and federal regulations. Disposal quantity and off-site location will be documented on Project Field Books and in the project report submittal.
- Personal protective equipment, disposable bailers, and similar equipment may be disposed as municipal waste, unless waste characterization results mandate otherwise.

WASTE STORAGE MANAGEMENT

Hazardous materials generated on site should be temporarily stored in a secure location that is under the control of the owner/operator or does not allow for vandalism (i.e., within a locked building structure or within a locked fenced in area). A waste-staging area should be designated on-site by the Project Manager in conjunction with the owner/operator.

ATTACHMENTS

Investigation Derived Waste Container Log (sample)
Investigation Derived Waste Container Label (sample)

REFERENCES

None

FOP 032.2

MANAGEMENT OF INVESTIGATION-DERIVED WASTE (IDW)

IDW Container Label (sample):

 <p>BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC</p>
Project Name: _____
Project Number: _____
Container I.D.: _____
Contents/Matrix: _____
Estimated Quantity: _____
Date of Generation: _____
Date of Sample Collection: _____
Contact Name: _____
Contact Phone Number: _____

FIELD OPERATING PROCEDURES

Non-Disposable and
Non-Dedicated
Sampling Equipment
Decontamination

FOP 040.1

NON-DISPOSABLE AND NON-DEDICATED SAMPLING EQUIPMENT DECONTAMINATION

PURPOSE

This procedure is to be used for the decontamination of non-disposable and non-dedicated equipment used in the collection of environmental samples. The purpose of this procedure is to remove chemical constituents from previous samples from the sampling equipment. This prevents these constituents from being transferred to later samples, or being transported out of controlled areas.

HEALTH AND SAFETY

Nitric acid is a strong oxidizing agent as well as being extremely corrosive to the skin and eyes. Solvents such as acetone, methanol, hexane and isopropanol are flammable liquids. Limited contact with skin can cause irritation, while prolonged contact may result in dermatitis. Eye contact with the solvents may cause irritation or temporary corneal damage. Safety glasses with protective side shields, neoprene or nitrile gloves and long-sleeve protective clothing must be worn whenever acids and solvents are being used.

PROCEDURE – GENERAL EQUIPMENT

Bailers, split-spoons, steel or brass split-spoon liners, Shelby tubes, submersible pumps, soil sampling knives, and similar equipment will be decontaminated as described below.

1. Wash equipment thoroughly with non-phosphate detergent and potable-quality water, using a brush where possible to remove any particulate matter or surface film. If the sampler is visibly coated with tars or other phase-separated hydrocarbons, pre-wash with acetone or isopropanol, or by steam cleaning. Decontamination will adhere to the following procedure:

FOP 040.1

NON-DISPOSABLE AND NON-DEDICATED SAMPLING EQUIPMENT DECONTAMINATION

- a. Rinse with potable-quality water; if the sampling equipment is very oily and use of a solvent is necessary, rinse with pesticide-grade isopropanol.
 - b. Rinse with potable-quality water;
 - c. Rinse with deionized water demonstrated analyte-free, such as distilled water;
 - d. Air dry; and
 - e. Store in a clean area or wrap in aluminum foil (shiny side out) or new plastic sheeting as necessary to ensure cleanliness.
2. All non-dedicated well evacuation equipment, such as submersible pumps and bailers, which are put into the well, must be decontaminated following the procedures listed above. All evacuation tubing must be dedicated to individual wells (i.e., tubing cannot be reused). However, if submersible pump discharge tubing must be reused, the tubing and associated sample valves or flow-through cells used in well purging or pumping tests will be decontaminated as described below:
- a. Pump a mixture of potable water and a non-phosphate detergent through the tubing, sample valves and flow cells, using the submersible pump.
 - b. Steam clean or detergent wash the exterior of the tubing, sample valves, flow cells and pump.
 - c. Pump potable water through the tubing, sample valve, and flow cell until no indications of detergent (e.g. foaming) are observed.
 - d. Double rinse the exterior of the tubing with potable water.
 - e. Rinse the exterior of the tubing with distilled water.

FOP 040.1

NON-DISPOSABLE AND NON-DEDICATED SAMPLING EQUIPMENT DECONTAMINATION

- f. Store in a clean area or wrap the pump and tubing assembly in new plastic sheeting as necessary to ensure cleanliness until ready for use.
3. All unused sample bottles and sampling equipment must be maintained in such a manner that there is no possibility of casual contamination.
4. Manage all waste materials generated during decontamination procedures as described in the Benchmark Field Operating Procedure for Management of Investigation Derived Waste.

PROCEDURE – SUBMERSIBLE PUMPS

Submersible pumps used in well purging or purging tests will be decontaminated thoroughly each day before use as well as between well locations as described below:

Daily Decontamination Procedure:

1. Pre-rinse: Operate the pump in a basin containing 8 to 10 gallons of potable water for 5 minutes and flush other equipment with potable water for 5 minutes.
2. Wash: Operate the pump in 8 to 10 gallons of non-phosphate detergent solution (i.e., Alconox) for 5 minutes and flush other equipment with fresh detergent solution for 5 minutes.
3. Rinse: Operate the pump in a basin of potable water for 5 minutes and flush other equipment with potable water for 5 minutes.
4. Disassemble pump.
5. Wash pump parts with a non-phosphate detergent solution (i.e., Alconox). Scrub all pump parts with a test tube brush or similar device.

FOP 040.1

NON-DISPOSABLE AND NON-DEDICATED SAMPLING EQUIPMENT DECONTAMINATION

6. Rinse pump with potable water.
7. Rinse the inlet screen, the shaft, the suction interconnection, the motor lead assembly, and the stator housing with distilled/deionized water.
8. Rinse the impeller assembly with 1% nitric acid (HNO₃).
9. Rinse the impeller assembly with isopropanol.
10. Rinse the impeller assembly with distilled/deionized water.

Between Wells Decontamination Procedure:

1. Pre-rinse: Operate the pump in a basin containing 8 to 10 gallons of potable water for 5 minutes.
2. Wash: Operate the pump in 8 to 10 gallons of non-phosphate detergent solution (i.e., Alconox) for 5 minutes.
3. Rinse: Operate the pump in a basin of potable water for 5 minutes.
4. Final rinse the pump in distilled/deionized water.

ATTACHMENTS

None

REFERENCES

Benchmark FOPs:
032 Management of Investigation-Derived Waste

FIELD OPERATING PROCEDURES

Sample Labeling,
Storage, and Shipment
Procedures

SAMPLE LABELING, STORAGE & SHIPMENT PROCEDURES

PURPOSE

The collection and analysis of samples of environmental media, including soils, groundwater, surface water, and sediment, are the central activities of the field investigation. These samples must be properly labeled to preserve its identity, and properly stored and shipped in a manner that preserves its integrity and chain of custody. This procedure presents methods for these activities.

SAMPLE LABELING PROCEDURE

1. Assign each sample retained for analysis a unique 9-digit alphanumeric identification code or as indicated in the Project Work Plan. Typically, this code will be formatted as follows:

Sample I.D. Example: GW051402047	
GW	Sample matrix GW = groundwater; SW = surface water; SUB = subsurface soil; SS = surface soil; SED = sediment; L = leachate; A = air
05	Month of sample collection
14	Day of sample collection
02	Year of sample collection
047	Consecutive sample number

2. Consecutive sample numbers will indicate the individual sample's sequence in the total set of samples collected during the investigation/sampling event. The sample number above, for example, would indicate the 47th sample retained for analysis during the field investigation, collected on May 14, 2002.

FOP 046.0

SAMPLE LABELING, STORAGE & SHIPMENT PROCEDURES

3. Affix a non-removable (when wet) label to each sample container. The following information will be written on the label with black or blue ink that will not smudge when wet:
 - Project number
 - Sample ID (see Step 1 above)
 - Date of sample collection
 - Time of sample collection (military time only)
 - Specify “grab” or “composite” sample with an “X”
 - Sampler initials
 - Preservative(s) (if applicable)
 - Analytes for analysis (if practicable)
4. Record all sample label information in the Project Field Book and on a Sample Summary Collection Log (see attached samples), keyed to the sample identification number. In addition, add information regarding the matrix, sample location, depth, etc. to provide a complete description of the sample.

SAMPLE STORAGE PROCEDURE

1. Immediately after collection, placement in the proper container, and labeling, place samples to be retained for chemical analysis into resealable plastic bags.
2. Place bagged samples into an ice chest filled approximately half-full of double bagged ice. Blue ice is not an acceptable substitute for ice.
3. Maintain samples in an ice chest or in an alternative location (e.g. sample refrigerator) as approved by the Benchmark Field Team Leader until time of shipment. Periodically drain melt-water off coolers and replenish ice as necessary.

FOP 046.0

SAMPLE LABELING, STORAGE & SHIPMENT PROCEDURES

4. Ship samples on a daily basis, unless otherwise directed by the Benchmark Field Team Leader.
5. Maintain appropriate custody procedures on coolers and other sample storage containers at all times. These procedures are discussed in detail in the Project Quality Assurance Project Plan, Monitoring Plan or Work Plan.
6. Samples shall be kept in a secure location locked and controlled (i.e., locked building or fenced area) so that only the Project Field Team Leader has access to the location or under the constant visual surveillance of the same.

SAMPLE SHIPPING PROCEDURE

1. Fill out the chain-of-custody form completely (see attached sample) with all relevant information. The white original goes with the samples and should be placed in a resealable plastic bag and taped inside the sample cooler lid; the sampler should retain the copy.
2. Place a layer of inert cushioning material such as bubble pack in the bottom of cooler.
3. Place each bottle in a bubble wrap sleeve or other protective wrap. To the extent practicable, then place each bottle in a resealable plastic bag.
4. Open a garbage bag (or similar) into a cooler and place sample bottles into the garbage bag (or similar) with volatile organic analysis (VOA) vials near the center of the cooler.
5. Pack bottles with ice in plastic bags. At packing completion, cooler should be at least 50 percent ice, by volume. Coolers should be completely filled, so that samples do not move excessively during shipping.
6. Duct tape (or similar) cooler drain closed and wrap cooler completely in two or more locations to secure lid, specifically covering the hinges of the cooler.

FOP 046.0

SAMPLE LABELING, STORAGE & SHIPMENT PROCEDURES

7. Place laboratory label address identifying cooler number (i.e., 1 of 4, 2 of 4 etc.) and overnight delivery waybill sleeves on cooler lid or handle sleeve (Federal Express).
8. Sign the custody seal tape with an indelible soft-tip marker and place over the duct tape across the front and back seam between the lid and cooler body.
9. Cover the signed custody seal tape with an additional wrap of transparent strapping tape.
10. Place “Fragile” and “This Side Up” labels on all four sides of the cooler. “This Side Up” labels are yellow labels with a black arrow with the arrowhead pointing toward the cooler lid.
11. For coolers shipped by overnight delivery, retain a copy of the shipping waybill, and attach to the chain-of-custody documentation.

ATTACHMENTS

Soil/Sediment Sample Summary Collection Log (sample)
Groundwater/Surface Water Sample Summary Collection Log (sample)
Wipe Sample Summary Collection Log (sample)
Air Sample Summary Collection Log (sample)
Chain-Of-Custody Form (sample)

REFERENCES

None

FIELD OPERATING PROCEDURES

Screening of Soil
Samples for Organic
Vapors During
Impacted Soil Removal
Activities

FOP 048.0

SCREENING OF SOIL SAMPLES FOR ORGANIC VAPORS DURING IMPACTED SOIL REMOVAL ACTIVITIES

PURPOSE

This procedure is used to screen soil samples for the presence of volatile organic constituents (VOCs) using a field organic vapor meter. The field meter should either be a photoionization detector (PID) or flame-ionization detector (FID) type. This type of screening is generally performed during underground storage tank (UST) and/or impacted soil removal activities as a procedure for ensuring the health and safety of the community and personnel at the site as well as to identify potential VOC-impacted soil samples for laboratory analysis (i.e., confirmatory or verification samples). Soil samples are also screened in the field to provide assessment criteria to determine horizontal and vertical extents of VOC-impacts in order to ensure soils that may have been impacted by volatile organic substances are removed.

PROCEDURE

1. Calibrate air-monitoring equipment in accordance with the appropriate Benchmark's Field Operating Procedures or manufacturers recommendations for calibration of field meters.
2. Perform community air monitoring in accordance with the Project Work Plan and/or Benchmark's FOP: Real-Time Air Monitoring During Intrusive Activities.
3. Upon proper removal of any identified UST in accordance with NYSDEC Division of Environmental Remediation, Spill Response Unit or Bulk Storage Unit guidelines and/or Benchmark's FOP: Underground Storage Tank Removal Procedures; examine the four sidewalls and bottom of the excavation for visually impacted (i.e., stained) soils.

**SCREENING OF SOIL SAMPLES FOR ORGANIC
VAPORS DURING IMPACTED SOIL REMOVAL ACTIVITIES**

4. If visually impacted soils are identified, direct the excavating equipment operator to scrape the impacted area (i.e., sidewall or bottom of the excavation) and present the scraped soil for evaluation. NOTE: Under no circumstances should anyone enter an excavation greater than 4 feet in depth, unless absolutely necessary. Excavation entry may only occur under strict confined space entry procedures following implementation of specific engineering controls (i.e., continuous air monitoring, excavation shoring, trench box installation, benching).
5. Visually inspect and perform an open air PID/FID scan of the scraped soil sample noting stratification, visible staining, or other evidence of impact (i.e., presence of non-aqueous phase liquid, NAPL).
6. Collect a representative sample (approximately 100 milligrams (mg)) of soil using a decontaminated or dedicated stainless steel sampling tool (i.e., spoon, spatula, scoop, or approved equivalent), for field headspace determination of VOC-impact. Place the representative soil sample into a labeled wide-mouth glass jar approximately $\frac{1}{2}$ to $\frac{3}{4}$ full and seal with aluminum foil and a screw top cap. Alternatively, the soil sample may be placed into a clean, re-sealable plastic bag and sealed. Be sure to leave adequate headspace above the soil sample within either sealed container.
7. Place the field screening sample (i.e., jar or bag) in a location where the ambient temperature is at least 70° Fahrenheit for at least 15 minutes, but no more than 60 minutes.
8. Carefully remove the screw top cap from the jar and slowly insert the tip of the organic vapor meter (PID or FID) through the aluminum foil seal making the smallest hole possible. Alternatively, unseal a portion of the plastic bag just big enough to insert the probe of a calibrated PID.
9. Record the depth, sample location (i.e., sidewall, bottom) and maximum reading in parts per million by volume (ppmv) in the Project Field Book and Impacted Soil Excavation Log (sample attached), at the depth interval corresponding to the depth of sample collection.

FOP 048.0

SCREENING OF SOIL SAMPLES FOR ORGANIC VAPORS DURING IMPACTED SOIL REMOVAL ACTIVITIES

10. The representative soil samples collected from the excavation will be used to assess the vertical and horizontal limits of VOC-impact and guide the impacted soil removal activities in accordance with project requirements (i.e., PID scans less than 20 ppm will not require removal unless laboratory analytical results exceed regulatory limits).
11. Collect verification/confirmation samples in accordance with NYSDEC Division of Environmental Remediation, Spill Response Unit or Bulk Storage Unit guidelines and/or Benchmark's FOP: Surface and Subsurface Soil Sampling Procedures.

ATTACHMENTS

Impacted Soil Excavation Log (sample)

REFERENCES

Benchmark FOPs:

- 010 *Calibration and Maintenance of Portable Flame Ionization Detector*
- 011 *Calibration and Maintenance of Portable Photoionization Detector*
- 063 *Surface and Subsurface Soil Sampling Procedures*
- 073 *Real-Time Air Monitoring During Intrusive Activities*
- 074 *Underground Storage Tank Removal Procedures*

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SCREENING OF SOIL SAMPLES FOR ORGANIC VAPORS DURING IMPACTED SOIL REMOVAL ACTIVITIES



IMPACTED SOIL EXCAVATION LOG

Project:	EXCAVATION I.D.:
Project No.:	Excavation Date:
Client:	Excavation Method:
Location:	CQA Observer:

Excavation Location: <i>NOT TO SCALE</i> (approximate)	Excavation Cross Section:
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TIME	Length:	Width:	Depth:	PID Scan (ppm)	PID Headspace (ppm)	Photos Y / N
Start:						
End:						
Verification Sample I.D.	Depth (ft)	Width (ft)	Length (ft)			

COMMENTS:

UST ENCOUNTERED: yes no If yes, Describe (type, material, size, capacity etc.):

GROUNDWATER ENCOUNTERED: yes no If yes, depth to GW:

VISUAL IMPACTS: yes no Describe:

OLFACTORY OBSERVATIONS: yes no Describe:

NON-NATIVE FILL ENCOUNTERED: yes no Describe:

OTHER OBSERVATIONS: yes no Describe:

QUANTITY OF IMPACTED SOIL REMOVED:

FINAL DESTINATION OF IMPACTED SOIL:

TYPE OF BACKFILL:

SURFACE COMPLETION:

FIELD OPERATING PROCEDURES

Real-Time Air
Monitoring During
Intrusive Activities

FOP 073.2

REAL-TIME AIR MONITORING DURING INTRUSIVE ACTIVITIES PROCEDURE

PURPOSE

This guideline presents requirements for real-time community air monitoring and required responses during all project required intrusive activities, such as drilling, test pitting, earthwork construction etc. This procedure is consistent with the requirements for community air monitoring for all intrusive projects, including projects conducted at remediation sites, as established by the New York State Department of Health (NYSDOH) and the New York State Department of Environmental Conservation (NYSDEC). Accordingly, it follows procedures and practices outlined under NYSDEC's DER-10 (May 2010) Appendix 1A (NYSDOH's Generic Community Air Monitoring Plan) and Appendix 1B (Fugitive Dust and Particulate Monitoring).

This FOP requires real-time monitoring for constituents of concern (COC) (i.e., volatile organic compounds (VOCs), lower explosive limit (% LEL), particulates (i.e., dust) etc.) at the upwind and downwind perimeter as well as the exclusion zone of a project site during all intrusive activities. This FOP is not intended for use in establishing action levels for worker respiratory protection (see Project Health and Safety Plan (HASP) for worker protection action levels). Rather, its intent is to provide a measure of protection for the surrounding community from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The community, as referenced in this document, includes any off-site residences, public buildings/grounds and commercial or industrial establishments adjacent to the project site. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, this FOP helps to confirm that work activities did not spread contamination off-site through via air transport mechanisms. Community air monitoring shall be integrated with the construction

FOP 073.2

REAL-TIME AIR MONITORING DURING INTRUSIVE ACTIVITIES PROCEDURE

worker personal exposure-monitoring program contained in the project and site-specific HASP.

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for volatile organic compounds (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 NYSDEC/NYSDOH staff.

MONITORING & MITIGATION PROCEDURE

Real-time air monitoring perimeter locations for monitoring stations will be established based on the location of the exclusion zone (i.e., immediate work area) and wind direction. Where wind direction is shifting or winds are calm, the downwind monitoring location will default to the perimeter location nearest the most sensitive receptor (i.e., residential property). All downwind receptors being equal, the downwind monitoring location will default to the perimeter location downwind of the prevailing winds at the site. Although additional site specific COCs may be monitored during real-time air monitoring activities, the most common COCs are discussed in this FOP, including organic vapors (i.e., VOCs), airborne particulates (i.e., fugitive dust) and combustible gases (i.e., methane) and oxygen.

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REAL-TIME AIR MONITORING DURING INTRUSIVE ACTIVITIES PROCEDURE

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

ORGANIC VAPORS

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. 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

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REAL-TIME AIR MONITORING DURING INTRUSIVE ACTIVITIES PROCEDURE

capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.
- If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.
- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.
- All 15-minute readings must be recorded and be available for State (DEC and DOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.
- **Special Requirements for Work Within 20 Feet of Potentially Exposed Individuals or Structures**
 - When work areas are within 20 feet of potentially exposed populations or occupied structures, the continuous monitoring locations for VOCs and

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REAL-TIME AIR MONITORING DURING INTRUSIVE ACTIVITIES PROCEDURE

particulates must reflect the nearest potentially exposed individuals and the location of ventilation system intakes for nearby structures. The use of engineering controls such as vapor/dust barriers, temporary negative-pressure enclosures, or special ventilation devices should be considered to prevent exposures related to the work activities and to control dust and odors. Consideration should be given to implementing the planned activities when potentially exposed populations are at a minimum, such as during weekends or evening hours in non-residential settings.

