**FORMER CARBORUNDUM COMPANY**

**HYDE PARK FACILITY**

**NIAGARA COUNTY**

**TOWN OF NIAGARA, NEW YORK**

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# SITE MANAGEMENT PLAN

**NYSDEC Site Number: 932036**

**Prepared for:**

Elm Holdings Inc.
c/o Remediation Management Services Company
201 Helios Way, Floor 6, Houston Texas 77079

**Prepared by:**

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**Revisions to Final Approved Site Management Plan:**

| Revision No. | Date Submitted | Summary of Revision | NYSDEC Approval Date |
|---|---|---|---|
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**APRIL 2024**

# CERTIFICATION STATEMENT

I, MARK BECKER, certify that I am currently a Qualified Environmental Professional as in defined in 6 NYCRR Part 375 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).

Mark J Becker QEP

APRIL 30, 2024 DATE

# FORMER CARBORUNDUM COMPANY,
# HYDE PARK FACILITY
# NIAGARA COUNTY
# TOWN OF NIAGARA, NEW YORK

## SITE MANAGEMENT

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## TABLE OF CONTENTS

# TABLE OF CONTENTS (Continued)

## List of Tables

## List of Figures

# TABLE OF CONTENTS (Continued)

## List of Appendices

## List of Acronyms

| | |
|---|---|
| bgs | below ground surface |
| CAMP | Community Air Monitoring Plan |
| C/D | Construction and Demolition |
| COC | Contaminant of concern |
| CVOCs | Chlorinated volatile organic compounds |
| DCA | 1,1-Dichloroethane |
| DCE | 1,1-Dichloroethene |
| DER | Division of Environmental Remediation |
| DUSR | Data Usability Summary Report |
| EC | Engineering Control |
| EVO | Emulsified vegetable oil |
| EWP | Excavation Work Plan |
| FSP | Field Sampling Plan |
| ft | feet |
| HASP | Health and Safety Plan |
| IC | Institutional Control |
| IRM | Interim Remedial Measure |
| mcg/m3 | micrograms per cubic meter |
| MNA | Monitored natural attenuation |
| NYSDEC | New York State Department of Environmental Conservation |
| NYSDOH | New York State Department of Health |
| NYCRR | New York Codes, Rules and Regulations |
| OU | Operable Unit |
| PAH | Polycyclic aromatic hydrocarbon |
| PCBs | Polychlorinated biphenyls |
| P.E. or PE | Professional Engineer |
| PFAS | Per- and Polyfluoroalkyl Substances |
| PID | Photoionization Detector |
| PSA | Preliminary Site Assessment |
| PRR | Periodic Review Report |
| QA/QC | Quality Assurance/Quality Control |
| QAPP | Quality Assurance Project Plan |
| QEP | Qualified Environmental Professional |
| RAO | Remedial Action Objective |
| RCRA | Resource Conservation and Recovery Act |
| RI/FS | Remedial Investigation/Feasibility Study |
| ROD | Record of Decision |
| RP | Remedial Party |
| RSO | Remedial System Optimization |
| SCG | Standards, Criteria and Guidelines |
| SCO | Soil Cleanup Objective |
| SMP | Site Management Plan |
| SVOC | Semi-volatile organic compound |

| | |
|---|---|
| TAGM | Technical Administrative Guidance Memorandum |
| TOGS | Technical & Operational Guidance Series |
| TOC | Total organic carbon |
| TCE | Trichloroethene |
| USEPA | United States Environmental Protection Agency |
| VC | Vinyl chloride |
| VOCs | Volatile organic compounds |

## 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:** | **932036. Former Carborundum Company, Hyde Park Facility, Niagara, NY 14305** |
|---|---|
| Institutional Controls: | 1. The property is subject to the Environmental Notice. |
| | 2. Unless prior written approval by NYSDEC is first obtained, where contamination remains at the Property, there shall be no disturbance or excavation of the Property which threatens the integrity of the engineering controls which will or is reasonably anticipated to, interfere significantly with any proposed, ongoing, or completed remedial program at the site, or which results or may result in a significantly increased threat of harm or damage at the site. |
| | 3. No person shall disturb remove, or otherwise interfere with the installation, use, operation, and maintenance of engineering controls (ECs) required for the Remedy, unless in each instance they first obtain a written waiver of such prohibition from NYSDEC. All ECs must be inspected at a frequency and in a manner defined in the SMP. |
| | 4. The property may be used for industrial use; |
| | 5. No person shall use the groundwater underlying the Property without treatment rendering it safe for drinking water or industrial purposes, as appropriate, unless the user first obtains permission to do so from NYSDEC. Use of the groundwater without appropriate treatment may result in a significantly increased threat of harm or damage at any site. |
| | 6. Upon change of use, re-occupancy of the site building, or new construction on the site, the site remedy requires evaluation of the potential for soil vapor intrusion and the possibility of adverse impacts on indoor air, and compliance with NYSDOH Guidance for Evaluating Soil Vapor Intrusion to address current of potential human exposures. |

| **Site Identification:** | **932036. Former Carborundum Company, Hyde Park Facility, Niagara, NY 14305** |
|---|---|
| | 7. It is a violation of 6 NYCRR 375-1.11(b) to use the Property in a manner inconsistent with the Environmental Notice. |
| | 8. Monitoring and Sampling Plan to evaluate overall performance and effectiveness of the remedy. |
| Engineering Controls: | 1. Monitoring Wells |
| Inspections: | Frequency |
| 1. Site-Wide Inspection to Verify IC-EC Compliance and Condition of Monitoring Well Network | Annually |
| Monitoring: | |
| 1. Groundwater Monitoring Wells: MW-5A, MW-5B, MW-6, MW-7A, MW-7B, MW-10A, MW-10B, MW-12B, MW-13B, MW-14B, MW-16A, MW-16B, MW-17A, MW-17B, MW-18A, MW-18B, and MW-19B | Annually in Spring (even numbered years) or Fall (odd numbered years) |
| 2. Groundwater Monitoring Well: MW-15 | Every 5 Years |
| 2. Soil Vapor Intrusion Evaluation for Change in Use/New Buildings | As needed |
| Maintenance: | |
| 1. Monitoring well maintenance | As needed |
| | |
| Reporting: | |
| 1. Groundwater Monitoring Report | Annually |
| 2. Periodic Review Report | Every Three Years |

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

# 1. INTRODUCTION

## 1.1 General

This Site Management Plan (SMP) is a required element of the remedial program for the Former Carborundum Company Hyde Park Site located at 3425 Hyde Park Boulevard in the Town of Niagara, New York (hereinafter referred to as the “Site”). See Figure 1. The Site is currently in the New York State (NYS) Inactive Hazardous Waste Disposal Site Remedial Program, Site No. 932036, which is administered by New York State Department of Environmental Conservation (NYSDEC or Department).

The Carborundum Company, a predecessor company of Elm Holdings, Inc., entered into an Order on Consent on September 7, 1995 (last amended January 4, 2001) with the NYSDEC to investigate and remediate 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 Notice provided in Appendix B.

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 Notice granted to the NYSDEC, and recorded with the Niagara 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 and off-site until the Environmental Notice 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 Notice 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 Notice. Failure to properly implement the SMP is a violation of the Environmental Notice, 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 and the Order on Consent, (Index #BP-0454-94-04; Site #932036) 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 AECOM Technical Services, Inc. (AECOM) on behalf of Remedial Party Elm Holdings Inc., in accordance with the requirements of the NYSDEC's DER-10 ("Technical Guidance for Site Investigation and Remediation"), dated May 2010, 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 Notice 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 Notice 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 remedial party 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 Order on Consent, 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 non-routine maintenance activities.
5. 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.
6. 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:

1. 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 Order on Consent, and all approved work plans and reports, including this SMP.
2. 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 on the following page 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.

**Table 1: Notifications***

| Name | Contact Information | Required Notification** |
|---|---|---|
| NYSDEC Project Manager Steven Moeller | (716) 851-7220<br>steven.moeller@dec.ny.gov | All Notifications |
| NYSDEC Project Manager’s Supervisor Stanley Radon | (716) 851-7220<br>stanley.radon@dec.ny.gov | All Notifications |
| NYSDEC Site Control Kelly A. Lewandowski | (518) 402-9569<br>kelly.lewandowski@dec.ny.gov | Notifications 1 and 7 |
| NYSDOH Project Manager Christopher Budd | (518) 402-1769<br>christopher.budd@health.ny.gov | Notifications 5 and 6 |

* 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. SUMMARY OF PREVIOUS INVESTIGATIONS AND REMEDIAL ACTIONS

## 2.1 Site Location and Description

The site is located in the Town of Niagara, Niagara County, New York and is identified as Section 130.19 Block 2 and Lot 1 on the Niagara County Tax Map (see Figure 3). The site is an approximately 7-acre area and is bounded by mixed industrial properties to the north, Rhode Island Avenue and residential properties to the south, residential properties to the east, and Hyde Park Boulevard to the west (see Figure 3). The boundaries of the site are more fully described in Appendix B –Environmental Notice. The owner(s) of the site parcel at the time of issuance of this SMP is/are:

3425 Hyde Park Boulevard LLC (owner of the property)
Elm Holdings Inc. (remedial party)

## 2.2 Physical Setting

### 2.2.1 Land Use

The Site consists of the following: a former manufacturing building in the west half of the site and fenced asphalt and gravel parking areas in the east half. The Site is zoned industrial and is currently inactive (i.e., no current operating tenant or manufacturing operations). Manufacturing at the factory ceased in 2004. Historically the Site was used for manufacturing of heating elements and electronic components from silicon carbide. The gravel area in the eastern half of the site was formerly used for staging and storing excess materials (sand, silicon carbide, scrap graphite and steel, and empty drums). Prior to 1962 the gravel area was also used to burn cardboard, paper, and scrap wood (INTERA, 1993) (Figure 4).

The properties adjoining the Site and in the neighborhood surrounding the Site primarily include mixed use industrial, commercial, and residential properties. The properties immediately south of the Site across Rhode Island Avenue include residential properties; the properties immediately north of the Site include industrial properties; the properties immediately east of the Site include residential properties; and the properties to the west of the Site include mixed commercial and residential properties across Hyde Park Boulevard.

### 2.2.2 Geology

#### 2.2.2.1 Overburden

Fill at the site consists of 2 to10 feet of gravel and disturbed silty clay fill. Areas excavated during the site soil IRMs in 1999 and 2002 were backfilled with clean silt and clay fill to depths of approximately 2 to 21 feet, and crushed stone backfill used as a surface treatment. The native soils underlying the Site generally consist of a heterogeneous mixture of silt and clay, with minor proportions of sand and gravel, with the coarse fraction existing as both embedded grains in the silt and clay and as lenses. There is a zone of coarser grained material observed near (or at) the top of bedrock. Top of bedrock typically occurs 20 to 27 feet (ft) below ground surface (bgs).

#### 2.2.2.2 Bedrock

Overburden at the Site is underlain by fractured Middle Silurian Dolostone (greater than 20 feet bgs) of the Lockport Group. The Lockport Dolostone consists of dark grey to black, fossiliferous, dolostone with shaley interbeds. Both inclined and horizontal fractures are noted. Open fractures are infilled with clay and silt. Closed fractures show secondary carbonate mineralization. Vugs and rubbly zones are prevalent in the upper portion of the Lockport Dolomite (INTERA, 1993).

A map showing the locations of site cross sections is presented in Figure 5. Geologic cross sections are shown in Figure 6 and Figure 7. Site specific boring logs are provided in Appendix C.

### 2.2.3 Hydrogeology

The topography at the site is flat with a gentle slope across the property to the south. Elevation at the site is approximately 595 feet above mean seal level. The Site hydrogeology consists of two water bearing zones: (1) overburden low permeability shallow soils consisting of silt and clay with lenses of sand (approximately five to 20 ft below ground surface (bgs); and (2) fractured dolomitic bedrock (greater than 20 ft).

Observations during 2008-2009 in-situ bioremediation injection events indicated a hydraulic connection between the overburden and the bedrock units (Parsons, 2010a).

In general, overburden groundwater flow is from northeast to southwest with a gently sloping gradient in the central portion of the Site with steeper gradients in both the northeast and southwest portions of the Site.

The bedrock groundwater flow direction is westerly to southwesterly towards Hyde Park Boulevard and Rhode Island Avenue, with some minor variations. Regionally, groundwater flow is affected by the Niagara River Gorge located approximately 1.5 miles west of the Site.

The geometric mean hydraulic conductivity for the overburden, calculated during slug tests from the Preliminary Site Assessment (PSA) (INTERA, 1993), was $4.3 \times 10^{-6}$ ft/s. The geometric mean hydraulic conductivity for the bedrock, calculated during the RI (INTERA, 1997), was $3.43 \times 10^{-5}$ ft/s. Annual groundwater flow velocities range from 3-10 feet per year in overburden and 100-300 feet per year in fractured bedrock (INTERA 1993, 1997, 2006 and DE&S, 1998). Downward vertical gradients generally occur in overburden/bedrock well pairs in the north, east and central portions of the Site; upward vertical gradients generally occur in well pairs in the south/southwest portion of the Site, with seasonal variations depending on locations.

There are no known private drinking water wells located within one mile of the site. All residents and businesses are supplied by municipal water sourced from the upper Niagara River.

Groundwater contour maps for overburden and bedrock from 2021 are shown in Figures 8 and 9. Groundwater elevation data from 2021 is provided in Table 2. A 3-D model for groundwater flow is presented in Figure 10. Groundwater monitoring well construction logs are provided in Appendix C.

### 2.3 Investigation and Remedial History

The Site property is a 7-acre inactive, vacated manufacturing plant located in the Town of Niagara at the intersection of Hyde Park Boulevard and Rhode Island Street. The Carborundum Company purchased the property from the Globar Company in 1936 and manufactured heating elements and electronic components from silcon carbide. BP America subsequently acquired the Carborundum Company in 1987. The Globar facility was subsequently sold in 1993 to CESIWID, Inc. and CESIWID, Inc. sold the facility to Kanthal-Globar. Kanthal-Globar then sold the property in 2008 to 3425 Hyde Park Boulevard, LLC, the current owner; however, BP America retained the responsibility for certain pre-existing conditions when they sold the facility to CESIWID, Inc.

In 1985, the Carborundum Company collected samples to assess soil and groundwater contamination. In 1987, the United States Environmental Protection Agency completed a preliminary assessment and referred the Site to the State of New York. In 1990, NYSDEC completed a PSA. As a result of the completed investigations, the Site remained on the Registry as a Class 2a site. Subsequently, the Carborundum Company completed a PSA in 1993, which found contamination (hazardous waste) in Site soils and groundwater resulting from past spills and leaks from bulk chemical storage. As a result, the Site was upgraded to a Class 2 Registry site. Since 1993, a series of investigations were completed to define the extent of soil and groundwater contamination.

This contamination is being addressed under the direction of NYSDEC under the 1995 Order on Consent and associated modifications. The Order on Consent required a Remedial Investigation/Feasibility Study (RI/FS). The RI Report was issued in January 1997. A supplemental investigation was completed, and the Phase II RI Report was issued in May 1998. The results of these investigations lead to a soil removal interim remedial measure (IRM), which was completed in 1999, to remove on-site soils with residual volatile organic compounds (VOCs).

The FS was completed in January 2000. Later in 2000, the NYSDEC issued a Record of Decision (ROD) for Operable Unit (OU) 1 and OU2. Within this document, the Site was divided into three OUs to simplify selection of remedial alternatives:

- OU1 – On-site soil,
- OU2 – Groundwater beneath the Site, and
- OU3 – Off-site soil east of the Site.

The OU1/OU2 ROD selected “No Further Action” for OU1, “No Further Action with groundwater monitoring” for OU2, and a requirement to conduct additional investigations to identify appropriate remedial actions for OU3. Additional soil investigation and removal related to OU3 was conducted east of the property boundaries in 2002. The ROD for OU3 was issued in August 2004 and identified that “No Further Action” was required for OU3. With the completion of the OU1/OU2 ROD in 2000 and OU3 ROD in 2004, the OU3 ROD stated the site would be reclassified to a Class 4.

For OU2, NYSDEC selected No Further Action with groundwater monitoring. Semi-annual groundwater sampling began in 2000. In 2005, NYSDEC requested that groundwater monitoring be continued but annually on an alternating spring/fall schedule. Since this request from NYSDEC in 2005, annual groundwater monitoring has been conducted and includes the collection of groundwater samples for chemical analysis of chlorinated VOCs (CVOCs) and natural attenuation parameters. Key CVOCs present at select locations in the groundwater at the Site are trichloroethene (TCE), 1,1-dichloroethene (DCE), 1,1-dichloroethane (DCA), and vinyl chloride (VC).

As stated in the ROD, the remedial goals for the Site are dependent on natural attenuation. In 2005, after review of the first Five Year Review Report (INTERA, 2005), NYSDEC suggested that, although natural attenuation was occurring, progress towards remediation was slow. Therefore, remedial alternatives were evaluated and in the 2006 Remedial Alternatives Report (Parsons, 2006) that was submitted to NYSDEC, application of enhanced in situ bioremediation was chosen as the preferred alternative for pilot testing.

A Soil Vapor Intrusion Assessment at the Site post-dated the remedial action and RODs for OU1 to OU3 and took place in 2007 (Parsons, 2007a, & 2007b). The results of the study did not indicate a potential for soil vapor intrusion from the Site to impact nearby residences, additional studies will be conducted should the building use change.

Bioremediation injections using emulsified vegetable oil (EVO) and microorganisms were completed in 2008 (overburden), 2009 (overburden and bedrock), 2011 (overburden) and 2013 (overburden and bedrock). Terra Systems, Inc. (TSI) SRS®-SD was used for all overburden injections, SRS®-FR was used for all bedrock injections, and TSI-DC® bioaugmentation culture was used for microorganism bioaugmentation. The remedial objective of enhancing the natural attenuation process in groundwater was achieved through the bioremediation/bioaugmentation injections conducted between 2008 and 2013.

In March 2013 the NYSDEC reclassified the Site from Class 2 to Class 4 on the Registry. The Class 4 classification is assigned to a site that has been properly closed but requires continued site management. Class 4 sites have not necessarily been brought into compliance with standards, criteria, or guidance (SCGs).

A detailed remedial history timeline and a summary of the available project records to document key investigative and remedial milestones for the Site are included in Appendix D.

### 2.3.1 Site Contamination (more info)

The PSAs, RI, Phase II RI, and IRM investigations identified two media impacted by contamination: soils and groundwater (DE&S, 2000, INTERA, 2002a). Soil Vapor was investigated in a separate study in 2007 (Parsons, 2007a, 2007b). Contaminants of concern (COCs) found at the site, as identified in the RODs for OU1/OU2 and OU3 consisted of specific VOCs and polycyclic aromatic hydrocarbons (PAHs) in soils and VOCs in groundwater. These COCs are summarized as follows in Table 3:

**Table 3: Site Contaminants of Concern**

| VOCs of Concern | Media | Area |
|---|---|---|
| Trichloroethene | Soil, GW | OU1, OU2, OU3 |
| 1,2-Dichloroethene | Soil, GW | OU1, OU2, OU3 |
| Vinyl chloride | Soil, GW | OU1, OU2, OU3 |
| Benzene | GW | OU2 |
| Acetone | Soil | OU1 |
| Xylene | Soil | OU1 |
| Toluene | Soil | OU1 |
| Ethyl benzene | Soil | OU1 |
| **SVOCs of Concern** | | |
| Acenaphthylene | Soil | OU1 |
| Anthracene | Soil | OU1 |
| Benzo(a)anthracene | Soil | OU1 |
| Benzo(b)fluoranthene | Soil | OU1 |
| Benzo(a)pyrene) | Soil | OU1 |
| Benzo(k)fluoranthene | Soil | OU1 |
| Chrysene | Soil | OU1 |
| Fluorene | Soil | OU1 |
| Ideno(1,2,3-cd)pyrene | Soil | OU1 |
| Naphthalene | Soil | OU1 |
| Phenanthrene | Soil | OU1 |
| Pyrene | Soil | OU1 |

Acetone, trichloroethene, and xylenes were all compounds utilized during operations at the Carborundum Facility. Other CVOCs listed are breakdown products of trichloroethene. The benzene, toluene, ethyl benzene, and xylenes are petroleum products and could have been from historic spillage or leakage on the property. The SVOCs at the site were PAHs located along the north boundary fence near the former railroad spur. PAHs are commonly associated with railroads and are considered a secondary issue. PAH contamination was not found in the groundwater at the site. (DE&S, 2000).

In soil, other organic and metal contaminants were assessed during previous investigations and are not considered COCs. In groundwater semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), and pesticides were not detected in any of the groundwater samples collected during the RI.

Soil and groundwater analytical results in the studies were compared to soil and groundwater SCGs at the time of the investigations. Site-specific soil cleanup objectives were calculated based on 1.4% total organic carbon (TOC) in soil according to the NYSDEC "Technical and Administrative Guidance Memorandum (TAGM) 4046 (NYSDEC, 1994) (Appendix E). Groundwater results were compared to NYSDEC Class GA Ambient Water Quality Criteria (NYSDEC, 1998).

### 2.3.2 OU1 and OU3 - Soil Nature and Extent

Figures 11, 12, and 13 present the extensive soil sampling locations completed during multiple investigations for OU1 (onsite) and OU3 (offsite) soil. (DE&S, 1999, INTERA, 2002a). Ranges of concentrations for on-site and off-site COCs are presented in Table 4 and Table 5 (NYSDEC, 2000, 2004). Samples were collected from shallow, mid-level, and deeper soils and from both fill and native material. As described in the RI/FS, Site studies found COCs in five areas on the Site in concentrations in excess of the TAGM SCGs (DE&S, 2000) which were targeted for soil excavation as part of the OU1 IRM in 1999: These areas were subdivided for IRM excavation based on the available data. Figure 14 presents the extent of areas excavated during the 1999 IRM for OU1. Figure 15 presents where contaminated soils from the offsite area east of the site were excavated during the 2002 IRM for OU3.

COCs were not detected at significant levels in any of the surface soils from the RI and surface soils at the Site are not a concern. Removal of contaminated subsurface soils was executed as an IRM, a permanent part of the remedy for the Site. Contaminated soils were excavated and transported offsite for appropriate disposal.

### 2.3.3 OU2 - Groundwater Nature and Extent

VOCs have been detected in groundwater monitoring wells on the Site during sampling events conducted prior to the remedy. TCE, 1,2-DCE, and VC were the most commonly detected VOCs in groundwater. Figure 16 and Figure 17 present VOCs in overburden and bedrock wells in November 1997 following the RI, and prior to the IRMs. These figures show groundwater contamination extends over the western portion of the site in the overburden and bedrock. Table 4 presents the range of COC compounds found in groundwater from the ROD for OU2 (NYSDEC, 2000).

### 2.3.4 Soil Vapor Nature and Extent

A Soil Vapor Intrusion Assessment was conducted in March and July 2007. Table 6 and Figure 18 summarize the results of soil vapor samples collected. One soil vapor point analytical result detected TCE at a concentration of 4.5 micrograms per cubic meter (mcg/m$^3$) on the northwest corner of the Site alongside Hyde Park Boulevard. In 2007, the State of New York did not have any standards, criteria or guidance values for concentrations of volatile chemicals in soil vapor or indoor air. A co-located ambient air sample detected TCE at 1.14 mcg/m$^3$ and 1,2-DCE at 1.83 mcg/m$^3$ respectively. The 2017 update to the NYSDOH Guidance for Evaluating Soil Vapor Intrusion (NYSDOH, 2006, amended through 2017), presents decision matrices for paired sub-slab vapor and indoor air samples. Both TCE and cis-1,2-DCE are Matrix A compounds. If the soil vapor and indoor air results were applied to Matrix A as sub-slab vapor and indoor air samples, respectively, the matrix recommendation would be “Identify Source(s) and Resample or Mitigate.” All other soil vapor and ambient air samples collected were non-detect. An email was received from NYSDEC stating that no further action was required regarding soil vapor on December 5, 2008 (NYSDEC, 2008). If the building use changes in the future, the site remedy requires evaluation of the potential for soil vapor intrusion and the possibility of adverse impacts on indoor air, and compliance with NYSDOH Guidance for Evaluating Soil Vapor Intrusion to address current of potential human exposures.

## 2.4 Remedial Action Objectives

The Remedial Action Objectives (RAOs) for the Site as listed in the Record of Decision for Operable Unit 1 and Operable Unit 2 dated October 27, 2000, and in the Record of Decision for Operable Unit 3 dated August 23, 2004 are as follows:

Goals for the remedial Program have been established through the remedy selection process stated in 6 NYCRR Part 375.1.10. The overall remedial goal is to meet all SCGs and be protective of human health and the environment. At a minimum, the remedy selected should eliminate or mitigate all significant threats to public health and/or the environment presented by the hazardous waste disposed at the site through the proper application of scientific and engineering principals.

### 2.4.1 Groundwater

Reduce, to the extent practicable:

- off-site migration of groundwater that does not attain NYSDEC Class GA Ambient Water Quality Criteria.

### 2.4.2 Soil

Eliminate or reduce to the extent practicable:

- Exposures of persons at or around the site to related contaminants of concern in subsurface soil.

The remediation goals for the site include achieving to the extent practicable:

- Ambient groundwater quality standards based on NYSDEC Division of Water Technical & Operational Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations (TOGS 1.1.1) (NYSDEC, 1998); and

- Site Specific SCGs for soil based on the NYSDEC “Technical and Administrative Guidance Memorandum (TAGM) 4046 Determination of Soil Cleanup Objectives and Cleanup Levels.

## 2.5 Remaining Contamination

The majority of the soil contamination was removed and disposed of off-site during the performance of Interim Remedial Measures in 1999 (OU1) and 2002 (OU3). The objective for OU1 was accomplished through the IRM provided that it continues to be operated and maintained in a manner consistent with the current zoning for heavy industrial use. The objective for OU3 was accomplished and the remedial goals met by removing the contaminated soil identified in the remedial investigation for offsite soils. The OU2 groundwater remedy was monitored natural attenuation (MNA). Groundwater monitoring wells were installed to monitor natural attenuation of residual groundwater contamination. Following the fifth-year summary report (INTERA, 2005a) indicating that groundwater contamination was still present on Site, a remedial alternatives evaluation led to four rounds of bioremediation injections using EVO and microorganisms between 2008-2013. Following bioaugmentation, key COCs decreased in several wells. Groundwater monitoring continues to date, evaluating progress of the MNA.

### 2.5.1 Soil

#### 2.5.1.1 Operable Unit #1 Remaining Soil Contamination

An interim remedial measure (IRM) completed in August 1999 removed most of the contaminated soil from the site (OU1). The OU1 IRM successfully removed over 90% of the soil contamination at the site from the areas of excavation. Minor amounts of contaminated soil were left in Area 2 at a depth of 10 to 24 feet. Concerns for slope stability associated with the presence of the facilities infrastructure prevented excavation of the remaining contamination. The remaining soil contamination in Area 2 does not pose an exposure concern for those using the site or the nearby residents. Following the OU1 IRM the average total VOCs in the remaining soils was 1,465 µg/kg. After completion of the IRM, the remaining areas (1,2,4, & 5) met the site-specific TAGM SCGs for VOCs.