- If total VOC concentrations opposite the walls of occupied structures or next to intake vents exceed 1 ppm, monitoring should occur within the occupied structure (s). Background readings in the occupied spaces must be taken prior to commencement of the planned work. Any unusual background readings should be discussed with NYSDOH prior to commencement of the work.
- If total particulate concentrations opposite the walls of occupied structures or next to intake vents exceed 150 mcg/m³, work activities should be suspended until controls are implemented and are successful in reducing the total particulate concentration to 150 mcg/m³ or less at the monitoring point.
- Depending upon the nature of contamination and remedial activities, other parameters (e.g., explosivity, oxygen, hydrogen Sulfide, carbon monoxide) may also need to be monitored. Response levels and actions should be pre-determined, as necessary, for each site.

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REAL-TIME AIR MONITORING DURING INTRUSIVE ACTIVITIES PROCEDURE

Additionally, if following the cessation of work and efforts to abate the emission source are unsuccessful, and if sustained organic vapor levels exceed 25 ppm above background within the 20-foot zone for more than 30 minutes, then the **Major Vapor Emission Response Plan** (see below) will automatically be placed into effect.

Major Vapor Emission Response Plan

Upon activation of Major Vapor Emission Response Plan, the following activities will be undertaken:

1. All Emergency Response Contacts as listed below and in the Site-Specific Health and Safety Plan will be contacted.
2. The local police authorities will immediately be contacted by the Site Safety and Health Officer and advised of the situation.
3. The Site Safety and Health Officer will determine if site workers can safely undertake source abatement measures. Abatement measures may include covering the source area with clean fill or plastic sheeting, or consolidating contaminated materials to minimize surface area. The Site Safety and Health Officer will adjust worker personal protective equipment as necessary to protect workers from over-exposure to organic vapors.

The following personnel are to be notified by the Site Safety and Health Officer in the listed sequence if the Major Vapor Emission Response Plan is activated:

Contact	Phone
Police/Fire Department	911
New York State DOH	(518) 402-7860
New York State DEC Region 8	(585) 226-2466, switchboard

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New York State DEC Region 9	(716) 851-7220
State Emergency Response Hotline	(800) 457-7362

In addition, the Site Safety and Health Officer will provide these authorities with a description of the apparent source of the contamination and abatement measures being taken by the contractor, if any.

AIRBORNE PARTICULATES

Fugitive dust suppression and airborne particulate monitoring shall be performed during any intrusive activities involving disturbance or handling of site soil/fill materials. Fugitive dust suppression techniques will include the following minimum measures:

- Spraying potable water on all excessively dry work areas and roads.
- All fill materials leaving the site will be hauled in properly covered containers or haul trailers.
- Additional dust suppression efforts may be required as discussed below.

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

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REAL-TIME AIR MONITORING DURING INTRUSIVE ACTIVITIES PROCEDURE

of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) 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 $\mu\text{g}/\text{m}^3$ above the upwind level and provided that no visible dust is migrating from the work area.
- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 $\mu\text{g}/\text{m}^3$ 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 $\mu\text{g}/\text{m}^3$ of the upwind level and in preventing visible dust migration.
- All readings must be recorded and be available for State (DEC and DOH) personnel to review.

Visual Assessment

In conjunction with the real-time monitoring program, TurnKey personnel and any subcontractors thereof will be responsible for visually assessing fugitive dust migration from the site. If airborne dust is observed leaving the site, the work will be stopped until supplemental dust suppression techniques are employed in those areas.

Supplemental Dust Suppression

Supplemental dust suppression techniques may include but are not necessarily limited to the

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REAL-TIME AIR MONITORING DURING INTRUSIVE ACTIVITIES PROCEDURE

following measures:

- Reducing the excavation size, number of excavations or volume of material handled.
- Restricting vehicle speeds.
- Applying water on buckets during excavation and dumping.
- Wetting equipment and excavation faces.
- Wetting haul roads.
- Restricting work during extreme wind conditions.
- Use of a street sweeper on paved haul roads, where feasible.

Work can resume using supplemental dust suppression techniques provided that the measures are successful in reducing the sustained downwind particulate concentration to below 150 ug/m³ of the upwind level, and in preventing visible dust migration off-site.

COMBUSTIBLE GASES & OXYGEN

Ambient combustible gas and oxygen concentrations should be measured prior to commencing intrusive activities each workday and a minimum of every 30-minutes thereafter. Air monitoring activities should be performed using equipment appropriate to measure combustible gases in percent lower explosive limit (LEL) and percent oxygen and calibrated daily. All combustible gas and oxygen readings must be recorded in the Project Field Book and/or Real-Time Air Monitoring Logs (sample attached) and, if applicable, be made available for State (DEC and DOH) personnel to review.

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REAL-TIME AIR MONITORING DURING INTRUSIVE ACTIVITIES PROCEDURE

Mitigation upon the detection of various action levels of organic vapors are presented below:

Combustible Gas:

- If the sustained ambient air concentration of combustible gas at the downwind perimeter of the site exceeds a reading of 10 to 25% LEL, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 10% LEL, work activities can resume with continued monitoring.
- If sustained combustible gas levels at the downwind perimeter of the site persist at levels in excess of 25% LEL, work activities must be halted, the source of explosion hazards identified, corrective actions taken to abate emissions and monitoring continued. Following combustible gas mitigation, work activities can resume provided that the sustained total organic vapor level 200 feet downwind of the exclusions 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 a sustained value of 10% LEL.

Oxygen:

- If the sustained ambient oxygen concentration at the downwind perimeter of the site measures a reading between 19.5% - 21% oxygen, work activities can continue with extreme caution, however attempts to determine the potential source of oxygen displacement must be conducted.
- If the sustained oxygen level readily decreases below 19.5% LEL, work activities should be discontinued and all personnel must leave the area immediately.
- If the sustained oxygen level at the downwind perimeter of the site persists at levels between 21-25%, work activities can resume with caution.
- If the sustained oxygen level at the downwind perimeter of the site persists at levels exceeding 25% (fire hazard potential), work activities should be discontinued and all personnel must leave the area immediately.

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**REAL-TIME AIR MONITORING DURING INTRUSIVE
ACTIVITIES PROCEDURE**

ATTACHMENTS

Real-Time Air Monitoring Log (sample)

REFERENCES

TurnKey FOPs:

- 006 *Calibration and Maintenance of Combustible Gas/Oxygen Meter*
- 010 *Calibration and Maintenance of Flame Ionization Detector*
- 011 *Calibration and Maintenance of Portable Photoionization Detector*
- 084 *Calibration and Maintenance of Portable Particulate Meter*

FIELD OPERATING PROCEDURES

“Before Going Into
The Field” Procedure

FOP 076.0

“BEFORE & AFTER” PROJECT PROCEDURES FOR FIELD PERSONNEL

PURPOSE

This procedure describes the required field and office activities to be preformed “before and after” project assignments by field personnel. Field activities may include, but are not limited to, drilling oversight, excavation contractor oversight, matrix sample collection (e.g., soil, sediment, groundwater, surface water, wipe, and/or air), third party oversight, and site reconnaissance to name a few. Office activities may include, but are not limited to, photocopying field book entries, completing all field forms, tabulating collected field and laboratory data, and preparation of report text.

The primary goal of this procedure is to eliminate delays and unnecessary budgetary “strain” due to a lack of preparedness and knowledge of the site by the field team members. This procedure also seeks to streamline the preparation and transfer of field information/data from field personnel to the Project Manager upon field work completion.

PROJECT ASSIGNMENT

During the initial meeting with the Project Manager, several questions should be raised by the field team member and answered by the Project Manager. A pad of paper and pen should be in hand to record all pertinent job information. At a minimum, the following questions should be answered:

1. *What is the job number?*
2. *Who is the client and the on-site representative (if applicable)?*
3. *What is the name of the project?*
4. *What are the job responsibilities and how should they be accomplished?*
5. *How much time do I have to complete the assigned tasks?*
6. *Are there any project required documents? What are they?*

Any deviation from the above questions should be approved by the Project Manager prior to contravention, not at the end of the day or following the project completion.

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“BEFORE & AFTER” PROJECT PROCEDURES FOR FIELD PERSONNEL

“BEFORE” CHECKLISTS

Checklists should be developed and used so that all of the required steps prior to going into the field are undertaken. A good checklist will include:

- Adequate review of the documents listed in this FOP
- Any documents, equipment, and supplies presented in this FOP
- Providing adequate notification to the laboratory (so that holding times are not exceeded) and to the owner of the site and the primary regulatory agency (usually in writing) that a round of sampling is to commence in order to facilitate sampling and allow for a sampling audit or split sampling.
- Specifying and documenting the equipment maintenance and calibration undertaken prior to going into the field relative to the sampling event.
- Checking and calibrating the equipment.
- Listing the documents, equipment, and supplies required to collect samples at the site as presented in this FOP.

Prior to going into the field, sampling personnel should reacquaint themselves with the sampling plan. The review is undertaken so that the required specific protocol such as sampling from the least to the most contaminated wells, knowing where quality control samples are to be taken, knowing the disposition of purge water, etc., is understood and followed.

The amount of equipment maintenance and calibration required prior to going into the field should be clearly specified in the presampling equipment maintenance and calibration checklists, which are based on the manufacturer’s recommendations, sampling objectives, and prior experience. Maintenance and calibration performed before sampling must be

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“BEFORE & AFTER” PROJECT PROCEDURES FOR FIELD PERSONNEL

documented to provide evidence that the equipment was adequately maintained and calibrated and to keep a permanent record of equipment servicing and performance.

A list of all the documents, equipment, and supplies required for the sampling event should be prepared and used. It can be frustrating and time consuming to forget equipment and supplies, so some up-front preparation is warranted. The following sections provide a list of the documentation, equipment, and supplies, which should assist in preparing a site-specific equipment and supply checklist. Once prepared, the checklist and project requirements should be reviewed with the Project Manager.

“BEFORE” DOCUMENTATION SUMMARY

Prior to going into the field, the field team should review and understand all of the project documents including, but not limited to:

- The Health and Safety Plan (HASP)
- The Site Analytical Plan (SAP), Sampling Plan, or similar document
- The Quality Assurance Project Plan (QAPP)
- The Work Plan
- Project specific Field Operating Procedures and field forms
- Site Maps
- Equipment operation manuals
- Chain-of-Custody forms
- Shipping labels and custody seals
- Any reference materials (i.e., conversion tables, volume calculation, etc.). The Pocket Ref, Third Edition by Thomas Glover is a great source for the field.

If at any time, the field team does not understand the project required protocol, procedures, sample locations, etc.; the Project Manager should be consulted for clarification.

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“BEFORE & AFTER” PROJECT PROCEDURES FOR FIELD PERSONNEL

“BEFORE” EQUIPMENT SUMMARY

Prior to going into the field, the field team should review the following equipment checklist, noting that project specific equipment may not be included in this list:

- Water level indicator
- Pumps, sample tubing, flow controllers, power cord(s), batteries, compressors, generators, etc.
- Bailers (disposable, PVC, stainless steel, glass), rope
- Flow-through cell
- Field meters with adequate calibration solutions (pH/Eh meter, conductivity meter, dissolved oxygen meter, turbidity meter, batteries, etc.)
- Garden hose
- Explosive gas meter and/or photoionization detector (PID) with calibration supplies
- Complete set of hand tools including a sharp knife, screw drivers, pliers, hacksaw, flashlight, large pipe wrench, hammer, bolt cutters, and replacement locks
- Fish hook with weight and string
- Field filtering equipment and supplies
- Decontamination supplies, such as scrub brushes, Alconox®, distilled water, potable water, 5-gallon bucket, paper towels, aluminum foil
- 5-gallon bucket(s)
- Measuring cup
- Sample bottles/containers (with extras) and preservatives
- Stainless steel spoons, trowels, shovels
- Shipping containers (i.e., coolers)
- Clipboard
- Calculator
- Water resistant clock or watch with second hand
- First aid kit

**“BEFORE & AFTER”
PROJECT PROCEDURES FOR FIELD PERSONNEL**

“BEFORE” SUPPLIES SUMMARY

Prior to going into the field, the field team should review the following supplies checklist, noting that project specific supplies may not be included in this list:

- Laboratory grade non-phosphate detergent (Alconox®)
- Appropriate personal protective equipment appropriate to the contaminants of concern, such as nitrile gloves, Tyvek, boots, hardhat, safety glasses, hearing protection, etc.
- Bags of ice
- Plastic garbage bags
- Plastic sheeting
- Sufficient quantities of potable and laboratory grade deionized water for cleaning and equipment blanks
- Methanol
- Isopropyl alcohol
- Clean rags and paper towels
- Electrical tape, duct tape, and wide transparent tape
- Hand soap
- Regular, ballpoint, and indelible pens
- Hollow braid polyethylene rope

After providing adequate notification (lab, state and/or federal agencies), performing the presampling maintenance and calibration, obtaining the site and well keys, and packing the supplies and equipment, the field activities are ready to be performed.

“AFTER” – PROJECT FILE REVIEW & CREATION

It is the responsibility of each field crew member to review his/her own field notes and time sheet for accuracy and completeness. All errors to the field notes should be corrected, dated, and initialed for Project Manager review. Once reviewed by the field team member, the Project Field Book, all field forms, photographs, chain-of-custodies etc. must be

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“BEFORE & AFTER” PROJECT PROCEDURES FOR FIELD PERSONNEL

photocopied, scanned (if required), downloaded, etc. and then given to the Project Manager in an organized file folder in a timely manner. Avoiding delay during this step is critical, especially when there are severe time constraints for the project.

REFERENCES

1. Wilson, Neal. *Soil Water and Ground Water Sampling*, 1995

FIELD OPERATING PROCEDURES

Stockpile Sampling
Procedures for
Chemical Analysis

FOP 079.0

STOCKPILE SAMPLING PROCEDURES FOR CHEMICAL ANALYSIS

PURPOSE

This guideline presents a method for collecting representative soil samples from stockpiled borrow source material for chemical analysis.

GENERAL

In general, off-site soil that is brought to a Site for use as supplemental fill is subject to Quality Assurance sampling and analysis. If QA is required, all off-site soil proposed for use as Site backfill shall be documented by the subcontractor in writing to have originated from locations having no evidence of disposal or release of hazardous, toxic or radioactive substances, wastes or petroleum products. If the subcontractor designates a source as “virgin” soil, it shall be further documented in writing to be native soil material having not supported any known past industrial or commercial development or agricultural use. Borrow soils can be used as backfill once concentrations are confirmed to meet project designated criteria for the Constituents of Primary Concern (COPCs) and NYSDEC TAGM HWR-94-4046 recommended soil cleanup objectives (SCOs) or NYSDEC 6NYCRR Part 375 SCOs.

Sample collection equipment will include stainless steel mixing bowls, stainless steel mixing spoons, and a stainless steel hand auger with extension rods or a stainless steel spade or equivalent. It may be necessary to use a backhoe or drilling rig to facilitate sample collection.

**STOCKPILE SAMPLING PROCEDURES
FOR CHEMICAL ANALYSIS**

SAMPLING PLAN

1. Virgin Sources – Virgin borrow sources will be confirmed acceptable for use as site backfill through collection of a single composite soil sample representative of the borrow pit or stockpile.
2. Non-Virgin Sources – Prior to sampling, determine the amount of soil that will be sampled. The soil will be tested via collection of one composite sample per 250 cubic yards of material from each source area. If more than 1,000 cubic yards of soils are excavated from a given off-site source area and all samples of the first 1,000 cubic yards meet project designated criteria, the sample collection frequency may be reduced to one composite for each additional 1,000 cubic yards of soils from the same source area, up to 5,000 cubic yards. For borrow sources greater than 5,000 cubic yards, sampling frequency may be reduced to one sample per 5,000 cubic yards, providing all earlier samples meet project designated criteria. Sampling procedure for non-virgin sources is described in the next section.

SAMPLE COLLECTION AND HANDLING

The following procedure will be used to collect representative soil samples from a non-virgin soil stockpile.

1. Using a stainless steel spade (or hand auger), a backhoe, or drilling rig, penetrate the pile to a depth of approximately 2 to 3 feet and collect four (4) representative grab samples of approximate equal volume from the top, middle, and bottom.
2. Transfer each grab into a small stainless steel mixing bowl.
3. **VOC Analysis:** Using a clean stainless steel spoon, transfer equal amounts from each small mixing bowl into a laboratory-supplied, 4 oz. VOC sample jar. This should be performed by randomly transferring several small aliquots from each bowl, taking care to minimize disturbance of the soil.

**STOCKPILE SAMPLING PROCEDURES
FOR CHEMICAL ANALYSIS**

4. **Other COPCs:** Transfer equal aliquots from each small bowl into a large mixing bowl and homogenize the sample. Fill the remaining laboratory-supplied jars with the homogenized soil for all other project required COPCs (i.e., SVOCs, PCBs, Pesticides, Herbicides, inorganics, etc.).
5. Label each set of jars with the following information:
 - Project and site name
 - Sample Code
 - Project Number
 - Date/Time
 - Sample type (soil composite or grab)
 - Sampler's initials
 - Sample Preservation
 - Required analysis

The sample code will consist of a unique, alphanumeric identification code keyed to the sampling location. Identify the sampling location on a field sketch.

6. Record all information associated with sample collection in the Project Field Book.
7. Label, store, and ship the samples in accordance with the Benchmark Field Operating Procedure for Sample Labeling, Storage and Shipment Procedures.
8. Clean the sampling and mixing equipment with Alconox and deionized water and repeat steps 1 through 7 for the remaining samples.

REFERENCES

Benchmark FOPs:

046 *Sample Labeling, Storage and Shipment Procedures*

FIELD OPERATING PROCEDURES

Waste Sampling
Procedures

FOP 082.0

WASTE SAMPLING PROCEDURES

PURPOSE

This guideline describes the equipment and procedures that can safely be used to collect waste samples from open and closed units.

INTRODUCTION

Hazardous wastes are regulated by the USEPA under 40 CFR Parts 260-265. Therefore, many of the methods that are used to manage, store, treat, and dispose hazardous wastes and potential hazardous wastes are of concern to both the regulators and the regulated community. Samples are often required of regulated or potentially regulated materials. While it is understood that each facility and waste stream may present its own unique sampling and analytical challenges, this procedure will list equipment and enumerate procedures that have been used by the USEPA to safely and successfully sample specific waste units.

SAFETY

Sampling of waste units should be assessed for potential hazards by both the Project Manager (PM) and the site safety officer (SSO). It is the SSOs responsibility to enforce the site Health and Safety Plan (HASP), and to ensure that procedures used during waste sampling are in accordance with current company protocol. Sampling equipment contaminated during waste sampling investigations should be cleaned with laboratory detergent and rinsed with tap water prior to returning the equipment from the field. Contaminated sampling equipment that is to be discarded must be disposed of properly in accordance with the site-specific Work Plan.

It should be noted that although Benchmark does not readily perform field activities with highly hazardous materials, we do occasionally oversee contractors who do. Therefore, it is prudent on our part to recognize those situations and be prepared to ensure the activities of

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WASTE SAMPLING PROCEDURES

our subcontractors comply with the site-specific HASP as well as those procedures discussed herein. Any reference within this procedure to personal protective equipment (PPE) upgrades above a modified level C (i.e., Tyvek, nitrile gloves, and full-face respirator) relates solely to our subcontractors.

QUALITY CONTROL PROCEDURES

In some instances, special decontamination procedures will be necessary and should be developed on a case-by-case basis according to the specific material encountered. Any cleaning procedures and equipment repairs conducted in the field deviating from those specified in the associated FOPs or the site-specific Work Plan, should be discussed with the Project Manager, and thoroughly documented in the Project Field Book.

All air monitoring and field analytical/screening equipment (i.e., photoionization detectors) should be checked and calibrated per manufacturer's specifications before being used to collect any waste stream unit sample (open or closed). The Field Team Leader should record all calibration results on appropriate field forms.

WASTE UNIT TYPES

Waste management units can be generally categorized into two types: open and closed. In general, open units are larger than closed units and include waste piles and surface impoundments whereas closed units include containers and tanks as well as ancillary tank equipment. Besides containers and tanks, sumps may also be considered closed units because they are designed to collect the spillage of liquid wastes and are sometimes configured as a confined space.

Although both may pose hazards, units that are open to the environment are generally less hazardous than closed units. Sampling of closed units is considered a higher hazard risk

WASTE SAMPLING PROCEDURES

because of the potential of exposure to toxic gases and flammable/explosive atmospheres. Because closed units prevent the dilution of the wastes by environmental influences, they are more likely to contain materials that have concentrated levels of hazardous constituents. While opening closed units for sampling purposes, investigators/contractor's shall use Level B PPE, air monitoring instruments to ensure that the working environment does not contain hazardous levels of flammable/explosive gasses or toxic vapors, and follow the appropriate safety requirements stipulated in the site-specific HASP.

Buried waste materials should be located and excavated with extreme caution. Once the buried waste is uncovered, the appropriate safety and sampling procedures utilized will depend on the type of waste unit.

Open Units

While open units may contain many types of wastes and come in a variety of shapes and sizes, they can be generally regarded as either waste piles or surface impoundments.

Definitions of these two types of open units from 40 CFR Part 260.10 are:

- Waste pile -- any non-containerized accumulation of solid, non-flowing hazardous waste that is used for treatment or storage and that is not a containment building.
- Surface impoundment -- "...a facility or part of a facility which is a natural topographic depression, man-made excavation, or diked area formed primarily of earthen materials (although it may be lined with man-made materials), which is designed to hold the accumulation of liquid wastes or wastes containing free liquids, and which is not an injection well. Examples of surface impoundments are holding, storage, settling and aeration pits, ponds, and lagoons."

One of the distinguishing features between waste piles and surface impoundments is the state of the waste. Waste piles typically contain solid or non-flowing materials whereas liquid wastes are usually contained in surface impoundments. The nature of the waste will also determine the mode of delivering the waste to the unit. Wastes are commonly pumped

WASTE SAMPLING PROCEDURES

or gravity fed into impoundments while heavy equipment or trucks may be used to dump wastes in piles. Once the waste has been placed in an open unit, the state of the waste may be altered by environmental factors (e.g., temperature, precipitation, etc.).

Surface impoundments may contain several phases such as floating solids, liquid phase(s), and sludges. Waste piles are usually restricted to solids and semi-solids. All of the potential phases contained in a waste unit should be considered in developing the sample design to meet the study's objective.

Closed Units

There are a variety of designs, shapes, sizes, and functions of closed units. In addition to the challenges of the various designs and the safety requirements for sampling them, closed units are difficult to sample because they may contain liquid, solid, semi-solid/sludge, or any combination of phases. Based on the study's design, it may be necessary to obtain a cross sectional profile of the closed unit in an attempt to characterize the unit. The following are definitions of types of closed waste units described in 40 CFR Part 260.10:

- Container-- any portable device in which a material is stored, transported, treated, disposed, or otherwise handled. Examples of containers are drums, overpacks, pails, totes, and roll-offs.
- Tank-- a stationary device, designed to contain an accumulation of hazardous waste constructed primarily of non-earthen materials, which provide structural support.

Portable tanks, tank trucks, and tank cars vary in size and may range from simple to extremely complex designs. Depending on the unit's design, it may be convenient to consider some of these storage units as tanks for sampling purposes even though they meet the definition of a container.

WASTE SAMPLING PROCEDURES

- Ancillary equipment (tank) -- any device including, but not limited to, such devices as piping, fittings, flanges, valves, and pumps that is used to distribute, meter, or control the flow of hazardous waste from its point of generation to a storage or treatment tank(s), between hazardous waste storage and treatment tanks to a point of disposal on-site, or to a point of shipment for disposal off-site.
- Sump -- any pit or reservoir that meets the definition of a tank and those troughs/trenches connected to it that serve to collect hazardous wastes.

Note: some outdoor sumps may be considered open units/surface impoundments.

Although any of the closed units may not be completely sealed and may be partially open to the environment, the unit needs to be treated as a closed unit for sampling purposes until a determination can be made. Once a closed unit is opened, a review of the proposed sampling procedures and level of protection can be performed to determine if the (PPE) is suitable for the site conditions.

Samples collected from different waste units should not be composited into one sample container without additional analytical and/or field screening data to determine if the materials are compatible and will not cause an inadvertent chemical reaction.

EQUIPMENT

Selecting appropriate equipment to sample wastes is a challenging task due to the uncertainty of the physical characteristics and nature of the wastes. It may be difficult to separate, homogenize and/or containerize a waste due to its physical characteristics (viscosity, particle size, etc.). In addition, the physical characteristics of a waste may change with temperature, humidity, or pressure. Waste streams may vary depending on how and when a waste was generated, how and where it was stored/disposed, and the conditions under which it was

WASTE SAMPLING PROCEDURES

stored/disposed. Also, the physical location of the wastes or the unit configuration may prevent the use of conventional sampling equipment.

Given the uncertainties that a waste may present, it is desirable to select sampling equipment that will facilitate the collection of samples that will meet the study's objective, and that will not unintentionally bias the sample by excluding some of the sample population that is under consideration. However, due to the nature of some waste matrices or the physical constraints of some waste units, it may be necessary to collect samples knowing that a portion of the desired population was omitted due to limitations of the equipment. Any deviations from the study plan or difficulties encountered in the field concerning sample collection that may have an effect on the study's objective should be documented in a log book, reviewed with the analytical data, and presented in the report.

WASTE SAMPLING EQUIPMENT

Waste sampling equipment should be made of non-reactive materials that will neither add to nor alter the chemical or physical properties of the material that is being sampled. The attached Table 1 lists some conventional equipment for sampling waste units/phases and some potential limitations of the equipment. Another reference for selecting sampling equipment is the ASTM, Standard Guide for Selection of Sampling Equipment for Wastes and Contaminated Media Data Collection Activities, D6232-98.

WASTE SAMPLING PROCEDURES

Waste Piles

Waste piles vary in size, shape, composition, and compactness, and may vary in distribution of hazardous constituents and characteristics (strata). These variables will affect safety and access considerations. The number of samples, the type of sample(s), and the sample location(s) should be based on the study's objectives. Commonly used equipment to collect

WASTE SAMPLING PROCEDURES

samples from waste piles are listed in Table 1. All equipment should be compatible with the waste and should have been cleaned to prevent any cross contamination of the sample.

Surface Impoundments

Surface impoundments vary in size, shape, and waste content, and may vary in distribution of hazardous constituents and characteristics (strata). The number of samples, the type of sample(s), and the sample location(s) should be based on the study's objectives. Commonly used equipment to collect samples from surface impoundments are listed in Table 1. All equipment should be compatible with the waste and should have been cleaned to prevent any cross contamination of the sample.

Because of the potential danger of sampling waste units suspected of containing elevated levels of hazardous constituents, personnel should never attempt to sample surface impoundments used to manage potentially hazardous wastes from a boat. All sampling should be conducted from the banks or piers of surface impoundments. Any exception must be approved by the appropriate site safety officer and/or the Occupational Health and Safety Designee (OHSD).

Drums

Drums are the most frequent type of containers sampled by field investigators for chemical analyses and/or physical testing. Caution should be exercised by the field investigators when sampling drums because of the potential presence of explosive/flammable gases and/or toxic vapors. Therefore, the following procedures should be used when collecting samples from drums of unknown material:

1. Visually inspect all drums that are being considered for sampling for the following:
 - pressurization (bulging/dimples);
 - crystals formed around the drum opening;
 - leaks, holes, stains;

WASTE SAMPLING PROCEDURES

- labels, markings;
- composition and type (steel/poly and open/bung);
- condition, age, rust
- sampling accessibility

Drums showing evidence of pressurization and crystals should be furthered assessed to determine if remote drum opening is needed. If drums cannot be accessed for sampling, heavy equipment is usually necessary to stage drums for the sampling activities. Adequate time should be allowed for the drum contents to stabilize after a drum is handled.

2. Identify each drum that will be opened (e.g., paint sticks, spray paint, cones, etc).

LEVEL "B" PROTECTION IS REQUIRED FOR THE FOLLOWING PROCEDURES.

3. Before opening, ground each metal drum that is not in direct contact with the earth using grounding wires, alligator clips, and a grounding rod or metal structure. If a metal drum is in an overpack drum, the metal drum should be grounded.
4. Touch the drum opening equipment to the bung or lid and allow an electrical conductive path to form. Slowly remove the bung or drum ring and/or lid with spark resistant tools (brass/beryllium).
5. Screen drums for explosive gases and toxic vapor with air monitoring instruments as bung or drum lid is removed. Depending on site conditions screen for one or more of the following:
 - radioactivity
 - cyanide fumes
 - halogen vapors
 - pH
 - flash point (requires sample for testing)

Note the state, quantity, phases, and color of the drum contents. Record all relevant results, observations, and information in a logbook.

WASTE SAMPLING PROCEDURES

6. Select the appropriate sampling equipment based on the state of the material and the type of container. Sampling equipment should be made of non-reactive materials that will meet the study's objective(s).
7. Place oil wipe (as necessary), sampling equipment, and sample containers near drum(s) to be sampled.

AIR MONITORING FOR TOXIC VAPORS AND EXPLOSIVE GASES AND OXYGEN DEFICIENT ATMOSPHERES SHOULD BE CONDUCTED DURING DRUM SAMPLING.

Liquids -- Slowly lower the COLIWASA or drum thief to the bottom of the container. Close the COLIWASA with the inner rod or create a vacuum with the sampler's gloved thumb on the end of the thief and slowly remove the sampling device from the drum. Release the sample from the device into the sample container. Repeat the procedure until a sufficient sample volume is obtained.

Solids/Semi-Solids -- Use a push tube, bucket auger, or screw auger or if conditions permit a pneumatic hammer/drill to obtain the sample. Carefully use a clean stainless steel spoon to place the sample into container(s) for analyses.

8. Close the drums when sampling is complete. Segregate contaminated sampling equipment and investigative derived wastes (IDW) containing incompatible materials as determined by the drum screening procedure (Step #5). At a minimum, contaminated equipment should be cleaned with laboratory detergent and rinsed with tap water prior to returning it from the field.

Tanks

Sampling tanks is considered hazardous due to the potential for them to contain large volumes of hazardous materials and therefore, appropriate safety protocols must be followed. Unlike drums, tanks may be compartmentalized or have complex designs.

WASTE SAMPLING PROCEDURES

Preliminary information about the tank's contents and configuration should be reviewed prior to the sampling operation to ensure the safety of sampling personnel and that the study's objectives can be achieved.

In addition to having discharge valves near the bottom of tanks and bulk storage units, most tanks have hatches at the top. It is desirable to collect samples from the top hatch because of the potential for the tank's contents to be stratified. Additionally, when sampling from the discharge valve, there is a possibility of a stuck or broken valve which could cause an uncontrolled release. Investigators should not utilize valves on tanks or bulk storage devices unless they are operated by the owner or operator of the facility, or a containment plan is in place should the valve stick or break. If the investigator must sample from a tank discharge valve, the valving arrangement of the particular tank must be clearly understood to insure that the compartment(s) of interest is sampled.

Because of the many different types of designs and materials that may be encountered, only general sampling procedures that outline sampling a tank from the top hatch are listed below:

1. All relevant information concerning the tank such as the type of tank, the tank capacity, markings, condition, and suspected contents should be documented in a logbook.
2. The samplers should inspect the ladder, stairs, and catwalk that will be used to access the top hatch to ensure that they will support the samplers and their equipment.

LEVEL "B" PROTECTION IS REQUIRED FOR THE FOLLOWING PROCEDURES.

3. Before opening, ground each metal tank using grounding wires, alligator clips, and a grounding rod or metal structure.

WASTE SAMPLING PROCEDURES

4. Any vents or pressure release valves should be slowly opened to allow the unit to vent to atmospheric pressure. Air monitoring for explosive/flammable gases and toxic vapors should be conducted during the venting with the results recorded in a log book. If dangerous concentrations of gases evolve from the vent or the pressure is too great, leave the area immediately.
5. Touch tank opening equipment to the bolts in the hatch lid and allow electrical conductive path to form. Slowly remove bolts and/or hatch with spark resistant tools (brass/beryllium). If a pressure build up is encountered or detected, cease opening activities and leave the area.
6. Screen tanks for explosive/flammable gases and toxic vapors with air monitoring instruments. Depending on the study objectives and site conditions, conduct characteristic screening (e.g., pH, halogen, etc.) as desired. Collect a small volume of sample for flash point testing, if warranted. Note the state, quantity, number of phases, and color of the tank contents. Record all relevant results, observations, and information in a logbook. Compare the screening results with any pre-existing data to determine if the tank should be sampled.
7. Select the appropriate sampling equipment based on the state of the material and the type of tank. Sampling equipment should be constructed of non-reactive materials that will meet the study's objective(s).
8. Place oil wipe (as necessary), sampling equipment, and sample containers near tanks(s) to be sampled.

AIR MONITORING FOR TOXIC VAPORS, EXPLOSIVE GASES AND OXYGEN DEFICIENT ATMOSPHERES SHOULD BE CONTINUOUS DURING TANK SAMPLING.

Liquids -- Slowly lower the bailer, bacon bomb, Dipstick™, COLIWASA, or Teflon® tubing to the desired sampling depth. (NOTE: In work areas where explosive/flammable atmospheres could occur, peristaltic pumps powered by 12 V. batteries should not be used.) Close the sampling device or create a vacuum and slowly remove the sampling device from

WASTE SAMPLING PROCEDURES

the tank. Release the sample from the device into the sample container. Repeat the procedure until a sufficient sample volume is obtained.

Solids/Semi-Solids - Use a push tube, bucket auger, screw auger, Mucksucker™, or if conditions permit a pneumatic hammer/drill to obtain the sample. Carefully extrude the sample from the sampling device or use a clean stainless steel spoon to place the sample into containers for analyses.

9. Close the tank when sampling is complete. Segregate contaminated sampling equipment and investigative derived wastes (IDW) containing incompatible materials as determined by the screening procedure (Step #6). At a minimum, contaminated equipment should be cleaned with laboratory detergent and rinsed with tap water prior to returning it from the field. IDW should be managed according to Section 5.15, and Region 4's Contaminated Media Policy.

Miscellaneous Contaminated Materials

Sampling may be required of materials or equipment (e.g., documents, building materials, equipment, etc.) to determine whether or not various surfaces are contaminated by hazardous constituents, or to evaluate the effectiveness of decontamination procedures.

Wipe or swab samples may be taken on non-absorbent, smooth surfaces such as metal, glass, plastic, etc. The wipe materials must be compatible with the solvent used and the analyses to be performed, and should not come apart during use. The wipes are saturated with a solvent; methylene chloride, hexane, isopropanol or analyte free water depending on the parameters to be analyzed. The laboratory performing the analyses can provide the appropriate solvent. Wipe samples should not be collected for volatile organic compounds analysis. Sampling personnel should be aware of hazards associated with the selected solvent and should take appropriate precautions to prevent any skin contact or inhalation of these solvents. All surfaces and areas selected for sampling should be based on the study's

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WASTE SAMPLING PROCEDURES

objectives. Typically, 10 cm by 10 cm templates are prepared from aluminum foil which are secured to the surface of interest. The prepared (saturated with solvent) wipe(s) is removed from its container with tongs or gloves, and used to wipe the entire area with firm strokes using only one side of the wipe. The goal is to systematically wipe the whole area. The wipe is then folded with the sample side inward and placed into the sample container. This procedure is repeated until the area is free of visible contamination or no more wipes remain. Care should be taken to keep the sample container tightly sealed to prevent evaporation of the solvent. Samplers must also take care to not touch the used side of the wipe.

For items with porous surfaces such as documents (usually business records), insulation, wood, etc., actual samples of the materials are required. It is therefore important, that during the collection and/or analyses of the sample that evidentiary material is not destroyed.

All secondary containing pails will be secured in the vehicles while transporting the samples from the field to the laboratory for analyses. In addition, each pail should indicate when protective equipment is recommended to handle the actual waste/sample material

REFERENCES

United States Environmental Protection Agency. November 2001. *Environmental Investigations Standard Operating Procedures and Quality Assurance Manual*.

Benchmark FOPs:

- 011 *Calibration and Maintenance of Portable Photoionization Detector*
- 046 *Sample Labeling, Storage and Shipment Procedures*

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WASTE SAMPLING PROCEDURES

TABLE 1
SAMPLING EQUIPMENT for VARIOUS WASTE UNITS

Equipment	Waste Units/Phases	Limitations
scoop with bracket/conduit	impoundments, piles, containers, tanks/liquids, solids, sludges	Can be difficult to collect deeper phases in multiphase wastes. Depth constraints.
spoon	impoundments, piles, containers/solids, sludges	Similar limitations as the scoop. Generally not effective in sampling liquids.
push tube	piles, containers/cohesive solids, sludges	Should not be used to sample solids with dimensions >1/2 the diameter of the tube. Depth constraints
auger	impoundments, piles, containers / solids	Can be difficult to use in an impoundment or a container, or for solidified wastes.
sediment sampler	impoundments, piles/solids, sludges	Should not be used to sample solids with dimensions >1/2 the diameter of the tube.
ponar dredge	impoundments/solids, sludges	Must have means to position equipment to desired sampling location. Difficult to decon.
COLIWASA or drum	impoundments, containers,	Not good with viscous wastes. Devices >_ 7'
thief	tanks/liquids	Require 2 samplers to use effectively.
Dipstick™ /	impoundments, containers,	Not recommended for tanks >11 feet deep.
Mucksucker™	tanks/liquids, sludges	Devices >_ 7' require 2 samplers to use effectively
bacon bomb	impoundments, tanks/liquids	Not good with viscous wastes.
bailer	impoundments, tanks/liquids	Only if waste is homogeneous. Not good with viscous wastes
peristaltic pump with vacuum jug assembly	impoundments, tanks/liquids	Cannot be used in flammable atmospheres. Not good with viscous wastes
back-hoe bucket	piles/solids, sludges	May be difficult to access desired sampling location. Difficult to decon. Can lose volatiles.
split-spoon	piles/solids	Requires drill rig or direct push equipment.
roto-hammer	piles, containers/solids	Physically breaks up sample. May release volatiles. Not for flammable atmospheres.

FIELD OPERATING PROCEDURES

Field Quality Control
Procedures

FIELD QUALITY CONTROL PROCEDURES

PURPOSE

In addition to traditional environmental samples (e.g., soil, groundwater, wipe, vapor etc.) described in each project work plan, site-specific field quality assurance/quality control (QA/QC) samples are typically collected and analyzed to support the required third-party data usability assessment effort of a project. Site-specific QA/QC samples generally include matrix spikes, matrix spike duplicates, blind duplicates (where appropriate), and trip blanks which accompany aqueous volatile organic compound (VOC) samples only.

The number of QA/QC field samples (blind duplicate, matrix spike/matrix spike duplicate, trip blank, field blank, or equipment blank) will be designated prior to field mobilization, but final QC sample locations will be contingent upon field conditions. This procedure outlines and discusses each QA/QC sample that may be required during a project.

PROCEDURE

A brief summary of each QA/QC sample identified above is presented below. Where appropriate, the procedure to be used to collect these samples is also presented.

- **Trip Blanks** – A sufficient number of trip blanks for VOC analysis must be prepared by the laboratory and delivered to the sampling team prior to a sampling event, typically two or three 40-ml VOA vials with organic free reagent water. One sealed blank will be carried into the field per day along with the sample containers for each day that water matrix volatile organic samples are collected. Trip blanks will be transported and handled in the same manner as the actual samples. The results of the trip blank analysis will be reviewed to evaluate if the potential for sample contamination during transportation and handling exists. The trip blanks will be analyzed for the same VOCs (and method) as the project groundwater samples.
- **Blind Duplicate** – One blind duplicate must be collected and analyzed per 20 samples collected per matrix (i.e., soil, groundwater, soil vapor, etc.). The location

FIELD QUALITY CONTROL PROCEDURES

of the sample collection point will not be disclosed to the analytical laboratory, therefore the field sample containers will be returned to the laboratory identified only as the “blind duplicate.” The well or sample location will be recorded in the Project Field Book or handheld RuggedReader® Pocket PC and on the field data sheets, and the results will be compared to review analytical precision. Sample analysis will be identical to the original sample per the project work plan. The Blind Duplicate sample must be collected simultaneously from the same source under identical conditions as the original sample.

- **Matrix Spike/Matrix Spike Duplicate (MS/MSD)** – A sufficient volume of sample will be collected at one sampling location per sampling event for MS/MSD analysis per matrix (i.e., soil and groundwater only). The laboratory will report the results of the MS/MSD analysis, which will be reviewed for sampling and analysis precision and accuracy. Sample analysis will be identical to the original sample per the project work plan. The MS/MSD sample must be collected simultaneously from the same source under identical conditions as the original sample.