Soils in a portion of Area 1 (along the north boundary fence near the former railroad spur) exceed SCGs for several PAHs. The performance of the IRM was driven by the VOCs in the soils. NYSDEC established a PAH clean-up objective of 25 ppm total PAHs for soils in Areas 1A and 1C during the execution of the IRM. This objective was established on June 16, 1999 because clean-up objectives for some individual PAH compounds are quite low and difficult to achieve given widespread occurrence of PAHs in industrialized areas. (DE&S, 2000). The PAH contaminants remaining in Area 1 are below 25 ppm total PAHs and have been covered with a minimum of 2 feet of clean soil.

Table 7 and Figure 19 summarize the results of all soil samples collected that exceed the site specific SCGs at the site after completion of the OU1 remedial action.

#### 2.5.1.2 Operable Unit #3 Remaining Soil Contamination

The December 2002 soil excavation IRM for OU3 addressed two CVOCs (TCE and 1,2-DCE) in off-site soils as well as the contaminated soil remaining along the eastern property boundary of the Site that could not be removed during the IRM in 1999. Following the IRM, no CVOCs from confirmation samples in the offsite excavation exceeded the SCGs determined for the site (TAGM 4046). Two floor samples in the on-site excavation area contained COCs above cleanup-objectives at a depth of approximately 21 ft bgs. Table 8 and Figure 20 summarize the results of all remaining soil contamination from the OU3 IRM. NYSDEC was consulted and it was determined that the deep contamination would not pose a health risk and therefore no further excavation was conducted (INTERA, 2004a). As stated in the ROD for OU3 (NYSDEC, August 2004), NYSDEC determined the IRM achieved the remediation goals for the site and that No Further Action was necessary for remedy completion.

### 2.5.2 Groundwater

Groundwater at the Site was contaminated with CVOCs. A groundwater monitoring program has been in place at the site since 2000. CVOCs have steadily declined in the overburden and bedrock groundwater over the past 20 years in response to source area soil removal, with more recent substantial declines related to the 2008, 2009, 2011, and 2013 bioremediation (i.e., substrate and microorganism) injections. Due largely to flow in bedrock fractures, the VOC decreases have also been observed downgradient of the injection areas and in offsite wells, and to date, little rebound has been observed.

Natural anaerobic biodegradation of TCE was substantially enhanced by the bioremediation injection program and TCE is now only found above SCGs in a few select overburden wells (MW-7A, MW-10A, MW-18A). However, concentrations of cis-1,2-DCE, and VC in most wells are still above SCGs. Following the sequence of reductive dechlorination, as the more chlorinated compounds are depleted over time, and if conditions remain favorable for dechlorination, the cis-1,2-DCE and VC concentrations would be expected to decrease with further MNA.

Since the injections, groundwater monitoring has continued annually at the Site and will continue to do so under this SMP. Analytical CVOC and MNA parameter data for the time period since the bioaugmentation injections (2007-2021) are presented in Appendix F. Long-term trend graphs showing chlorinated ethenes in Site groundwater wells since the start of the groundwater monitoring program in 2000 are presented in Appendix G. Table 9 compares the Fall 2021 well monitoring data to the SCGs. Figures 21 and 22 are isocontours of the 2021 overburden and bedrock total CVOC concentrations.

In a letter dated September 6, 2018, NYSDEC requested that Elm Holdings sample Site groundwater for emerging contaminants 1,4-dioxane and per- and polyfluoroalkyl substances (PFAS) as part of a state-wide survey of remediation sites (NYSDEC, 2018b). Groundwater samples were collected from three bedrock wells in October 2018. The guidance for these compounds has been evolving since the sampling event. The results of the sampling are presented in Table 10 and in a letter report (AECOM 2019a).

# 3. INSTITUTIONAL AND 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 Notice;
- A description of the controls to be evaluated during each required 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 H) 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 ROD for OU1 and OU2 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 industrial uses only. Adherence to these ICs on the site is required by the Environmental Notice and will be implemented under this SMP. ICs identified in the Environmental Notice may not be discontinued without an amendment to or extinguishment of the Environmental Notice. The IC boundaries are shown on Figure 3. These ICs are:

- The Property is subject to the Environmental Notice
- Unless prior written approval by NYSDEC is first obtained, where contamination remains at the Property, there shall be no disturbance or excavation of the Property which threatens the integrity of the engineering controls which will or is reasonably anticipated to, interfere significantly with any proposed, ongoing, or completed remedial program at the site, or which results or may result in a significantly increased threat of harm or damage at the site.
- The property may be used for: industrial use;
- All ECs must be 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 New York State Department of Health (NYSDOH) or the Niagara 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;
- Groundwater and other environmental or public health monitoring must be performed as defined in this SMP;
- 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;
- Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in 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 Notice;

- The potential for vapor intrusion must be evaluated for any buildings developed in the area within the IC boundaries noted on Figure 3, and any potential impacts that are identified must be monitored or mitigated;

- 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 Groundwater Monitoring Wells

Exposure to remaining contamination at the site is prevented through sampling of select monitoring wells onsite. Figure 2 presents the location of all overburden and bedrock monitoring wells onsite including the 18 wells that will be sampled as part of the Groundwater Sampling Plan. Procedures and scheduling for the sampling of the selected site monitoring wells are provided in the Monitoring and Sampling Plan included in Section 4.0 of this SMP with sampling methodologies presented in the Field Sampling Plan (FSP) provided in Appendix I.

### 3.3.2 Criteria for Completion of Groundwater Remediation

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).

As discussed below, the NYSDEC may approve termination of a groundwater monitoring program. When a remedial party receives this approval, the remedial party will decommission all site-related monitoring, injection and recovery wells as per the NYSDEC CP-43 policy.

The remedial party will also conduct any needed site restoration activities, such as asphalt patching and decommissioning wells. 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.

#### 3.3.2.1 Monitoring Wells associated with Monitored Natural Attenuation

Groundwater monitoring activities to assess natural attenuation will continue, as determined by the NYSDEC project manager in consultation with NYSDOH project manager, until residual groundwater concentrations are found to be consistently below ambient water quality standards, the site SCGs, or have become asymptotic at an acceptable level over an extended period. In the event that monitoring data indicates that monitoring for natural attenuation may no longer be required, a proposal to discontinue the monitoring will be submitted by the remedial party. Monitoring will continue until permission to discontinue is granted in writing by the NYSDEC project manager. If groundwater contaminant levels become asymptotic at a level that is not acceptable to the NYSDEC, additional source removal, treatment and/or control measures will be evaluated.

#### 3.3.2.2 Monitoring Wells associated with Bioremediation / Bioaugmentation Injections

Groundwater monitoring activities to assess Bioremediation Injections with EVO and Microorganisms will continue, as determined by the NYSDEC project manager in consultation with NYSDOH project manager, until residual groundwater concentrations are found to be consistently below ambient water quality standards or the site SCGs, or have become asymptotic at an acceptable level over an extended period. If monitoring data indicates that monitoring may no longer be required, a proposal to discontinue the remedy will be submitted by the remedial party. Monitoring will continue until permission to discontinue is granted in writing by the NYSDEC project manager. If groundwater contaminant levels become asymptotic at a level that is not acceptable to the NYSDEC, additional injections, source removal, treatment and/or control measures will be evaluated.

## 4. 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 J and Field Sampling Plan in Appendix I.

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

- Sampling and analysis of all appropriate media (e.g., groundwater, indoor air, soil vapor, soils);
- Assessing compliance with applicable NYSDEC SCGs, particularly groundwater standards and Part 375 Soil Cleanup Objectives (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;
- 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, concurrently with the annual groundwater sampling event. 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 375or 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 K – 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 of the groundwater monitoring well network;
- General site conditions at the time of the inspection;
- 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.

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:

- If these controls continue to be protective of human health and the environment;
- Compliance with requirements of this SMP and the Environmental Notice;
- 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.

## 4.3 Post-Remediation Media Monitoring and Sampling

Groundwater is the only media currently required to be sampled under the chosen remedy (No Further Action with groundwater monitoring) described in the ROD for OU1 & OU2. Samples shall be collected from a select subset of existing site groundwater monitoring wells on a routine basis. Sampling locations, required analytical parameters, and schedule are provided in Table 11 – Post Remedial Sampling Requirements and Schedule. A map showing the site wells which are included in the groundwater monitoring program is provided in Figure 2. Modification to the frequency or sampling requirements will require approval from the NYSDEC project manager.

Soil Vapor Intrusion Sampling may be required in the future upon change of use, or re-occupancy of the site building, or new construction on the site; however, at this time the facility is still unoccupied and historical SVI studies indicate no current need for additional SVI sampling.

Detailed sample collection and analytical procedures and protocols are provided in Appendix I – Field Sampling Plan and Appendix J – Quality Assurance Project Plan.

### 4.3.1 Groundwater Sampling

Groundwater monitoring will be performed at 17 of 53 existing site monitoring wells, injection wells, and performance monitoring wells to assess the performance of the remedy. Seventeen monitoring wells will be sampled on an alternating spring (even years)/fall (odd years) schedule. One well (downgradient MW-15) will be sampled every 5 years with the next sampling scheduled for Fall 2023. Modification to the frequency or sampling requirements will require approval from the NYSDEC project manager.

The network of monitoring wells, injection wells, and performance monitoring wells has been installed to monitor on-site and downgradient groundwater conditions at the site and enhance the performance of the groundwater remedy. As part of the groundwater monitoring, seven source area wells and ten downgradient wells are sampled to evaluate the effectiveness of the remedial system. Six overburden and eleven bedrock wells will monitor the two water bearing zones identified at the site.

The remedial party will measure depth to groundwater for each of the 53 existing site monitoring wells, injection wells, and performance monitoring wells in the network in order to create overburden and bedrock groundwater contour maps before sampling site monitoring wells. Due to the additional traffic safety precautions for accessing MW-15 in the middle of Hyde Park Boulevard, the depth to groundwater for MW-15 will only be measured during sampling events for this well every 5 years.

Table 12 – Monitoring Well Construction Details summarizes the identification number, as well as the purpose, location, depths, diameter and screened intervals for all site wells. Monitoring well construction logs are included in Appendix C of this document.

Groundwater monitoring includes the collection of groundwater samples for the analyses of site-specific CVOCs, including tetrachloroethene (PCE), TCE, cis-1,2-DCE, trans-1,2-DCE, 1,1-DCE, 1DCA, 1,1,1-trichloroethane (TCA), VC, and chloroethane. Select monitored natural attenuation MNA parameters will also be collected at 13 of the 17 annual sample locations as listed in Table 12 - Post Remedial Sampling Requirements and Schedule. There are six well pairs chosen for these additional analyses located within, upgradient, downgradient, and side gradient of the source area: MW-5A and -5B, MW-7A and -7B, MW-10A and -10B, MW-16A and -16B, MW-17A and -17B, and MW-18A and -18B. A seventh bedrock well, MW-12B will also be part of the downgradient bedrock monitoring.

Wells and MNA parameters were selected for the monitoring program following guidance from Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water (USEPA, 1998). Ferrous iron will be field-analyzed using a HACH DR-900 colorimeter or other equivalent field-testing device. Other field analyses include alkalinity, carbon dioxide, and hydrogen sulfide. These analyses will be collected using HACH field kits.

Well head analyses will be collected at every well during groundwater sampling and include dissolved oxygen, oxidation-reduction potential, pH, temperature, specific conductance, turbidity, and visual appearance.

Unless specified otherwise by NYSDEC, groundwater sampling will be done in accordance with Groundwater Sampling Guidelines for Superfund and RCRA Project Managers (USEPA OSWER 542-S-02-001). The default groundwater sampling method will be in accordance with EPA’s low stress (often referred to as low flow) sampling technique (EPA, 1998). Purge water will be contained and staged on site for subsequent disposal in accordance with applicable regulations.

To date, groundwater sampling at the site has been in accordance with the groundwater monitoring work plan (DE&S 2000) for Operable Unit 2 (OU2), and approved revisions per subsequent correspondence with NYSDEC. The sampling well list, analyses, and protocols discussed in this SMP Monitoring and Sampling Plan and the accompanying FSP in Appendix I incorporate changes to date and update outdated protocols previously detailed in the existing groundwater monitoring work plan. Groundwater sampling at the site will follow this SMP Monitoring and Sampling Plan and any future changes approved by the NYSDEC.

Quality assurance/quality control (QA/QC) samples, including one field duplicate, one matrix spike/matrix spike duplicate sample, and trip blanks will be collected and submitted for analysis in accordance with the Quality Assurance Project Plan (QAPP) provided in Appendix J.

All wells selected for the GW Monitoring Program have historically been part of an established sampling network and included in alternating spring/fall annual sampling reports following the several Site groundwater injection events.

If biofouling or silt accumulation occurs in the on-site and/or off-site monitoring wells, the wells will be physically agitated/surged and redeveloped. Additionally, monitoring wells will be properly decommissioned and replaced if an event renders the wells unusable.

Repairs and/or replacement of wells in the monitoring well network will be performed based on assessments of structural integrity and overall performance.

The NYSDEC project manager will be notified prior to any repair or decommissioning of any monitoring well for the purpose of replacement, and the repair or decommissioning and replacement process will be documented in the subsequent Periodic Review Report. Well decommissioning without replacement will be done only with the prior approval of the NYSDEC project manager. Well abandonment will be performed in accordance with NYSDEC's guidance entitled "CP-43: Groundwater Monitoring Well Decommissioning Procedures." Monitoring wells that are decommissioned because they have been rendered unusable will be replaced in kind in the nearest available location, unless otherwise approved by the NYSDEC project manager.

The sampling frequency may only be modified with the approval of the NYSDEC project manager. This SMP will be modified to reflect changes in sampling plans approved by the NYSDEC project manager.

Deliverables for the groundwater monitoring program are specified in Section 7.0 – Reporting Requirements.

### 4.3.2 Soil Vapor Intrusion Sampling

Soil vapor intrusion sampling will be performed as needed in the future upon change of use, or re-occupancy of the site building, or new construction on the site. Should there be a change in condition as described above, a work plan will be developed and this SMP modified as needed for soil vapor intrusion and the possibility of adverse impacts on indoor air. Any soil vapor intrusion studies and/or remedial systems would be in compliance with the FSP provided in Appendix I and the New York Department of Health Guidance for Evaluating Soil Vapor Intrusion (NYSDOH, 2006, amendments to May 2017).

The sampling frequency may only be modified with the approval of the NYSDEC project manager. This SMP will be modified to reflect changes in sampling plans approved by the NYSDEC project manager.

### 4.3.3 Monitoring and Sampling Protocol

All sampling activities will be recorded in a field book and associated sampling log as provided in Appendix K - Site Management Forms and Appendix I – Field Sampling Plan. Other observations (e.g., groundwater monitoring well integrity) will be noted on the sampling log. The sampling log will serve as the inspection form for the monitoring network. Additional detail regarding monitoring and sampling protocols are provided in the site-specific Field Sampling Plan provided as Appendix I of this document.

# 5. OPERATION AND 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. Should that change in the future, this SMP will be modified to reflect changes approved by the NYSDEC project manager.

# 6. 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.

The Site is not located within the Federal Emergency Management Agency (FEMA) 100-year flood plain. Based on the elevation of the site above sea level and the generally flat topography of the land and lack of nearby surface water at the site, erosion from flooding and other storm events would likely be limited in severity. The remaining contamination at the site is in groundwater and is not susceptible to surface release/spill.

## 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).

Waste generation, energy usage, and emissions from vehicles will be minimized to the greatest extent possible during groundwater sampling events and periodic site visits. Dedicated sampling tubing and equipment will be used when possible.

### 6.2.1 Frequency of System Checks, Sampling and Other Periodic Activities

Transportation to and from the Site, use of consumables in relation to visiting the Site in order to conduct system checks and/or collect samples, and shipping samples to a laboratory for analyses have direct and/or inherent energy costs. The schedule and/or means of these periodic activities have been prepared so that these tasks can be accomplished in a manner that does not impact remedy protectiveness but reduces expenditure of energy or resources. To the extent practicable, groundwater monitoring events will coincide with other necessary site visits, inspections, and combined with visits to other sites to reduce overall fuel uses and travel to and from the Site. Pre-planning prior to all site visits will help make sure all necessary equipment and bottleware is ready and transported with the minimum number of trips.

## 6.3 Remedial System Optimization

A Remedial Site Optimization (RSO) study will be conducted any time that the NYSDEC project manager or the remedial party requests in writing that an in-depth evaluation of the remedy is needed. An RSO may be appropriate if any of the following occur:

- The remedial actions have not met or are not expected to meet RAOs in the time frame estimated in the Decision Document;
- Previously unidentified source material may be suspected;
- Plume shift has potentially occurred;
- Site conditions change due to development, change of use, change in groundwater use, etc.;
- There is an anticipated transfer of the site management to another remedial party or agency; and
- A new and applicable remedial technology becomes available.

An RSO will provide a critique of a site’s conceptual model, give a summary of past performance, document current cleanup practices, summarize progress made toward the site’s cleanup goals, gather additional performance or media specific data and information and provide recommendations for improvements to enhance the ability of the present system to reach RAOs or to provide a basis for changing the remedial strategy.

The RSO study will focus on overall site cleanup strategy, process optimization and management with the intent of identifying impediments to cleanup and improvements to site operations to increase efficiency, cost effectiveness and remedial time frames. Green remediation technology and principals are to be considered when performing the RSO.

# 7. 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 K. 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 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.

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 13 and summarized in the Periodic Review Report.

**Table 13: Schedule of Interim Monitoring/Inspection Reports**

| Task/Report | Reporting Frequency* |
|---|---|
| Annual Groundwater Monitoring Report | Annually |
| Periodic Review Report | Every three years, or as otherwise determined by the NYSDEC |

* 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 (e.g., sub-slab vapor, indoor air, outdoor air);
- 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 EQuIS$^{TM}$ database in accordance with the requirements found at this link http://www.dec.ny.gov/chemical/62440.html.

## 7.2 Periodic Review Report

In accordance with NYSDEC correspondence dated February 22, 2022, approving the July 2018 to July 2021 PRR, a Periodic Review Report (PRR) will be submitted to the NYSDEC project manager every third year. The most recent PRR was submitted to the NYSDEC project manager on August 30, 2021 for the period July 31, 2018 through July 31, 2021 (AECOM, 2021b). The next PRR shall be submitted every third year 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 B-Environmental Notice. 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 inspection.

- 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, if applicable.

- 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, including but not limited to:

  - Trend monitoring graphs that present groundwater contaminant levels from before the start of the remedy implementation to the most current sampling data;

  - A current map for sites with remaining groundwater contamination; and

  - A groundwater elevation contour map for each gauging event.

- 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$^{TM}$ 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 ROD;

- 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 ROD ; and

- The overall performance and effectiveness of the remedy.

### 7.2.1 Certification of Institutional Controls

Following the last inspection of the reporting period, a qualified environmental professional as defined in 6 NYCRR Part 375 or 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:

At the end of each certifying period, as determined by the NYSDEC project manager, the following certification will be provided to the NYSDEC project manager:

*"For each institutional identified for the site, I certify that all of the following statements are true:*

- *The institutional 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 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, [name], of [business address], am certifying as [Owner or Owner's Designated Site Representative]."*

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.

### 7.4 Remedial Site Optimization Report

If an RSO is to be performed (see Section 6.3), upon completion of an RSO, an RSO report must be submitted to the NYSDEC project manager for approval. A general outline for the RSO report is provided in Appendix L. The RSO report will document the research/ investigation and data gathering that was conducted, evaluate the results and facts obtained, present a revised conceptual site model and present recommendations. RSO recommendations are to be implemented upon approval from the NYSDEC. Additional work plans, design documents, health and safety plans (HASPs) etc., may still be required to implement the recommendations, based upon the actions that need to be taken. A final engineering report and update to the SMP may also be required.

The RSO report will be submitted, in electronic format, to the NYSDEC project manager and the NYSDOH project manager.

# 8. REFERENCES

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# TABLES

## Table 2
## Water Level Measurements
## Fall 2021 Monitoring Event
## Former Carborundum Company, Hyde Park Facility
## Niagara, New York

| Well ID | Elevation Top of Casing | Easting | Northing | 12/3/2021 | |
|---|---|---|---|---|---|
| | | | | Depth to Water | Groundwater Elevation |
| PMW-1 | 596.62 | 1028372.30 | 1136886.30 | 7.25 | 589.37 |
| PMW-2 | 595.98 | 1028371.76 | 1136875.49 | 6.19 | 589.79 |
| PMW-3 | 596.59 | 1028379.73 | 1136882.30 | 6.46 | 590.13 |
| PMW-4 | 597.05 | 1028384.66 | 1136909.84 | 7.41 | 589.64 |
| PMW-5 | 592.65 | 1028308.62 | 1136764.72 | 3.61 | 589.04 |
| PMW-6 | 592.44 | 1028310.46 | 1136747.77 | 4.12 | 588.32 |
| PMW-7 | 592.93 | 1028325.51 | 1136758.05 | 4.49 | 588.44 |
| PMW-8 | 593.11 | 1028352.65 | 1136824.51 | 4.41 | 588.70 |
| PMW-9 | 592.45 | 1028282.58 | 1136689.24 | 3.80 | 588.65 |
| INJ-1 | 596.66 | 1028382.45 | 1136887.25 | 6.84 | 589.82 |
| INJ-2 | 595.89 | 1028374.60 | 1136890.69 | 6.75 | 589.14 |
| INJ-3 | 592.87 | 1028313.28 | 1136774.48 | 4.21 | 588.66 |
| INJ-4 | 593.26 | 1028332.65 | 1136771.29 | 4.39 | 588.87 |
| INJ-5U | 596.08 | 1028365.66 | 1136878.92 | 7.16 | 588.92 |
| INJ-5L | 596.00 | 1028365.66 | 1136878.92 | 5.64 | 590.36 |
| INJ-6U | 596.96 | 1028376.98 | 1136868.99 | 5.78 | 591.18 |
| INJ-6L | 595.97 | 1028376.98 | 1136868.99 | 6.95 | 589.02 |
| INJ-7 | 592.76 | 1028409.44 | 1136837.46 | 2.43 | 590.33 |
| INJ-8 | 592.98 | 1028418.16 | 1136832.59 | 3.78 | 589.20 |
| INJ-9 | 591.62 | 1028023.50 | 1136898.15 | 3.29 | 588.33 |
| INJ-10 | 591.49 | 1028032.17 | 1136890.90 | 1.41 | 590.08 |
| MW-1A | 597.56 | 1028606.44 | 1136554.99 | 7.89 | 589.67 |
| MW-1B | 597.64 | 1028611.01 | 1136554.66 | 8.09 | 589.55 |
| MW-2A | 595.73 | 1028335.27 | 1136881.61 | 5.21 | 590.52 |
| MW-2B | 595.80 | 1028337.09 | 1136888.34 | 7.03 | 588.77 |
| MW-3A | 599.94 | 1028627.22 | 1136895.86 | 5.21 | 594.73 |
| MW-3B | 599.70 | 1028624.57 | 1136899.80 | 10.38 | 589.32 |
| MW-4A | 591.60 | 1028027.77 | 1136890.77 | 3.19 | 588.41 |
| MW-4B | 591.49 | 1028023.72 | 1136890.65 | 1.85 | 589.64 |
| MW-5A | 597.91 | 1028256.93 | 1136567.66 | 9.69 | 588.22 |
| MW-5B | 597.79 | 1028256.86 | 1136562.36 | 9.25 | 588.54 |
| MW-6 | 595.51 | 1028293.24 | 1136889.98 | 6.84 | 588.67 |
| MW-7A | 596.59 | 1028379.67 | 1136889.32 | 6.56 | 590.03 |
| MW-7B | 596.66 | 1028377.01 | 1136884.33 | 7.49 | 589.17 |
| MW-8 | 599.63 | 1028584.29 | 1136897.91 | 10.04 | 589.59 |
| MW-10A | 596.87 | 1028134.19 | 1136571.96 | 8.82 | 588.05 |
| MW-10B | 596.71 | 1028129.79 | 1136571.87 | 8.19 | 588.52 |
| MW-11A | 595.48 | 1027992.43 | 1136576.28 | 8.07 | 587.41 |
| MW-11B | 595.57 | 1027996.44 | 1136575.71 | 7.77 | 587.80 |

Table 2
Water Level Measurements
Fall 2021 Monitoring Event
Former Carborundum Company, Hyde Park Facility
Niagara, New York

| Well ID | Elevation Top of Casing | Easting | Northing | 12/3/2021 Depth to Water | 12/3/2021 Groundwater Elevation |
|---|---|---|---|---|---|
| MW-12A[1] | 590.79 | 1027887.31 | 1136654.88 | NA | NA |
| MW-12B | 590.89 | 1027886.62 | 1136658.22 | 2.31 | 588.58 |
| MW-13A | 595.18 | 1028202.92 | 1136517.75 | 7.09 | 588.09 |
| MW-13B | 594.73 | 1028199.59 | 1136517.64 | 6.62 | 588.11 |
| MW-14A | 592.97 | 1027954.11 | 1136524.76 | 7.13 | 585.84 |
| MW-14B | 592.85 | 1027951.17 | 1136524.55 | 4.49 | 588.36 |
| MW-15[2] | 591.44 | 1027851.99 | 1136475.97 | NA | NA |
| MW-16A | 591.64 | 1028415.02 | 1136829.41 | 2.59 | 589.05 |
| MW-16B | 592.38 | 1028414.66 | 1136826.44 | 2.78 | 589.60 |
| MW-17A | 593.13 | 1028319.92 | 1136765.00 | 2.99 | 590.14 |
| MW-17B | 592.92 | 1028319.47 | 1136763.41 | 4.21 | 588.71 |
| MW-18A | 593.78 | 1028377.39 | 1136661.13 | 4.71 | 589.07 |
| MW-18B | 593.43 | 1028375.07 | 1136659.79 | 4.77 | 588.66 |
| MW-19A | 594.95 | 1028610.90 | 1136747.48 | 5.09 | 589.86 |
| MW-19B | 594.65 | 1028611.64 | 1136749.89 | 5.05 | 589.60 |

Note:
NA - Not Available.
1. Well MW-12A discovered destroyed during Fall 2019 sampling event.
2. MW-15 is to be sampled every 5 years in accordance with NYSDEC approval on April 8, 2014 and is to be sampled next in 2023. A water level will be obtained at that time.