- **Equipment (Rinsate) Blank** – In general, dedicated sampling equipment is used to minimize field decontamination time and avoid the need for equipment blanks; however there may be instances where the use of non-dedicated equipment cannot be avoided. An equipment blank will be collected for each day of sampling activity when non-dedicated sampling equipment is used. These equipment blank samples will be used as a QC check of the decontamination procedures for sampling equipment. Sample analysis for the equipment blank will consist of the most comprehensive parameter list used for risk assessment in which the non-dedicated equipment was used for environmental sample collection. During most projects, every effort to use dedicated sampling equipment should be made in order to minimize field decontamination time and avoid the need for equipment blanks. Equipment Blank sampling procedure is as follows:
 - Non-dedicated equipment are to be decontaminated in accordance with Benchmark’s Non-disposable and Non-dedicated Sampling Equipment Decontamination procedures prior to use in the field. If organic-free

FOP 085.0

FIELD QUALITY CONTROL PROCEDURES

- deionized water (generally provided by the laboratory) is not available for decontamination, equipment will be allowed to thoroughly air dry.
- Once properly rinsed or allowed to air dry, analyte-free water (provided by the laboratory) is poured appropriately over or through the decontaminated sample collection device, collected in a sample container, and returned to the laboratory as a sample.
 - **Field Blank** – A field blank is a sample of the unused final decontamination rinse water that is collected at the sampling site and returned to the laboratory as a sample. Sample analysis for the field blank will consist of the most comprehensive parameter list used during the investigation.
 - **Split Sample** – A split sample is a sample that has been portioned into two or more containers from a single sample container or sample mixing container. Samples for VOC analysis should never be mixed prior to splitting.
 - **Blank Wipe Samples** – There are two types of blank wipe samples, an equipment blank and a field blank that may be required per the project work plan, both are described below:
 - Equipment Blank – Required only if reusable templates are used for wipe sample collection. The decontaminated template is wiped with a hexane saturated swab. The swab is placed in the appropriate sample container and returned to the laboratory as a sample.
 - Field Blank – Clean disposable gloves are wiped with a hexane saturated swab. The swab is placed in the appropriate sample container and returned to the laboratory as a sample.

REFERENCES

Benchmark FOPs:

040 *Non-disposable and Non-dedicated Sampling Equipment Decontamination*

APPENDIX F

QUALITY ASSURANCE PROJECT PLAN

QUALITY ASSURANCE PROJECT PLAN

**293 GROTE STREET
BUFFALO, NEW YORK
BCP SITE NO. C915368**

October 2022

0581-021-001

Prepared for:

293 Grote Street, LLC

Prepared By:



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QUALITY ASSURANCE PROJECT PLAN (QAPP)

293 Grote Street

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QUALITY ASSURANCE PROJECT PLAN (QAPP)

293 Grote Street

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1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) is an appendix to the Site Management Plan (SMP), which is required as an element of the remedial program at the 293 Grote Street Site (hereinafter referred to as the “Site”) under the New York State (NYS) Brownfield Cleanup Program (BCP), administered by New York State Department of Environmental Conservation (NYSDEC). The Site was remediated in accordance with Brownfield Cleanup Agreements (BCA) Index # C915368-04-21, Site C915368, which was executed in April 2021.

1.1 Site Location and Description

The site is located in Buffalo, Erie County, New York and is identified as Section 100.63 Block 3 and Lot 1.1 on the Erie County Tax Map (see Figure 3). The site is an approximately 0.746-acre area and is bounded by Grote Street to the north, residential properties to the south, and commercial properties to the east and west.

The Site consists of the following: a 2-story, approximately $\pm 17,500$ square foot brick building with an exterior courtyard and an approximate 0.3-acre parking lot to the west. The Site is zoned N-1S, Secondary Employment Center, which permits a wide range of uses including residential, lodging, retail and service, professional offices and light industrial. The Site building is being redeveloped as residential apartments

1.2 Scope of the QAPP

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

The QAPP provides:

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

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

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

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

2.0 PROJECT ORGANIZATION AND RESPONSIBILITY

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

2.1 NYSDEC and NYSDOH

The NYSDEC, in conjunction with the NYSDOH, will review the work plans and supporting documents for completeness and conformance with applicable BCP regulations, guidance and policy and will decide to accept or reject these documents based on this review. The NYSDEC also has the authority to review and approve QA documentation collected during brownfield cleanup construction and to confirm that the QA Plan was followed.

2.2 Property Owner

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

2.3 Project Manager

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

- o Define project objectives and develop a detailed work plan schedule.
- o Establish project policy and procedures to address the specific needs of the project as a whole, as well as the objectives of each task.
- o Acquire and apply technical and corporate resources as needed to assure performance within budget and schedule constraints.

- o Develop and meet ongoing project and/or task staffing requirements, including mechanisms to review and evaluate each task product.
- o Review the work performed on each task to assure its quality, responsiveness, and timeliness.
- o Review and analyze overall task performance with respect to planned requirements and authorizations.
- o Review and approve all deliverables before their submission to NYSDEC.
- o Develop and meet ongoing project and/or task staffing requirements, including mechanisms to review and evaluate each task product.
- o Ultimately be responsible for the preparation and quality of interim and final reports.
- o Represent the project team at meetings.

2.4 Field Team Leader:

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

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

2.5 Quality Assurance (QA) Officer

The QA Officer will have direct access to corporate executive staff as necessary, to resolve any QA dispute, and is responsible for auditing the implementation of the QA

program in conformance with the demands of specific investigations and policies, and NYSDEC requirements. Specific function and duties include:

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

2.6 Laboratory Responsibilities

Any environmental laboratory utilized for sample analysis for this Site must be an independent, NY State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP)-certified facility approved to perform the analyses prescribed herein.

- Laboratory Director:

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

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

- Quality Assurance Manager (QA Manager):

The QA Manager has the overall responsibility for data after it leaves the laboratory. The QA Manager will be independent of the laboratory but will

communicate data issues through the Laboratory Director. In addition, the QA Manager will:

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

3.0 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA

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

- The procedures to be used to collect, preserve, package, and transport soil, groundwater and air samples.
- Field data collection.
- Record keeping.
- Data management.
- Chain-of-custody procedures.
- Precision, accuracy, completeness, representativeness, for sample analysis and data management under EPA analytical methods.

3.1 Level of QC Effort for Sample Parameters

Field blank, method blank, trip blank, field duplicate, laboratory duplicate, laboratory control, standard reference materials (SRM) and matrix spike samples will be analyzed to assess the quality of the data resulting from the field sampling and analytical programs. QC samples are discussed below.

- Field and trip blanks consisting of distilled water will be submitted to the analytical laboratories to provide the means to assess the quality of the data resulting from the field-sampling program. Field (equipment) blank samples are analyzed to check for procedural chemical constituents at the facility that may cause sample contamination. Trip blanks are used to assess the potential for contamination of samples due to contaminant migration during sample shipment and storage.
- Method blank samples are generated within the laboratory and used to assess contamination resulting from laboratory procedures.
- Duplicate samples are analyzed to check for sampling and analytical reproducibility.

- MS/MSD and MS/Duplicate samples provide information about the effect of the sample matrix on the digestion and measurement methodology. Depending on site-specific circumstances, one MS/MSD or MS/Duplicate should be collected for every 20 or fewer investigative samples to be analyzed for organic and inorganic chemicals of a given matrix.

The general level of QC effort will be one field (blind) duplicate and one field blank (when non-dedicated equipment is used) for every 20 or fewer investigative samples of a given matrix. Additional sample volume will also be provided to the laboratory to allow one site-specific MS/MSD or MS/Duplicate for every 20 or fewer investigative samples of a given matrix. One trip blank consisting of distilled, deionized water will be included along with each sample delivery group of aqueous VOC samples.

4.0 SAMPLE CUSTODY PROCEDURES

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

4.1 Field Custody Procedures

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

4.1.1 Sample Storage

Samples are stored in secure limited-access areas. Walk-in coolers or refrigerators are maintained at 4°C, \pm 2°C, or as required by the applicable regulatory program. The temperatures of all refrigerated storage areas are monitored and recorded a minimum of once per day. Deviations of temperature from the applicable range require corrective action, including moving samples to another storage location if necessary. Sample parameter lists, holding times and sample container requirements are summarized on Table 1.

4.1.2 Sample Custody

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

- It is in someone's actual possession.
- It is in someone's view after being in his or her physical possession.

- It was in someone's possession and then locked, sealed, or secured in a manner that prevents unsuspected tampering.
- It is placed in a designated and secured area.

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

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

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

4.1.3 Sample Tracking

All samples are maintained in the appropriate coolers prior to and after analysis. The analysts remove and return their samples as needed. Samples that require internal COC are relinquished to the analysts by the sample custodians. The analyst and sample custodian must sign the original COC relinquishing custody of the samples from the sample custodian

to the analyst. When the samples are returned, the analyst will sign the original COC returning sample custody to the sample custodian. Sample extracts are relinquished to the instrumentation analysts by the preparatory analysts. Each preparation department tracks internal COC through their logbooks/spreadsheets.

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

5.0 CALIBRATION PROCEDURES AND FREQUENCY

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

5.1 Field Instrument Calibration

Quantitative field data to be obtained during groundwater sampling include pH, turbidity, specific conductance, temperature, dissolved oxygen and depth to groundwater. Quantitative water level measurements will be obtained with an electronic sounder or steel tape, which require no calibration. Quantitative field data to be obtained during soil sampling include screening for the presence of volatile organic constituents using a photoionization detector (PID).

5.2 Preventative Maintenance

Each piece of field equipment is checked according to its routine maintenance schedule and before field activities begin. Field equipment that may be used at the Site includes:

- Photoionization detector (PID)
- Water quality meters (includes pH, turbidity, temperature, Eh, and specific conductance)
- Electric water level indicator

Field personnel will report all equipment maintenance and/or replacement needs to the Project QA Officer and will record the information on the daily field record.

6.0 DATA VALIDATION AND REPORTING

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

6.1 Data Usability Evaluation

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

6.1.1 Procedures Used to Evaluate Field Data Usability

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

6.1.2 Procedures Used to Evaluate Laboratory Data Usability

Data evaluation will be performed by the third-party data validator using the most current methods and quality control criteria from the USEPA's Contract Laboratory Program (CLP) *National Functional Guidelines for Organic Data Review*, and Contract Laboratory Program, *National Functional Guidelines for Inorganic Data Review*. The data review guidance will be used only to the extent that it is applicable to the SW-846 methods; SW-846 methodologies will be followed primarily and given preference over CLP when differences occur. Also, results of blanks, surrogate spikes, MS/MSDs, and laboratory control samples will be reviewed/evaluated by the data validator. All sample analytical data for each sample matrix shall be evaluated. The third-party data validation expert will also evaluate the overall completeness of the data package. Completeness checks will be administered on all data to determine whether deliverables specified in this QAPP are present. The reviewer will determine whether all required items are present and request copies of missing deliverables.

6.2 Data Reporting

6.2.1 Field Data Reporting

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

6.2.2 Laboratory Data Reporting

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

7.0 CORRECTIVE ACTION

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

7.1 Field Corrective Action

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

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

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

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

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

7.2 Laboratory Corrective Action

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

7.3 Data Validation & Assessment Corrective Action

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

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

TABLE



TABLE 1

**SAMPLE CONTAINER, VOLUME, PRESERVATION &
HOLDING TIME REQUIREMENTS
SITE MANAGEMENT PLAN
293 Grote Street
Buffalo, New York**

Matrix	Parameter ¹	Method	Container Type	Minimum Volume	Preservation (Cool to 2-4 °C for all samples)	Holding Time from Sample Date
Soil/Fill	Part 375 VOCs/TICs/GRO	8260B/8015B	WMG	4 oz.	Cool to 2-4 °C, Zero Headspace	14 days
	Part SVOCs/TICs/DRO	8270C/8015B	WMG	8 oz.	Cool to 2-4 °C	14 days extrac./40 days
	Part 375 Metals	6010B/7470A	WMG	8 oz.	Cool to 2-4 °C	6 months/Hg 28 days
	PCBs	8082	WMG	4 oz.	Cool to 2-4 °C	14 days extrac./40 days

References:

1. Test Methods for Evaluating Solid Wastes, USEPA SW-846, Update III, 1991.

Acronyms:

- VOCs = Volatile Organic Compounds
- SVOCs = Semi-Volatile Organic Compounds
- TICs = Tentatively Identified Compounds
- PCBS = Polychlorinated Biphenyls
- WMG = Wide Mouth Glass

APPENDIX G

HEALTH & SAFETY PLAN (CD ENCLOSED)

SITE HEALTH AND SAFETY PLAN
for
BROWNFIELD CLEANUP PROGRAM
POST REMEDIAL ACTIVITIES

293 GROTE STREET SITE
BUFFALO, NEW YORK

October 2022

B0581-021-001

Prepared for:

293 Grote Street, LLC

Prepared by:



Benchmark Civil/Environmental Engineering & Geology, PLLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716) 856-0599

**293 GROTE STREET SITE
HEALTH AND SAFETY PLAN FOR POST REMEDIAL ACTIVITIES**

ACKNOWLEDGEMENT

Plan Reviewed by (initial):

Corporate Health and Safety Director: _____ Thomas H. Forbes, P.E.

Project Manager: _____ Christopher Z. Boron

Designated Site Safety and Health Officer: _____ Christopher Z. Boron

Acknowledgement:

I acknowledge that I have reviewed the information contained in this site-specific Health and Safety Plan, and understand the hazards associated with performance of the field activities described herein. I agree to comply with the requirements of this plan.

NAME (PRINT)	SIGNATURE	DATE
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

**293 GROTE STREET SITE
HEALTH AND SAFETY PLAN FOR POST REMEDIAL ACTIVITIES**

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ATTACHMENTS

Attachment A	Emergency Response Plan
Attachment B	Hot Work Permit Form
Attachment C	Community Air Monitoring Plan

1.0 INTRODUCTION

1.1 General

In accordance with OSHA requirements contained in 29 CFR 1910.120, this Health and Safety Plan (HASP) describes the specific health and safety practices and procedures to be employed by Benchmark Civil/Environmental Engineering & Geology, PLLC (Benchmark) employees during post remedial activities at the 293 Grote Street Site (Site) located in the City of Buffalo, Erie County, New York (see Figure 1). This HASP presents procedures for Benchmark employees who will be involved with post remedial field activities; it does not cover the activities of other contractors, subcontractors or other individuals on the Site. These firms will be required to develop and enforce their own HASPs as discussed in Section 2.0. Benchmark accepts no responsibility for the health and safety of contractor, subcontractor, or other personnel.

This HASP presents information on known Site health and safety hazards using available historical information, and identifies the equipment, materials and procedures that will be used to eliminate or control these hazards. Environmental monitoring will be performed during the course of field activities to provide real-time data for on-going assessment of potential hazards.

1.2 Background

The Site is a ±0.746-acre parcel addressed at 293 Grote Street, Erie County, New York. The Site is located in a mixed residential, commercial, and industrial area of the City of Buffalo. The building is currently vacant and is being redeveloped as residential apartments.

The past uses of the Site have included residential, auto repair, a meter manufacturer, and machine shop. The most recent use was Buerk Tool & Machine which went out of business in 2019.

A 5,000-gallon UST, reportedly installed around 1957 for fuel oil storage, was present in the courtyard area of the Site. Evidence of a petroleum release was identified during Phase II activities and Spill Number 2007182 was assigned to the Site. Polychlorinated biphenyls (PCBs) and metals contamination were identified in the courtyard and likely associated with historic machine shop usage. Fill materials were identified in the gravel parking lot west of the Site in the vicinity of former residential dwellings in that area.

Impacted fill materials containing semi-volatile organic compounds (SVOCs) and metals are present and may be associated with fill material import after the buildings were demolished. PCBs were also detected in the concrete floor slab and 2nd floor wood floor of the building.

1.3 Known and Suspected Environmental Conditions

Benchmark completed a Remedial Investigation (RI) at the 293 Grote Street Site. The RI, in addition to previous investigations, identified contamination at the Site requiring remediation in order to satisfy the requirements for Restricted Residential Track 4 cleanup. Interim Remedial Measures (IRMs) and remedial action activities were completed to address contamination on-site. The previous investigations, RI, IRMs, and remedial action activities are summarized below:

Soil

Based on the Phase II and RI activities, SVOC-, metals-, and PCB-impacted soil/fill was present at the Site at depths ranging from ground surface to approximately 6 fbs. Impacted soil/fill was identified in the courtyard area proximate a former 5,000-gallon fuel oil UST, in the southern alleyway area, and in the parking lot area. Impacts were addressed during IRM activities as discussed below.

Groundwater

The results of the groundwater samples collected as part of the RI indicate SVOCs and metals are present in the groundwater above their respective TOGS 1.1.1 Groundwater Quality Standards (GWQS). The detected exceedances of these analytes in the groundwater are attributable to the urban nature of the Site and are ubiquitous in urban settings and are therefore not considered a concern in the groundwater.

Soil Vapor

Analytical results in comparison to the New York State Department of Health (NYSDOH) Decision Matrices indicate that no further action is required for the building.

Building Materials

PCBs were detected above the high occupancy threshold of 1 mg/kg at one (1) concrete floor sample location, CON-4 and evidence of significant oil staining was observed throughout. PCBs were detected above the high occupancy threshold of 1 mg/kg at eight (8) wood floor locations, WOOD-5, WOOD-6, WOOD-7, WOOD-13, WOOD-15, WOOD-16, WOOD-17, and WOOD-18. Wood Subfloor samples collected from

four (4) of the eight (8) locations where elevated PCBs were observed in the wood floor also exceeded the high occupancy threshold location at all four (4) sample locations, SUB-FLOOR WOOD-13, -15, -16, and -17. The PCB-impacted concrete and wood floors were addressed as a part of the IRM.

IRM

IRMs completed at the Site involved the following activities:

- Removal and disposal of PCB-impacted concrete flooring and removal and recycling of unimpacted concrete flooring from the 1st floor of the building.
- Removal and disposal of PCB-impacted wood flooring from a portion of the 2nd floor of the building.
- Removal and disposal/recycling of a 5,000-gallon UST, its contents, and associated vent/fill piping from the courtyard area.
- Excavation of non-hazardous soil/fill from the courtyard and UST area, groundwater management, collection of post-excavation samples, and backfill.
- Excavation of non-hazardous soil/fill from under the building for installation of the new concrete floor and plumbing lines.
- Excavation of non-hazardous soil/fill from AOC-1, -2, and -3 in the parking lot and alleyway areas, groundwater management, collection of post-excavation samples, and backfill.
- Excavation of non-hazardous soil/fill from the parking lot area for installation of utilities and cover system.

Remedial Action

Remedial action activities at the Site involved the following:

- Placement of a cover system, including a demarcation layer in areas without hardscape.

1.4 Parameters of Interest

Based on the previous investigations, constituents of potential concern (COPCs) in soil and groundwater at the Site include:

- **Semi-volatile Organic Compounds (SVOCs)** – SVOCs present at elevated concentration may include polycyclic aromatic hydrocarbons (PAHs), which are byproducts of incomplete combustion and impurities in petroleum products. PAHs

present at elevated levels in the soil/fill samples include: are benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, chrysene, and indeno(1,2,3-cd)pyrene.

- **Metals** – Metals present at elevated concentrations of soil/fill may include lead and manganese.

1.5 Overview of Post Remedial Activities

BCP IRMs and remedial activities were completed between November 2021 and October 2022. The work involved removal/off-site disposal of soil/fill to meet the Part 375 Restricted-Residential Use SCOs, and placement of a cover system over the site.

Benchmark personnel will be on-site to observe any post remedial activities involving soil/fill disturbance. Activities of this nature that are reasonably expected to occur during the post-remedial period are described below.

- **Cover System Removal/Replacement:** It may be necessary to remove or repair a portion of the cover system. Subgrade soil/fill may be exposed as part of that effort.
- **Subgrade Utility Installation or Repair:** Installation or repair of new subgrade utilities (gas, electric, stormwater, etc.) may be required.
- **Subgrade Foundation Construction:** It may be necessary or desirable to construct a new structure on the property, in which case subgrade soil/fill would be encountered for foundation work.

2.0 ORGANIZATIONAL STRUCTURE

This section of the HASP describes the lines of authority, responsibility, and communication as they pertain to health and safety functions at the Site. The purpose of this chapter is to identify the personnel who impact the development and implementation of the HASP and to describe their roles and responsibilities. This chapter also identifies other contractors and subcontractors involved in work operations and establish the lines of communications among them for health and safety matters. The organizational structure described in this chapter is consistent with the requirements of 29 CFR 1910.120(b)(2). This section will be reviewed by the Project Manager and updated as necessary to reflect the current organizational structure at this Site.

2.1 Roles and Responsibilities

All Benchmark personnel on the Site must comply with the minimum requirements of this HASP. The specific responsibilities and authority of management, safety and health, and other personnel on this Site are detailed in the following paragraphs.

2.1.1 Corporate Health and Safety Director

The Benchmark-TurnKey Corporate Health and Safety Director is *Mr. Thomas H. Forbes, P.E.* The Corporate Health and Safety Director is responsible for developing and implementing the Health and Safety program and policies for Benchmark Environmental Engineering & Science, PLLC and TurnKey Environmental Restoration, LLC, and consulting with corporate management to ensure adequate resources are available to properly implement these programs and policies. The Corporate Health and Safety Director coordinates Benchmark's Health and Safety training and medical monitoring programs and assists project management and field staff in developing site-specific health and safety plans.

2.1.2 Project Officer

The Project Officer for the Site is *Mr. Thomas Forbes, P.E.* The Project Officer has the responsibility for ensuring conformance with the BCP program requirements. The Project Officer will report directly to the Applicant and the NYSDEC/NYSDOH Project Coordinators and is responsible for project oversight. The Project Officer will:

- Define project objectives, oversee detailed work plan development and project schedule.

- Acquire and apply technical and corporate resources as needed to assure performance within budget and schedule constraints.
- Review the work performed on the project to assure its quality, responsiveness, and timeliness.
- Certify deliverables before their submission to NYSDEC.

2.1.3 Project Manager

The Project Manager for this Site is **Mr. Christopher Boron**. The Project Manager has the responsibility and authority to direct Benchmark work operations at the Site. The Project Manager coordinates safety and health functions with the Site Safety and Health Officer and bears ultimate responsibility for proper implementation of this HASP. He may delegate authority to expedite and facilitate any application of the program, including modifications to the overall project approach as necessary to circumvent unsafe work conditions. Specific duties of the Project Manager include:

- Preparing and coordinating the Site work plan.
- Providing Benchmark workers with work assignments and overseeing their performance.
- Coordinating health and safety efforts with the Site Safety and Health Officer (SSHO).
- Reviewing the emergency response coordination plan to assure its effectiveness.
- Serving as the primary liaison with Site contractors and the property owner.

2.1.4 Site Safety and Health Officer

The Site Safety and Health Officer (SSHO) for this Site is **Mr. Christopher Z. Boron**. The qualified alternate SSHO is **Mr. Nathan Munley**. The SSHO reports to the Project Manager. The SSHO is on-site or readily accessible to the Site during all work operations and has the authority to halt Site work if unsafe conditions are detected. The specific responsibilities of the SSHO are:

- Managing the safety and health functions for Benchmark personnel on the Site.
- Serving as the point of contact for safety and health matters.
- Ensuring that Benchmark field personnel working on the Site have received proper training (per 29 CFR Part 1910.120(e)), that they have obtained medical clearance to wear respiratory protection (per 29 CFR Part 1910.134), and that they

are properly trained in the selection, use and maintenance of personal protective equipment, including qualitative respirator fit testing.

- Performing or overseeing Site monitoring as required by the HASP.
- Assisting in the preparation and review of the HASP.
- Maintaining site-specific safety and health records as described in this HASP.
- Coordinating with the Project Manager, Site Workers, and Contractor's SSHO as necessary for safety and health efforts.

2.1.5 Site Workers

Site workers are responsible for: complying with this HASP or a more stringent HASP, if appropriate (i.e., Contractor and Subcontractor's HASP); using proper PPE; reporting unsafe acts and conditions to the SSHO; and following the safety and health instructions of the Project Manager and SSHO.

2.1.6 Other Site Personnel

Other Site personnel who will have health and safety responsibilities will include the Drilling Contractor, who will be responsible for developing, implementing and enforcing a Health and Safety Plan equally stringent or more stringent than Benchmark's HASP. Benchmark assumes no responsibility for the health and safety of anyone outside its direct employ. Each Contractor's HASP shall cover all non-Benchmark/TurnKey Site personnel. Each Contractor shall assign a SSHO who will coordinate with Benchmark's SSHO as necessary to ensure effective lines of communication and consistency between contingency plans.

In addition to Benchmark and Contractor personnel, other individuals who may have responsibilities in the work zone include subcontractors and governmental agencies performing Site inspection work (i.e., the New York State Department of Environmental Conservation). The Contractor shall be responsible for ensuring that these individuals have received OSHA-required training (29 CFR 1910.120(e)), including initial, refresher and site-specific training, and shall be responsible for the safety and health of these individuals while they are on-Site.

3.0 HAZARD EVALUATION

Due to the presence of certain contaminants at the Site, the possibility exists that workers will be exposed to hazardous substances during field activities. The principal points of exposure would be through direct contact with and incidental ingestion of soil, and through the inhalation of contaminated particles or vapors. Other points of exposure may include direct contact with groundwater. In addition, the use of drilling and/or medium to large-sized construction equipment (e.g., drill rig, excavator) will also present conditions for potential physical injury to workers. Further, since some of the work will be performed outdoors, the potential exists for heat/cold stress to impact workers, especially those wearing protective equipment and clothing. Adherence to the medical evaluations, worker training relative to chemical hazards, safe work practices, proper personal protection, environmental monitoring, establishment work zones and Site control, appropriate decontamination procedures and contingency planning outlined herein will reduce the potential for chemical exposures and physical injuries.

3.1 Chemical Hazards

As discussed in Section 1.3, historic activities have potentially resulted in impacts to Site soil/fill and groundwater. Soil/fill sample results indicate that SVOC (PAHs) and metals impact to Site soil/fill. Table 1 lists exposure limits for airborne concentrations of the COPCs identified in Section 1.4 of this HASP. Brief descriptions of the toxicology of the prevalent COPCs and related health and safety guidance and criteria are provided below.

- **Polycyclic Aromatic Hydrocarbons (PAHs)** are formed as a result of the pyrolysis and incomplete combustion of organic matter such as fossil fuel. PAH aerosols formed during the combustion process disperse throughout the atmosphere, resulting in the deposition of PAH condensate in soil, water and on vegetation. In addition, several products formed from petroleum processing operations (e.g., roofing materials and asphalt) also contain elevated levels of PAHs. Hence, these compounds are widely dispersed in the environment. PAHs are characterized by a molecular structure containing three or more fused, unsaturated carbon rings. Seven of the PAHs are classified by USEPA as probable human carcinogens (USEPA Class B2). These are: benzo(a)pyrene; benzo(a)anthracene; benzo(b)fluoranthene; and dibenzo(a,h)anthracene. The primary route of exposure to PAHs is through incidental ingestion and inhalation of contaminated particulates. PAHs are characterized by an organic odor, and exist as oily liquids in pure form. Acute exposure symptoms may include acne-

type blemishes in areas of the skin exposed to sunlight.

- **Lead (CAS #7439-92-1)** can affect almost every organ and system in our bodies. The most sensitive is the central nervous system, particularly in children. Lead also damages kidneys and the immune system. The effects are the same whether it is breathed or swallowed. Lead may decrease reaction time, cause weakness in fingers, wrists or ankles and possibly affect memory. Lead may cause anemia.
- **Manganese (CAS #7439-96-5)** is a naturally occurring element that is commonly used in the production of steel, stainless steel, and cast iron. Exposure may cause insomnia, mental confusion, cough, difficulty breathing, vomiting, weakness, and damage to kidneys and the central nervous system.

With respect to the anticipated post remedial activities discussed in Section 1.5, possible routes of exposure to the above-mentioned contaminants are presented in Table 2. The use of proper respiratory equipment, as outlined in Section 7.0 of this HASP, will minimize the potential for exposure to airborne contamination. Exposure to contaminants through dermal and other routes will also be minimized through the use of protective clothing (Section 7.0), safe work practices (Section 6.0), and proper decontamination procedures (Section 12.0).

3.2 Physical Hazards

Post remedial field activities at the 293 Grote Street Site may present the following physical hazards:

- The potential for physical injury during heavy construction equipment use, such as excavator and/or drilling equipment.
- The potential for heat/cold stress to employees during the summer/winter months (see Section 10.0).
- The potential for slip and fall injuries due to rough, uneven terrain and/or open excavations.

These hazards represent only some of the possible means of injury that may be present during post remedial activities at the Site. Since it is impossible to list all potential sources of injury, it shall be the responsibility of each individual to exercise proper care and caution during all phases of the work.

4.0 TRAINING

4.1 Site Workers

All personnel performing post remedial activities at the Site (such as, but not limited to, equipment operators, general laborers, and drillers) and who may be exposed to hazardous substances, health hazards, or safety hazards and their supervisors/managers responsible for the Site shall receive training in accordance with 29 CFR 1910.120(e) before they are permitted to engage in operations in the exclusion zone or contaminant reduction zone. This training includes an initial 40-hour Hazardous Waste Site Worker Protection Course, an 8-hour Annual Refresher Course subsequent to the initial 40-hour training, and 3 days of actual field experience under the direct supervision of a trained, experienced supervisor. Additional site-specific training shall also be provided by the SSHO prior to the start of field activities. A description of topics to be covered by this training is provided below.

4.1.1 Initial and Refresher Training

Initial and refresher training is conducted by a qualified instructor as specified under OSHA 29 CFR 1910.120(e)(5) and is specifically designed to meet the requirements of OSHA 29 CFR 1910.120(e)(3) and 1910.120(e)(8). The training covers, as a minimum, the following topics:

- OSHA HAZWOPER regulations.
- Site safety and hazard recognition, including chemical and physical hazards.
- Medical monitoring requirements.
- Air monitoring, permissible exposure limits, and respiratory protection level classifications.
- Appropriate use of personal protective equipment (PPE), including chemical compatibility and respiratory equipment selection and use.
- Work practices to minimize risk.
- Work zones and Site control.
- Safe use of engineering controls and equipment.
- Decontamination procedures.
- Emergency response and escape.
- Confined space entry procedures.

- Heat and cold stress monitoring.
- Elements of a Health and Safety Plan.
- Spill containment.

Initial training also incorporates workshops for PPE and respiratory equipment use (Levels A, B and C), and respirator fit testing. Records and certification received from the course instructor documenting each employee's successful completion of the training identified above are maintained on file at Benchmark's Buffalo, NY office. Contractors and Subcontractors are required to provide similar documentation of training for all their personnel who will be involved in on-site work activities.

Any employee who has not been certified as having received health and safety training in conformance with 29 CFR 1910.120(e) is prohibited from working in the exclusion and contamination reduction zones, or to engage in any on-site work activities that may involve exposure to hazardous substances or wastes.

4.1.2 Site Training

Site workers are given a copy of the HASP and provided a site-specific briefing prior to the commencement of work to ensure that employees are familiar with the HASP and the information and requirements it contains. The Site briefing shall be provided by the SSO prior to initiating field activities and shall include:

- Names of personnel and alternates responsible for Site safety and health.
- Safety, health and other hazards present on the Site.
- The site lay-out including work zones and places of refuge.
- The emergency communications system and emergency evacuation procedures.
- Use of PPE.
- Work practices by which the employee can minimize risks from hazards.
- Safe use of engineering controls and equipment on the site.
- Medical surveillance, including recognition of symptoms and signs of over-exposure as described in Chapter 5 of this HASP.
- Decontamination procedures as detailed in Chapter 12 of this HASP.
- The emergency response plan as detailed in Chapter 15 of this HASP.
- Confined space entry procedures, if required, as detailed in Chapter 13 of this HASP.
- The spill containment program as detailed in Chapter 9 of this HASP.

- Site control as detailed in Chapter 11 of this HASP.

Supplemental health and safety briefings will also be conducted by the SSHO on an as-needed basis during the course of the work. Supplemental briefings are provided as necessary to notify employees of any changes to this HASP as a result of information gathered during ongoing Site characterization and analysis. Conditions for which the SSHO may schedule additional briefings include but are not limited to: a change in Site conditions (e.g., based on monitoring results); changes in the work schedule/plan; newly discovered hazards; and safety incidents occurring during Site work.

4.2 Supervisor Training

On-site safety and health personnel who are directly responsible for or who supervise the safety and health of workers engaged in hazardous waste operations (i.e., SSHO) shall receive, in addition to the appropriate level of worker training described in Section 4.1, above, 8 additional hours of specialized supervisory training, in compliance with 29 CFR 1910.120(e)(4).

4.3 Emergency Response Training

Emergency response training is addressed in Appendix A of this HASP, Emergency Response Plan.

4.4 Site Visitors

Each Contractor's SSHO will provide a site-specific briefing to Site visitors and other non-Benchmark personnel who enter the Site beyond the Site entry point. The site-specific briefing will provide information about Site hazards, the Site layout including work zones and places of refuge, the emergency communications system and emergency evacuation procedures, and other pertinent safety and health requirements as appropriate.

Site visitors will not be permitted to enter the exclusion zone or contaminant reduction zones unless they have received the level of training required for Site workers as described in Section 4.1.

5.0 MEDICAL MONITORING

Medical monitoring examinations are provided to Benchmark employees as stipulated under 29 CFR Part 1910.120(f). These exams include initial employment, annual and employment termination physicals for Benchmark employees involved in hazardous waste site field operations. Post-exposure examinations are also provided for employees who may have been injured, received a health impairment, or developed signs or symptoms of over-exposure to hazardous substances or were accidentally exposed to substances at concentrations above the permissible exposure limits without necessary personal protective equipment. Such exams are performed as soon as possible following development of symptoms or the known exposure event.

Medical evaluations are performed by Health Works, an occupational health care provider under contract with Benchmark. Health Works is located in Seneca Square Plaza, 1900 Ridge Road, West Seneca, New York 14224. The facility can be reached at (716) 823-5050 to schedule routine appointments or post-exposure examinations.

Medical evaluations are conducted according to the Benchmark Medical Monitoring Program and include an evaluation of the workers' ability to use respiratory protective equipment. The examinations include:

- Occupational/medical history review.
- Physical exam, including vital sign measurement.
- Spirometry testing.
- Eyesight testing.
- Audio testing (minimum baseline and exit, annual for employees routinely exposed to greater than 85db).
- EKG (for employees >40 yrs age or as medical conditions dictate).
- Chest X-ray (baseline and exit, and every 5 years).
- Blood biochemistry (including blood count, white cell differential count, serum multiplastic screening).
- Medical certification of physical requirements (i.e., sight, musculoskeletal, cardiovascular) for safe job performance and to wear respiratory protection equipment.

The purpose of the medical evaluation is to determine an employee's fitness for duty on hazardous waste sites; and to establish baseline medical data.

In conformance with OSHA regulations, Benchmark will maintain and preserve medical records for a period of 30 years following termination of employment. Employees are provided a copy of the physician's post-exam report and have access to their medical records and analyses.

6.0 SAFE WORK PRACTICES

Benchmark employees shall conform to the following safe work practices during on-site work activities conducted within the exclusion and contamination reduction zones:

- Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth contact is strictly prohibited.
- The hands and face must be thoroughly washed upon leaving the work area and prior to engaging in any activity indicated above.
- Respiratory protective equipment and clothing must be worn by personnel entering the Site as required by the HASP or as modified by the Site safety officer. Excessive facial hair (i.e., beards, long mustaches or sideburns) that interferes with the satisfactory respirator-to-face seal is prohibited.
- Contact with surfaces/materials either suspected or known to be contaminated will be avoided to minimize the potential for transfer to personnel, cross contamination and need for decontamination.
- Medicine and alcohol can synergize the effects of exposure to toxic chemicals. Due to possible contraindications, use of prescribed drugs should be reviewed with the Benchmark occupational physician. Alcoholic beverage and illegal drug intake are strictly forbidden during the workday.
- Personnel shall be familiar with standard operating safety procedures and additional instructions contained in this Health and Safety Plan.
- On-site personnel shall use the “buddy” system. No one may work alone (i.e., out of earshot or visual contact with other workers) in the exclusion zone.
- Personnel and equipment in the contaminated area shall be minimized, consistent with effective Site operations.
- Employees have the obligation to immediately report and if possible, correct unsafe work conditions.
- Use of contact lenses on-site will not be permitted. Spectacle kits for insertion into full-face respirators will be provided for Benchmark employees, as requested and required.

The recommended specific safety practices for working around the contractor’s equipment (e.g., backhoes, bulldozers, excavators, drill rigs etc.) are as follows:

- Although the Contractor and subcontractors are responsible for their equipment and safe operation of the Site, Benchmark personnel are also responsible for their own safety.
- Subsurface work will not be initiated without first clearing underground utility

services.

- Heavy equipment should not be operated within 20 feet of overhead wires. This distance may be increased if windy conditions are anticipated or if lines carry high voltage. The Site should also be sufficiently clear to ensure the project staff can move around the heavy machinery safely.
- Care should be taken to avoid overhead wires when moving heavy-equipment from location to location.
- Hard hats, safety boots and safety glasses should be worn at all times in the vicinity of heavy equipment. Hearing protection is also recommended.
- The work Site should be kept neat. This will prevent personnel from tripping and will allow for fast emergency exit from the Site.
- Proper lighting must be provided when working at night.
- Construction activities should be discontinued during an electrical storm or severe weather conditions.
- The presence of combustible gases should be checked before igniting any open flame.
- Personnel shall stand upwind of any construction operation when not immediately involved in sampling/logging/observing activities.
- Personnel will not approach the edge of an unsecured trench/excavation closer than 2 feet.

7.0 PERSONAL PROTECTIVE EQUIPMENT

7.1 Equipment Selection

Personal protective equipment (PPE) will be donned when work activities may result in exposure to physical or chemical hazards beyond acceptable limits, and when such exposure can be mitigated through appropriate PPE. The selection of PPE will be based on an evaluation of the performance characteristics of the PPE relative to the requirements and limitations of the Site, the task-specific conditions and duration, and the hazards and potential hazards identified at the Site.

Equipment designed to protect the body against contact with known or suspect chemical hazards are grouped into four categories according to the degree of protection afforded. These categories designated A through D consistent with United States Environmental Protection Agency (USEPA) Level of Protection designation, are:

- **Level A:** Should be selected when the highest level of respiratory, skin and eye protection is needed.
- **Level B:** Should be selected when the highest level of respiratory protection is needed, but a lesser level of skin protection is required. Level B protection is the minimum level recommended on initial Site entries until the hazards have been further defined by on-site studies. Level B (or Level A) is also necessary for oxygen-deficient atmospheres.
- **Level C:** Should be selected when the types of airborne substances are known, the concentrations have been measured and the criteria for using air-purifying respirators are met. In atmospheres where no airborne contaminants are present, Level C provides dermal protection only.
- **Level D:** Should not be worn on any Site with elevated respiratory or skin hazards. This is generally a work uniform providing minimal protection.

OSHA requires the use of certain PPE under conditions where an immediate danger to life and health (IDLH) may be present. Specifically, OSHA 29 CFR 1910.120(g)(3)(iii) requires use of a positive pressure self-contained breathing apparatus, or positive pressure air-line respirator equipped with an escape air supply when chemical exposure levels present a substantial possibility of immediate serious injury, illness or death, or impair the ability to escape. Similarly, OSHA 29 CFR 1910.120(g)(3)(iv) requires donning totally-encapsulating chemical protective suits (with a protection level equivalent to Level A protection) in conditions where skin absorption of a hazardous substance may result in a substantial

possibility of immediate serious illness, injury or death, or impair the ability to escape.

In situations where the types of chemicals, concentrations, and possibilities of contact are unknown, the appropriate level of protection must be selected based on professional experience and judgment until the hazards can be further characterized. The individual components of clothing and equipment must be assembled into a full protective ensemble to protect the worker from site-specific hazards, while at the same time minimizing hazards and drawbacks of the personal protective gear itself. Ensemble components are detailed below for levels A/B, C, and D protection.

7.2 Protection Ensembles

7.2.1 Level A/B Protection Ensemble

Level A/B ensembles include similar respiratory protection, however Level A provides a higher degree of dermal protection than Level B. Use of Level A over Level B is determined by: comparing the concentrations of identified substances in the air with skin toxicity data, and assessing the effect of the substance (by its measured air concentrations or splash potential) on the small area of the head and neck unprotected by Level B clothing.

The recommended PPE for level A/B is:

- Pressure-demand, full-face piece self-contained breathing apparatus (MSHA/-NIOSH approved) or pressure-demand supplied-air respirator with escape self-contained breathing apparatus (SCBA).
- Chemical-resistant clothing. For Level A, clothing consists of totally-encapsulating chemical resistant suit. Level B incorporates hooded one-or two-piece chemical splash suit.
- Inner and outer chemical resistant gloves.
- Chemical-resistant safety boots/shoes.
- Hardhat.

7.2.2 Level C Protection Ensemble

Level C protection is distinguished from Level B by the equipment used to protect the respiratory system, assuming the same type of chemical-resistant clothing is used. The main selection criterion for Level C is that conditions permit wearing an air-purifying device. The device (when required) must be an air-purifying respirator (MSHA/NIOSH approved) equipped with filter cartridges. Cartridges must be able to remove the substances

encountered. Respiratory protection will be used only with proper fitting, training and the approval of a qualified individual. In addition, an air-purifying respirator can be used only if: oxygen content of the atmosphere is at least 19.5% in volume; substances are identified and concentrations measured; substances have adequate warning properties; the individual passes a qualitative fit-test for the mask; and an appropriate cartridge/canister is used, and its service limit concentration is not exceeded.

Recommended PPE for Level C conditions includes:

- Full-face piece, air-purifying respirator equipped with MSHA and NIOSH approved organic vapor/acid gas/dust/mist combination cartridges or as designated by the SSHO.
- Chemical-resistant clothing (hooded, one or two-piece chemical splash suit or disposable chemical-resistant one-piece suit).
- Inner and outer chemical-resistant gloves.
- Chemical-resistant safety boots/shoes.
- Hardhat.