# Table 4
# Nature and Extent of On-Site Soil and Groundwater Contamination
# Former Carborundum Company, Hyde Park Facility
# Niagara, New York
# October 2000

| Media | Contaminants of Concern | | CAS No. | Concentration Range Detected (ppb)[a] | SCG[b] (ppb)[a] | Frequency of Exceeding SCG |
|---|---|---|---|---|---|---|
| Groundwater | Volatile Organic Compounds (VOCs) | trichloroethene | 79-01-6 | ND[c] - 8,700 | 5 | 10 of 51 |
| | | 1,2-dichloroethene (total) | 156-59-2 (cis);<br>156-60-5 (trans) | ND[c] - 5,206 J | 5 | 37 of 51 |
| | | vinyl chloride | 75-01-4 | ND[c] -1,300 | 2 | 27 of 51 |
| | | benzene | 71-43-2 | ND[c] -4 J | 0.7[d] | 2 of 51 |
| | | 1,1,-dichloroethane | 75-34-3 | ND[c] - 1,500 J | 5 | 3 of 51 |
| Soils* | Volatile Organic Compounds (VOCs) | trichloroethene | 79-01-6 | ND[c] - 300,000 J | 880 | 8 of 75 |
| | | 1,2-dichloroethene | 156-59-2 (cis);<br>156-60-5 (trans) | ND[c] - 37,000 | 410 | 8 of 75 |
| | | vinyl chloride | 75-01-4 | ND[c] - 400 J | 200 | 1 of 75 |
| | | toluene | 108-88-3 | ND[c] - 84,000 J | 2,100 | 2 of 75 |
| | | acetone | 67-64-1 | ND[c] - 6,100 | 200 | 2 of 75 |
| | | ethylbenzene | 100-41-4 | ND[c] - 90,000 J | 7,700 | 1 of 75 |
| | | xylene | 1330-20-7 | ND[c] - 400,000 J | 1,680 | 4 of 65 |
| | Polycyclic Aromatic Hydrocarbons (PAHs) | benzo(a)anthracene | 56-55-3 | ND[c] - 35,000 J | 224 | 4 of 26 |
| | | benzo(b)fluoranthene | 205-99-2 | ND[c] - 64,500 J | 1,500 | 2 of 26 |
| | | benzo(a)pyrene | 50-32-8 | ND[c] - 24,000 J | 61 | 3 of 26 |
| | | phenanthrene | 85-01-8 | ND[c] - 62,000 J | 50,000 | 1 of 26 |
| | | pyrene | 129-00-0 | ND[c] - 54,000 J | 50,000 | 1 of 26 |
| | | chrysene | 218-01-9 | ND[c] - 28,000 J | 560 | 4 of 26 |
| | | benzo(k)fluoranthene | 207-08-9 | ND[c] - 66,000 J | 1,500 | 2 of 26 |
| | | indeno(1,2,3-cd)pyrene | 193-39-5 | ND[c] - 8,200 J | 4,480 | 2 of 26 |

[a] ppb = parts per billion, which is equivalent to micrograms per liter, µg/L, in water and micrograms per kilogram, µg/kg in soil;

[b] SCG = standards, criteria, and guidance values;

[c] ND = Not Detected

[d] Groundwater SCGs are based on NYSDEC TOGS 1.1.1. except for benzene which at the time of the ROD, was not listed in TOGS 1.1.1.

0.7 µg/L is from NYSDEC(1991) (6NYCRR Part 703) and is more stringent than the current TOGS 1.1.1 benzene value of 1 µg/L

J - indicates an estimated value

*Pre-IRM Sampling, only two areas of soil media in OU1 exceeded SCGs at depth after IRM work.

Soil SCGs are based on the NYSDEC "Technical and Administrative Guidance Memorandum (TAGM 4046); Determination of Soil Cleanup Objectives and Cleanup Levels". Site specific soil cleanup objectives and cleanup levels, based on soil carbon content, were calculated using the procedure found in TAGM 4046. Through laboratory analysis, the carbon content of OU1 soils was determined to be 1.4%, compared to the TAGM default value of 1.0%. Based on these findings, site specific soil cleanup objectives for the OU1 IRM were calculated and are provided in Appendix E.

Source: NYSDEC, October 2000. Record of Decision, Carborundum Globar Site, Town of Niagara, Niagara County, Site Number 9-32-036, Operable Units One and Two.

# Table 5
# Nature and Extent of Off-Site Soil Contamination
# Former Carborundum Company, Hyde Park Facility
# Niagara, New York
# August 2001

| Subsurface Soil | Contaminants of Concern | Concentration Range Detected (ppm)[a] | SCG[b] (ppm)[a] | Frequency of Exceeding SCG |
|---|---|---|---|---|
| Volatile Organic Compounds (VOCs) | Trichloroethene | ND[c]- 21.0 | 0.88 | 2 of 40 |
| | 1,2-Dichloroethene | ND[c]- 0.79 | 0.41 | 2 of 40 |

[a] ppb = parts per billion, which is equivalent to micrograms per liter, ug/L, in water;

ppm = parts per million, which is equivalent to milligrams per kilogram, mg/kg, in soil;

[b] SCG = standards, criteria, and guidance values;

[c] ND = Not Detected

Soil SCGs are based on the NYSDEC "Technical and Administrative Guidance Memorandum (TAGM 4046); Determination of Soil Cleanup Objectives and Cleanup Levels". Site specific soil cleanup objectives and cleanup levels, based on soil carbon content, were calculated using the procedure found in TAGM 4046. Through laboratory analysis, the carbon content of OU3 soils was determined to be 1.4%, compared to the TAGM default value of 1.0%. Based on these Findings, site specific soil cleanup objectives for the OU3 IRM were calculated and are provided in Appendix E. (ROD for OU3, NYSDEC August 2004)

Source: NYSDEC, August 2004. Record of Decision, Carborundum Globar Site, Town of Niagara, Niagara County, Site Number 9-32-036, Unit No. 3.

# TABLE 6
# Summary of Analytical Results
# Soil Vapor Sampling
# Former Carborundum Company, Hyde Park Facility
# Niagara, New York

| Hyde Park Facility | | Field Location | VP-1 | VP-2 | VP-4 | VP-5 | VA-1 | VA-2 | VP-3 | A-1 |
|---|---|---|---|---|---|---|---|---|---|---|
| Soil Vapor Analytical Results | | Field Sample | C-1002 | C-1022 | C-1026 | C-1012 | C-1007 | C-1004 | C-1026 | C-1002 |
| Town of Niagara, NY | | Source: | Paradigm | Paradigm | Paradigm | Paradigm | Paradigm | Paradigm | Paradigm | Paradigm |
| March and July 2007 | | Analysis | TO-15 | TO-15 | TO-15 | TO-15 | TO-15 | TO-15 | TO-15 | TO-15 |
| | | Matrix: | Vapor | Vapor | Vapor | Vapor | Vapor | Vapor | Vapor | Vapor |
| | | Sampled: | 3/8/07 | 3/8/07 | 3/8/07 | 3/9/07 | 3/8/07 | 3/9/07 | 7/26/07 | 7/26/07 |
| CAS NO. | COMPOUND | UNITS: | | | | | | | | |
| | VOLATILES | | | | | | | | | |
| 75-01-4 | vinyl chloride | $ug/m^3$ | ND <1.00 | ND <1.00 | ND <1.00 | ND <1.01 | ND <1.00 | ND <1.00 | ND <1.00 | ND <1.00 |
| 75-35-4 | 1,1-dichloroethane | $ug/m^3$ | ND <1.00 | ND <1.00 | ND <1.00 | ND <1.60 | ND <1.00 | ND <1.00 | ND <1.00 | ND <1.00 |
| 156-60-5 | trans-1,2-dichloroethene | $ug/m^3$ | ND <1.00 | ND <1.00 | ND <1.00 | ND <1.57 | ND <1.00 | ND <1.00 | ND <1.00 | ND <1.00 |
| 156-59-2 | cis-1,2-dichloroethene | $ug/m^3$ | ND <1.00 | ND <1.00 | ND <1.00 | ND <1.57 | 1.83 | ND <1.00 | ND <1.00 | ND <1.00 |
| 79-01-6 | trichloroethene | $ug/m^3$ | 4.5 | ND <1.000 | ND <1.000 | ND <1.00 | 1.14 | ND <1.000 | ND <1.00 | ND <1.00 |

Note: VP-1 through VP-5 are soil vapor samples. VA-1, VA-2, and A-1 are ambient outdoor air samples.

Sources: Parsons, July 2007. Addendum to Results of Soil Vapor Intrusion Assessment, Former Carborundum Company, 3425 Hyde Park Blvd. Town of Niagara, Niagara County, New York.

## Table 7
## Verification Sampling Result Exceedences - May-August 1999
## Former Carborundum Company, Hyde Park Facility
## Niagara, New York

| | | | | Areas 1A and 1C | | | | | | | | Areas 1D, 1D-extension, and 2C | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Subsurface Soil | Contaminants of Concern | Clean-up Objective (µg/kg) | Action Level (µg/kg) | 1AVS005 | 1AVS010 | 1AVS078 | 1AVS079 | 1AVS137 | 1AVS138 | 1AVS208 | 1AVS209 | 1DVS213 | 1DVS216 | 1DVS220 | 2CVS176<br>A615-17(split)[3]<br>2CVS177(dup)[3] | 2CVS179 | 2CVS180 | 2CVS182 | 2CVS183<br>A615-19(split)[2] | 2CVS189<br>2CVS193(dup)[1] | 2DVS241 |
| Volatile Organic Compounds (VOCs) | Trichloroethene | 880 | 64,000 | 200 D | 39 | 330 | 450 | 210 | 120 | 19,000 D | 67 | 44 J | 16 J | 1, 500 D | 600 JD | 980 | 590 | 330 | 37 J | 1,150 D | 21 J |
| | 1,2-Dichloroethene (total) | 410 | $2.8x10^6$ | ND | ND | ND | ND | ND | ND | 39 J | ND | 340 | 410 | 350 | 2,060 JD | 2,700 D | 590 | 520 | 555 D | 1,100 JD | 420 |
| | Acetone | 200 | $8x10^6$ | 11 J | 50 | 92 | 100 | 19 JB | 24 JB | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| | Vinyl Chloride | 200 | 360 | ND | ND | ND | ND | ND | ND | ND | ND | 810 | 230 | ND | 60 J | 25 J | ND | ND | 38 J | ND | ND |
| | Xylenes (total) | 1,680 | $2x10^8$ | ND | 1 J | ND | ND | ND | ND | ND | ND | 32 J | 280 | 31 J | 1 J | ND | ND | ND | 5 J | 3 J | ND |
| | Ethylbenzene | 7,700 | $8x10^6$ | ND | ND | ND | ND | ND | ND | ND | ND | 350 | 720 | 24 J | 1 J | ND | ND | ND | 42 J | 81 | ND |
| | Toluene | 2,100 | $20x10^6$ | ND | 2 J | ND | ND | ND | ND | ND | ND | 81 | 82 | ND | 1 J | ND | ND | ND | 2 J | 9 J | ND |
| | Methylene Chloride | 150 | 93,000 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | 3 JB | ND | ND | ND | 5 JB | ND | ND |
| Polycyclic Aromatic Hydrocarbons (PAHs) | Acenaphthylene | 57,600 | -- | 1,200 | ND | ND | ND | ND | ND | 56 J | ND | | | | | | | | | | |
| | Anthracene | 50,000 | -- | 3,300 | 640 | 2,200 | 360 J | 1,800 | 9,700 | 1,900 J | 300 J | | | | | | | | | | |
| | Benzo(a)anthracene | 3,860 | -- | 14,000 | 2,500 | 6,900 D | 1,200 | 8,900 D | 34,000 D | 12,000 D | 4,100 D | | | | | | | | | | |
| | Benzo(a)pyrene | 15,400 | -- | 16,000 | 3,200 | 7,400 D | 1,300 | 14,000 D | 53,000 D | 20,000 JD | 11,000 JD | | | | | | | | | | |
| | Benzo(b)fluoranthene | 1,500 | -- | 25,000 D | 3,500 D | 8,700 D | 1,900 | 19,000 D | 74,000 D | 21,000 JD | 7,100 JD | | | | | | | | | | |
| | Benzo(k)fluoranthene | 1,500 | -- | 6,600 | 1,200 | 2,700 | 530 | 4,500 | 13,000 | 5,000 JD | 1,700 J | | | | | | | | | | |
| | Chrysene | 560 | -- | 13,000 | 2,500 | 7,400 D | 1,300 | 9,200 D | 35,000 D | 13,000 D | 4,300 D | | | | | | | | | | |
| | Dibenz(a,h)anthracene | 14 | -- | 2,300 | 670 J | 750 | 150 J | 2,100 | 7,700 | 3,900 JD | 2,500 JD | | | | | | | | | | |
| | Fluoranthene | 50,000 | -- | 38,000 D | 4,900 D | 12,000 D | 2,100 | 16,000 D | 61,000 D | 15,000 D | 1,900 J | | | | | | | | | | |
| | Fluorene | 50,000 | -- | 1,700 J | 260 J | 1,100 | 170 J | 440 J | 4,300 | 760 J | 110 J | | | | | | | | | | |
| | Indeno(1,2,3-cd)pyrene | 4,480 | -- | 9,600 | 2,100 | 2,600 | 520 | 6,400 D | 27,000 D | 10,000 JD | 3,900 JD | | | | | | | | | | |
| | Naphthalene | 18,200 | -- | 2,000 J | 230 J | 2,000 | 340 J | 390 J | 6,500 | 370 J | 96 J | | | | | | | | | | |
| | Phenanthrene | 50,000 | -- | 24,000 D | 3,200 | 10,000 D | 1,600 | 7,600 D | 42,000 D | 9,000 D | 1,600 J | | | | | | | | | | |
| | Pyrene | 50,000 | -- | 25,000 D | 3,800 D | 16,000 D | 2,600 | 15,000 D | 57,000 D | 15,000 D | 3,500 D | | | | | | | | | | |
| | Total PAHs | 25,000 | -- | 181,700 | 28,700 | 79,750 | 14,070 | 105,330 | 424,200 | 126,986 | 42,106 | | | | | | | | | | |

1 - The results reported are the average of the sample and duplicate.

2 - The results reported are the average of the DE&S verification sample and the NYSDEC split sample.

3 - The results reported are the average of all three samples.

4 - The following locations from area 2A were potentially addressed with the additional OU3 onsite excavation in December 2002: ASVS042, 2AVS043, 2AVS052, 2AVS053, 2AVS093, 2AVS094, 2AVS095, 2AVS096, 2AVS097, 2AVS098

J - Indicates an estimated value. Compound meets identification criteria and is less than the specific detection limit but greater than zero.

B - Indicates that the analyte was found in both the sample and its associated laboratory blank. Possible/probable blank contamination.

D - Indicates compound identified in an analysis at a secondary dilution factor.

ND - Not Detected

µg/kg = microgram per kilogram = ppb

| | |
|---|---|
| 350 D | Shaded concentrations indicate an exceedance of the clean-up objective |
| **350 D** | Bold concentrations indicate an exceedance of the action level |

Source: DE&S, December 1999. Execution of the Interim Remedial Measure for the Former Carborundum Company Volumes I & II - Electric Products Division, Hyde Park Facility, Town of Niagara, Niagara County, New York, Site No. 932036.

# Table 7
## Verification Sampling Result Exceedences - May-August 1999
## Former Carborundum Company, Hyde Park Facility
## Niagara, New York

| | | | | Areas 2A and 2E | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Subsurface Soil | Contaminants of Concern | Clean-up Objective (µg/kg) | Action Level (µg/kg) | 2AVS042[4] | 2AVS043[4] | 2AVS052 | 2AVS053[4] | 2AVS092 | 2AVS093[4] | 2AVS094[4] | 2AVS095[4] | 2AVS096[4] | 2AVS097[4] | 2AVS098[4] | 2AVS125 | 2AVS127 | 2AVS133 | 2AVS134 | 2AVS135<br>2AVS136(dup)[1] | 2AVS255<br>A615-27(split)[2] |
| Volatile Organic Compounds (VOCs) | Trichloroethene | 880 | 64,000 | 2,000 D | 11,000 D | 14,000 | 800 | 3,400 D | 19,000 D | 2,400 D | 180 J | 590 | 1,100 | 5,600 D | 1,000 | 260 | 870 | 220 | 72 J | 2,190 D |
| | 1,2-Dichloroethene (total) | 410 | $2.8x10^6$ | 4,400 D | 24,000 D | 250 | 590 | 370 | 780 D | 2,400 D | 2,500 D | 4,500 D | 59 J | 180 | 92 | 440 | 620 | 730 | 675 JD | 81 |
| | Acetone | 200 | $8x10^6$ | 20 J | 120 B | 200 B | 29 JB | ND | 310 | 95 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| | Vinyl Chloride | 200 | 360 | 110 | 1,100 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | 17 J | ND | 41 J | 30 | 9 J |
| | Xylenes (total) | 1,680 | $2x10^8$ | 620 | 8,600 D | 180 | ND | ND | 240 | 350 | 300 J | 14 J | ND | ND | 43 J | 8 J | 64 | ND | ND | 2 J |
| | Ethylbenzene | 7,700 | $8x10^6$ | 230 | 2,700 D | 29 J | ND | ND | 53 J | 340 | 94 J | 9 J | ND | ND | 6 J | ND | 9 J | ND | ND | ND |
| | Toluene | 2,100 | $20x10^6$ | 480 | 4,200 D | 300 | ND | 100 | 2,400 D | 140 | 11 J | 240 | ND | ND | 9 J | ND | 13 J | ND | ND | 2 J |
| | Methylene Chloride | 150 | 93,000 | ND | ND | ND | ND | ND | 8 J | ND | ND | ND | ND | ND | ND | ND | 6 J | 6 J | 6 J | 5 BJ |
| Polycyclic Aromatic Hydrocarbons (PAHs) | Acenaphthylene | 57,600 | -- | | | | | | | | | | | | | | | | | |
| | Anthracene | 50,000 | -- | | | | | | | | | | | | | | | | | |
| | Benzo(a)anthracene | 3,860 | -- | | | | | | | | | | | | | | | | | |
| | Benzo(a)pyrene | 15,400 | -- | | | | | | | | | | | | | | | | | |
| | Benzo(b)fluoranthene | 1,500 | -- | | | | | | | | | | | | | | | | | |
| | Benzo(k)fluoranthene | 1,500 | -- | | | | | | | | | | | | | | | | | |
| | Chrysene | 560 | -- | | | | | | | | | | | | | | | | | |
| | Dibenz(a,h)anthracene | 14 | -- | | | | | | | | | | | | | | | | | |
| | Fluoranthene | 50,000 | -- | | | | | | | | | | | | | | | | | |
| | Fluorene | 50,000 | -- | | | | | | | | | | | | | | | | | |
| | Indeno(1,2,3-cd)pyrene | 4,480 | -- | | | | | | | | | | | | | | | | | |
| | Naphthalene | 18,200 | -- | | | | | | | | | | | | | | | | | |
| | Phenanthrene | 50,000 | -- | | | | | | | | | | | | | | | | | |
| | Pyrene | 50,000 | -- | | | | | | | | | | | | | | | | | |
| | Total PAHs | 25,000 | -- | | | | | | | | | | | | | | | | | |

1 - The results reported are the average of the sample and duplicate.

2 - The results reported are the average of the DE&S verification sample and the NYSDEC split sample.

3 - The results reported are the average of all three samples.

4 - The following locations from area 2A were potentially addressed with the additional OU3 onsite excavation in December 2002: ASVS042, 2AVS043, 2AVS052, 2AVS053, 2AVS093, 2AVS094, 2AVS095, 2AVS096, 2AVS097, 2AVS098

J - Indicates an estimated value. Compound meets identification criteria and is less than the specific detection limit but greater than zero.

B - Indicates that the analyte was found in both the sample and its associated laboratory blank. Possible/probable blank contamination.

D - Indicates compound identified in an analysis at a secondary dilution factor.

ND - Not Detected

µg/kg = microgram per kilogram = ppb

| | |
|---|---|
| 350 D | Shaded concentrations indicate an exceedance of the clean-up objective |
| **350 D** | Bold concentrations indicate an exceedance of the action level |

Source: DE&S, December 1999. Execution of the Interim Remedial Measure for the Former Carborundum Company Volumes I & II - Electric Products Division, Hyde Park Facility, Town of Niagara, Niagara County, New York, Site No. 932036.

# Table 8
# Verification Sampling Result Exceedance - December 2002
# Former Carborundum Company, Hyde Park Facility
# Niagara, New York

| Subsurface Soil | Contaminants of Concern | Clean-up Objective (µg/kg) | Action Level (µg/kg) | OU3IRMSVS18 | OU3IRMSVS19 (dup) | OU3IRMVS21 |
|---|---|---|---|---|---|---|
| Volatile Organic Compounds (VOCs) | Trichloroethene | 880 | 64,000 | 10,000 J | 5,300 J | 7,900 D |
| | 1,2-Dichloroethene (total) | 410 | 2.8x10$^{6}$ | 4,600 | 4,700 | 640 D |
| | Acetone | 200 | 8x10$^{6}$ | <1,250 | <1,250 | <10 UJ |
| | Vinyl Chloride | 200 | 360 | <1,250 | <1,250 | 4 J |
| | Xylenes (total) | 1,680 | 2x10$^{8}$ | <625 | <625 | <5 |
| | Ethylbenzene | 7,700 | 8x10$^{6}$ | <625 | <625 | <5 |
| | Toluene | 2,100 | 20x10$^{6}$ | 450 J | <625 | <5 |
| | Methylene Chloride | 150 | 93,000 | <625 | <625 | 4 BJ |

UJ - Indicates the analyte was not detected above the reported sample quantitation limit and the quantitation limit is approximate.
J - Indicates an estimated value. Compound meets identification criteria and is less than the specific detection limit but greater than zero.
B - Indicates that the analyte was found in both the sample and its associated laboratory blank. Possible/probable blank contamination.
D - Indicates compound identified in an analysis at a secondary dilution factor.
<5 - Indicates not detected above laboratory detection limit.
350 D Shaded concentrations indicate an exceedance of the clean-up objective

Source: INTERA, January 2004. Execution of the Interim Remedial Measure Addendum for the Former Carborundum Company - Electric Products Division, Hyde Park Facility, Town of Niagara, Niagara County, New York, Site No. 932036, Final Document.

## Table 9
## Monitoring Well Groundwater Analytical Result Summary - Fall 2021
## Former Carborundum Company, Hyde Park Facility
## Niagara, New York

| Parameter | Criteria(1) | MW- 5A | MW- 5B | MW- 6 | MW- 7A | MW- 7B | MW-10A | MW-10B | MW-12B | MW-13B |
|---|---|---|---|---|---|---|---|---|---|---|
| Valatile Organic Compounds | | | | | | | | | | |
| PCE (µg/L) | 5 | 1.0 U | 2.0 U | 2.0 U | 4.0 U | 1.0 U | 25 U | 10 U | 1.0 UJ | 2.0 U |
| TCE (µg/L) | 5 | 1.0 U | 2.0 U | 2.0 U | 7.3 | 1.0 U | 13 J | 10 U | 1.0 UJ | 2.0 U |
| Cis-1,2-DCE (µg/L) | 5 | 52 | 40 | 13 | 150 | 1.5 | 650 | 220 | 73 J- | 3.7 |
| Trans-1,2-DCE (µg/L) | 5 | 1.0 U | 2.0 U | 2.0 U | 4.0 U | 1.0 U | 25 U | 10 U | 1.0 UJ | 2.0 U |
| 1,1-DCE (µg/L) | 5 | 1.0 U | 2.0 U | 2.0 U | 4.0 U | 1.0 U | 25 U | 10 U | 1.0 UJ | 2.0 U |
| Vinyl Chloride (µg/L) | 2 | 62 | 140 | 98 | 150 | 18 | 180 | 370 | 49 DJ- | 6.4 |
| 1,1,1-Trichloroethane (µg/L) | 5 | 1.0 U | 2.0 U | 2.0 U | 4.0 U | 1.0 U | 25 U | 10 U | 1.0 UJ | 2.0 U |
| 1,1-Dichloroethane (µg/L) | 5 | 1 | 2.0 U | 2.0 U | 90 | 1.0 U | 25 U | 10 U | 0.4 J- | 2.0 U |
| Chloroethane (µg/L) | 5 | 0.60 J | 2.0 U | 2.0 U | 16 | 1.0 U | 25 U | 10 U | 1.0 UJ | 2.0 U |
| Dissolved Metals | | | | | | | | | | |
| Dissolved Iron (mg/L) | -- | 0.05 U | 0.24 | NA | 1.5 | 0.05 U | 1.4 | 0.33 | 0.048 J | NA |
| Dissolved Gases | | | | | | | | | | |
| Ethane (µg/L) | -- | 7.2 J | 7.5 U | NA | 170 U | 7.5 U | 7.5 U | 170 U | 7.5 U | NA |
| Ethene (µg/L) | -- | 7.1 | 2.4 J | NA | 150 U | 7.0 U | 14 | 150 U | 4.1 J | NA |
| Methane (µg/L) | -- | 470 | 300 | NA | 13000 | 160 | 880 | 1900 | 330 | NA |
| Miscellaneous Parameters | | | | | | | | | | |
| BOD (mg/L) | -- | 2.0 U | 2.0 U | NA | 7.9 | 2.0 U | 2.0 U | 2.0 U | 2.0 U | NA |
| COD (mg/L) | -- | 17 | 35 | NA | 36 | 10 U | 26 | 40 | 100 | NA |
| TOC (mg/L) | -- | 1.5 | 4.5 | NA | 14 | 4.6 | 2 | 4.6 | 6.3 | NA |
| Chloride (mg/L) | 250 | 76 | 120 | NA | 14 | 240 | 220 | 140 | 77 | NA |
| Sulfate (mg/L) | 250 | 87 | 230 | NA | 89 | 200 | 150 | 220 | 72 | NA |
| Sulfide (mg/L) | 0.05 | 1.0 U | 1.0 U | NA | 0.8 J | 0.8 J | 1.0 U | 1.0 U | 1.0 U | NA |
| Nitrate (mg/L) | 10 | 0.47 | 0.25 U | NA | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.24 | NA |
| Nitrite (mg/L) | 1 | 0.10 U | 0.25 U | NA | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.050 U | NA |
| Nitrate-Nitrite (mg/L) | | 0.050 U | 0.050 U | NA | 0.050 U | 0.050 U | 0.050 UJ | 0.25 J | 0.23 | NA |

See Page 2 of 2 for notes.