An air-monitoring program is part of all response operations when atmospheric contamination is known or suspected. It is particularly important that the air be monitored thoroughly when personnel are wearing air-purifying respirators. Continual surveillance using direct-reading instruments is needed to detect any changes in air quality necessitating a higher level of respiratory protection.

7.2.3 Level D Protection Ensemble

As indicated above, Level D protection is primarily a work uniform. It can be worn in areas where only boots can be contaminated, where there are no inhalable toxic substances and where the atmospheric contains at least 19.5% oxygen.

Recommended PPE for Level D includes:

- Coveralls.
- Safety boots/shoes.
- Safety glasses or chemical splash goggles.
- Hardhat.
- Optional gloves; escape mask; face shield.

7.2.4 Recommended Level of Protection for Site Tasks

Based upon current information regarding both the contaminants suspected to be present at the Site and the various tasks that are included in the remedial activities, the minimum required levels of protection for these tasks shall be as identified in Table 3.

8.0 EXPOSURE MONITORING

8.1 General

Based on the results of historic sample analysis and the nature of the proposed work activities at the Site, the possibility exists that organic vapors and/or particulates may be released to the air during intrusive construction activities. Ambient breathing zone concentrations may at times, exceed the permissible exposure limits (PELs) established by OSHA for the individual compounds (see Table 1), in which case respiratory protection will be required. Respiratory and dermal protection may be modified (upgraded or downgraded) by the SSHO based upon real-time field monitoring data.

8.1.1 On-Site Work Zone Monitoring

Benchmark personnel will conduct routine, real-time air monitoring during intrusive construction phases such as excavation, backfilling, drilling, etc. The work area will be monitored at regular intervals using a photo-ionization detector (PID), combustible gas meter and a particulate meter. Observed values will be recorded and maintained as part of the permanent field record.

Additional air monitoring measurements may be made by Benchmark personnel to verify field conditions during subcontractor oversight activities. Monitoring instruments will be protected from surface contamination during use. Additional monitoring instruments may be added if the situations or conditions change. Monitoring instruments will be calibrated in accordance with manufacturer's instructions before use.

8.1.2 Off-Site Community Air Monitoring

In addition to on-site monitoring within the work zone(s), monitoring at the down-wind portion of the Site perimeter will be conducted. This will provide a real-time method for determination of vapor and/or particulate releases to the surrounding community as a result of ground intrusive investigation work.

Ground intrusive activities are defined in the Generic Community Air Monitoring Plan and attached as Appendix C. Ground intrusive activities include soil/fill excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells. Non-intrusive activities include the collection of surface soil/fill samples or the collection of groundwater samples from installed monitoring wells. Continuous monitoring is required for

ground intrusive activities and periodic monitoring is required for non-intrusive activities. Periodic monitoring consists of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring while bailing a well, and taking a reading prior to leaving a sampling location. This may be upgraded to continuous if the sampling location is in close proximity to individuals not involved in the Site activity (i.e., on a curb of a busy street). The action levels below will be used during periodic monitoring.

8.2 Monitoring Action Levels

8.2.1 On-Site Work Zone Action Levels

The PID, or other appropriate instrument(s), will be used by Benchmark personnel to monitor organic vapor concentrations as specified in this HASP. Combustible gas will be monitored with the “combustible gas” option on the combustible gas meter or other appropriate instrument(s). In addition, fugitive dust/particulate concentrations will be monitored during major soil intrusion (well/boring installation) using a real-time particulate monitor as specified in this plan. In the absence of such monitoring, appropriate respiratory protection for particulates shall be donned. Sustained readings obtained in the breathing zone may be interpreted (with regard to other Site conditions) as follows for Benchmark personnel:

- Total atmospheric concentrations of unidentified (vapors or gases ranging from 0 to 1 ppm above background on the PID) - Continue operations under Level D (see Appendix A).
- Total atmospheric concentrations of unidentified vapors or gases yielding sustained readings from >1 ppm to 5 ppm above background on the PID (vapors not suspected of containing high levels of chemicals toxic to the skin) - Continue operations under Level C (see Appendix A).
- Total atmospheric concentrations of unidentified vapors or gases yielding sustained readings of >5 ppm to 50 ppm above background on the PID - Continue operations under Level B (see Attachment 1), re-evaluate and alter (if possible) construction methods to achieve lower vapor concentrations.
- Total atmospheric concentrations of unidentified vapors or gases above 50 ppm on the PID - Discontinue operations and exit the work zone immediately.

The particulate monitor will be used to monitor respirable dust concentrations during intrusive activities and during handling of Site soil/fill. Action levels based on the instrument readings shall be as follows:

- Less than 50 mg/m³ - Continue field operations.
- 50-150 mg/m³ - Don dust/particulate mask or equivalent
- Greater than 150 mg/m³ - Don dust/particulate mask or equivalent. Initiate engineering controls to reduce respirable dust concentration (viz., wetting of excavated soils or tools at discretion of Site Health and Safety Officer).

Readings from the field equipment will be recorded and documented on the appropriate Project Field Forms. Instruments will be calibrated before use on a daily basis and the procedure will be documented on the appropriate Project Field Forms.

8.2.2 Community Air Monitoring Action Levels

In addition to the action levels prescribed in Section 8.2.1 for Benchmark personnel on-site, the following criteria shall also be adhered to for the protection of downwind receptors consistent with NYSDOH requirements (Appendix C):

o **ORGANIC VAPOR PERIMETER MONITORING:**

- If the sustained ambient air concentration of organic vapors at the downwind perimeter of the exclusion zone exceeds 5 ppm above background for the 15-minute average, work activities will be temporarily halted and monitoring continued. If the sustained organic vapor decreases below 5 ppm over background, work activities can resume with continued monitoring.
- If the sustained ambient air concentration of organic vapors at the downwind perimeter of the exclusion zone are greater than 5 ppm over background but less than 25 ppm for the 15-minute average, activities can resume provided that: the organic vapor level 200 feet downwind of the working site or half the distance to the nearest off-site residential or commercial structure, whichever is less, but in no case less than 20 feet, is below 5 ppm over background; and more frequent intervals of monitoring, as directed by the Site Health and Safety Officer, are conducted.
- If the sustained organic vapor level is above 25 ppm at the perimeter of the exclusion zone for the 15-minute average, the Site Health and Safety Officer must be notified and work activities shut down. The Site Health and Safety Officer will determine when re-entry of the exclusion zone is possible and will

implement downwind air monitoring to ensure vapor emissions do not impact the nearest off-site residential or commercial structure at levels exceeding those specified in the ***Organic Vapor Contingency Monitoring Plan*** below. All readings will be recorded and will be available for New York State Department of Environmental Conservation (DEC) and Department of Health (DOH) personnel to review.

o **ORGANIC VAPOR CONTINGENCY MONITORING PLAN:**

- If the sustained organic vapor level is greater than 5 ppm over background 200 feet downwind from the work area or half the distance to the nearest off-site residential or commercial property, whichever is less, all work activities must be halted.
- If, following the cessation of the work activities or as the result of an emergency, sustained organic levels persist above 5 ppm above background 200 feet downwind or half the distance to the nearest off-site residential or commercial property from the work area, then the air quality must be monitored within 20 feet of the perimeter of the nearest off-site residential or commercial structure (20-foot zone).
- If efforts to abate the emission source are unsuccessful and if sustained organic vapor levels approach or exceed 5 ppm above background within the 20-foot zone for more than 30 minutes, or are sustained at levels greater than 10 ppm above background for longer than one minute, then the ***Major Vapor Emission Response Plan*** (see below) will automatically be placed into effect.

o **MAJOR VAPOR EMISSION RESPONSE PLAN:**

Upon activation, the following activities will be undertaken:

1. All Emergency Response Contacts as listed in this Health and Safety Plan and the Emergency Response Plan (Appendix A) will be advised.
2. The local police authorities will immediately be contacted by the Site Health and Safety Officer and advised of the situation.
3. Frequent air monitoring will be conducted at 30-minute intervals within the 20-foot zone. If two sustained successive readings below action levels are measured, air monitoring may be halted or modified by the Site Health and Safety Officer.

The following personnel are to be notified in the listed sequence in the event that a Major Vapor Emission Plan is activated:

Responsible Person	Contact	Phone Number
SSHO	Police	911
SSHO	State Emergency Response Hotline	(800) 457-7362

Additional emergency numbers are listed in the Emergency Response Plan included as Appendix A.

o **EXPLOSIVE VAPORS:**

- Sustained atmospheric concentrations of greater than 10% LEL in the work area - Initiate combustible gas monitoring at the downwind portion of the Site perimeter.
- Sustained atmospheric concentrations of greater than 10% LEL at the downwind Site perimeter – Halt work and contact local Fire Department.

o **AIRBORNE PARTICULATE COMMUNITY AIR MONITORING**

Respirable (PM-10) particulate monitoring will be performed on a continuous basis at the upwind and downwind perimeter of the exclusion zone. The monitoring will be performed using real-time monitoring equipment capable of measuring PM-10 and integrating over a period of 15-minutes for comparison to the airborne particulate action levels. The equipment will be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration will be visually assessed during all work activities. All readings will be recorded and will be available for NYSDEC and NYSDOH review. Readings will be interpreted as follows:

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter (ug/m³) greater than the background (upwind perimeter) reading 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 provided that the downwind PM-10 particulate levels do not exceed 150 ug/m³ above the upwind level and that visible dust is not migrating from the work area.
- If, after implementation of dust suppression techniques downwind PM-10 levels are greater than 150 ug/m³ above the upwind level, work activities must be stopped and dust suppression controls re-evaluated. Work can resume provided that supplemental dust suppression measures and/or other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 ug/m³ of the upwind level and in preventing visible dust migration.

Pertinent emergency response information including the telephone number of the Fire Department is included in the Emergency Response Plan (Appendix A).

9.0 SPILL RELEASE/RESPONSE

This chapter of the HASP describes the potential for and procedures related to spills or releases of known or suspected petroleum and/or hazardous substances on the Site. The purpose of this Section of the HASP is to plan appropriate response, control, countermeasures and reporting, consistent with OSHA requirements in 29 CFR 1910.120(b)(4)(ii)(J) and (j)(1)(viii). The spill containment program addresses the following elements:

- Potential hazardous material spills and available controls.
- Initial notification and evaluation.
- Spill response.
- Post-spill evaluation.

9.1 Potential Spills and Available Controls

An evaluation was conducted to determine the potential for hazardous material and oil/petroleum spills at this Site. For the purpose of this evaluation, hazardous materials posing a significant spill potential are considered to be:

- CERCLA Hazardous Substances as identified in 40 CFR Part 302, where such materials pose the potential for release in excess of their corresponding Reportable Quantity (RQ).
- Extremely Hazardous Substances as identified in 40 CFR Part 355, Appendix A, where such materials pose the potential for release in excess of their corresponding Reportable Quantity (RQ).
- Hazardous Chemicals as defined under Section 311(e) of the Emergency Planning and Community Right-To-Know Act of 1986, where such chemicals are present or will be stored in excess of 10,000 lbs.
- Toxic Chemicals as defined in 40 CFR Part 372, where such chemicals are present or will be stored in excess of 10,000 lbs.
- Chemicals regulated under 6NYCRR Part 597, where such materials pose the potential for release in excess of their corresponding Reportable Quantity (RQ).

Oil/petroleum products are considered to pose a significant spill potential whenever the following situations occur:

- The potential for a “harmful quantity” of oil (including petroleum and non-petroleum-based fuels and lubricants) to reach navigable waters of the U.S. exists (40 CFR Part 112.4). Harmful quantities are considered by USEPA to be volumes

that could form a visible sheen on the water or violate applicable water quality standards.

- The potential for any amount of petroleum to reach any waters of NY State, including groundwater, exists. Petroleum, as defined by NY State in 6NYCRR Part 612, is a petroleum-based heat source, energy source, or engine lubricant/maintenance fluid.
- The potential for any release, to soil or water, of petroleum from a bulk storage facility regulated under 6NYCRR Part 612. A regulated petroleum storage facility is defined by NY State as a site having stationary tank(s) and intra-facility piping, fixtures and related equipment with an aggregate storage volume of 1,100 gallons or greater.

The evaluation indicates that, based on Site history and decommissioning records, a hazardous material spill and/or a petroleum product spill is not likely to occur during post remedial activities.

9.2 Initial Spill Notification and Evaluation

Any worker who discovers a hazardous substance or oil/petroleum spill will immediately notify the Project Manager and SSHO. The worker will, to the best of his/her ability, report the material involved, the location of the spill, the estimated quantity of material spilled, the direction/flow of the spill material, related fire/explosion incidents, if any, and any associated injuries. The Emergency Response Plan presented in Appendix A of this HASP will immediately be implemented if an emergency release has occurred.

Following initial report of a spill, the Project Manager will make an evaluation as to whether the release exceeds RQ levels. If an RQ level is exceeded, the Project Manager will notify the Site owner and NYSDEC at 1-800-457-7362 within 2 hours of spill discovery. The Project Manager will also determine what additional agencies (e.g., USEPA) are to be contacted regarding the release, and will follow-up with written reports as required by the applicable regulations.

9.3 Spill Response

For all spill situations, the following general response guidelines will apply:

- Only those personnel involved in overseeing or performing containment operations will be allowed within the spill area. If necessary, the area will be roped, ribboned, or otherwise blocked off to prevent unauthorized access.

- Appropriate PPE, as specified by the SSHO, will be donned before entering the spill area.
- Ignition points will be extinguished/removed if fire or explosion hazards exist.
- Surrounding reactive materials will be removed.
- Drains or drainage in the spill area will be blocked to prevent inflow of spilled materials or applied materials.

For minor spills, the Contractor will maintain a Spill Control and Containment Kit in the Field Office or other readily accessible storage location. The kit will consist of, at a minimum, a 50 lb. bag of “speedy dry” granular absorbent material, absorbent pads, shovels, empty 5-gallon pails and an empty open-top 55-gallon drum. Spilled materials will be absorbed, and shoveled into a 55-gallon drum for proper disposal (NYSDEC approval will be secured for on-site treatment of the impacted soils/absorbent materials, if applicable). Impacted soils will be hand-excavated to the point that no visible signs of contamination remains, and will be drummed with the absorbent.

In the event of a major release or a release that threatens surface water, a spill response contractor will be called to the Site. The response contractor may use heavy equipment (e.g., excavator, backhoe, etc.) to berm the soils surrounding the spill Site or create diversion trenching to mitigate overland migration or release to navigable waters. Where feasible, pumps will be used to transfer free liquid to storage containers. Spill control/cleanup contractors in the Western New York area that may be contacted for assistance include:

- The Environmental Service Group of NY, Inc.: (716) 695-6720
- Environmental Products and Services, Inc.: (716) 447-4700
- Op-Tech: (716) 873-7680

9.4 Post-Spill Evaluation

If a reportable quantity of hazardous material or oil/petroleum is spilled as determined by the Project Manager, a written report will be prepared as indicated in Section 9.2. The report will identify the root cause of the spill, type and amount of material released, date/time of release, response actions, agencies notified and/or involved in cleanup, and procedures to be implemented to avoid repeat incidents. In addition, all re-useable spill cleanup and containment materials will be decontaminated, and spill kit supplies/disposable items will be replenished.

10.0 HEAT/COLD STRESS MONITORING

Since some of the work activities at the Site will be scheduled for both the summer and winter months, measures will be taken to minimize heat/cold stress to Benchmark employees. The Site Safety and Health Officer and/or his or her designee will be responsible for monitoring Benchmark field personnel for symptoms of heat/cold stress.

10.1 Heat Stress Monitoring

Personal protective equipment may place an employee at risk of developing heat stress, a common and potentially serious illness often encountered at construction, landfill, waste disposal, industrial or other unsheltered sites. The potential for heat stress is dependent on a number of factors, including environmental conditions, clothing, workload, physical conditioning and age. Personal protective equipment may severely reduce the body's normal ability to maintain temperature equilibrium (via evaporation and convection), and require increased energy expenditure due to its bulk and weight.

Proper training and preventive measures will mitigate the potential for serious illness. Heat stress prevention is particularly important because once a person suffers from heat stroke or heat exhaustion, that person may be predisposed to additional heat related illness. To avoid heat stress, the following steps should be taken:

- Adjust work schedules.
- Modify work/rest schedules according to monitoring requirements.
- Mandate work slowdowns as needed.
- Perform work during cooler hours of the day if possible or at night if adequate lighting can be provided.
- Provide shelter (air-conditioned, if possible) or shaded areas to protect personnel during rest periods.
- Maintain worker's body fluids at normal levels. This is necessary to ensure that the cardiovascular system functions adequately. Daily fluid intake must approximately equal the amount of water lost in sweat (i.e., eight fluid ounces must be ingested for approximately every 1 lb of weight lost). The normal thirst mechanism is not sensitive enough to ensure that enough water will be consumed to replace lost perspiration. When heavy sweating occurs, workers should be encouraged to drink more.
- Train workers to recognize the symptoms of heat related illness.

Heat-Related Illness - Symptoms:

- Heat rash may result from continuous exposure to heat or humid air.
- Heat cramps are caused by heavy sweating with inadequate electrolyte replacement. Signs and symptoms include: muscle spasms; pain in the hands, feet and abdomen.
- Heat exhaustion occurs from increased stress on various body organs including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Signs and symptoms include: pale, cool, moist skin; heavy sweating; dizziness; nausea; fainting.
- Heat stroke is the most serious form of heat stress. Temperature regulation fails and the body temperature rises to critical levels. Immediate action must be taken to cool the body before serious injury and death occur. Competent medical help must be obtained. Signs and symptoms are: red, hot, usually dry skin; lack of or reduced perspiration; nausea; dizziness and confusion; strong, rapid pulse; coma.

The monitoring of personnel wearing protective clothing should commence when the ambient temperature is 70 degrees Fahrenheit or above. For monitoring the body's recuperative ability to excess heat, one or more of the following techniques should be used as a screening mechanism.

- Heart rate may be measured by the radial pulse for 30 seconds as early as possible in the resting period. The rate at the beginning of the rest period should not exceed 100 beats per minute. If the rate is higher, the next work period should be shortened by 10 minutes (or 33%), while the length of the rest periods stay the same. If the pulse rate is 100 beats per minute at the beginning of the next rest period, the following work cycle should be further shortened by 33%.
- Body temperature may be measured orally with a clinical thermometer as early as possible in the resting period. Oral temperature at the beginning of the rest period should not exceed 99.6 degrees Fahrenheit. If it does, the next work period should be shortened by 10 minutes (or 33%), while the length of the rest period remains the same. However, if the oral temperature exceeds 99.6 degrees Fahrenheit at the beginning of the next period, the work cycle may be further shortened by 33%. Oral temperature should be measured at the end of the rest period to make sure that it has dropped below 99.6 degrees Fahrenheit. No Benchmark employee will be permitted to continue wearing semi-permeable or impermeable garments when his/her oral temperature exceeds 100.6 degrees Fahrenheit.

10.2 Cold Stress Monitoring

Exposure to cold conditions may result in frostbite or hypothermia, each of which progresses in stages as shown below.

- **Frostbite** occurs when body tissue (usually on the extremities) begins to freeze. The three states of frostbite are:
 - 1) **Frost nip** - This is the first stage of the freezing process. It is characterized by a whitened area of skin, along with a slight burning or painful sensation. Treatment consists of removing the victim from the cold conditions, removal of boots and gloves, soaking the injured part in warm water (102 to 108 degrees Fahrenheit) and drinking a warm beverage. Do not rub skin to generate friction/ heat.
 - 2) **Superficial Frostbite** - This is the second stage of the freezing process. It is characterized by a whitish gray area of tissue, which will be firm to the touch but will yield little pain. The treatment is identical for Frost nip.
 - 3) **Deep Frostbite** - In this final stage of the freezing process the affected tissue will be cold, numb and hard and will yield little to no pain. Treatment is identical to that for Frost nip.
- **Hypothermia** is a serious cold stress condition occurring when the body loses heat at a rate faster than it is produced. If untreated, hypothermia may be fatal. The stages of hypothermia may not be clearly defined or visible at first, but generally include:
 - 1) Shivering
 - 2) Apathy (i.e., a change to an indifferent or uncaring mood)
 - 3) Unconsciousness
 - 4) Bodily freezing

Employees exhibiting signs of hypothermia should be treated by medical professionals. Steps that can be taken while awaiting help include:

- 1) Remove the victim from the cold environment and remove wet or frozen clothing. (Do this carefully as frostbite may have started.)
- 2) Perform active re-warming with hot liquids for drinking (Note: do not give the victim any liquid containing alcohol or caffeine) and a warm water bath (102 to 108 degrees Fahrenheit).
- 3) Perform passive re-warming with a blanket or jacket wrapped around the victim.