## Table 9
## Monitoring Well Groundwater Analytical Result Summary - Fall 2021
## Former Carborundum Company, Hyde Park Facility
## Niagara, New York

| Parameter | Criteria(1) | MW-14B | MW-16A | MW-16B | MW-17A | MW-17B | MW-18A | MW-18B | MW-19B | MW-5B (Duplicate) |
|---|---|---|---|---|---|---|---|---|---|---|
| Valatile Organic Compounds | | | | | | | | | | |
| PCE (μg/L) | 5 | 1.0 U | 5.0 U | 1.0 U | 4.0 U | 4.0 U | 1.0 UJ | 2.0 U | 1.0 U | 2.0 U |
| TCE (μg/L) | 5 | 1.0 U | 5.0 U | 1.0 U | 4.0 U | 4.0 U | 23 J- | 2.0 U | 1.0 U | 2.0 U |
| Cis-1,2-DCE (μg/L) | 5 | 1.0 U | 8.2 | 2.1 | 48 | 31 | 43 J- | 47 | 1.8 | 39 |
| Trans-1,2-DCE (μg/L) | 5 | 1.0 U | 5.0 U | 1.0 U | 4.0 U | 4.0 U | 1.0 UJ | 2.0 U | 1.0 U | 2.0 U |
| 1,1-DCE (μg/L) | 5 | 1.0 U | 5.0 U | 1.0 U | 4.0 U | 4.0 U | 0.49 J- | 2.0 U | 1.0 U | 2.0 U |
| Vinyl Chloride (μg/L) | 2 | 1.9 | 260 | 6.5 | 110 | 20 | 2.3 J- | 80 | 1.5 | 130 |
| 1,1,1-Trichloroethane (μg/L) | 5 | 1.0 U | 5.0 U | 1.0 U | 4.0 U | 4.0 U | 1.0 UJ | 2.0 U | 1.0 U | 2.0 U |
| 1,1-Dichloroethane (μg/L) | 5 | 1.0 U | 5.0 U | 1.0 U | 13 | 7.3 | 3.3 J- | 2.0 U | 1.0 U | 2.0 U |
| Chloroethane (μg/L) | 5 | 1.0 U | 5.0 U | 1.0 U | 4.0 U | 2.9 J | 1.0 UJ | 2.0 U | 1.0 U | 2.0 U |
| Dissolved Metals | | | | | | | | | | |
| Dissolved Iron (mg/L) | -- | NA | 0.024 J | 0.54 | 0.69 | 0.94 | 1.4 | 0.32 | NA | 0.22 |
| Dissolved Gases | | | | | | | | | | |
| Ethane (μg/L) | -- | NA | 7.5 U | 170 U | 9.4 | 170 U | 7.5 U | 170 U | NA | 7.5 U |
| Ethene (μg/L) | -- | NA | 77 | 150 U | 14 | 150 U | 7.0 U | 150 U | NA | 2.4 J |
| Methane (μg/L) | -- | NA | 160 | 8000 | 12000 | 26000 | 4000 | 13000 | NA | 300 |
| Miscellaneous Parameters | | | | | | | | | | |
| BOD (mg/L) | -- | NA | 2.0 U | 6.4 | 6.0 U | 16 | 2.0 U | 14 | NA | 2.0 U |
| COD (mg/L) | -- | NA | 52 | 16 | 52 | 13 | 45 | 39 | NA | 33 |
| TOC (mg/L) | -- | NA | 11 | 7.2 | 4.1 | 12 | 2.2 | 6 | NA | 4.6 |
| Chloride (mg/L) | 250 | NA | 190 | 130 | 32 | 130 | 53 | 98 | NA | 120 |
| Sulfate (mg/L) | 250 | NA | 930 | 230 | 55 | 90 | 120 | 190 | NA | 230 |
| Sulfide (mg/L) | 0.05 | NA | 1.0 U | 4.8 | 1.0 U | 5.6 | 1.0 U | 8 | NA | 1.0 U |
| Nitrate (mg/L) | 10 | NA | 0.42 | 0.050 U | 0.25 U | 0.25 U | 0.050 U | 0.050 U | NA | 0.25 U |
| Nitrite (mg/L)2 | 1 | NA | 0.050 U | 0.050 U | 0.25 U | 0.25 U | 0.050 U | 0.050 U | NA | 0.25 U |
| Nitrate-Nitrite (mg/L) | | NA | 0.22 | 0.050 U | 0.050 U | 0.034 J | 0.050 U | 0.029 J | NA | 0.050 U |

Notes:

(1) NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations, April 2000, Glass GA.

(2) Bold concentrations exceed criteria.

J = The reported concentration is an estimated value.
J- = The reported concentration is an estmated value biased low.
D = Result reported from a secondary dilution analysis.
U = Not detected above the reporting limit.
UJ = Not detected. The reporting limit is an estimated value.
NA - Not Analyzed

μg/L - micrograms per liter
mg/L - milligrams per liter
PCE - tetrachlorethene
TCE- trichloroethene
DCE - dichloroethene

BOD - biological oxygen demand
COD - chemical oxygen demand
TOC - total organic carbon

# Table 10

## Analytical Results
## Emerging Contaminants Groundwater Sampling Results
## Former Carborundum Company, Globar (Hyde Park Facility) Site
## NYSDEC Registry Site No. 932036

| Group | Method/Parameter | Standard/ Drinking Water Health Advisory | Guidance Values NYSDEC 2023 TOGS 1.1.1 Addendum [3] | Units | MW-08 (10/4/18) | MW-11B (10/5/18) | MW-17B (10/4/18) | Ambient Blank (10/4/18) | EB-100418 (10/4/18) |
|---|---|---|---|---|---|---|---|---|---|
| | **SW846-8260C SIM** | | | | | | | | |
| | 1,4-Dioxane | 5[1] | 0.35 | ug/L | 0.61 | 0.83 | **1.50** | NS | 0.099 U |
| Group | **EPA 537 Modified, Perfluorinated Alkyl Acids (PFOAs)** | | | | | | | | |
| Perfluoroalkyl sultonates | Perfluorobutanesulfonic acid (PFBS) | NA | NA | ng/L | 0.41 J | 0.19 U | 0.18 U | 0.17 U | 0.18 U |
| | Perfluorohexanesulfonic acid (PFHxS) | NA | NA | ng/L | 1.8 U | 1.9 U | 1.8 U | 0.25 J | 0.25 J |
| | Perfluoroheptanesulfonic Acid (PFHpS) | NA | NA | ng/L | 0.17 U | 0.19 U | 0.18 U | 0.16 U | 0.17 U |
| | Perfluorooctanesulfonic acid (PFOS) | 70[2] | 2.7 | ng/L | 0.49 U | 0.53 U | 0.50 U | 0.45 U | 0.47 U |
| | Perfluorodecanesulfonic acid (PFDS) | NA | NA | ng/L | 0.29 U | 0.31 U | 0.30 U | 0.27 U | 0.28 U |
| Perfluoroalkyl carboxylates | Perfluorobutanoic acid (PFBA) | NA | NA | ng/L | 7.9 | 5 | 6.5 | 0.29 U | 0.31 U |
| | Perfluoropentanoic acid (PFPeA) | NA | NA | ng/L | 5 | 0.48 U | 2.2 | 0.41 U | 0.43 U |
| | Perfluorohexanoic acid (PFHxA) | NA | NA | ng/L | 3.2 | 2.6 | 4.7 | 0.48 U | 0.51 U |
| | Perfluoroheptanoic acid (PFHpA) | NA | NA | ng/L | 0.56 J | 0.24 U | 0.82 J | 0.21 U | 0.22 U |
| | Perfluorooctanoic acid (PFOA) | 70[2] | 6.7 | ng/L | 1.2 J | 3.7 | **15** | 0.71 U | 0.75 U |
| | Perfluorononanoic acid (PFNA) | NA | NA | ng/L | 0.24 U | 0.26 U | 0.25 U | 0.29 J | 0.24 U |
| | Perfluorodecanoic acid (PFDA) | NA | NA | ng/L | 0.28 U | 0.30 U | 0.29 U | 0.26 U | 0.27 U |
| | Perfluoroundecanoic acid (PFUnA) | NA | NA | ng/L | 1.0 U | 1.1 U | 1.0 U | 0.92 U | 0.97 U |
| | Perfluorododecanoic acid(PFDoA) | NA | NA | ng/L | 0.5 U | 0.54 U | 0.51 U | 0.46 U | 0.48 U |
| | Perfluorotridecanoic acid (PFTriA) | NA | NA | ng/L | 1.2 U | 1.3 U | 1.2 U | 1.1 U | 1.1 U |
| | Perfluorotetradecanoic acid (PFTeA) | NA | NA | ng/L | 0.26 U | 0.28 U | 0.27 U | 0.24 U | 0.25 U |
| Fluorinated Telomer Sulfonates | 1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2) | NA | NA | ng/L | 1.8 U | 1.9 U | 1.8 U | 1.7 U | 1.8 U |
| | 1H,1H,2H,2H-perfluorodecanesulfonic acid (8:2) | NA | NA | ng/L | 1.8 U | 1.9 U | 1.8 U | 1.7 U | 1.8 U |
| Perfluorooctanesulfonamide | Perfluorooctanesulfonamide (PFOSA) | NA | NA | ng/L | 0.32 U | 0.34 U | 0.32 U | 0.29 U | 0.31 U |
| Perfluorooctanesulfonamidoacetic acids | N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA) | NA | NA | ng/L | 2.8 U | 3 U | 2.9 U | 2.6 U | 2.7 U |
| | N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA) | NA | NA | ng/L | 1.8 U | 1.9 U | 1.8 U | 1.6 U | 1.7 U |
| -- | Sum of PFOS AND PFOA concentrations | 70[2] | NA | ng/L | 1.2 | 3.7 | 15.0 | ND | ND |

**Notes:**

1 - Principal organic standard. NYSDEC Technical Operational and Guidance Series (TOGS) 1.1.1, Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations, June 1998.

2 - USEPA health advisory level (https://www.epa.gov/ground-water-and-drinking-water/drinking-water-health-advisories-pfoa-and-pfos).

3 - 2023 addendum to TOGS 1.1.1 for PFOA/PFOS and 1,4-dioxane (https://www.dec.ny.gov/chemical/122803.html).

ug/L - micrograms per liter (parts per billion)

ng/L - nanograms per liter (parts per trillion)

**Bold** - result exceeds the 2023 TOGS 1.1.1 addendum guidance value.

J - Result is less than the reporting limit (RL) but greater than or equal to the Method Detection Limit (MDL) and the concentration is an approximate value.

U - not detected above the method detection limit shown.

NS - Not sampled.

# Table 11
# Post Remediation Sampling Requirements and Schedule
## Hyde Park Site Management Plan
## Former Carborundum Company, Hyde Park Facility
## Niagara, New York

| Monitoring Well ID | Well Location | Unit | VOCs[A/] (SW8260C) | Methane, Ethane, Ethene (RSKSOP-175mod)(2) [B/] | Chloride (300.0) | Sulfate (300.0) | Total Organic Carbon (5310C) | BOD (5120B), | COD (410.4) | Dissolved Iron (6010C) | Nitrate (300.0, 353.2), Nitrite (300.0, 353.2) | Sulfide (SM 4500-S2) | Well Head Analysis [C/] | Field Analyses (Hach kits) [D/] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Existing Site Investigation Monitoring Wells in the Monitoring Program** | | | | | | | | | | | | | | |
| MW-5A | downgradient | overburden | X | X | X | X | X | X | X | X | X | X | X | X |
| MW-5B | downgradient | bedrock | X | X | X | X | X | X | X | X | X | X | X | X |
| MW-6 | source area | bedrock | X | | | | | | | | | | X | X |
| MW-7A | source area | overburden | X | X | X | X | X | X | X | X | X | X | X | X |
| MW-7B | source area | bedrock | X | X | X | X | X | X | X | X | X | X | X | X |
| MW-10A | downgradient | overburden | X | X | X | X | X | X | X | X | X | X | X | X |
| MW-10B | downgradient | bedrock | X | X | X | X | X | X | X | X | X | X | X | X |
| MW-12B | downgradient | bedrock | X | X | X | X | X | X | X | X | X | X | X | X |
| MW-13B | downgradient | bedrock | X | | | | | | | | | | X | X |
| MW-14B | downgradient | bedrock | X | | | | | | | | | | X | X |
| MW-15(1) | downgradient | bedrock | X | | | | | | | | | | X | X |
| MW-16A | source area | overburden | X | X | X | X | X | X | X | X | X | X | X | X |
| MW-16B | source area | bedrock | X | X | X | X | X | X | X | X | X | X | X | X |
| MW-17A | source area | overburden | X | X | X | X | X | X | X | X | X | X | X | X |
| MW-17B | source area | bedrock | X | X | X | X | X | X | X | X | X | X | X | X |
| MW-18A | downgradient | overburden | X | X | X | X | X | X | X | X | X | X | X | X |
| MW-18B | downgradient | bedrock | X | X | X | X | X | X | X | X | X | X | X | X |

**QA/QC**

Matrix spike/matrix spike duplicate pairs and field duplicates were collected at a rate of 5%.

Name field duplicates blind, using FD followed by the date followed by the matrix and a numerical identifier in sequence for each duplicate sample collected for that day (e.g., FD-GW-060322).

**Notes:**

(1) Sampling Schedule = Annual -alternating spring (even years)/fall (odd years) except for MW-15.

(2) MW-15 to be sampled every 5 years as approved by DEC in April 2014. Next sample event is in 2023.

Sampling for MW-15 requires permit from the Department of Transportation (DOT), Niagara County Residency (716) 438-2396.

[A/] VOCs (volatile organic compounds): tetrachloroethene, trichloroethene, cis-1,2-dichloroethene, trans-1,2- dichloroethene, 1,1-dichloroethene, 1,1-dichloroethane, 1-1-1-,trichloroethane, vinyl chloride, and chloroethane.

[B/] Analytical method for dissolved gases will be a laboratory-specific standard operating procedure (RSK-175).

[C/] Well head analyses include dissolved oxygen, oxidation-reduction potential, pH, temperature, electrical conductivity, turbidity and visual appearance.

[D/] Field analyses include alkalinity, carbon dioxide, hydrogen sulfide, and ferrous iron.

BOD - biological oxygen demand

COD - chemical oxygen demand

## Table 12
## Monitoring Well Construction Details
## Hyde Park Site Management Plan
## Former Carborundum Company, Hyde Park Facility
## Niagara, New York

| WELL ID | WELL TYPE | GEOLOGIC ZONE | COORDINATES (NORTHING) | COORDINATES (EASTING) | ESTABLISHED DATE | GROUND SURFACE ELEVATION (ft AMSL) | MEASURING POINT ELEVATION (ft AMSL) | Borehole Depth (ft bgs) | TOTAL WELL DEPTH (ft bgs) | WELL DIAMETER (inches) | TOP OF SCREEN DEPTH (ft) | BOTTOM OF SCREEN DEPTH (ft) | FLUSHMOUNT/ STICKUP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INJ- 1 | INJECTION | OVERBURDEN | 1136887.25 | 1028382.45 | 7/9/2008 | 593.90 | 596.66 | 26 | 25.6 | 2 | 10.5 | 25.6 | STICKUP |
| INJ- 2 | INJECTION | OVERBURDEN | 1136890.69 | 1028374.60 | 7/7/2008 | 594.19 | 595.89 | 26 | 26 | 2 | 10.7 | 26 | STICKUP |
| INJ- 3 | INJECTION | BEDROCK | 1136774.48 | 1028313.28 | 10/2/2009 | 593.25 | 592.87 | 32.5 | 32.1 | 4 | 26.5 | 32.1 | FLUSHMOUNT |
| INJ- 4 | INJECTION | BEDROCK | 1136771.29 | 1028332.65 | 10/2/2009 | 593.43 | 593.26 | 31.5 | 31.2 | 4 | 23.5 | 31.2 | FLUSHMOUNT |
| INJ- 5L | INJECTION | OVERBURDEN | 1136878.92 | 1028365.66 | 10/12/2011 | 593.50 | 596.00 | 24.5 | 24.5 | 1.5 | 19.5 | 24.5 | STICKUP |
| INJ- 5U | INJECTION | OVERBURDEN | 1136878.92 | 1028365.66 | 10/12/2011 | 593.50 | 596.08 | 24.5 | 17.6 | 1.5 | 12.5 | 17.6 | STICKUP |
| INJ- 6L | INJECTION | OVERBURDEN | 1136868.99 | 1028376.98 | 10/17/2011 | 593.40 | 595.97 | 24.5 | 24.5 | 1.5 | 20.5 | 24.5 | STICKUP |
| INJ- 6U | INJECTION | OVERBURDEN | 1136868.99 | 1028376.98 | 10/17/2011 | 593.40 | 595.96 | 24.5 | 16.5 | 1.5 | 11.5 | 16.5 | STICKUP |
| INJ- 7 | INJECTION | OVERBURDEN | 1136837.46 | 1028409.44 | 10/14/2011 | 593.04 | 592.76 | 19 | 19 | 1.5 | 14 | 19 | FLUSHMOUNT |
| INJ- 8 | INJECTION | OVERBURDEN | 1136832.59 | 1028418.16 | 10/18/2011 | 593.18 | 592.98 | 22 | 22 | 1.5 | 12 | 22 | FLUSHMOUNT |
| INJ- 9 | INJECTION | OVERBURDEN | 1136898.15 | 1028023.50 | 10/18/2011 | 591.90 | 591.62 | 20 | 20 | 1.5 | 15 | 20 | FLUSHMOUNT |
| INJ-10 | INJECTION | OVERBURDEN | 1136890.90 | 1028032.17 | 10/18/2011 | 591.92 | 591.49 | 20 | 20 | 1.5 | 15 | 20 | FLUSHMOUNT |
| MW- 1A | MONITORING WELL | OVERBURDEN | 1136554.99 | 1028606.44 | 8/7/1992 | 595.48 | 597.56 | 20.5 | 20.5 | 2 | 15.5 | 20.5 | STICKUP |
| MW- 1B | MONITORING WELL | BEDROCK | 1136554.66 | 1028611.01 | 8/6/1992 | 595.44 | 597.64 | 35.3 | 35.3 | 2 | 25.3 | 35.3 | STICKUP |
| MW- 2A | MONITORING WELL | OVERBURDEN | 1136881.61 | 1028335.27 | 7/29/1992 | 593.70 | 595.73 | 17.8 | 17.5 | 2 | 12.5 | 17.5 | STICKUP |
| MW- 2B | MONITORING WELL | BEDROCK | 1136888.34 | 1028337.09 | 8/3/1992 | 593.60 | 595.80 | 38.2 | 38.2 | 2 | 28.2 | 38.2 | STICKUP |
| MW- 3A | MONITORING WELL | OVERBURDEN | 1136895.86 | 1028627.22 | 8/5/1992 | 597.90 | 599.94 | 20 | 19.5 | 2 | 14.5 | 19.5 | STICKUP |
| MW- 3B | MONITORING WELL | BEDROCK | 1136899.80 | 1028624.57 | 8/5/1992 | 597.70 | 599.70 | 45.5 | 45.5 | 2 | 35.5 | 45.5 | STICKUP |
| MW- 4A | MONITORING WELL | OVERBURDEN | 1136890.77 | 1028027.77 | 8/12/1992 | 591.93 | 591.60 | 20 | 19 | 2 | 14 | 19 | FLUSHMOUNT |
| MW- 4B | MONITORING WELL | BEDROCK | 1136890.65 | 1028023.72 | 8/12/1992 | 591.90 | 591.49 | 34.5 | 34.5 | 2 | 24.5 | 34.5 | FLUSHMOUNT |
| MW- 5A | MONITORING WELL | OVERBURDEN | 1136567.66 | 1028256.93 | 8/14/1992 | 596.14 | 597.91 | 20 | 20 | 2 | 15 | 20 | STICKUP |
| MW- 5B | MONITORING WELL | BEDROCK | 1136562.36 | 1028256.86 | 8/13/1992 | 596.03 | 597.79 | 37.3 | 37.3 | 2 | 27.3 | 37.3 | STICKUP |
| MW- 6 | MONITORING WELL | BEDROCK | 1136889.98 | 1028293.24 | 5/6/1996 | 593.10 | 595.51 | 42 | 41.5 | 2 | 31.5 | 41.5 | STICKUP |
| MW- 7A | MONITORING WELL | OVERBURDEN | 1136889.32 | 1028379.67 | 5/3/1996 | 593.90 | 596.59 | 20 | 18.9 | 2 | 14 | 18.9 | STICKUP |
| MW- 7B | MONITORING WELL | BEDROCK | 1136884.33 | 1028377.01 | 5/3/1996 | 593.90 | 596.66 | 42 | 41 | 2 | 31 | 41 | STICKUP |
| MW- 8 | MONITORING WELL | BEDROCK | 1136897.91 | 1028584.29 | 5/7/1996 | 597.50 | 599.63 | 47.5 | 46.5 | 2 | 36.5 | 46.5 | STICKUP |
| MW-9[1] | MONITORING WELL | BEDROCK | NA | NA | 5/9/1996 | 596.30 | 598.46 | 43 | 42.5 | 2 | 32.5 | 42.5 | STICKUP |
| MW-10A | MONITORING WELL | OVERBURDEN | 1136571.96 | 1028134.19 | 5/15/1996 | 594.75 | 596.87 | 20 | 18.6 | 2 | 14 | 18.6 | STICKUP |
| MW-10B | MONITORING WELL | BEDROCK | 1136571.87 | 1028129.79 | 5/13/1996 | 594.67 | 596.71 | 37.8 | 36.7 | 4 | 27 | 36.7 | STICKUP |
| MW-11A | MONITORING WELL | OVERBURDEN | 1136576.28 | 1027992.43 | 5/20/1996 | 593.53 | 595.48 | 14.5 | 13.5 | 2 | 8.5 | 13.5 | STICKUP |
| MW-11B | MONITORING WELL | BEDROCK | 1136575.71 | 1027996.44 | 5/20/1996 | 593.56 | 595.57 | 35 | 34.2 | 4 | 24 | 34.2 | STICKUP |
| MW-12A[2] | MONITORING WELL | OVERBURDEN | 1136654.88 | 1027887.31 | 5/15/1996 | 591.30 | 590.79 | 15.5 | 14.7 | 2 | 9.7 | 14.7 | FLUSHMOUNT |
| MW-12B | MONITORING WELL | BEDROCK | 1136658.22 | 1027886.62 | 5/15/1996 | 591.30 | 590.89 | 32 | 30.5 | 4 | 20.4 | 30.5 | FLUSHMOUNT |
| MW-13A | MONITORING WELL | OVERBURDEN | 1136517.75 | 1028202.92 | 5/23/1996 | 595.60 | 595.18 | 20 | 18.6 | 2 | 13.8 | 18.6 | FLUSHMOUNT |
| MW-13B | MONITORING WELL | BEDROCK | 1136517.64 | 1028199.59 | 5/23/1996 | 595.40 | 594.73 | 37 | 36.5 | 2 | 26.5 | 36.5 | FLUSHMOUNT |

# Table 12
## Monitoring Well Construction Details
## Hyde Park Site Management Plan
## Former Carborundum Company, Hyde Park Facility
## Niagara, New York

| WELL ID | WELL TYPE | GEOLOGIC ZONE | COORDINATES (NORTHING) | COORDINATES (EASTING) | ESTABLISHED DATE | GROUND SURFACE ELEVATION (ft AMSL) | MEASURING POINT ELEVATION (ft AMSL) | Borehole Depth (ft bgs) | TOTAL WELL DEPTH (ft bgs) | WELL DIAMETER (inches) | TOP OF SCREEN DEPTH (ft) | BOTTOM OF SCREEN DEPTH (ft) | FLUSHMOUNT/ STICKUP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MW-14A | MONITORING WELL | OVERBURDEN | 1136524.76 | 1027954.11 | 5/21/1996 | 593.42 | 592.97 | 16 | 14.2 | 2 | 9.5 | 14.2 | FLUSHMOUNT |
| MW-14B | MONITORING WELL | BEDROCK | 1136524.55 | 1027951.17 | 5/22/1996 | 593.30 | 592.85 | 32 | 30.9 | 2 | 21 | 30.9 | FLUSHMOUNT |
| MW-15 | MONITORING WELL | BEDROCK | 1136475.97 | 1027851.99 | 11/20/1997 | 592.01 | 591.44 | 27.8 | 27.5 | 2 | 17.5 | 27.5 | FLUSHMOUNT |
| MW-16A | MONITORING WELL | OVERBURDEN | 1136829.41 | 1028415.02 | 10/26/2000 | 592.60 | 591.64 | 20 | 19.4 | 2 | 15 | 19.4 | FLUSHMOUNT |
| MW-16B | MONITORING WELL | BEDROCK | 1136826.44 | 1028414.66 | 10/25/2000 | 592.60 | 592.38 | 40 | 39.8 | 2 | 30 | 39.8 | FLUSHMOUNT |
| MW-17A | MONITORING WELL | OVERBURDEN | 1136765.00 | 1028319.92 | 10/27/2000 | 593.45 | 593.13 | 17.8 | 17.2 | 2 | 13 | 17.2 | FLUSHMOUNT |
| MW-17B | MONITORING WELL | BEDROCK | 1136763.41 | 1028319.47 | 10/27/2000 | 593.44 | 592.92 | 32.4 | 31.8 | 2 | 27.6 | 31.8 | FLUSHMOUNT |
| MW-18A | MONITORING WELL | OVERBURDEN | 1136661.13 | 1028377.39 | 10/30/2000 | 594.00 | 593.78 | 18 | 17.2 | 2 | 13 | 17.2 | FLUSHMOUNT |
| MW-18B | MONITORING WELL | BEDROCK | 1136659.79 | 1028375.07 | 10/30/2000 | 594.00 | 593.43 | 39 | 38.4 | 2 | 28.8 | 38.4 | FLUSHMOUNT |
| MW-19A | MONITORING WELL | OVERBURDEN | 1136747.48 | 1028610.90 | 10/23/2000 | 595.44 | 594.95 | 20 | 19.4 | 2 | 15 | 19.4 | FLUSHMOUNT |
| MW-19B | MONITORING WELL | BEDROCK | 1136749.89 | 1028611.64 | 10/24/2000 | 595.43 | 594.65 | 38.2 | 37.8 | 2 | 28.4 | 37.8 | FLUSHMOUNT |
| PMW- 1 | PERFORMANCE MONITORING WELL | OVERBURDEN | 1136886.30 | 1028372.30 | 7/9/2008 | 593.90 | 596.62 | 26 | 25.6 | 2 | 10.8 | 25.6 | STICKUP |
| PMW- 2 | PERFORMANCE MONITORING WELL | OVERBURDEN | 1136875.49 | 1028371.76 | 7/9/2008 | 593.53 | 595.98 | 25 | 23.9 | 2 | 8.9 | 23.9 | STICKUP |
| PMW- 3 | PERFORMANCE MONITORING WELL | OVERBURDEN | 1136882.30 | 1028379.73 | 7/9/2008 | 593.90 | 596.59 | 26.2 | 26 | 2 | 11.2 | 26 | STICKUP |
| PMW- 4 | PERFORMANCE MONITORING WELL | OVERBURDEN | 1136909.84 | 1028384.66 | 7/2/2008 | 595.10 | 597.05 | 28 | 27.6 | 2 | 12.6 | 27.6 | STICKUP |
| PMW- 5 | PERFORMANCE MONITORING WELL | BEDROCK | 1136764.72 | 1028308.62 | 10/2/2009 | 593.09 | 592.65 | 33 | 32.2 | 4 | 25.5 | 32.2 | FLUSHMOUNT |
| PMW- 6 | PERFORMANCE MONITORING WELL | BEDROCK | 1136747.77 | 1028310.46 | 10/2/2009 | 593.22 | 592.44 | 33 | 32.6 | 4 | 27 | 32.6 | FLUSHMOUNT |
| PMW- 7 | PERFORMANCE MONITORING WELL | BEDROCK | 1136758.05 | 1028325.51 | 10/2/2009 | 593.53 | 592.93 | 31 | 30.7 | 4 | 24 | 30.7 | FLUSHMOUNT |
| PMW- 8 | PERFORMANCE MONITORING WELL | BEDROCK | 1136824.51 | 1028352.65 | 7/11/2008 | 593.52 | 593.11 | 37.5 | 37.5 | 2 | 27.2 | 37.5 | FLUSHMOUNT |
| PMW- 9 | PERFORMANCE MONITORING WELL | BEDROCK | 1136689.24 | 1028282.58 | 10/2/2009 | 592.96 | 592.45 | 33 | 32.7 | 4 | 25 | 32.7 | FLUSHMOUNT |

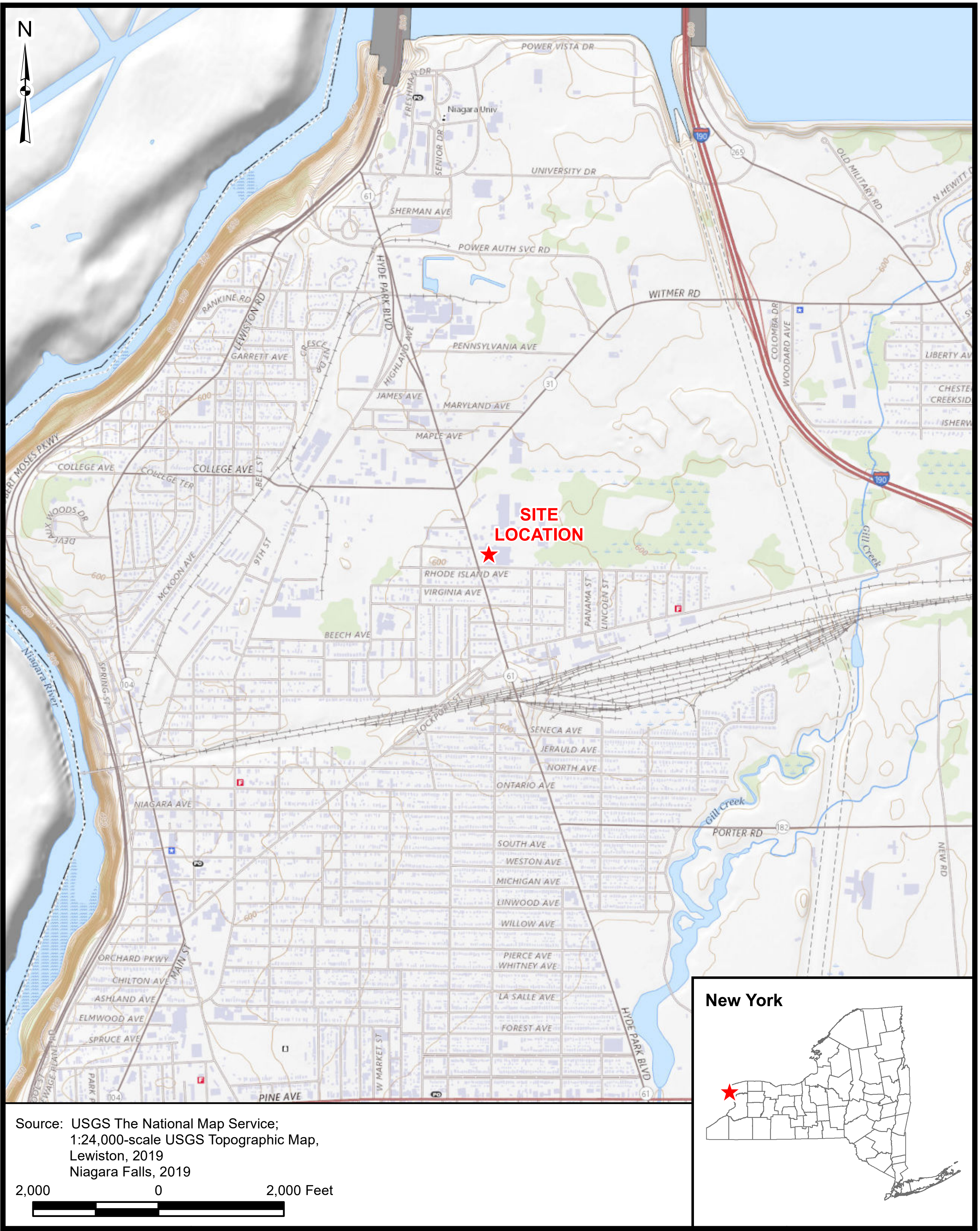
1. MW-9 was abandoned on May 28, 1999 by Earth Dimensions, Inc. of Elma, NY.
2. MW-12A discovered destroyed during Fall 2019 sampling event.

NA - not available

ft AMSL - feet above mean seal level

ft bgs - feet below ground surface

# FIGURES



Source: USGS The National Map Service;
1:24,000-scale USGS Topographic Map,
Lewiston, 2019
Niagara Falls, 2019

# FORMER CARBORUNDUM COMPANY
# TOWN OF NIAGARA, NEW YORK
# SITE LOCATION

FIGURE 1

J:\Projects\60481767_BPIPO\MISC\GIS\Hyde Park\Maps\SMP 2022\01 SITE LOCATION.mxd 3/11/2022

## Legend

| | | | |
|---|---|---|---|
| ⬠ | Injection Well | ⌖ | Monitoring Well (Destroyed/Abandoned) |
| ⌖ | Monitoring Well | ● | Performance Monitoring Well |
| ⌖ | Monitoring Well in the Monitoring Program | ✕ | Fence Line |
| | | ▭ | Approximate Site Boundary |

Notes: MW-9 was abandoned on May 28, 1999 by Earth Dimensions, Inc.;
MW-12A was discovered destroyed in December 2019
Source: ESRI World Imagery

FORMER CARBORUNDUM COMPANY
TOWN OF NIAGARA, NEW YORK
SITE PLAN

AECOM

FIGURE 2

J:\Projects\60481767_BPIPO\MISC\GIS\Hyde Park\Maps\SMP 2022\02 SITE PLAN.mxd 3/25/2022

**Legend**

SBL No. Tax Parcel Boundary

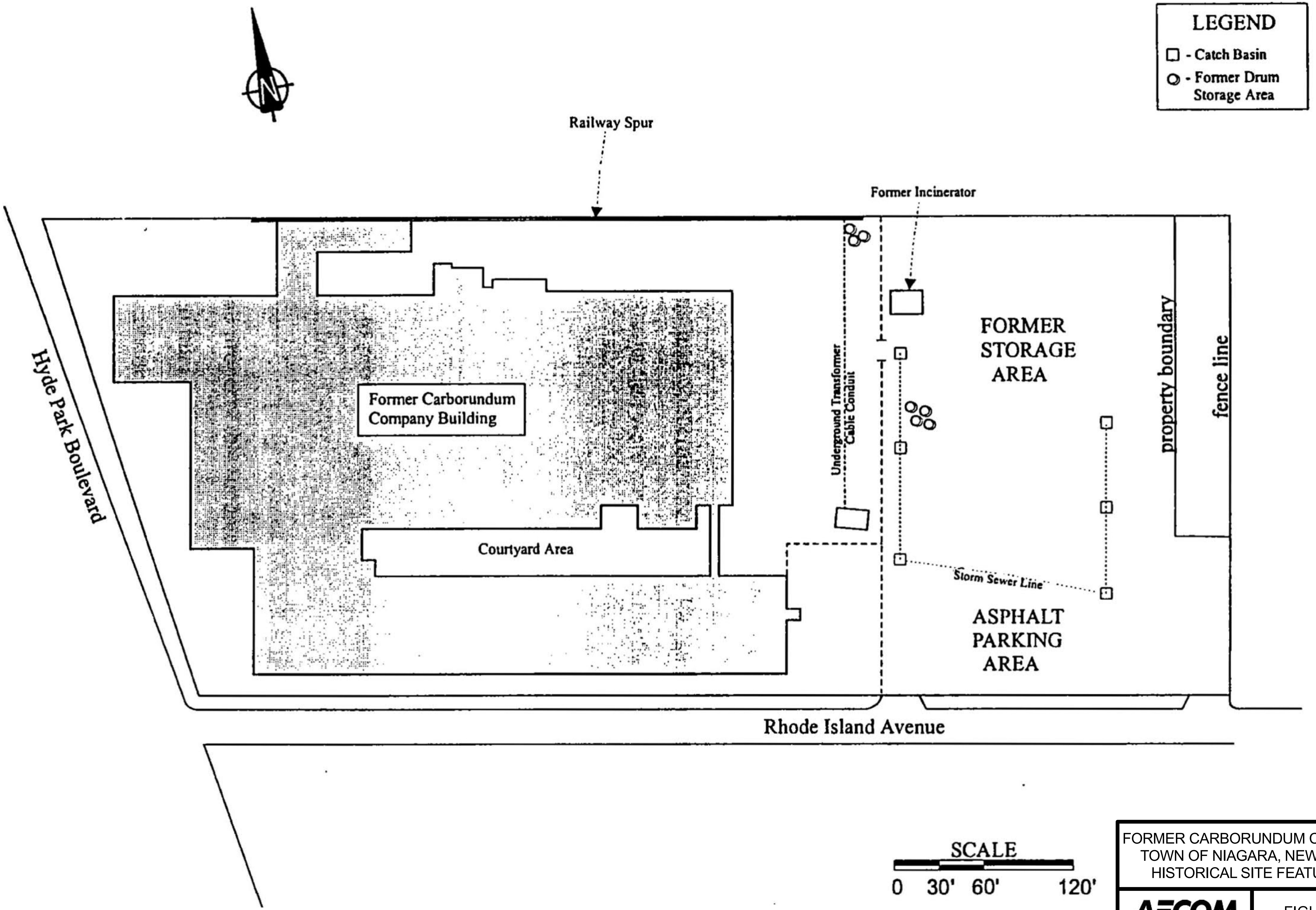
Source: ESRI World Imagery; Niagara County Real Property Parcels, 2016

FORMER CARBORUNDUM COMPANY
TOWN OF NIAGARA, NEW YORK
TAX PARCEL MAP

AECOM

FIGURE 3

J:\Projects\60481767_BPIPO\MISC\GIS\Hyde Park\Maps\SMP 2022\03 TAX PARCEL MAP.mxd 3/28/2022



Source: NYSDEC, October 2000. Record of Decision, Carborundum Globar Site, Town of Niagara, Niagara County, Site Number 9-32-036, Operable Units One and Two.

FORMER CARBORUNDUM COMPANY
TOWN OF NIAGARA, NEW YORK
HISTORICAL SITE FEATURES

AECOM

FIGURE 4

J:\Projects\60481767_BPIPOIMISC\GIS\Hyde Park\Maps\SMP 2022\04 HISTORICAL SITE FEATURES.mxd 3/25/2022

**Legend**

- ⬠ Injection Well
- ⊕ Monitoring Well
- ⊕ Monitoring Well (Monitoring Program)
- ⊕ Monitoring Well (Destroyed)
- ● Performance Monitoring Well
- A A' Cross Section Location
- ×— Fence Line
- ▭ Approximate Site Boundary

Note: MW-12A was discovered destroyed in December 2019

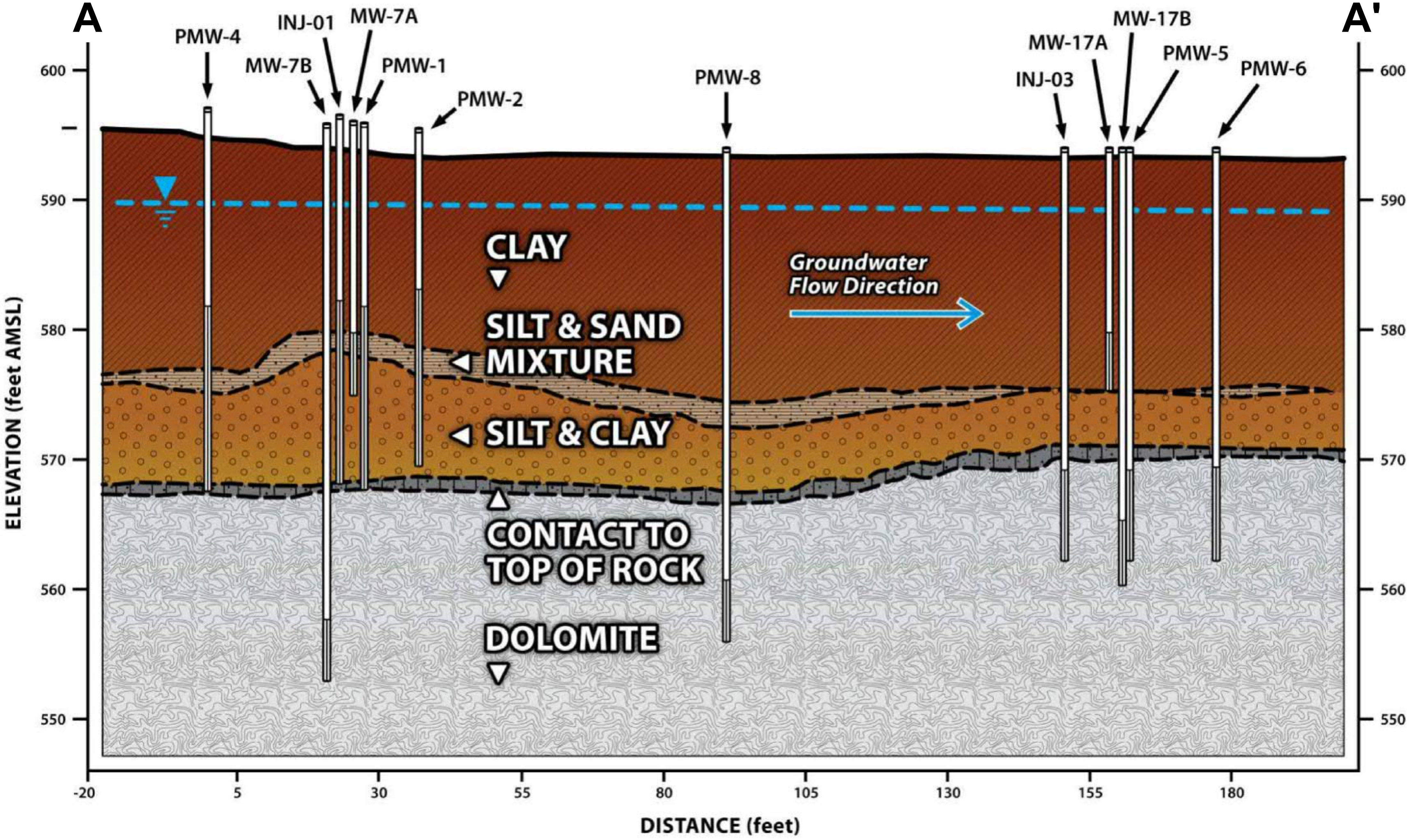
Source: ESRI World Imagery

FORMER CARBORUNDUM COMPANY
TOWN OF NIAGARA, NEW YORK
CROSS SECTION LOCATIONS

AECOM

FIGURE 5

J:\Projects\60481767_BPIPO\MISC\GIS\Hyde Park\Maps\SMP 2022\05 CROSS SECTION LOCATIONS.mxd 3/28/2022



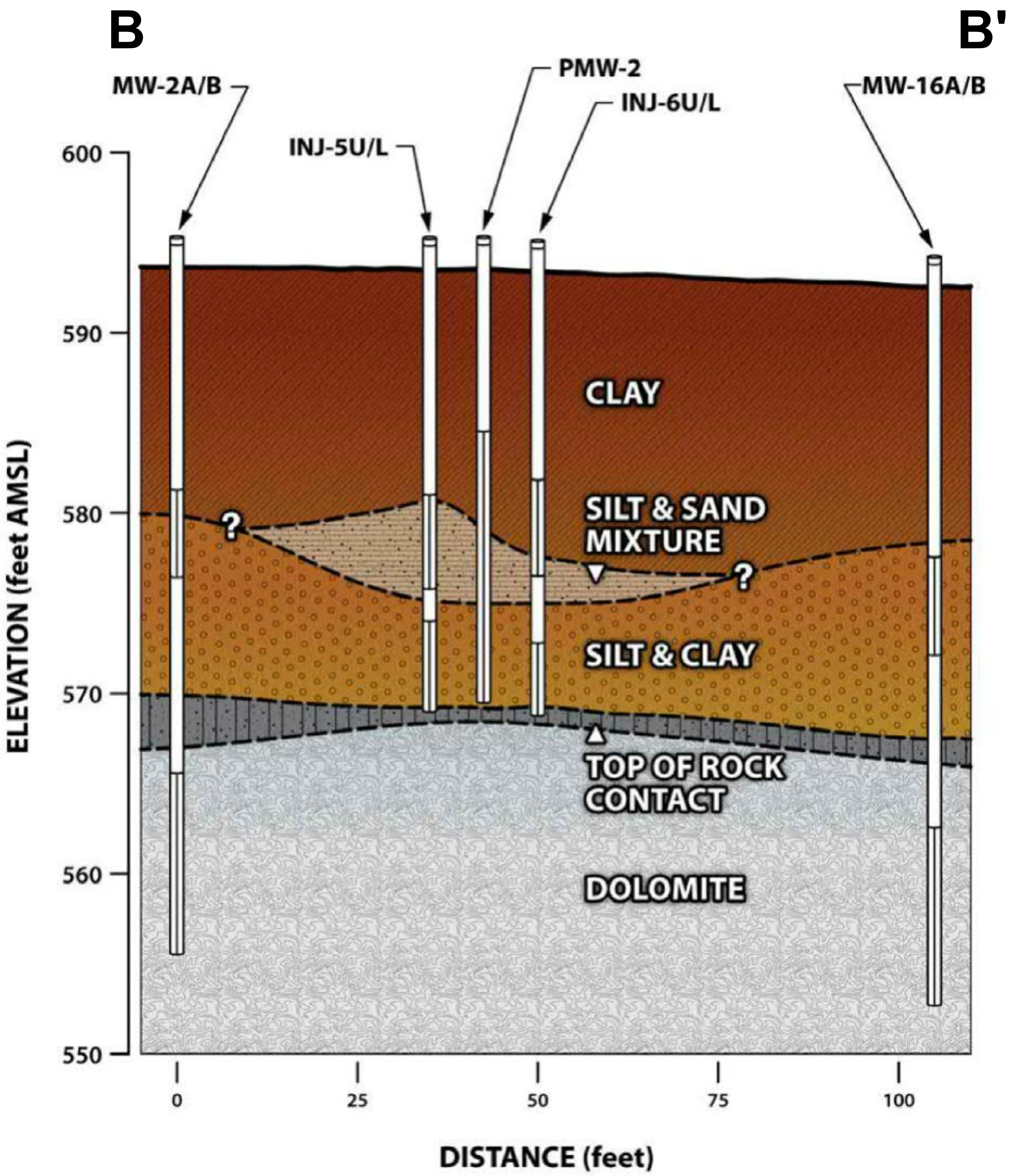
Source: Parsons, April 2013. Twelve-Month Data Summary Report, Former Carborundum Company, Hyde Park Facility (Site No. 932036), Town of Niagara, Niagara County, NY.

FORMER CARBORUNDUM COMPANY
TOWN OF NIAGARA, NEW YORK
CROSS SECTION A-A'

AECOM

FIGURE 6

J:\Projects\60481767_BPIPO\MISC\GIS\Hyde Park\Maps\SMP 2022\06 CROSS SECTION A-A'.mxd 3/11/2022



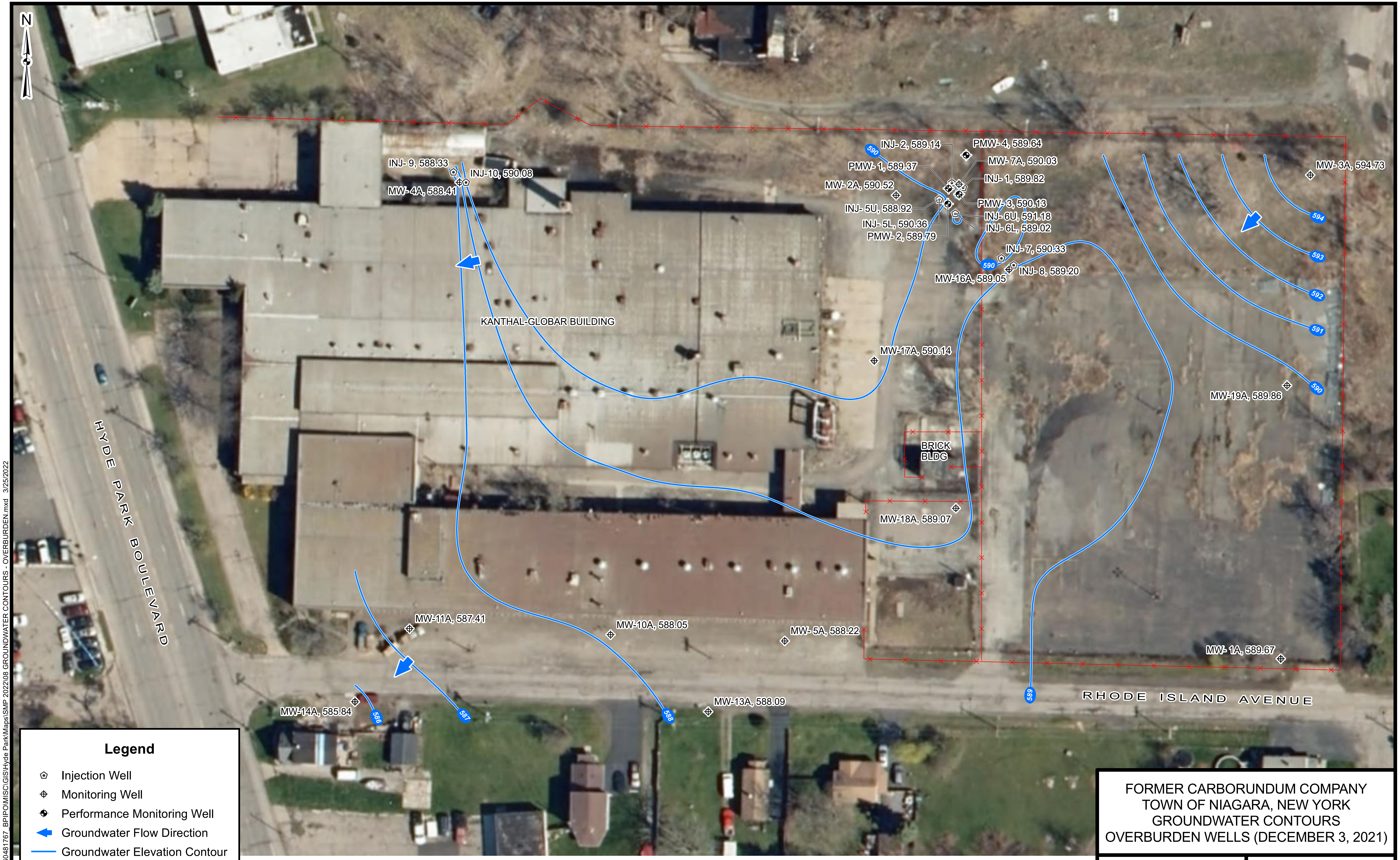
Source: Parsons, April 2013. Twelve-Month Data Summary Report, Former Carborundum Company, Hyde Park Facility (Site No. 932036), Town of Niagara, Niagara County, NY.