In any potential cold stress situation, it is the responsibility of the Site Health and Safety Officer to encourage the following:

- Education of workers to recognize the symptoms of frostbite and hypothermia.
- Workers should dress warmly, with more layers of thin clothing as opposed to one thick layer.
- Personnel should remain active and keep moving.
- Personnel should be allowed to take shelter in a heated areas, as necessary.
- Personnel should drink warm liquids (no caffeine or alcohol if hypothermia has set in).
- For monitoring the body's recuperation from excess cold, oral temperature recordings should occur:
 - At the Site Safety Technicians discretion when suspicion is based on changes in a worker's performance or mental status.
 - At a worker's request.
 - As a screening measure, two times per shift, under unusually hazardous conditions (e.g., wind chill less than 20 degrees Fahrenheit or wind chill less than 30 degrees Fahrenheit with precipitation).
 - As a screening measure, whenever anyone worker on-site develops hypothermia.

Any person developing moderate hypothermia (a core body temperature of 92 degrees Fahrenheit) will not be allowed to return to work for 48 hours without the recommendation of a qualified medical doctor.

11.0 WORK ZONES AND SITE CONTROL

Work zones around the areas designated for construction activities will be established on a daily basis and communicated to all employees and other Site users by the SSHO. It shall be each Contractor's Site Safety and Health Officer's responsibility to ensure that all Site workers are aware of the work zone boundaries and to enforce proper procedures in each area. The zones will include:

- Exclusion Zone ("Hot Zone") - The area where contaminated materials may be exposed, excavated or handled and all areas where contaminated equipment or personnel may travel. Flagging tape will delineate the zone. All personnel entering the Exclusion Zone must wear the prescribed level of personal protective equipment identified in Section 7.
- Contamination Reduction Zone - The zone where decontamination of personnel and equipment takes place. Any potentially contaminated clothing, equipment, and samples must remain in the Contamination Reduction Zone until decontaminated.
- Support Zone - The part of the site that is considered non-contaminated or "clean." Support equipment will be located in this zone, and personnel may wear normal work clothes within this zone.

In the absence of other task-specific work zone boundaries established by the SSHO, the following boundaries will apply to all investigation and construction activities involving disruption or handling of Site soils or groundwater:

- Exclusion Zone: 50 foot radius from the outer limit of the sampling/construction activity.
- Contaminant Reduction Zone: 100 foot radius from the outer limit of the sampling/construction activity.
- Support Zone: Areas outside the Contaminant Reduction Zone.

Access of non-essential personnel to the Exclusion and Contamination Reduction Zones will be strictly controlled by the SSHO. Only personnel who are essential to the completion of the task will be allowed access to these areas and only if they are wearing the prescribed level of protection. Entrance of all personnel must be approved by the SSHO.

The SSHO will maintain a Health and Safety Logbook containing the names of Benchmark workers and their level of protection. The zone boundaries may be changed by

the SSHO as environmental conditions warrant, and to respond to the necessary changes in work locations on-site.

12.0 DECONTAMINATION

12.1 Decontamination for Benchmark Employees

The degree of decontamination required is a function of a particular task and the environment within which it occurs. The following decontamination procedure will remain flexible, thereby allowing the decontamination crew to respond appropriately to the changing environmental conditions that may arise at the Site. Benchmark personnel on-site shall follow the procedure below, or the Contractor's procedure (if applicable), whichever is more stringent.

Station 1 - Equipment Drop: Deposit visibly contaminated (if any) re-useable equipment used in the contamination reduction and exclusion zones (tools, containers, monitoring instruments, radios, clipboards, etc.) on plastic sheeting.

Station 2 - Boots and Gloves Wash and Rinse: Scrub outer boots and outer gloves. Deposit tape and gloves in waste disposal container.

Station 3 - Tape, Outer Boot and Glove Removal: Remove tape, outer boots and gloves. Deposit tape and gloves in waste disposal container.

Station 4 - Canister or Mask Change: If worker leaves exclusive zone to change canister (or mask), this is the last step in the decontamination procedure. Worker's canister is exchanged, new outer gloves and boot cover donned, and worker returns to duty.

Station 5 - Outer Garment/Face Piece Removal: Protective suit removed and deposited in separate container provided by Contractor. Face piece or goggles are removed if used. Avoid touching face with fingers. Face piece and/or goggles deposited on plastic sheet. Hard hat removed and placed on plastic sheet.

Station 6 - Inner Glove Removal: Inner gloves are the last personal protective equipment to be removed. Avoid touching the outside of the gloves with bare fingers. Dispose of these gloves in waste disposal container.

Following PPE removal, personnel shall wash hands, face and forearms with absorbent wipes. If field activities proceed for duration of 6 consecutive months or longer, shower facilities will be provided for worker use in accordance with OSHA 29 CFR 1910.120(n).

12.2 Decontamination for Medical Emergencies

In the event of a minor, non-life threatening injury, personnel should follow the decontamination procedures as defined, and then administer first-aid.

In the event of a major injury or other serious medical concern (e.g., heat stroke), immediate first-aid is to be administered and the victim transported to the hospital in lieu of further decontamination efforts unless exposure to a Site contaminant would be considered “Immediately Dangerous to Life or Health.”

12.3 Decontamination of Field Equipment

The Contractor, in accordance with their Health and Safety Plan in the Contamination Reduction Zone will conduct decontamination of heavy equipment. As a minimum, this will include manually removing heavy soil contamination, followed by steam cleaning on an impermeable pad.

Benchmark personnel will conduct decontamination of all tools used for sample collection purposes. It is expected that all tools will be constructed of nonporous, nonabsorbent materials (i.e., metal), which will aid in the decontamination effort. Any tool or part of a tool made of porous, absorbent material (i.e., wood) will be placed into suitable containers and prepared for disposal.

Decontamination of bailers, split-spoons, spatula knives, and other tools used for environmental sampling and examination shall be as follows:

- Disassemble the equipment
- Water wash to remove all visible foreign matter.
- Wash with detergent.
- Rinse all parts with distilled-deionized water.
- Allow to air dry.
- Wrap all parts in aluminum foil or polyethylene.

13.0 CONFINED SPACE ENTRY

OSHA 29 CFR 1910.146 identifies a confined space as a space that is large enough and so configured that an employee can physically enter and do assigned work, has limited or restricted means for entry and exit, and is not intended for continuous employee occupancy. Confined spaces include, but are not limited to, trenches, storage tanks, process vessels, pits, sewers, tunnels, underground utility vaults, pipelines, sumps, wells, and excavations.

Confined space entry by Benchmark employees is not anticipated to be necessary to complete the post remedial activities identified in Section 2.0. In the event that the scope of work changes or confined space entry appears necessary, the Project Manager will be consulted to determine if feasible engineering alternatives to confined space entry can be implemented. If confined space entry by Benchmark employees cannot be avoided through reasonable engineering measures, task-specific confined space entry procedures will be developed, and a confined-space entry permit will be issued through Benchmark's corporate Health and Safety Director. Benchmark employees shall not enter a confined space without these procedures and permits in place.

14.0 FIRE PREVENTION AND PROTECTION

14.1 General Approach

Recommended practices and standards of the National Fire Protection Association (NFPA) and other applicable regulations will be followed in the development and application of Project Fire Protection Programs. When required by regulatory authorities, the project management will prepare and submit a Fire Protection Plan for the approval of the contracting officers, authorized representative or other designated official. Essential considerations for the Fire Protection Plan will include:

- Proper Site preparation and safe storage of combustible and flammable materials.
- Availability of coordination with private and public fire authorities.
- Adequate job-site fire protection and inspections for fire prevention.
- Adequate indoctrination and training of employees.

14.2 Equipment and Requirements

Fire extinguishers will be provided by each Contractor and are required on all heavy equipment and in each field trailer. Fire extinguishers will be inspected, serviced, and maintained in accordance with the manufacturer's instructions. As a minimum, all extinguishers shall be checked monthly and weighed semi-annually, and recharged if necessary. Recharge or replacement shall be mandatory immediately after each use.

14.3 Flammable and Combustible Substances

All storage, handling or use of flammable and combustible substances will be under the supervision of qualified persons. All tanks, containers and pumping equipment, whether portable or stationary, used for the storage and handling of flammable and combustible liquids, will meet the recommendations of the National Fire Protection Association.

14.4 Hot Work

If the scope of work necessitates welding or blowtorch operation, the hot work permit presented in Appendix B will be completed by the SSHO and reviewed/issued by the Project Manager.

15.0 EMERGENCY INFORMATION

In accordance with OSHA 29 CFR Part 1910, an Emergency Response Plan is attached to this HASP as Appendix A. The hospital route map is presented within Appendix A as Figure 1.

TABLES



TABLE 1
TOXICITY DATA FOR CONSTITUENTS OF POTENTIAL CONCERN
SITE HEALTH AND SAFETY PLAN
293 GROTE STREET SITE
BCP SITE NO. C915368
BUFFALO, NEW YORK

Parameter	Synonyms	CAS No.	Code	Concentration Limits ¹		
				PEL	TLV	IDLH
<i>Semi-volatile Organic Compounds (SVOCs) ²: ppm</i>						
Benzo(a)anthracene	<i>none</i>	56-55-3	<i>none</i>	--	--	--
Benzo(a)pyrene	<i>none</i>	50-32-8	<i>none</i>	--	--	--
Benzo(b)fluoranthene	<i>none</i>	205-99-2	<i>none</i>	--	--	--
Benzo(k)fluoranthene	<i>none</i>	207-08-9	<i>none</i>	--	--	--
Chrysene	<i>none</i>	218 01 9	<i>none</i>	--	--	--
Dibenzo(a,h)anthracene	<i>none</i>	53-70-3	<i>none</i>	--	--	--
Indeno(1,2,3-cd)pyrene	<i>none</i>	193-39-5	<i>none</i>	--	--	--
<i>Inorganic Compounds: mg/m ²</i>						
Lead	<i>none</i>	7439-92-1	<i>none</i>	0.05	0.15	100
Manganese	<i>none</i>	7439-96-5	<i>none</i>	5	5	500

Notes:

1. Concentration limits as reported by NIOSH Pocket Guide to Chemical Hazards, February 2004 (NIOSH Publication No. 97-140, fourth printing with changes and updates).
2. "--" = concentration limit not available; exposure should be minimized to the extent feasible through appropriate engineering controls & PPE.

Explanation:

C-## = Ceiling Level equals the maximum exposure concentration allowable during the work day.

IDLH = Immediately Dangerous to Life or Health.

TLV = Threshold Limit Value, established by American Conference of Industrial Hygienists (ACGIH), equals the maximum exposure concentration allowable for 8 hours/day @ 40 hr

TLVs are the amounts of chemicals in the air that almost all healthy adult workers are predicted to be able to tolerate without adverse effects. There are three types.

TLV-TWA (TLV-Time-Weighted Average) which is averaged over the normal eight-hour day/forty-hour work week. (Most TLVs.)

TLV-C or Ceiling limits are the concentration that should not be exceeded during any part of the working exposure.

Unless the initials "STEL" or "C" appear in the Code column, the TLV value should be considered to be the eight-hour TLV-TWA.

PEL = Permissible Exposure Limit, established by OSHA, equals the maximum exposure concentration allowable for 8 hours per day @ 40 hours per week



TABLE 2
POTENTIAL ROUTES OF EXPOSURE TO THE CONSTITUENTS OF POTENTIAL CONCERN
SITE HEALTH AND SAFETY PLAN
293 GROTE STREET
BCP SITE NO. C915368
BUFFALO, NEW YORK

Activity ¹	Direct Contact with Soil/Fill	Inhalation of Vapors or Dust	Direct Contact with Groundwater
Potential Post-Remedial Activities			
Cover System Removal/Replacement	x	x	
Subgrade Utility Installtion/Repair	x	x	
Subgrade Foundation Construction	x	x	

Notes:

1. Activity as described in Section 1.5 of the Health and Safety Plan.

**TABLE 3
REQUIRED LEVELS OF PROTECTION FOR POST REMEDIAL ACTIVITIES
SITE HEALTH AND SAFETY PLAN
293 GROTE STREET
BCP SITE NO. C915368
BUFFALO, NEW YORK**

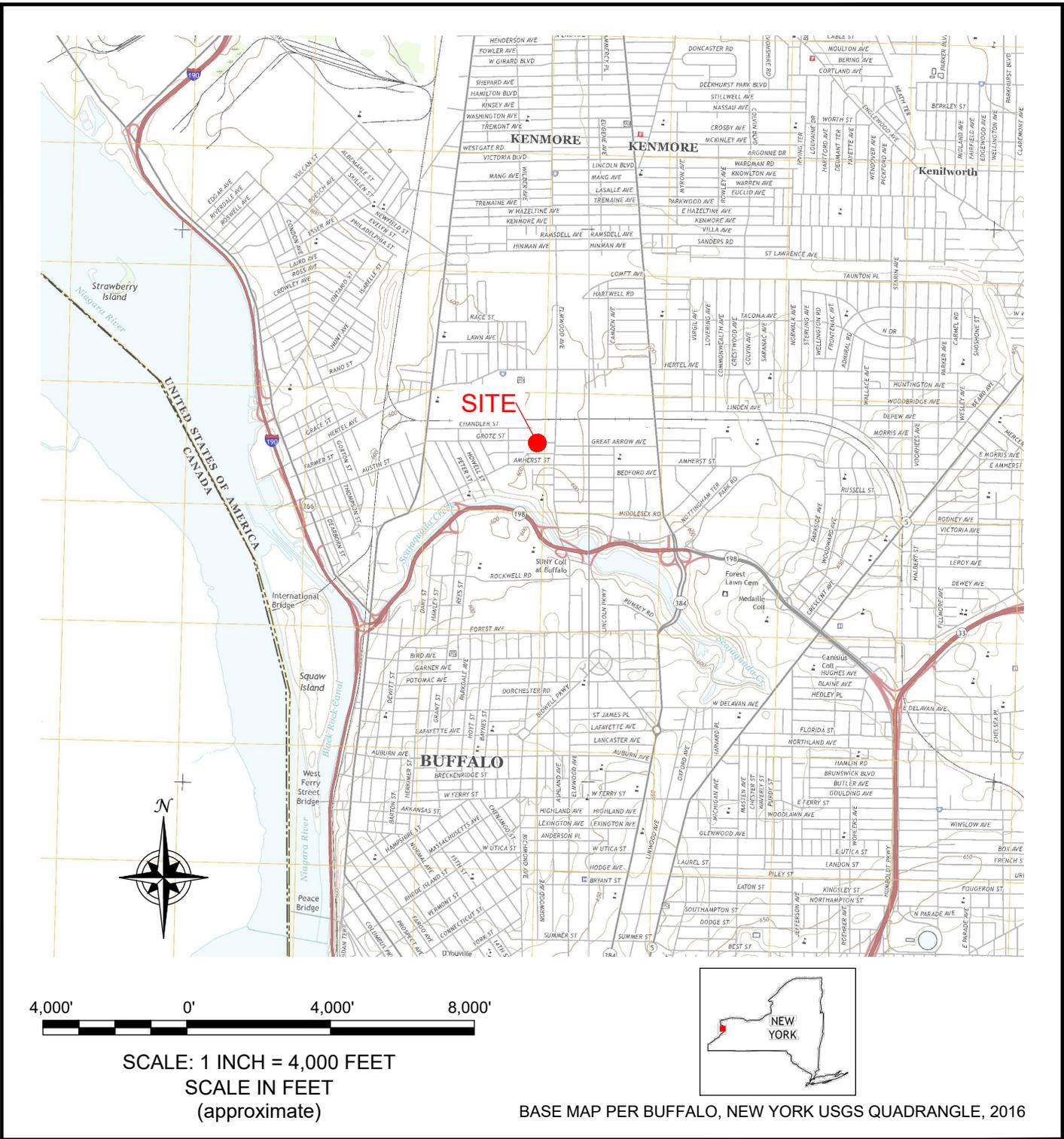
Activity	Respiratory Protection ¹	Clothing	Gloves ²	Boots ^{2,3}	Other Required PPE/Modifications ^{2,4}
Potential Post-Remedial Activities					
Cover System Removal/Replacement	Level D (upgrade to Level C if necessary)	Work Uniform or Tyvek	L/N	outer: L inner: STSS	HH SGSS
Subgrade Utility Installation/Repair	Level D (upgrade to Level C if necessary)	Work Uniform or Tyvek	L/N	outer: L inner: STSS	HH SGSS
Subgrade Foundation Construction	Level D (upgrade to Level C if necessary)	Work Uniform or Tyvek	L/N	outer: L inner: STSS	HH SGSS

Notes:

1. Respiratory equipment shall conform to guidelines presented in Section 7.0 of this HASP. The Level C requirement is an air-purifying respirator equipped with organic compound/acid
2. HH = hardhat; L= Latex; L/N = latex inner glove, nitrile outer glove; N = Nitrile; S = Saranex; SG = safety glasses; SGSS = safety glasses with sideshields; STSS = steel toe safety shoes.
3. Latex outer boot (or approved overboot) required whenever contact with contaminated materials may occur. SSHO may downgrade to STSS (steel-toed safety shoes) if contact will be
4. Dust masks shall be donned as directed by the SSHO (site safety and health officer) or site safety technician whenever potentially contaminated airborne particulates (i.e., dust) are present in significant amounts in the breathing zone. Goggles may be substituted with safety glasses w/side-shields whenever contact with contaminated

FIGURES

FIGURE 1




2558 HAMBURG TURNPIKE, SUITE 300, BUFFALO, NY 14218, (716) 856-0599

PROJECT NO.:	B0581-021-001
DATE:	OCTOBER 2022
DRAFTED BY:	CNK

SITE LOCATION AND VICINITY MAP

HEALTH AND SAFETY PLAN

293 GROTE STREET SITE
 BCP SITE NO. C915368
 BUFFALO, NEW YORK

PREPARED FOR
 293 GROTE STREET, LLC

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LEGEND:

- BCP BOUNDARY
- PARCEL BOUNDARY



SCALE: 1 INCH = 25 FEET
 SCALE IN FEET
 (approximate)



2558 HAMBURG TURNPIKE, SUITE 300, BUFFALO, NY 14218,
 (716) 856-0599

JOB NO.: B0581-021-001

SITE PLAN (AERIAL)

HEALTH AND SAFETY PLAN
 293 GROTE STREET
 BCP SITE NO. C915368
 BUFFALO, NEW YORK
 PREPARED FOR
 293 GROTE STREET, LLC

FIGURE 2

ATTACHMENT A

EMERGENCY RESPONSE PLAN

EMERGENCY RESPONSE PLAN
for
BROWNFIELD CLEANUP PROGRAM
POST REMEDIAL ACTIVITIES

293 GROTE STREET SITE
BUFFALO, NEW YORK

October 2022

B0581-021-001

Prepared for:

293 Grote Street, LLC

Prepared by:



Benchmark Civil/Environmental Engineering & Geology, PLLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716) 856-0599

**293 GROTE STREET SITE
HEALTH AND SAFETY PLAN FOR POST REMEDIAL ACTIVITIES
APPENDIX A: EMERGENCY RESPONSE PLAN**

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1.0 GENERAL

This report presents the site-specific Emergency Response Plan (ERP) referenced in the Site Health and Safety Plan (HASP) prepared for post remedial activities at the 293 Grote Street Site in Buffalo, New York. This appendix of the HASP describes potential emergencies that may occur at the Site; procedures for responding to those emergencies; roles and responsibilities during emergency response; and training all workers must receive in order to follow emergency procedures. This ERP also describes the provisions this Site has made to coordinate its emergency response planning with other contractors on-site and with off-site emergency response organizations.

This ERP is consistent with the requirements of 29 CFR 1910.120(l) and provides the following site-specific information:

- Pre-emergency planning.
- Personnel roles, lines of authority, and communication.
- Emergency recognition and prevention.
- Safe distances and places of refuge.
- Evacuation routes and procedures.
- Decontamination procedures.
- Emergency medical treatment and first aid.
- Emergency alerting and response procedures.
- Critique of response and follow-up.
- Emergency personal protective equipment (PPE) and equipment.

2.0 PRE-EMERGENCY PLANNING

This Site has been evaluated for potential emergency occurrences, based on site hazards, the required work tasks, the site topography, and prevailing weather conditions. The results of that evaluation indicate the potential for the following site emergencies to occur at the locations indicated.

Type of Emergency:

1. Medical, due to physical injury

Source of Emergency:

1. Slip/trip/fall

Location of Source:

1. Non-specific

3.0 ON-SITE EMERGENCY RESPONSE EQUIPMENT

Emergency procedures may require specialized equipment to facilitate worker rescue, contamination control and reduction, or post-emergency clean up. Emergency response equipment available on the Site is listed below. The equipment inventory and storage locations are based on the potential emergencies described above. This equipment inventory is designed to meet on-site emergency response needs and any specialized equipment needs that off-site responders might require because of the hazards at this Site but not ordinarily stocked.