FORMER CARBORUNDUM COMPANY
TOWN OF NIAGARA, NEW YORK
CROSS SECTION B-B'

AECOM

FIGURE 7

J:\Projects\60481767_BP\PO\MISC\GIS\Hyde Park\Maps\SMP 2022\07 CROSS SECTION B-B'.mxd 3/11/2022



Source: ESRI World Imagery

## Legend

- ⌂ Injection Well
- ⊕ Monitoring Well
- ◉ Performance Monitoring Well
- ◀ Groundwater Flow Direction
- — Groundwater Elevation Contour
- ×— Fence Line

# FORMER CARBORUNDUM COMPANY
TOWN OF NIAGARA, NEW YORK
GROUNDWATER CONTOURS
OVERBURDEN WELLS (DECEMBER 3, 2021)

AECOM

FIGURE 8

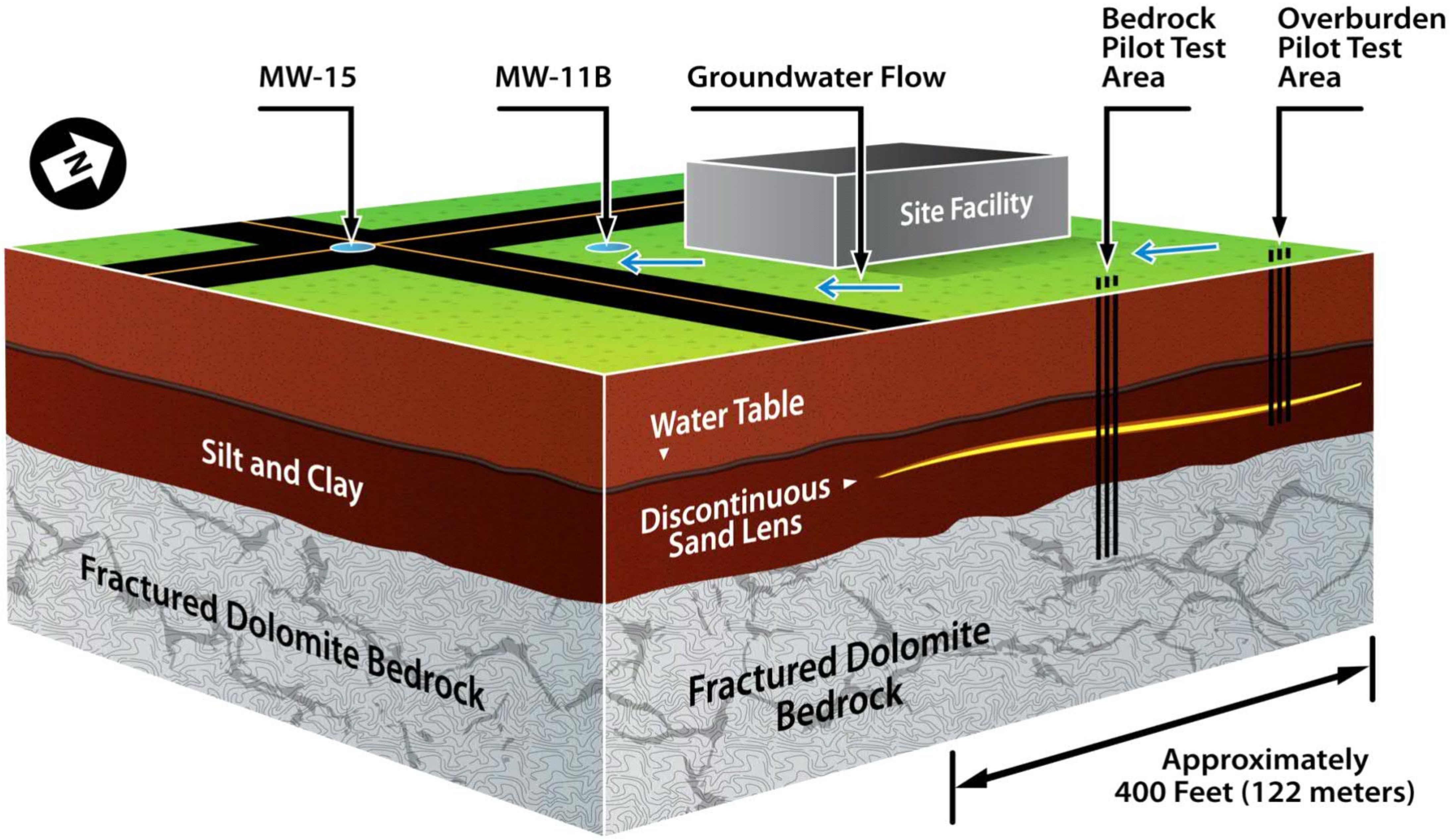
J:\Projects\60481767_BPIPO\MISC\GIS\Hyde Park\Maps\SMP 2022\08 GROUNDWATER CONTOURS - OVERBURDEN.mxd 3/25/2022

Source: ESRI World Imagery

FORMER CARBORUNDUM COMPANY
TOWN OF NIAGARA, NEW YORK
GROUNDWATER CONTOURS
BEDROCK WELLS (DECEMBER 3, 2021)

FIGURE 9

J:\Projects\60481767_BPIPO\MISC\GIS\Hyde Park\Maps\SMP 2022\09 GROUNDWATER CONTOURS - BEDROCK.mxd 3/25/2022



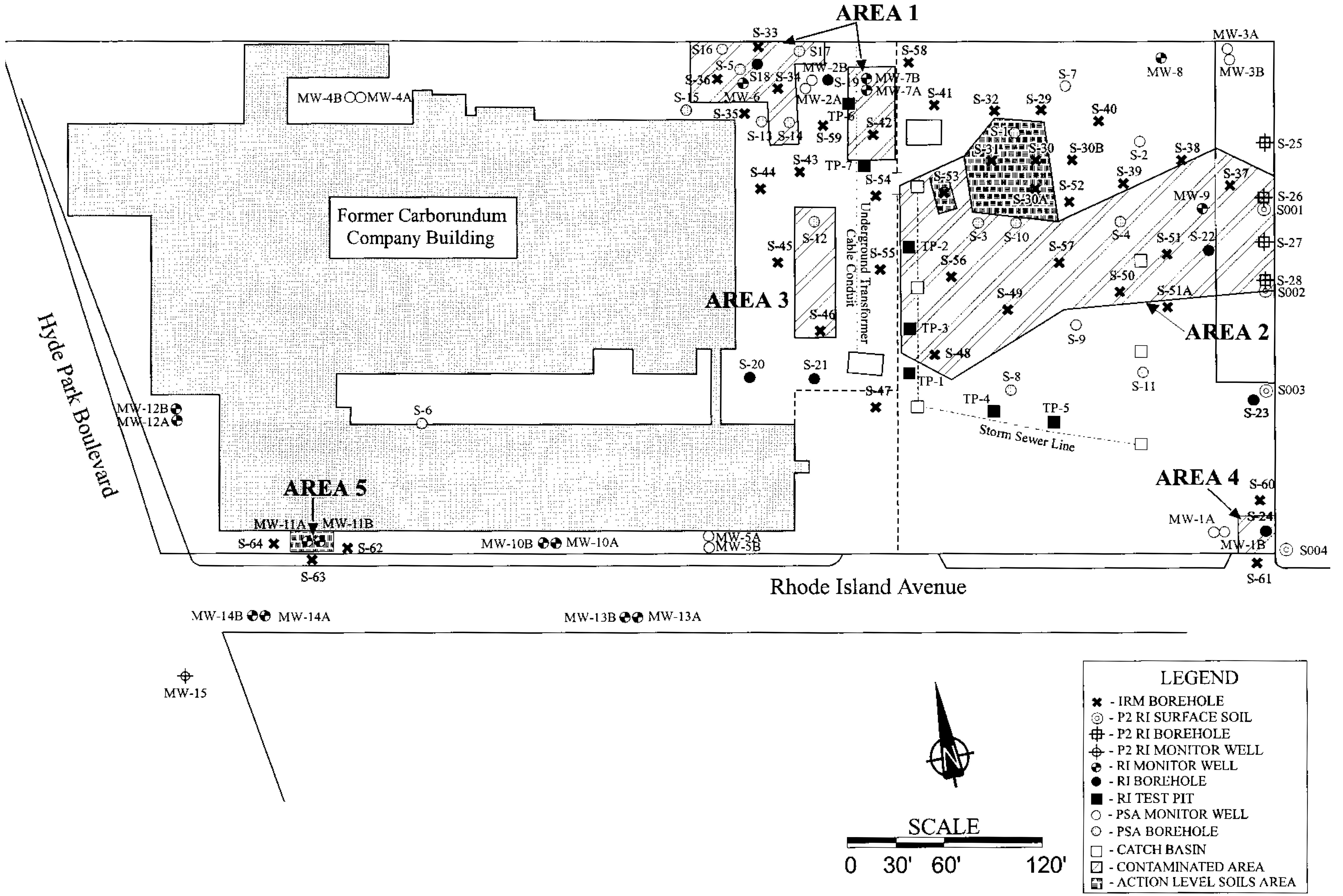
Source: Parsons, April 2013. Twelve-Month Data Summary Report, Former Carborundum Company, Hyde Park Facility (Site No. 932036), Town of Niagara, Niagara County, NY.

FORMER CARBORUNDUM COMPANY
TOWN OF NIAGARA, NEW YORK
3D SITE MODEL

AECOM

FIGURE 10

J:\Projects\60481767_BPIPO\MISC\GIS\Hyde Park\Maps\SMP 2022\10 3D SITE MODEL.mxd 3/25/2022



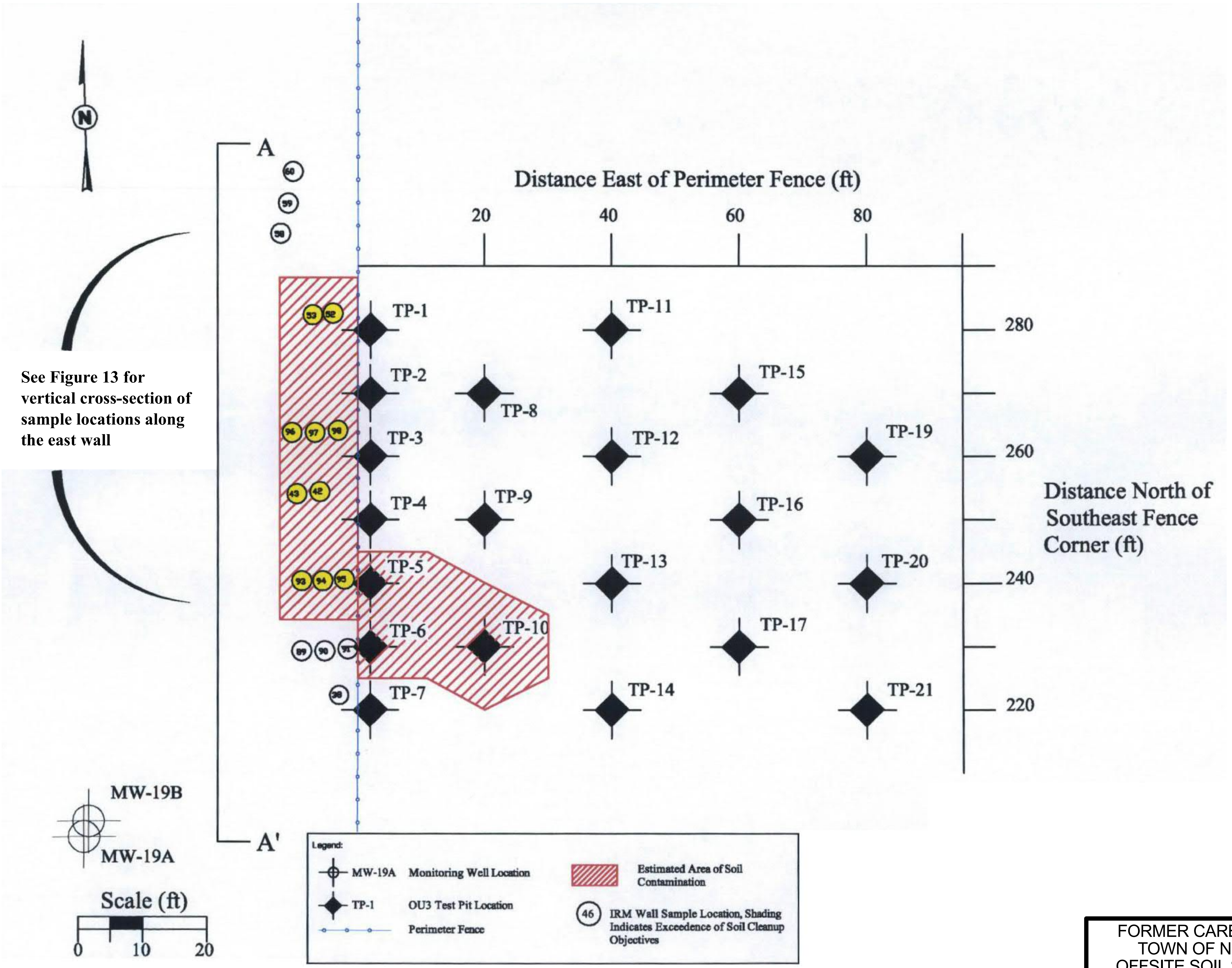
FORMER CARBORUNDUM COMPANY
TOWN OF NIAGARA, NEW YORK
PSA/RI/FS/IRM SAMPLE LOCATIONS

AECOM

FIGURE 11

Source: DE&S, December 1999. Execution of the Interim Remedial Measure for the Former Carborundum Company Volumes I & II - Electric Products Division, Hyde Park Facility, Town of Niagara, Niagara County, New York, Site No. 932036.

J:\Projects\60481767_BPIPO\MISC\GIS\Hyde Park\Maps\SMP 2022\11 PSA RI FS IRM SAMPLE LOCATIONS.mxd 3/28/2022



See Figure 13 for vertical cross-section of sample locations along the east wall

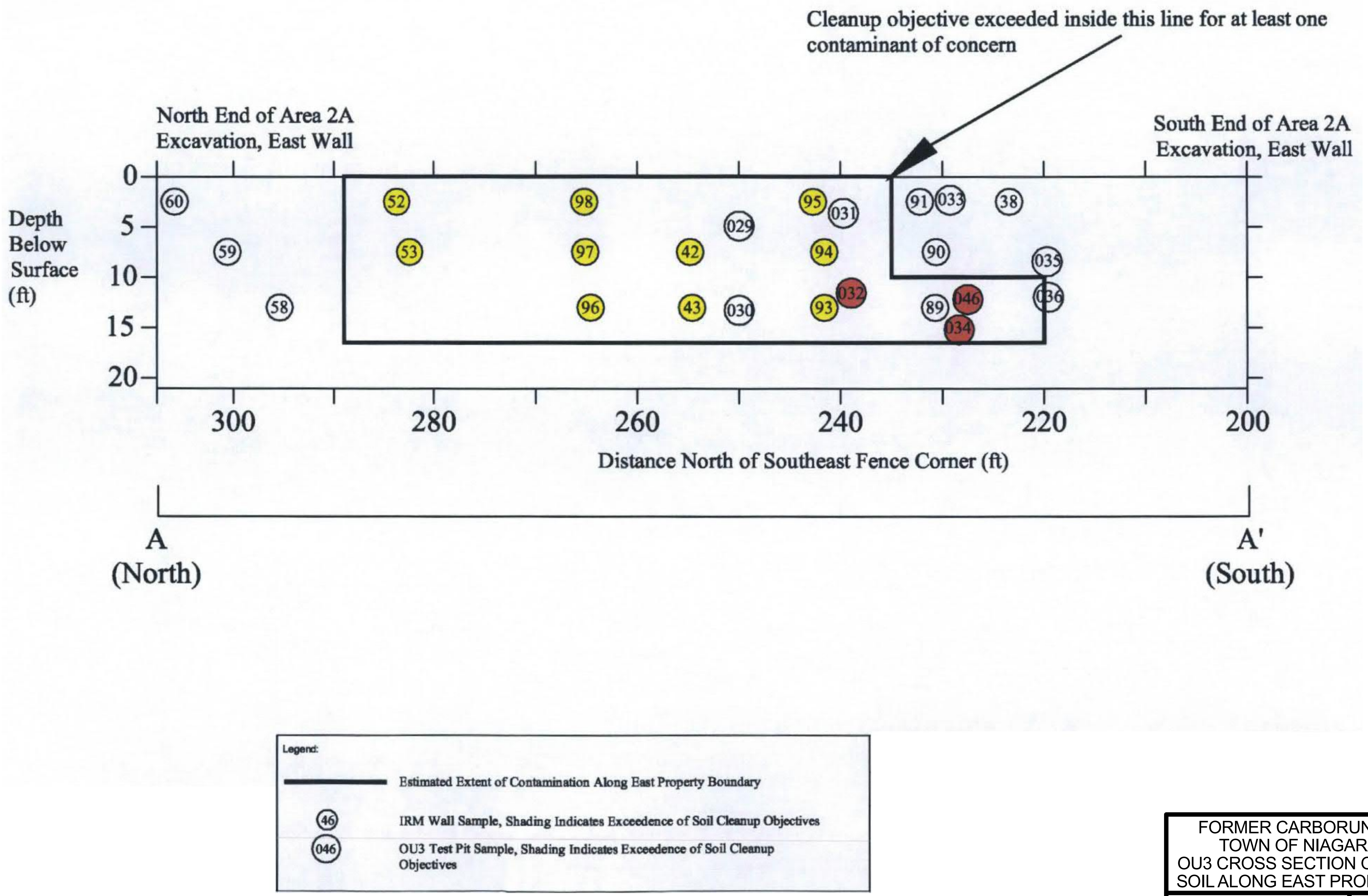
FORMER CARBORUNDUM COMPANY
TOWN OF NIAGARA, NEW YORK
OFFSITE SOIL SAMPLING LOCATIONS
& CONTAMINATION AREAS

AECOM

FIGURE 12

Source: INTERA, February 2002. OU3 Investigation at the Former Carborundum Company - Electric Products Division, Hyde Park Facility, Town of Niagara, Niagara County, New York, Site No. 932036, Final Report.

J:\Projects\60481767_BPIPO\MISC\GIS\Hyde Park\Maps\SMP 2022\12 OFFSITE SOIL SAMPLING LOCATIONS & CONTAMINATION AREAS.mxd 3/25/2022



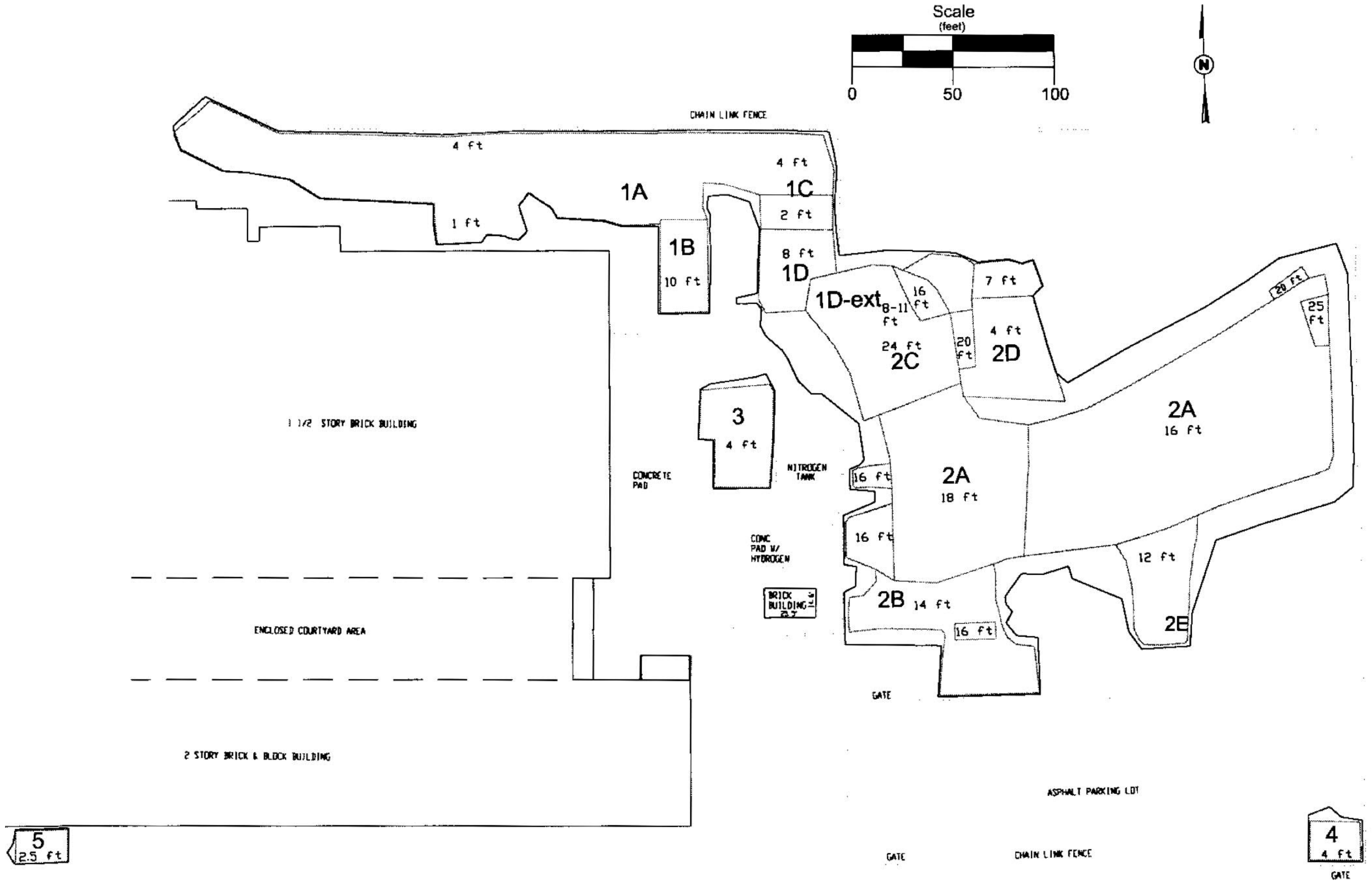
FORMER CARBORUNDUM COMPANY
TOWN OF NIAGARA, NEW YORK
OU3 CROSS SECTION OF CONTAMINATED SOIL ALONG EAST PROPERTY BOUNDARY

AECOM

FIGURE 13

Source: INTERA, February 2002. OU3 Investigation at the Former Carborundum Company - Electric Products Division, Hyde Park Facility, Town of Niagara, Niagara County, New York, Site No. 932036, Final Report.

J:\Projects\60481767_BPIPOIMISC\GIS\Hyde Park\Maps\SMP 2022\13 OU3 CROSS SECTION OF CONTAMINATED SOIL ALONG EAST PROPERTY BOUNDARY.mxd 3/25/2022



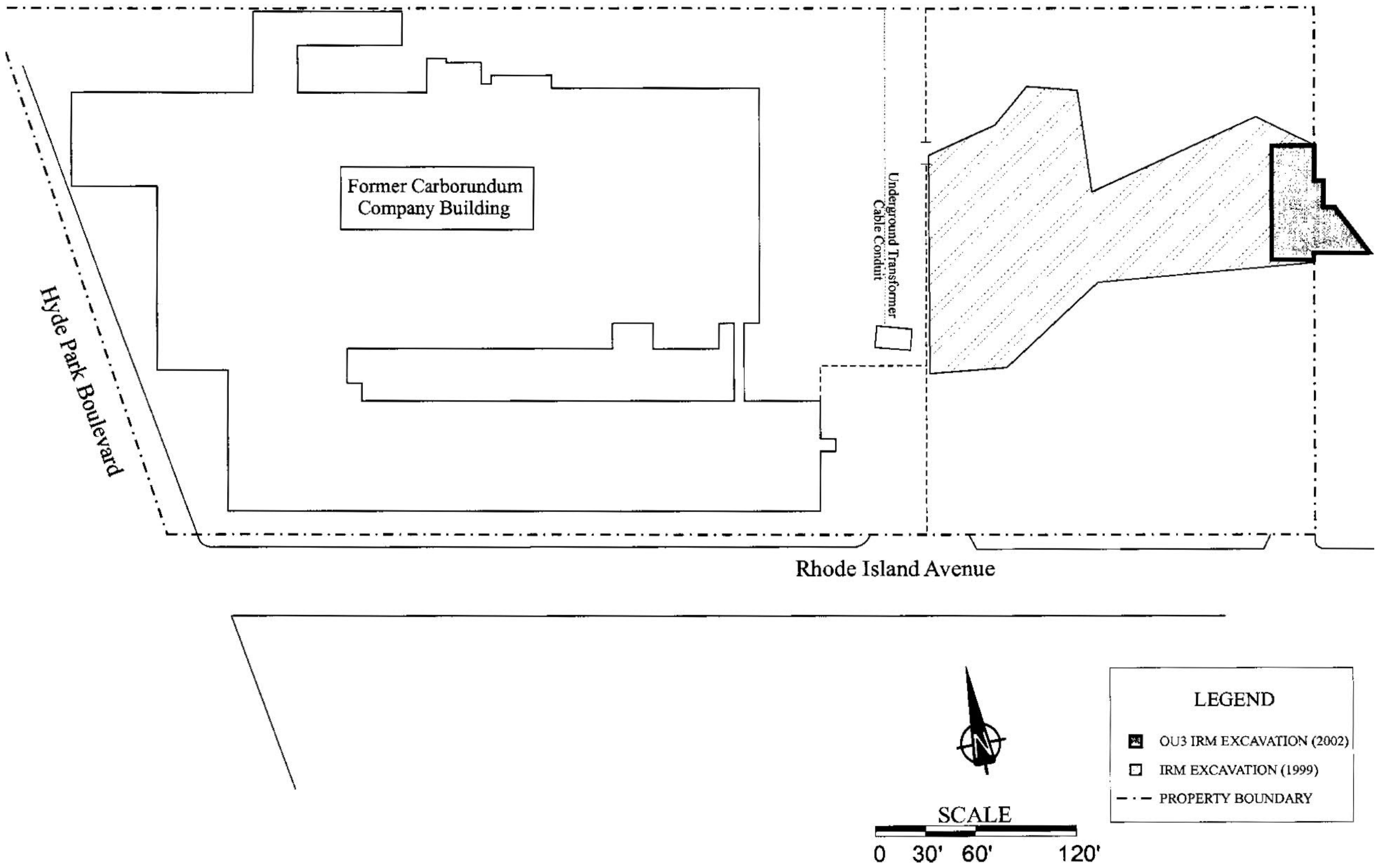
FORMER CARBORUNDUM COMPANY
TOWN OF NIAGARA, NEW YORK
OU1 EXCAVATION AREAS

AECOM

FIGURE 14

Source: DE&S, December 1999. Execution of the Interim Remedial Measure for the Former Carborundum Company Volumes I & II - Electric Products Division, Hyde Park Facility, Town of Niagara, Niagara County, New York, Site No. 932036.

J:\Projects\60481767_BPIPOIMISC\GIS\Hyde Park\Maps\SMP 2022\14 OU1 EXCAVATION AREAS.mxd 3/25/2022



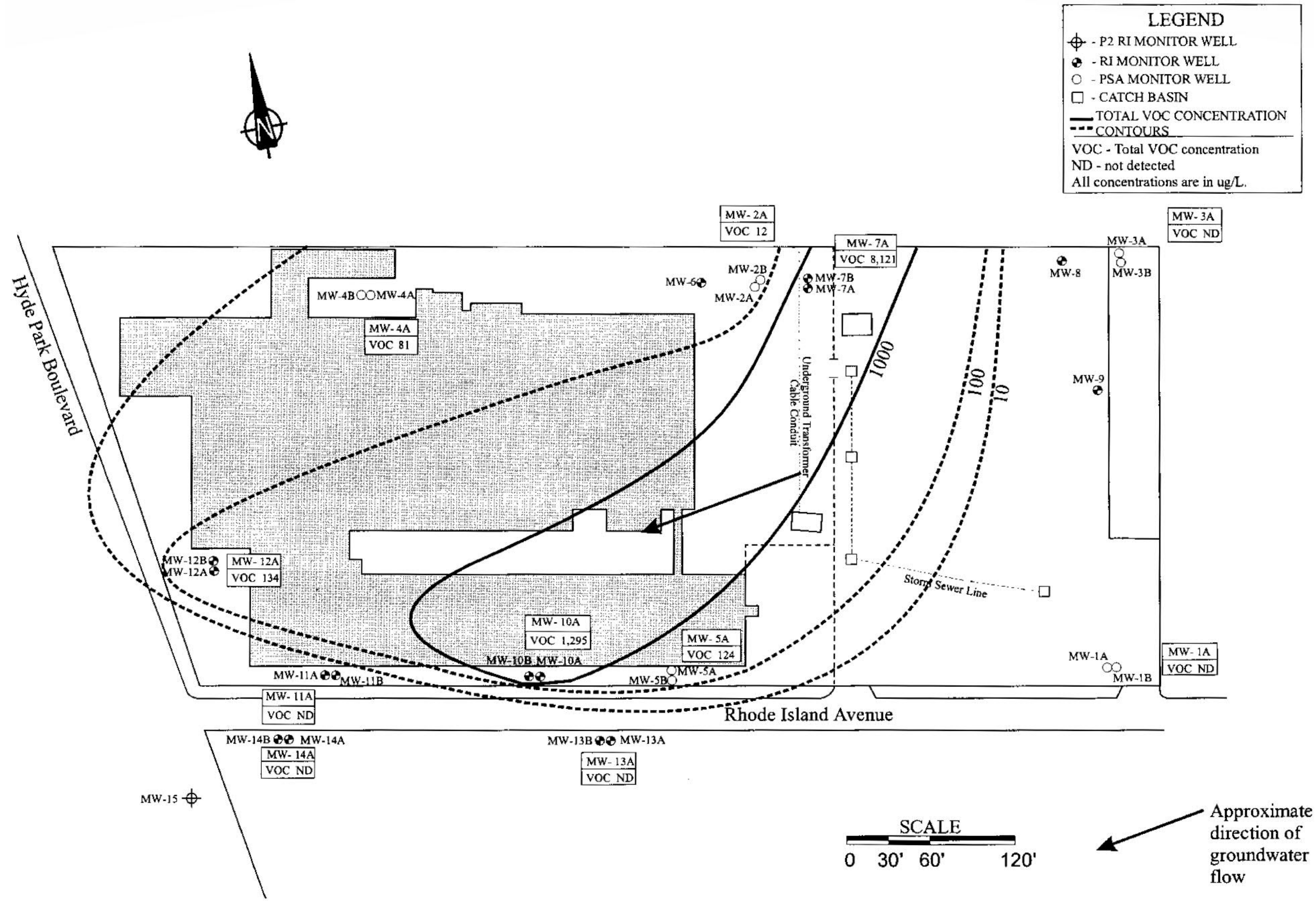
Source: INTERA, January 2004. Execution of the Interim Remedial Measure Addendum for the Former Carborundum Company - Electric Products Division, Hyde Park Facility, Town of Niagara, Niagara County, New York, Site No. 932036, Final Document.

FORMER CARBORUNDUM COMPANY
TOWN OF NIAGARA, NEW YORK
OU3 EXCAVATION AREAS

AECOM

FIGURE 15

J:\Projects\60481767_BPIPOMISC\GIS\Hyde Park\Maps\SMP 2022\15 OU3 EXCAVATION AREAS.mxd 3/25/2022



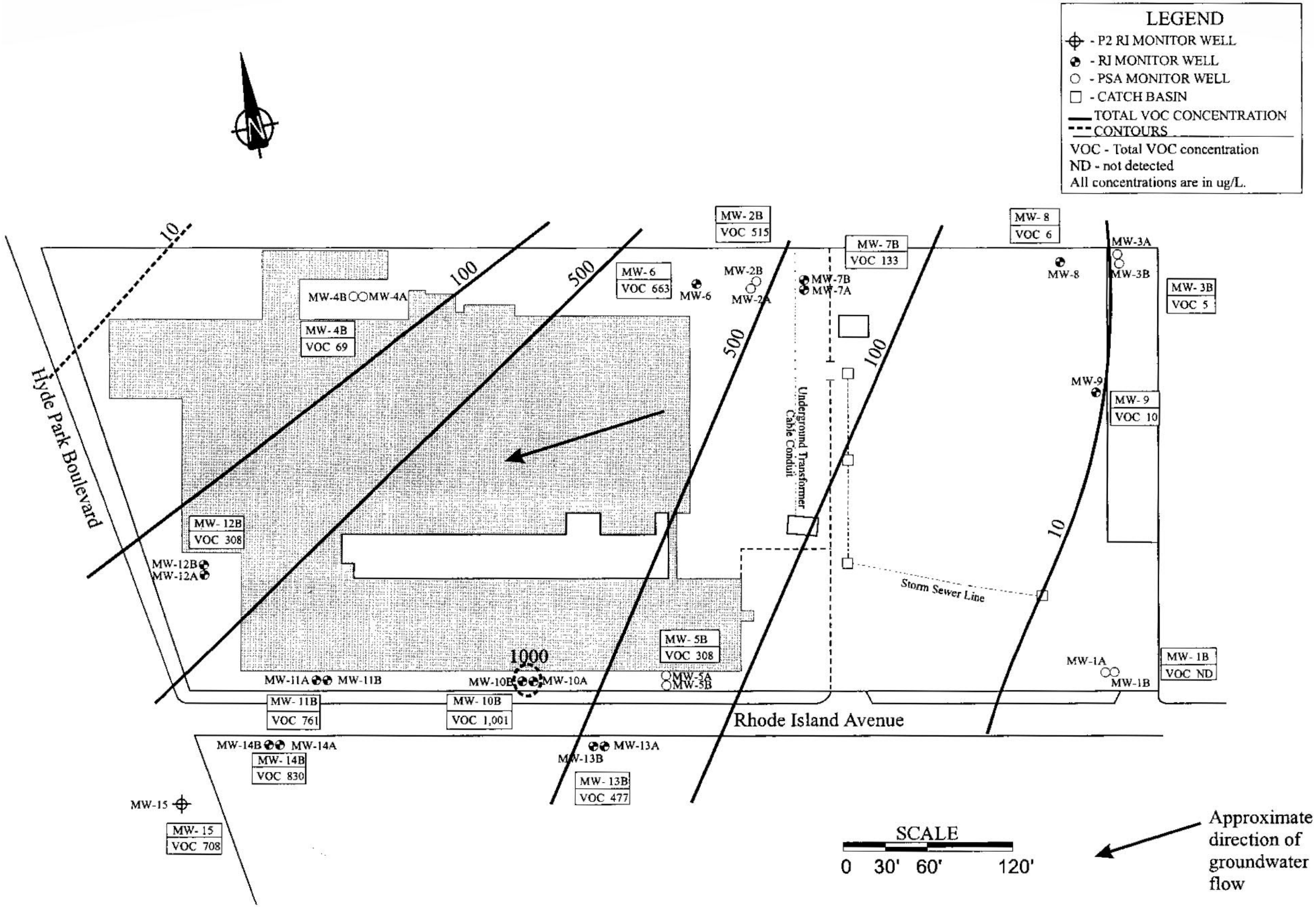
FORMER CARBORUNDUM COMPANY
TOWN OF NIAGARA, NEW YORK
OVERBURDEN TOTAL VOCS ISOCONTOURS
(NOVEMBER 1997)

AECOM

FIGURE 16

Source: DE&S, January 2000. Feasibility Study for the Remediation of the Former Carborundum Company - Electric Products Division, Hyde Park Facility, Town of Niagara, Niagara County, New York, Site No. 932036.

J:\Projects\60481767_BP\POM\MISC\GIS\Hyde Park\Maps\SMP 2022\16 OVERBURDEN TOTAL VOCS ISOCONTOURS (NOV 1997).mxd 3/25/2022



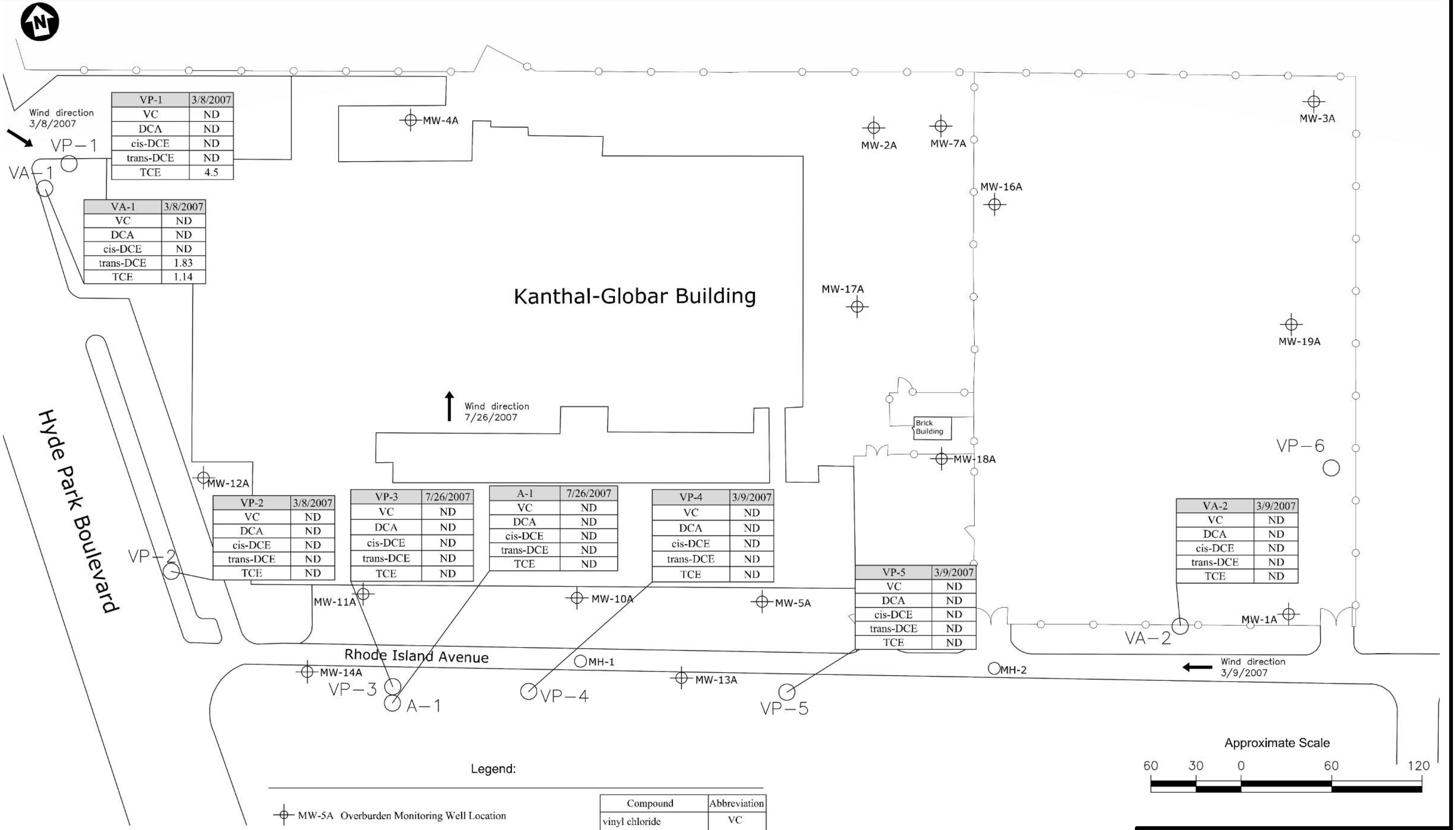
FORMER CARBORUNDUM COMPANY
TOWN OF NIAGARA, NEW YORK
BEDROCK TOTAL VOCS ISOCONTOURS
(NOVEMBER 1997)

AECOM

FIGURE 17

Source: DE&S, January 2000. Feasibility Study for the Remediation of the Former Carborundum Company - Electric Products Division, Hyde Park Facility, Town of Niagara, Niagara County, New York, Site No. 932036.

J:\Projects\60481767_BPIPOMISC\GIS\Hyde Park\Maps\SMP 2022\17 BEDROCK TOTAL VOCS ISOCONTOURS (NOV 1997).mxd 3/25/2022



| VP-1 | 3/8/2007 |
|---|---|
| VC | ND |
| DCA | ND |
| cis-DCE | ND |
| trans-DCE | ND |
| TCE | 4.5 |

| VA-1 | 3/8/2007 |
|---|---|
| VC | ND |
| DCA | ND |
| cis-DCE | ND |
| trans-DCE | 1.83 |
| TCE | 1.14 |

| VP-2 | 3/8/2007 |
|---|---|
| VC | ND |
| DCA | ND |
| cis-DCE | ND |
| trans-DCE | ND |
| TCE | ND |

| VP-3 | 7/26/2007 |
|---|---|
| VC | ND |
| DCA | ND |
| cis-DCE | ND |
| trans-DCE | ND |
| TCE | ND |

| A-1 | 7/26/2007 |
|---|---|
| VC | ND |
| DCA | ND |
| cis-DCE | ND |
| trans-DCE | ND |
| TCE | ND |

| VP-4 | 3/9/2007 |
|---|---|
| VC | ND |
| DCA | ND |
| cis-DCE | ND |
| trans-DCE | ND |
| TCE | ND |

| VP-5 | 3/9/2007 |
|---|---|
| VC | ND |
| DCA | ND |
| cis-DCE | ND |
| trans-DCE | ND |
| TCE | ND |

| VA-2 | 3/9/2007 |
|---|---|
| VC | ND |
| DCA | ND |
| cis-DCE | ND |
| trans-DCE | ND |
| TCE | ND |

| | | |
|---|---|---|
| ⌖ | MW-5A | Overburden Monitoring Well Location |
| ○ | MH-1 | Manhole / Sanitary Sewer Sample Location |
| ◯ | VP-1 | Sample Location<br>VA - Ambient Air Sample (March 2007)<br>A-1 - Ambient Air Sample (July 2007)<br>VP - Soil Vapor Sample |

| Compound | Abbreviation |
|---|---|
| vinyl chloride | VC |
| 1,1-dichloroethane | DCA |
| trans-1,2-dichloroethene | trans-DCE |
| cis-1,2-dichloroethene | cis-DCE |
| trichloroethene | TCE |

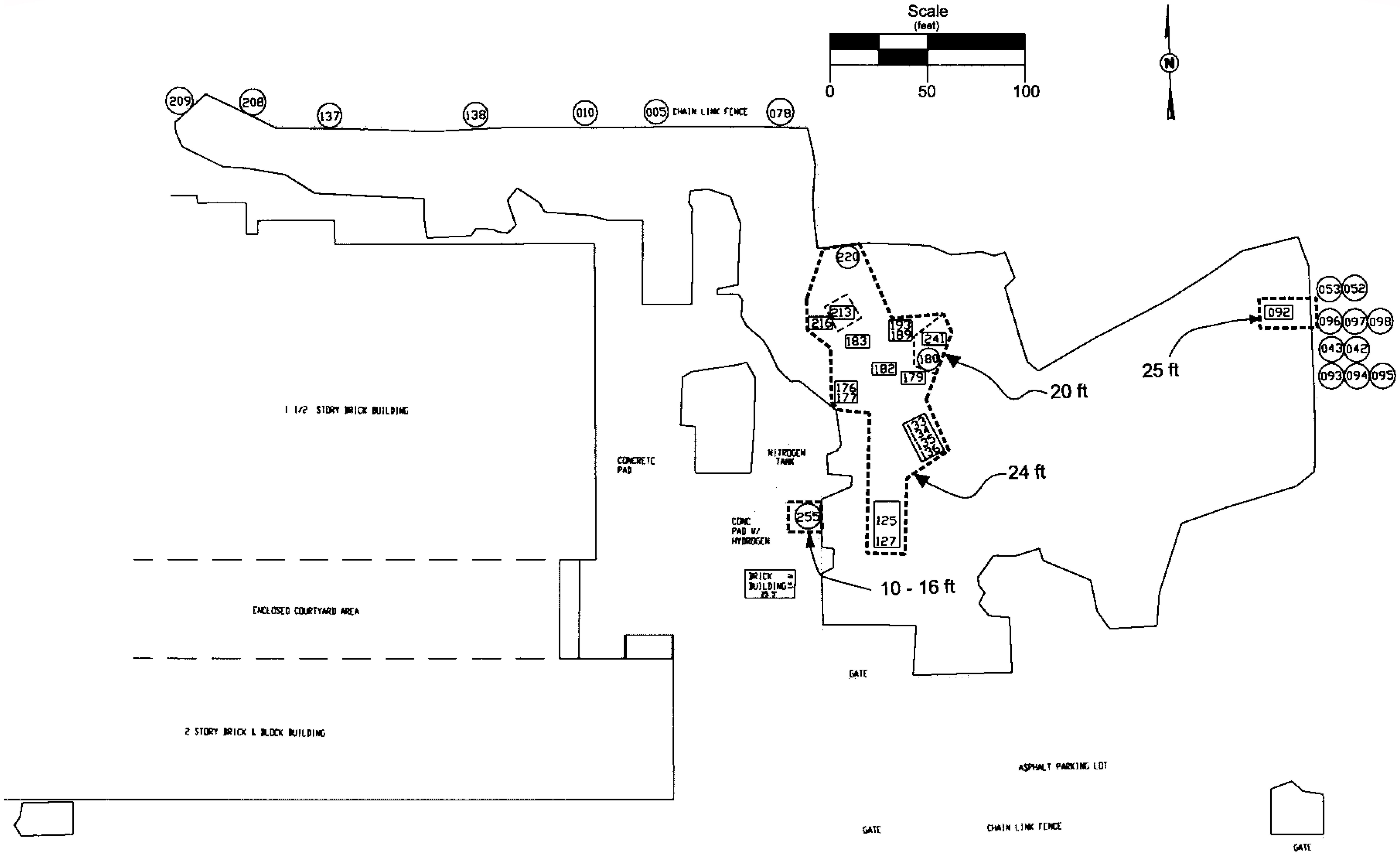
Source: Parsons, July 2007. Addendum to Results of Soil Vapor Intrusion Assessment, Former Carborundum Company, 3425 Hyde Park Blvd. Town of Niagara, Niagara County, New York.

FORMER CARBORUNDUM COMPANY
TOWN OF NIAGARA, NEW YORK
SOIL VAPOR SAMPLING
(2007)

AECOM

FIGURE 18

J:\Projects\60481767_BPIPO\MISC\GIS\Hyde Park\Maps\SMP 2022\18 SOIL VAPOR SAMPLING (2007).mxd 3/25/2022



Note:

All samples displayed exceed cleanup objectives.
Samples 213 an 043 exceed action level for vinyl chloride.

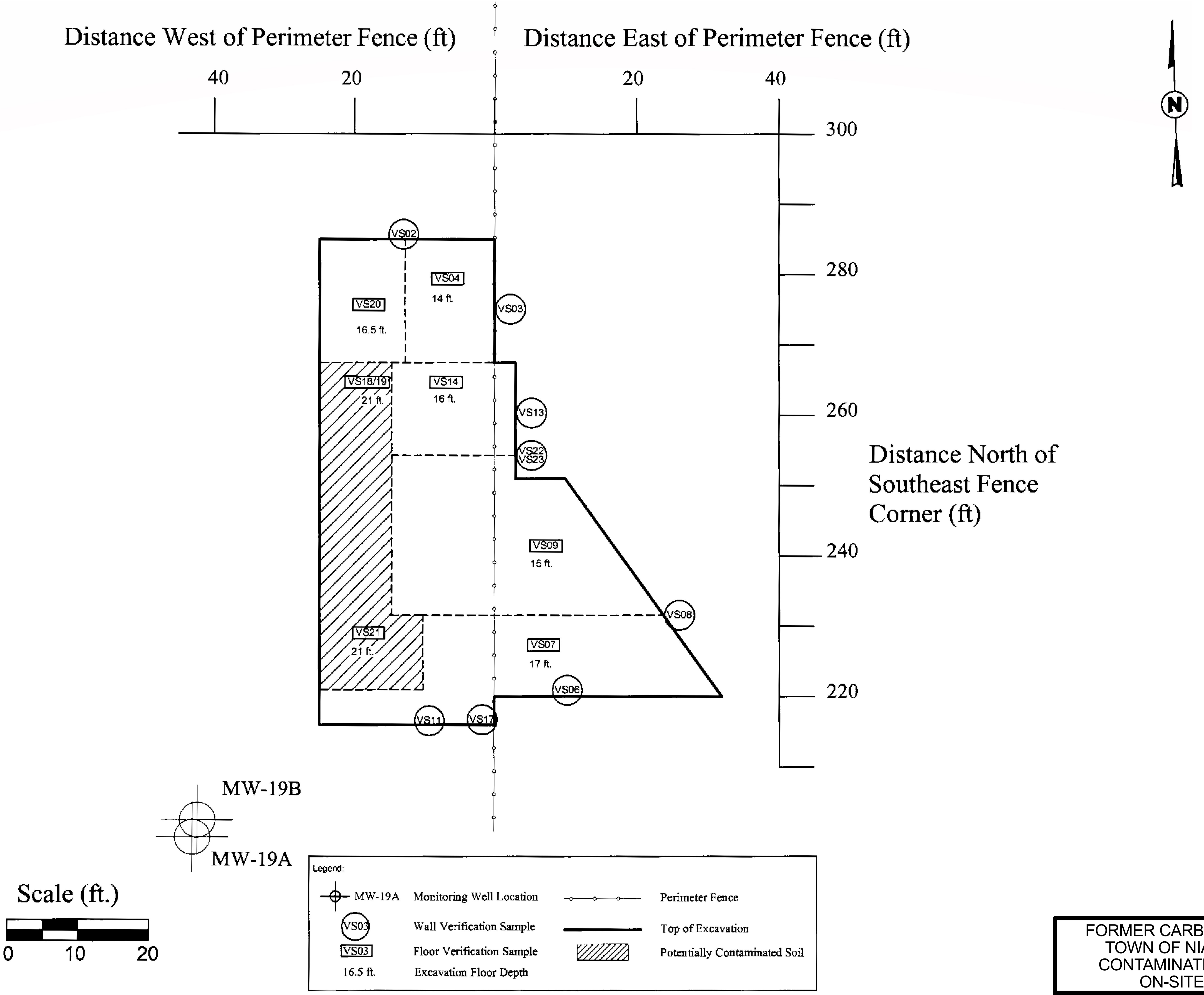
Note: See Table 7 for data.

Source: DE&S, December 1999. Execution of the Interim Remedial Measure for the Former Carborundum Company Volumes I & II - Electric Products Division, Hyde Park Facility, Town of Niagara, Niagara County, New York, Site No. 932036.

FORMER CARBORUNDUM COMPANY
TOWN OF NIAGARA, NEW YORK
CONTAMINATED SOIL REMAINING
ON-SITE OU1

FIGURE 19

J:\Projects\60481767_BPIPOIMISC\GIS\Hyde Park\Maps\SMP 2022\19 CONTAMINATED SOIL REMAINING ON-SITE OU1.mxd 3/28/2022



Note: See Table 8 for data.

Source: INTERA, January 2004. Execution of the Interim Remedial Measure Addendum for the Former Carborundum Company - Electric Products Division, Hyde Park Facility, Town of Niagara, Niagara County, New York, Site No. 932036, Final Document.

FORMER CARBORUNDUM COMPANY
TOWN OF NIAGARA, NEW YORK
CONTAMINATED SOIL REMAINING
ON-SITE PORTION OU3

AECOM

FIGURE 20

J:\Projects\60481767_BP\POM\SCG\GIS\Hyde Park\Maps\SMP 2022\20 CONTAMINATED SOIL REMAINING ON-SITE PORTION OU3.mxd 3/28/2022

Notes: Criteria is NYSDEC TOGS 1.1.1 Ambient Water Quality Standards, Class GA; Units are shown in µg/L

Source: ESRI World Imagery

FORMER CARBORUNDUM COMPANY
TOWN OF NIAGARA, NEW YORK
OVERBURDEN TOTAL VOCS ISOCONTOURS
(DECEMBER 2021)

AECOM

FIGURE 21

J:\Projects\60481767_BP\PO\MISC\GIS\Hyde Park\Maps\SMP 2022\21 OVERBURDEN TOTAL VOCS ISOCONTOURS (DEC 2021).mxd 3/28/2022

**Legend**

⬠ Injection Well

⊕ Monitoring Well

● Performance Monitoring Well

— Total VOC Isocontour

× Fence Line

Notes: Criteria is NYSDEC TOGS 1.1.1 Ambient Water Quality Standards, Class GA; Units are shown in µg/L

Source: ESRI World Imagery

FORMER CARBORUNDUM COMPANY
TOWN OF NIAGARA, NEW YORK
BEDROCK TOTAL VOCS ISOCONTOURS
(DECEMBER 2021)

AECOM

FIGURE 22

J:\Projects\60481767_BPIPO\MISC\GIS\Hyde Park\Maps\SMP 2022\22 BEDROCK TOTAL VOCS ISOCONTOURS (DEC 2021).mxd 3/28/2022

# APPENDIX A

# LIST OF SITE CONTACTS

# APPENDIX A – LIST OF SITE CONTACTS

| Name | Phone/Email Address |
|---|---|
| **Site Owner**<br>3425 Hyde Park Boulevard LLC | (716) 940-1435 / (716)754-2092<br>emery@simonconsructionco.com |
| **Remedial Party**<br>Elm Holdings Inc., Jim Smith | (832) 619-3585<br>Jim.Smith2@bp.com |
| **Qualified Environmental Professional**<br>Mark Becker, AECOM | (973) 883-8696<br>mark.becker@aecom.com |
| **NYSDEC DER Project Manager**<br>Steven Moeller | (716) 851-7220<br>steven.moeller@dec.ny.gov |
| **NYSDEC DER Project Manager's Supervisor**<br>Stanley Radon | (716) 851-7220<br>stanley.radon@dec.ny.gov |
| **NYSDEC Site Control**<br>Kelly A. Lewandowski | (518) 402-9569<br>kelly.lewandowski@dec.ny. |
| **NYSDOH Project Manager**<br>Christopher Budd | (518) 402-1769<br>christopher.budd@health.ny.gov |
| **On and off-site access contacts**<br>(such as tenants, adjacent property owners, etc.) | N/A |
| **Remedial Party Attorney**<br>Douglas Reinhart | (331) 236-1677<br>Douglas.reinhart@bp.com |

# APPENDIX B

# ENVIRONMENTAL NOTICE

**NIAGARA COUNTY - STATE OF NEW YORK**
**WAYNE F. JAGOW - NIAGARA COUNTY CLERK**
**P.O. BOX 461, LOCKPORT, NEW YORK 14095-0461**

---

COUNTY CLERK'S RECORDING PAGE
***THIS PAGE IS PART OF THE DOCUMENT - DO NOT DETACH***

---

RECEIPT NO. : 2012111615

Clerk: LJ
Instr #: 2012-04904
Rec Date: 03/06/2012 03:25:28 PM
Doc Grp: DEED
Descrip: MISCELLANEOUS
Num Pgs: 5

Party1: NYS DEPT OF ENVIRONMENTAL CONSERVATION
Party2: NYS DEPT OF ENVIRONMENTAL CONSERVATION
Town: NIAGARA

Recording:

| | |
|---|---|
| Cover Page | 8.00 |
| Recording Fee | 17.00 |
| Cultural Ed | 14.25 |
| Records Management - Coun | 1.00 |
| Records Management - Stat | 4.75 |
| Sub Total: | 45.00 |
| Total: | 45.00 |

**** NOTICE: THIS IS NOT A BILL ****

RECEIVED
NYSDEC - REGION
APR 12 2012
FOIL
_____REL _____UNREL

Record and Return To:

FRONTIER ABSTRACT & RESEARCH SERVICES
30 W BROAD ST
ROCHESTER NY 14614

# ENVIRONMENTAL NOTICE

**THIS ENVIRONMENTAL NOTICE** is made the 25th day of August 2011, by the New York State Department of Environmental Conservation (Department), having an office for the transaction of business at 625 Broadway, Albany, New York 12233

**WHEREAS,** a parcel of real property located at 3425 Hyde Park Boulevard in the Town of Niagara, County of Niagara, State of New York, which is part of lands conveyed by Kanthal Corporation, a Connecticut corporation, to 3425 Hyde Park Boulevard, LLC by deed dated June 25, 2008 and recorded in Niagara County Clerk's Office on July 30, 2008 in Book 3444 of Deeds at Page 404 and which is identified by tax parcel numbers 130.19-2-1 (the "Property"); and being more particularly described in Appendix "A," attached to this notice and made a part hereof, and hereinafter referred to as "the Property," is the subject of a Consent Order executed by Elm Holdings Inc., as part of the Department's State Superfund Program: and

**WHEREAS,** the Department approved a cleanup to address contamination disposed at the Property and such cleanup was conditioned upon certain limitations.

**NOW, THEREFORE,** the Department provides notice that:

**FIRST,** the Property subject to this Environmental Notice is as shown on a map attached to this Notice as Appendix "B" and made a part hereof.