Any additional personal protective equipment (PPE) required and stocked for emergency response is also listed in below. During an emergency, the Emergency Response Coordinator (ERC) is responsible for specifying the level of PPE required for emergency response. At a minimum, PPE used by emergency responders will comply with Section 7.0, Personal Protective Equipment, of this HASP. Emergency response equipment is inspected at regular intervals and maintained in good working order. The equipment inventory is replenished as necessary to maintain response capabilities.

Emergency Equipment	Quantity	Location
First Aid Kit	1	Site Vehicle
Chemical Fire Extinguisher	2 (minimum)	All heavy equipment and Site Vehicle

Emergency PPE	Quantity	Location
Full-face respirator	1 for each worker	Site Vehicle
Chemical-resistant suits	4 (minimum)	Site Vehicle

4.0 EMERGENCY PLANNING MAPS

An area-specific map of the Site will be developed on a daily basis during performance of field activities. The map will be marked to identify critical on-site emergency planning information, including: emergency evacuation routes, a place of refuge, an assembly point, and the locations of key site emergency equipment. Site zone boundaries will be shown to alert responders to known areas of contamination. There are no major topographical features, however the direction of prevailing winds/weather conditions that could affect emergency response planning are also marked on the map. The map will be posted at site-designated place of refuge and inside the Benchmark personnel field vehicle.

5.0 EMERGENCY CONTACTS

The following identifies the emergency contacts for this ERP.

Emergency Telephone Numbers:

Project Officer: *Thomas H Forbes, P.E.*

Work: (716) 856-0599

Mobile: (716) 864-1730

Project Manager: *Christopher Boron*

Work: (716) 856-0599

Mobile: (716) 864-2726

Corporate Health and Safety Director: *Thomas H. Forbes, P.E.*

Work: (716) 856-0599

Mobile: (716) 864-1730

Site Safety and Health Officer (SSHO): *Christopher Z. Boron*

Work: (716) 856-0599

Mobile: (716) 864-2726

Alternate SSHO: *Nathan Munley*

Work: (716) 856-0599

Mobile: (716) 289-1072

KENMORE MERCY HOSPITAL (ER):	(716) 447-6100
FIRE:	911
AMBULANCE:	911
BUFFALO POLICE:	911
STATE EMERGENCY RESPONSE HOTLINE:	(800) 457-7362
NATIONAL RESPONSE HOTLINE:	(800) 424-8802
NYSDOH:	(716) 847-4385
NYSDEC:	(716) 851-7220
NYSDEC 24-HOUR SPILL HOTLINE:	(800) 457-7252

The Site location is:

293 Grote Street

Buffalo, New York 14207

Site Phone Number: Benchmark-TurnKey Staff Cell Phones to be used.

6.0 EMERGENCY ALERTING & EVACUATION

Internal emergency communication systems are used to alert workers to danger, convey safety information, and maintain site control. Any effective system can be employed. Two-way radio headsets or field telephones are often used when work teams are far from the command post. Hand signals and air-horn blasts are also commonly used. Every system must have a backup. It shall be the responsibility of each contractor's Site Health and Safety Officer to ensure all personnel entering the site understand an adequate method of internal communication. Unless all personnel are otherwise informed, the following signals shall be used.

- 1) Emergency signals by portable air horn, siren, or whistle: two short blasts, personal injury; continuous blast, emergency requiring site excavation.
- 2) Visual signals: hand gripping throat, out of air/cannot breathe; hands on top of head, need assistance; thumbs up, affirmative/ everything is OK; thumbs down, no/negative; grip partner's wrist or waist, leave area immediately.

If evacuation notice is given, site workers leave the worksite with their respective buddies, if possible, by way of the nearest exit. Emergency decontamination procedures detailed in Section 12.0 of the HASP are followed to the extent practical without compromising the safety and health of site personnel. The evacuation routes and assembly area will be determined by conditions at the time of the evacuation based on wind direction, the location of the hazard source, and other factors as determined by rehearsals and inputs from emergency response organizations. Wind direction indicators are located so that workers can determine a safe up wind or cross wind evacuation route and assembly area if not informed by the emergency response coordinator at the time the evacuation alarm sounds. Since work conditions and work zones within the site may be changing on daily basis, it shall be the responsibility of the construction Site Health and Safety Officer to review evacuation routes and procedures as necessary and to inform all Benchmark-TurnKey workers of any changes.

Personnel exiting the site will gather at a designated assembly point. To determine that everyone has successfully exited the site, personnel will be accounted for at the assembly site. If any worker cannot be accounted for, notification is given to the SSHO (*Christopher*

Boron or *Nathan Munley*) so that appropriate action can be initiated. Contractors and subcontractors on this site have coordinated their emergency response plans to ensure that these plans are compatible and that source(s) of potential emergencies are recognized, alarm systems are clearly understood, and evacuation routes are accessible to all personnel relying upon them.

7.0 EXTREME WEATHER CONDITIONS

In the event of adverse weather conditions, the Site Safety and Health Officer in conjunction with the Contractor's SSHO will determine if engineering operations can continue without sacrificing the health and safety of site personnel. Items to be considered prior to determining if work should continue include but are not limited to:

- Potential for heat/cold stress.
- Weather-related construction hazards (e.g., flooding or wet conditions producing undermining of structures or sheeting, high wind threats, etc).
- Limited visibility.
- Potential for electrical storms.
- Limited site access/egress (e.g., due to heavy snow)

8.0 EMERGENCY MEDICAL TREATMENT & FIRST AID

Personnel Exposure:

The following general guidelines will be employed in instances where health impacts threaten to occur acute exposure is realized:

- Skin Contact: Use copious amounts of soap and water. Wash/rinse affected area for at least 15 minutes. Decontaminate and provide medical attention. Eyewash stations will be provided on site. If necessary, transport to Buffalo General Hospital.
- Inhalation: Move to fresh air and, if necessary, transport to Hospital.
- Ingestion: Decontaminate and transport to Hospital.

Personal Injury:

Minor first-aid will be applied on-site as deemed necessary. In the event of a life-threatening injury, the individual should be transported to Hospital via ambulance. The Site Health and Safety Officer will supply available chemical specific information to appropriate medical personnel as requested.

First aid kits will conform to Red Cross and other applicable good health standards and shall consist of a weatherproof container with individually sealed packages for each type of item. First aid kits will be fully equipped before being sent out on each job and will be checked weekly by the SSHO to ensure that the expended items are replaced.

Directions to Kenmore Mercy Hospital Emergency Room (see Figure 1):

The following directions describe the best route from the Site to Kenmore Mercy Hospital which is 2.5 miles away:

- Head East on Grote Street toward Elmwood Avenue.
- Turn Left onto Elmwood Avenue.
- Head North on Elmwood Avenue for 2.4 miles.
- Turn Left into the ER parking lot.

9.0 EMERGENCY RESPONSE CRITIQUE & RECORD KEEPING

Following an emergency, the SSHO and Project Manager shall review the effectiveness of this Emergency Response Plan (ERP) in addressing notification, control and evacuation requirements. Updates and modifications to this ERP shall be made accordingly. It shall be the responsibility of each contractor to establish and assure adequate records of the following:

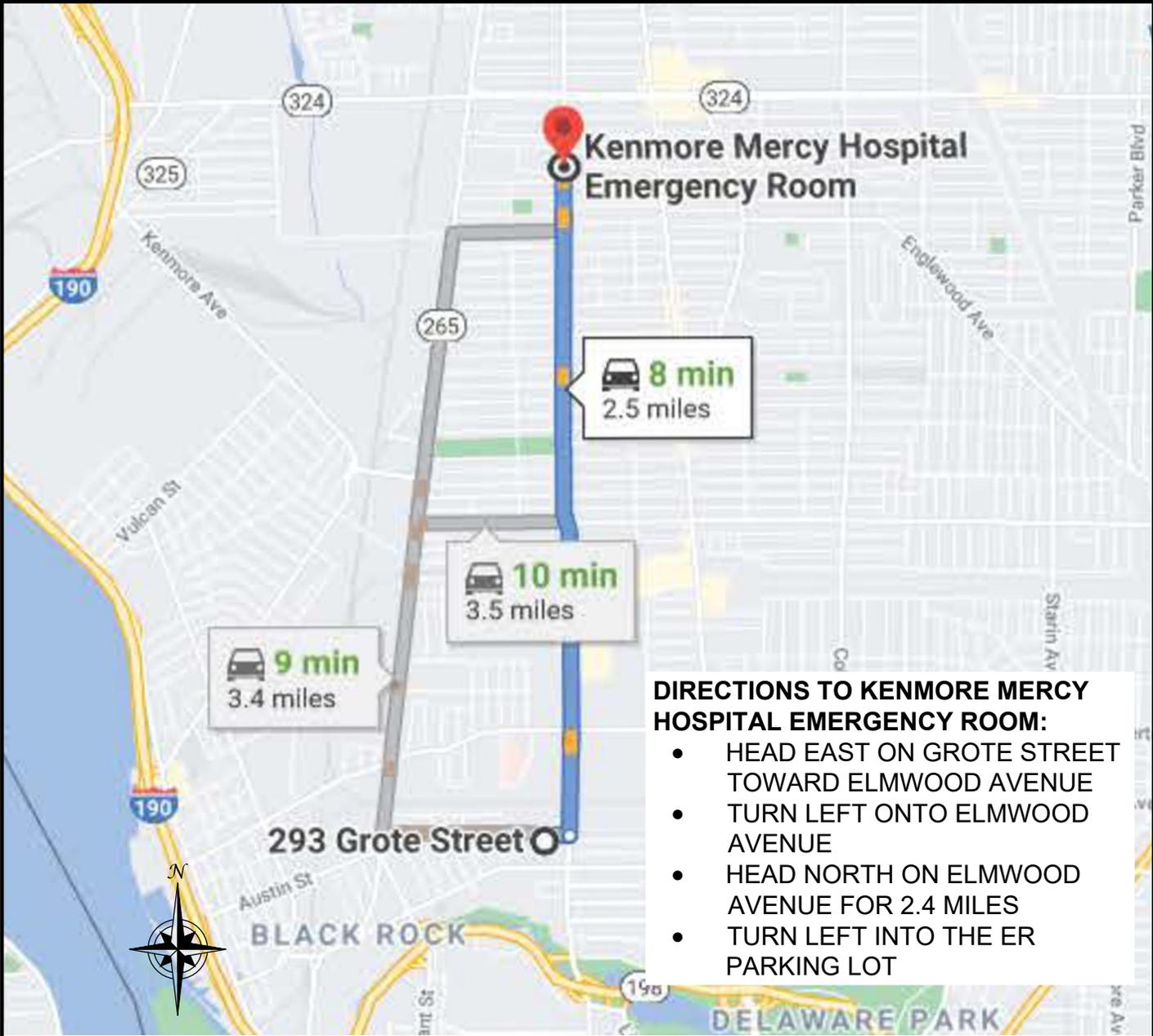
- Occupational injuries and illnesses.
- Accident investigations.
- Reports to insurance carrier or State compensation agencies.
- Reports required by the client.
- Records and reports required by local, state, federal and/or international agencies.
- Property or equipment damage.
- Third party injury or damage claims.
- Environmental testing logs.
- Explosive and hazardous substances inventories and records.
- Records of inspections and citations.
- Safety training.

10.0 EMERGENCY RESPONSE TRAINING

Persons who enter the worksite, including visitors, shall receive a site-specific briefing about anticipated emergency situations and the emergency procedures by the SSHO. Where this site relies on off-site organizations for emergency response, the training of personnel in those off-site organizations has been evaluated and is deemed adequate for response to this site.

FIGURES

FIGURE 1



- DIRECTIONS TO KENMORE MERCY HOSPITAL EMERGENCY ROOM:**
- HEAD EAST ON GROTE STREET TOWARD ELMWOOD AVENUE
 - TURN LEFT ONTO ELMWOOD AVENUE
 - HEAD NORTH ON ELMWOOD AVENUE FOR 2.4 MILES
 - TURN LEFT INTO THE ER PARKING LOT



SCALE: 1 INCH = 3,000 FEET
SCALE IN FEET
(approximate)



NOTE: IMAGE TAKEN FROM GOOGLE MAPS 2020



2558 HAMBURG TURNPIKE, SUITE 300, BUFFALO, NY 14218, (716) 856-0599

PROJECT NO.: B0581-021-001

DATE: OCTOBER 2022

DRAFTED BY: CNK

HOSPITAL ROUTE MAP

EMERGENCY RESPONSE PLAN

293 GROTE STREET SITE
BCP SITE NO. C915368
BUFFALO, NEW YORK

PREPARED FOR
293 GROTE STREET, LLC

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ATTACHMENT B

HOT WORK PERMIT FORM



HOT WORK PERMIT

PART 1 - INFORMATION

Issue Date:

Date Work to be Performed: Start:

Finish (permit terminated):

Performed By:

Work Area:

Object to be Worked On:

PART 2 - APPROVAL

(for 1, 2 or 3: mark Yes, No or NA)*

Will working be on or in:

Finish (permit terminated):

1. Metal partition, wall, ceiling covered by combustible material? yes no

2. Pipes, in contact with combustible material? yes no

3. Explosive area? yes no

* = If any of these conditions exist (marked "yes"), a permit will not be issued without being reviewed and approved by Thomas H. Forbes (Corporate Health and Safety Director). Required Signature below.

PART 3 - REQUIRED CONDITIONS**

(Check all conditions that must be met)

PROTECTIVE ACTION		PROTECTIVE EQUIPMENT	
<input type="checkbox"/>	Specific Risk Assessment Required	<input type="checkbox"/>	Goggles/visor/welding screen
<input type="checkbox"/>	Fire or spark barrier	<input type="checkbox"/>	Apron/fireproof clothing
<input type="checkbox"/>	Cover hot surfaces	<input type="checkbox"/>	Welding gloves/gauntlets/other:
<input type="checkbox"/>	Move movable fire hazards, specifically	<input type="checkbox"/>	Wellintons/Knee pads
<input type="checkbox"/>	Erect screen on barrier	<input type="checkbox"/>	Ear protection: Ear muffs/Ear plugs
<input type="checkbox"/>	Restrict Access	<input type="checkbox"/>	B.A.: SCBA/Long Breather
<input type="checkbox"/>	Wet the ground	<input type="checkbox"/>	Respirator: Type:
<input type="checkbox"/>	Ensure adequate ventilation	<input type="checkbox"/>	Cartridge:
<input type="checkbox"/>	Provide adequate supports	<input type="checkbox"/>	Local Exhaust Ventilation
<input type="checkbox"/>	Cover exposed drain/floor or wall cracks	<input type="checkbox"/>	Extinguisher/Fire blanket
<input type="checkbox"/>	Fire watch (must remain on duty during duration of permit)	<input type="checkbox"/>	Personal flammable gas monitor
<input type="checkbox"/>	Issue additional permit(s):	<input type="checkbox"/>	

Other precautions:

** Permit will not be issued until these conditions are met.

SIGNATURES

Originating Employee:

Date:

Project Manager:

Date:

Part 2 Approval:

Date:

ATTACHMENT C

NYSDOH GENERIC 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 $150 \text{ mcg}/\text{m}^3$ 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 $150 \text{ mcg}/\text{m}^3$ 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 $150 \text{ mcg}/\text{m}^3$ of the upwind level and in preventing visible dust migration.

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

December 2009

Appendix 1B

Fugitive Dust and Particulate Monitoring

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

1. Reasonable fugitive dust suppression techniques must be employed during all site activities which may generate fugitive dust.
2. Particulate monitoring must be employed during the handling of waste or contaminated soil or when activities on site may generate fugitive dust from exposed waste or contaminated soil. Remedial activities may also include the excavation, grading, or placement of clean fill. These control measures should not be considered necessary for these activities.
3. Particulate monitoring must be performed using real-time particulate monitors and shall monitor particulate matter less than ten microns (PM10) with the following minimum performance standards:
 - (a) Objects to be measured: Dust, mists or aerosols;
 - (b) Measurement Ranges: 0.001 to 400 mg/m³ (1 to 400,000 :ug/m³);
 - (c) Precision (2-sigma) at constant temperature: +/- 10 :g/m³ for one second averaging; and +/- 1.5 g/m³ for sixty second averaging;
 - (d) Accuracy: +/- 5% of reading +/- precision (Referred to gravimetric calibration with SAE fine test dust (mmd= 2 to 3 :m, g= 2.5, as aerosolized);
 - (e) Resolution: 0.1% of reading or 1g/m³, whichever is larger;
 - (f) Particle Size Range of Maximum Response: 0.1-10;
 - (g) Total Number of Data Points in Memory: 10,000;
 - (h) Logged Data: Each data point with average concentration, time/date and data point number
 - (i) Run Summary: overall average, maximum concentrations, time/date of maximum, total number of logged points, start time/date, total elapsed time (run duration), STEL concentration and time/date occurrence, averaging (logging) period, calibration factor, and tag number;
 - (j) Alarm Averaging Time (user selectable): real-time (1-60 seconds) or STEL (15 minutes), alarms required;
 - (k) Operating Time: 48 hours (fully charged NiCd battery); continuously with charger;
 - (l) Operating Temperature: -10 to 50° C (14 to 122° F);
 - (m) Particulate levels will be monitored upwind and immediately downwind at the working site and integrated over a period not to exceed 15 minutes.
4. In order to ensure the validity of the fugitive dust measurements performed, there must be appropriate Quality Assurance/Quality Control (QA/QC). It is the responsibility of the remedial party to adequately supplement QA/QC Plans to include the following critical features: periodic instrument calibration, operator training, daily instrument performance (span) checks, and a record keeping plan.
5. The action level will be established at 150 ug/m³ (15 minutes average). While conservative,

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

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

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

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

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

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

APPENDIX H

SITE MANAGEMENT FORMS

Summary of Green Remediation Metrics for Site Management

Site Name: _____ Site Code: _____

Address: _____ City: _____

State: _____ Zip Code: _____ County: _____

Initial Report Period (Start Date of period covered by the Initial Report submittal)

Start Date: _____

Current Reporting Period

Reporting Period From: _____ To: _____

Contact Information

Preparer's Name: _____ Phone No.: _____

Preparer's Affiliation: _____

I. Energy Usage: Quantify the amount of energy used directly on-site and the portion of that derived from renewable energy sources.

	Current Reporting Period	Total to Date
Fuel Type 1 (e.g. natural gas (cf))		
Fuel Type 2 (e.g. fuel oil, propane (gals))		
Electricity (kWh)		
Of that Electric usage, provide quantity:		
Derived from renewable sources (e.g. solar, wind)		
Other energy sources (e.g. geothermal, solar thermal (Btu))		

Provide a description of all energy usage reduction programs for the site in the space provided on Page 3.

II. Solid Waste Generation: Quantify the management of solid waste generated on-site.

	Current Reporting Period (tons)	Total to Date (tons)
Total waste generated on-site		
OM&M generated waste		
Of that total amount, provide quantity:		
Transported off-site to landfills		
Transported off-site to other disposal facilities		
Transported off-site for recycling/reuse		
Reused on-site		

Provide a description of any implemented waste reduction programs for the site in the space provided on Page 3.

III. Transportation/Shipping: Quantify the distances travelled for delivery of supplies, shipping of laboratory samples, and the removal of waste.

	Current Reporting Period (miles)	Total to Date (miles)
Standby Engineer/Contractor		
Laboratory Courier/Delivery Service		
Waste Removal/Hauling		

Provide a description of all mileage reduction programs for the site in the space provided on Page 3. Include specifically any local vendor/ services utilized that are within 50 miles of the site.

IV. Water Usage: Quantify the volume of water used on-site from various sources.

	Current Reporting Period (gallons)	Total to Date (gallons)
Total quantity of water used on-site		
Of that total amount, provide quantity:		
Public potable water supply usage		
Surface water usage		
On-site groundwater usage		
Collected or diverted storm water usage		

Provide a description of any implemented water consumption reduction programs for the site in the space provided on Page 3.

V. Land Use and Ecosystems: Quantify the amount of land and/or ecosystems disturbed and the area of land and/or ecosystems restored to a pre-development condition (i.e. Green Infrastructure).

	Current Reporting Period (acres)	Total to Date (acres)
Land disturbed		
Land restored		

Provide a description of any implemented land restoration/green infrastructure programs for the site in the space provided on Page 3.

Description of green remediation programs reported above (Attach additional sheets if needed)
Energy Usage:
Waste Generation:
Transportation/Shipping:
Water usage:
Land Use and Ecosystems:
Other:

CERTIFICATION BY CONTRACTOR	
I, _____ (Name) do hereby certify that I am _____ (Title) of the Company/Corporation herein referenced. According to my knowledge and belief, all items and amounts shown on the face of this application for payment are correct.	
_____ Date	_____ Contractor