**SECOND,** unless prior written approval by the Department or, if the Department shall no longer exist, any New York State agency or agencies subsequently created to protect the environment of the State and the health of the State's citizens, hereinafter referred to as "the Relevant Agency," is first obtained, where contamination remains at the Property there shall be no disturbance or excavation of the Property which threatens the integrity of the engineering controls, which will, or is reasonably anticipated to, interfere significantly with any proposed, ongoing, or completed remedial program at the site, or which results or may result in a significantly increased threat of harm or damage at the site. A violation of this provision is a violation of 6 NYCRR 375-1.11(b)(2).

**THIRD,** no person shall disturb, remove, or otherwise interfere with the installation, use, operation, and maintenance of engineering controls required for the Remedy or with performance of the Groundwater Monitoring Work Plan for Operable Unit 2, DE&S, August 2000, including letter modifications of September 28, 2005, unless in each instance they first obtain a written waiver of such prohibition from the Department or Relevant Agency.

**FOURTH,** the remedy was designed to be protective for the following use: industrial use. Therefore, any use for purposes other than for industrial use without the express written waiver of such prohibition by the Relevant Agency may result in a significantly increased threat of harm or damage at any site.

**FIFTH,** no person shall use the groundwater underlying the Property without treatment rendering it safe for drinking water or industrial purposes, as appropriate, unless the user first

2012111615

**2012-04904**
03/06/2012 03:25:28 PM
5 Pages
MISCELLANEOUS

Wayne F. Jagow, Niagara County Clerk
Clerk: LJ

obtains permission to do so from the Department or Relevant Agency. Use of the groundwater without appropriate treatment may result in a significantly increased threat of harm or damage at any site.

**SIXTH,** upon change of use, re-occupancy of the site building, or new construction on the site, the site remedy requires evaluation of the potential for soil vapor intrusion and the possibility of adverse impacts on indoor air, and compliance with New York State Department of Health Guidance for Evaluating Soil Vapor Intrusion to address current or potential human exposures.

**SEVENTH,** it is a violation of 6 NYCRR 375-1.11(b) to use the Property in a manner inconsistent with this environmental notice.

**IN WITNESS WHEREOF**, the undersigned has executed this instrument the day written below.

By: ______________________
Dale A. Desnoyers, Director
Division of Remediation

STATE OF NEW YORK ) ss:
COUNTY OF ALBANY )

On the 25th day of August in the year 2011, before me, the undersigned, personally appeared Dale Desnoyers, personally known to me or proved to me on the basis of satisfactory evidence to be the individual whose name is subscribed to the within instrument and acknowledged to me that he executed the same in his capacity as Designee of the Commissioner of the State of New York Department of Environmental Conservation, and that by his signature on the instrument, the individual, or the person upon behalf of which the individual acted, executed the instrument.

______________________
Notary Public – State of New York

**David J. Chiusano**
**Notary Public, State of New York**
**No. 01CH5032146**
**Qualified in Schenectady County**
**Commission Expires August 22, 2014**

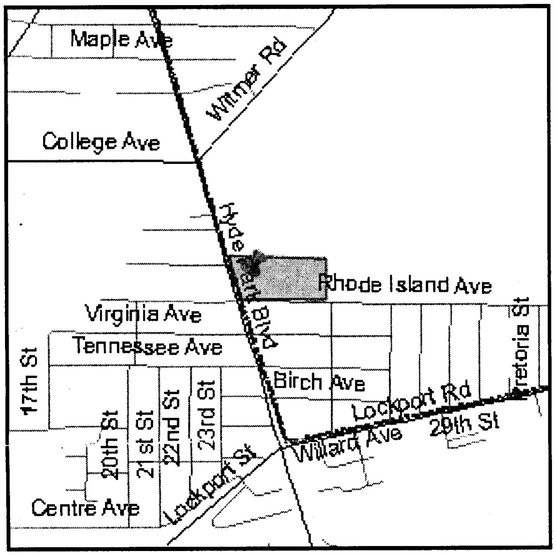
# APPENDIX "A"

**ALL THAT TRACT OR PARCEL OF LAND** situate in the Town of Niagara, County of Niagara and State of New York, being part of Lot No. 23, Township 13, Range 9 of the Holland Land Company's Survey and being more fully bounded and described as follows:

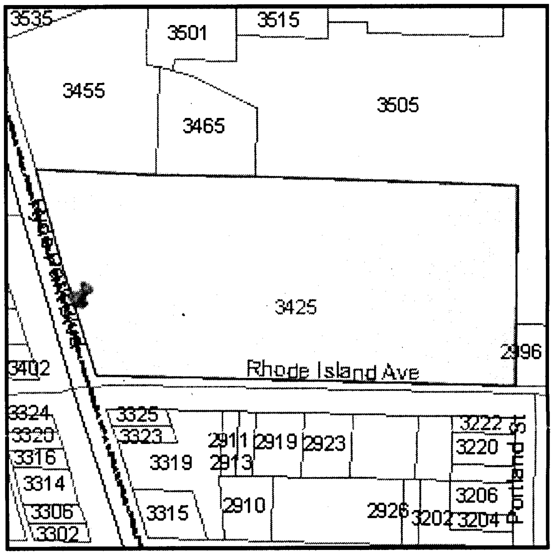
BEGINNING at the intersection of the east highway boundary of Hyde Park Boulevard, formerly known as Sugar Street, as it existed in 1993, which east line is the east line of Map No. 179, Parcel 179 of property acquired by the New York State Department of Public Works with the north right of way line of Rhode Island Avenue (60 feet wide), formerly known as Pennsylvania Avenue; thence northerly along the east highway boundary of Hyde Park Boulevard, a distance of 209.10 feet to an angle point in said right of way line; continuing thence along said east right of way line of Hyde Park Boulevard and at an interior angle of 178° 38; 28: with the previous course, a distance of 172.94 feet to a point in the south line of the Cheers II Subdivision as filed in the Niagara County Clerk's Office in Book 51 of Microfilmed Maps at pages 5088 and 5089; thence easterly at an interior angle with the previous course of 72° 57; 41" and along said south line of Cheers II Subdivision, a distance of 855.20 feet to a point; thence southerly at right angles to the previous course a distance of 250 feet to a point; thence easterly at right angles to the previous course, a distance of 38.20 feet to the west line of Portland Avenue (60 foot right of way); thence southerly along said west line of Portland Avenue at an angle left of 89° 49; 31" with the previous course, a distance of 116.13 feet to the north right of way line of Rhode Island Avenue (formerly Pennsylvania Avenue); thence westerly at right angles to the previous course and along said north line of Rhode Island Avenue a distance of 776.56 feet to the point of beginning.

# Niagara County On-Line Mapping System
# Parcel Detail Report

Address: 3425 Hyde Park Blvd
SBL: 130.19-2-1
Report generated: 9/1/2011 1:15:32 PM



Parcel Overview Map



Parcel Detail Map

**PIN:** 130.19-2-1

**SBL:** 1300190002001000

**Address:** 3425 Hyde Park Blvd

**Municipality:** 293000 - Niagara

**Owner:** 3425 Hyde Park Boulevard,LLC

**Frontage:**

**Depth:** 0

**Acreage:** 7

**Property Class:** 710

**Total Assessment:** $1,140,000

**Land Assessment:** $81,700

**School District Code:** 293001

**School District Name:** NIAGARA-WHEATFIELD (N)

**XY-Coordinates:** 1028218 , 1136737

**Deed Book:** 3444

**Deed Page:** 404

**Sale Date:** 2008/07/17

**Sale Price:** 425000

**Sqft Living Area:** 0

**Grade:** **Condition:**

**Year Built:** 0

**Building Style:**

**Districts:**

- **Agricultural:**
- **County Sewer:**
- **Drainage:**
- **Fire:** FD301
- **Fire Protection:**
- **Firemans Retirement Area:**
- **Gas Lighting:**
- **Light:** LD301
- **Paving:**
- **Refuse:** RD301
- **Road Improvement:**
- **Sewer:** SD301
- **Special Parking:**
- **Sewers:**
- **Storm Water:**
- **Village Sewer:**
- **Water:** WD301, WD302

# APPENDIX C

# MONITORING WELL BORING LOGS AND MONITORING WELL CONSTRUCTION DIAGRAMS

# SUMMARY OF BOREHOLE LOGS FOR MONITORING WELLS USED IN THE GROUNDWATER MONITORING PROGRAM

## FORMER CARBORUNDUM COMPANY – ELECTRIC PRODUCTS DIVISION, HYDE PARK FACILITY,
## TOWN OF NIAGARA, NIAGARA COUNTY, NEW YORK
## SITE NO. 932036

**Prepared By:**

**January 2006**

INTERA

**INTERA INC.** • 6850 Austin Center Boulevard • Suite 300 • Austin, Texas 78731, USA • Telephone: 512-346-2000 • Facsimile: 512-346-9436

# Report on the Preliminary Site Assessment of the Carborundum Company - Electric Products Division, Hyde Park Facility, Town of Niagara, Niagara County, New York

## SITE NO. 932036

Prepared For:
The Carborundum Company
Electric Products Division
3425 Hyde Park Blvd.
Town of Niagara, New York 14305-2201

Mailing Address:
P.O. Box 339
Niagara Falls, New York 14302

Prepared By:
INTERA INC.
Austin, Texas

91-022

May 1993

# APPENDIX C

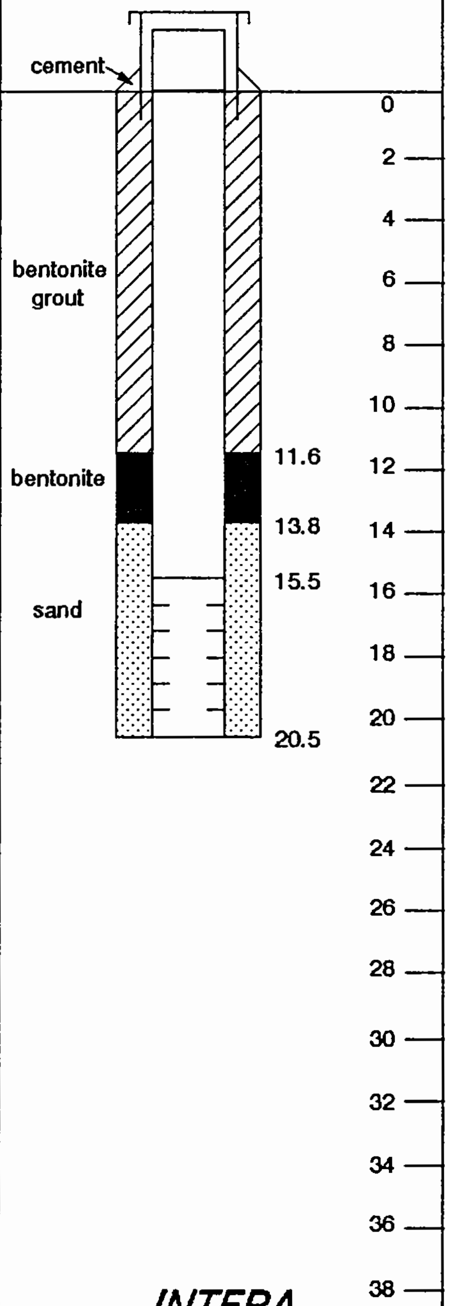
## Stratigraphic Logs

## Monitor Well Boreholes

# STRATIGRAPHIC AND INSTRUMENTATION LOG

| | | | |
|---|---|---|---|
| **Project Name and No.:** | Hyde Park PSA 91-022 | **Borehole No.:** | MW-1A |
| **Client:** | The Carborundum Company | **Date Completed:** | August 7, 1992 |
| **Location:** | Niagara Falls, N.Y. | **Drilling Method:** | Hollow Stem Auger |
| **Reference Elevation:** | | **Drill Supervisor:** | R.T. |

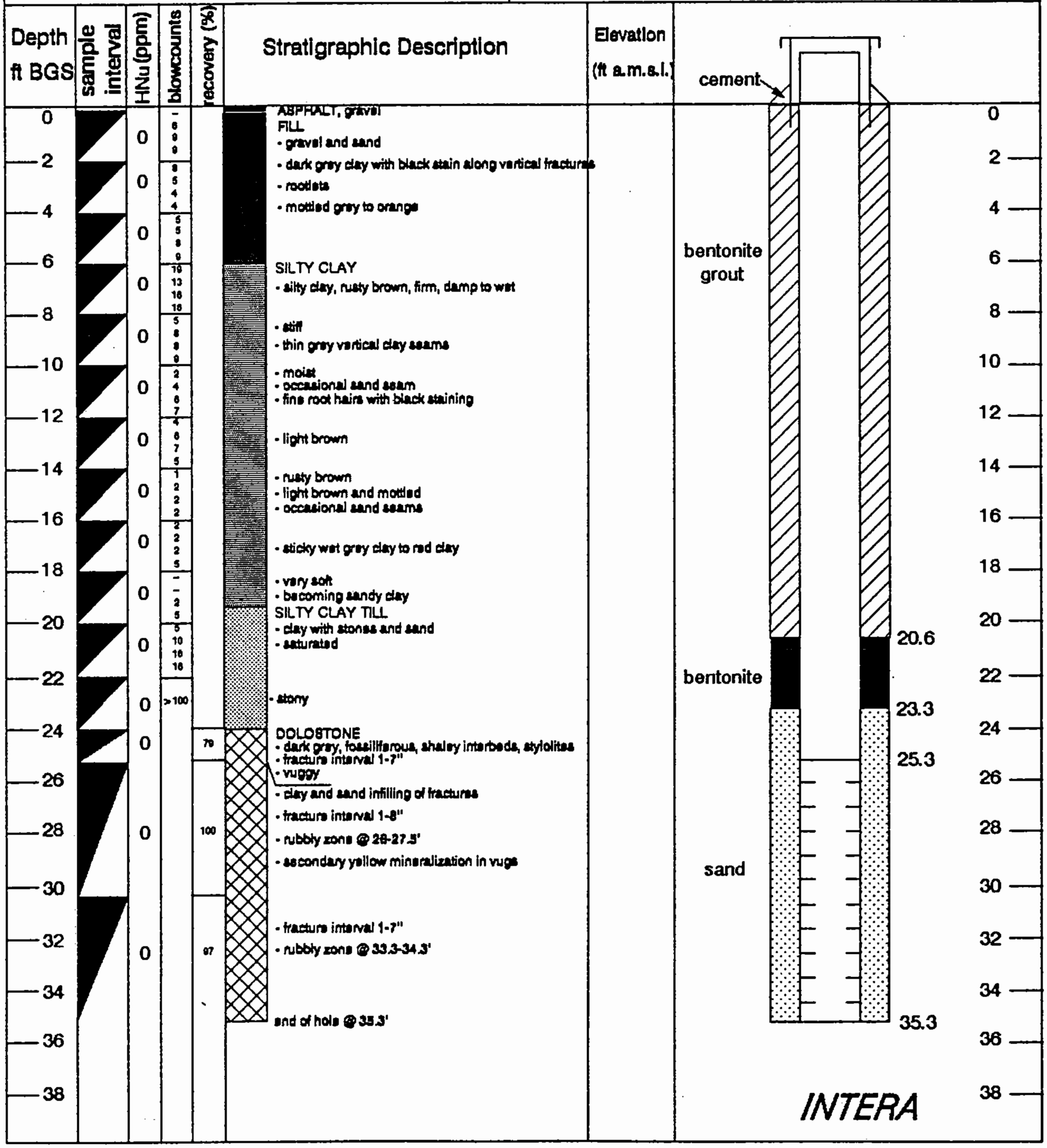
| Depth ft BGS | sample interval | HNu (ppm) | blowcounts | recovery (%) | Stratigraphic Description | Elevation (ft a.m.s.l.) |
|---|---|---|---|---|---|---|
| 0 | | | | | | |
| 2 | | | | | | |
| 4 | | | | | see MW-1B for stratigraphic log of overburden | |
| 6 | | | | | | |
| 8 | | | | | | |
| 10 | | | | | | |
| 12 | | | | | | |
| 14 | | | | | | |
| 16 | | | | | | |
| 18 | | | | | | |
| 20 | | | | | end of hole @ 20.5' | |
| 22 | | | | | | |
| 24 | | | | | | |
| 26 | | | | | | |
| 28 | | | | | | |
| 30 | | | | | | |
| 32 | | | | | | |
| 34 | | | | | | |
| 36 | | | | | | |
| 38 | | | | | | |



INTERA

# STRATIGRAPHIC AND INSTRUMENTATION LOG

| | | | |
|---|---|---|---|
| Project Name and No.: | Hyde Park PSA 91-022 | Borehole No.: | MW-1B |
| Client: | The Carborundum Company | Date Completed: | August 6, 1992 |
| Location: | Niagara Falls, N.Y. | Drilling Method: | Hollow Stem Auger, Diamond Coring |
| Reference Elevation: | | Drill Supervisor: | R.T. |



ASPHALT, gravel

FILL
- gravel and sand
- dark grey clay with black stain along vertical fractures
- rootlets
- mottled grey to orange

SILTY CLAY
- silty clay, rusty brown, firm, damp to wet
- stiff
- thin grey vertical clay seams
- moist
- occasional sand seam
- fine root hairs with black staining
- light brown
- rusty brown
- light brown and mottled
- occasional sand seams
- sticky wet grey clay to red clay
- very soft
- becoming sandy clay

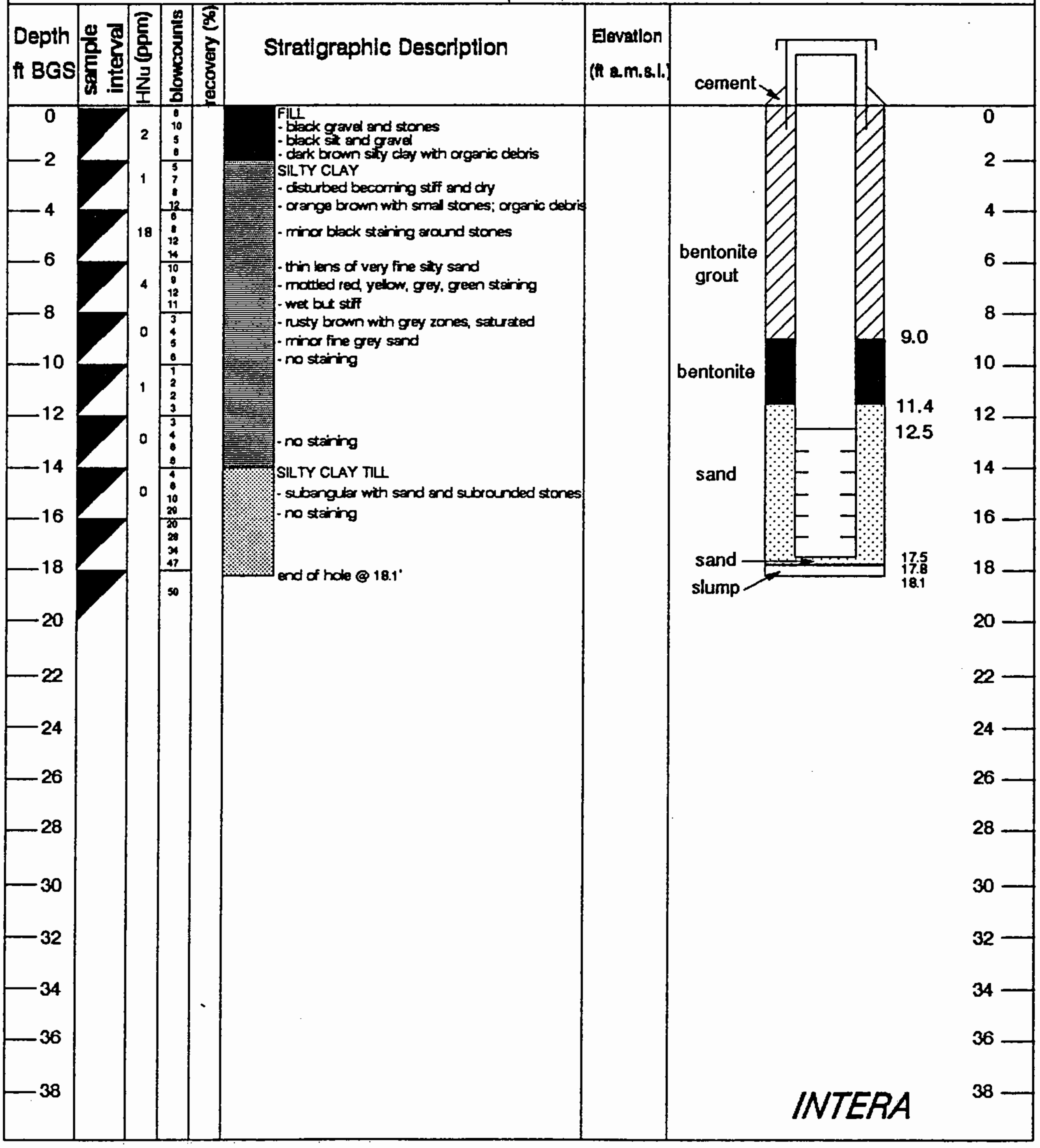
SILTY CLAY TILL
- clay with stones and sand
- saturated
- stony

DOLOSTONE
- dark grey, fossiliferous, shaley interbeds, stylolites
- fracture interval 1-7"
- vuggy
- clay and sand infilling of fractures
- fracture interval 1-8"
- rubbly zone @ 26-27.5'
- secondary yellow mineralization in vugs
- fracture interval 1-7"
- rubbly zone @ 33.3-34.3'

end of hole @ 35.3'

# STRATIGRAPHIC AND INSTRUMENTATION LOG

| | | | |
|---|---|---|---|
| **Project Name and No.:** | Hyde Park PSA 91-022 | **Borehole No.:** | MW-2A |
| **Client:** | The Carborundum Company | **Date Completed:** | July 29, 1992 |
| **Location:** | Niagara Falls, N.Y. | **Drilling Method:** | Hollow Stem Auger 8" O.D. |
| **Reference Elevation:** | | **Drill Supervisor:** | R.T. |



FILL
- black gravel and stones
- black silt and gravel
- dark brown silty clay with organic debris

SILTY CLAY
- disturbed becoming stiff and dry
- orange brown with small stones; organic debris
- minor black staining around stones
- thin lens of very fine silty sand
- mottled red, yellow, grey, green staining
- wet but stiff
- rusty brown with grey zones, saturated
- minor fine grey sand
- no staining
- no staining

SILTY CLAY TILL
- subangular with sand and subrounded stones
- no staining

end of hole @ 18.1'

*INTERA*

# STRATIGRAPHIC AND INSTRUMENTATION LOG

**Project Name and No.:** Hyde Park PSA 91-022

**Borehole No.:** MW-2B

**Client:** The Carborundum Company

**Date Completed:** Abandoned August 3, 1992

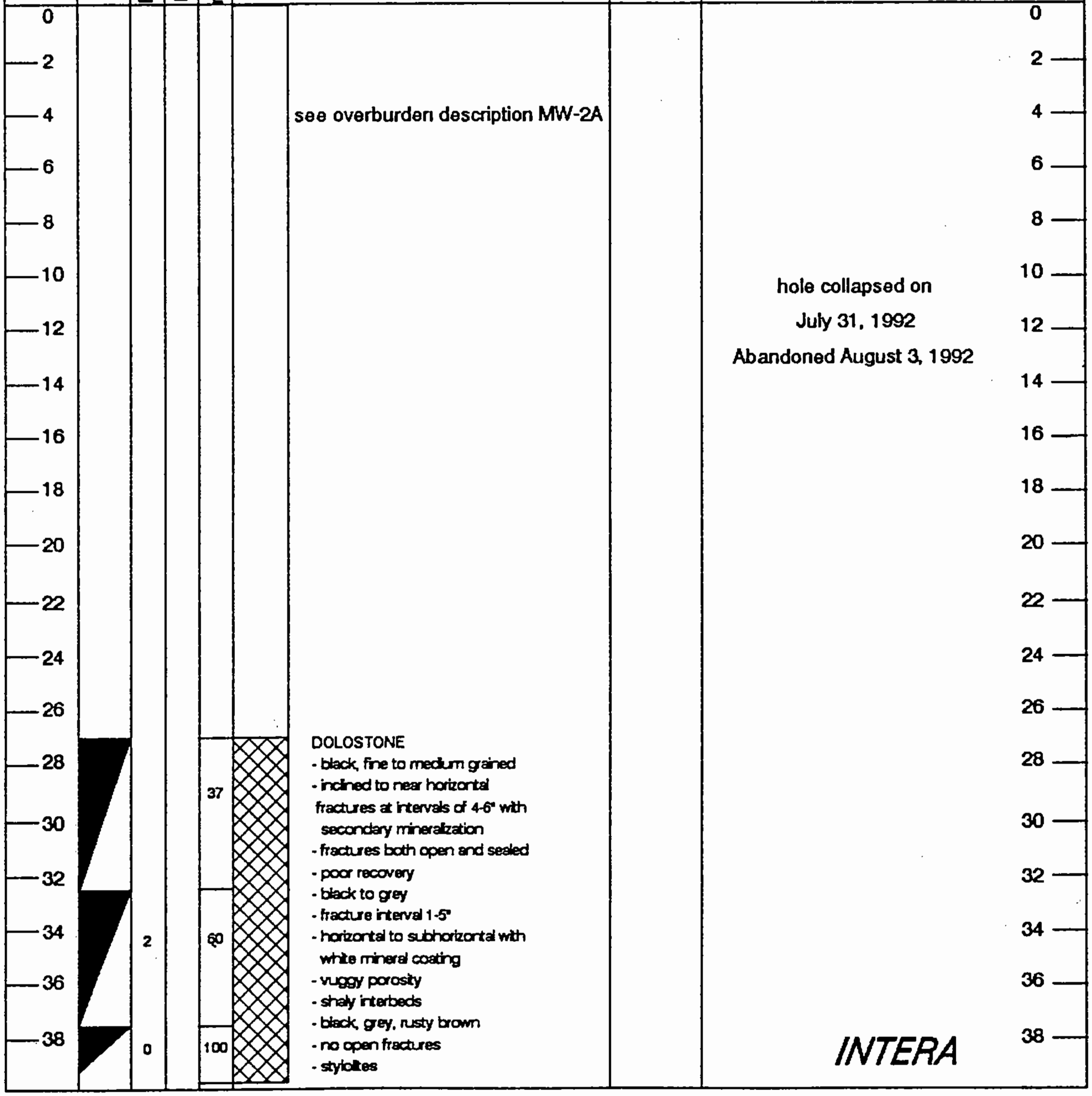
**Location:** Niagara Falls, N.Y.

**Drilling Method:** Hollow Stem Auger and Diamond Coring

**Reference Elevation:**

**Drill Supervisor:** R.T.

| Depth ft BGS | sample interval | HNu (ppm) | blowcounts | recovery (%) | Stratigraphic Description | Elevation (ft a.m.s.l.) | |
|---|---|---|---|---|---|---|---|



see overburden description MW-2A

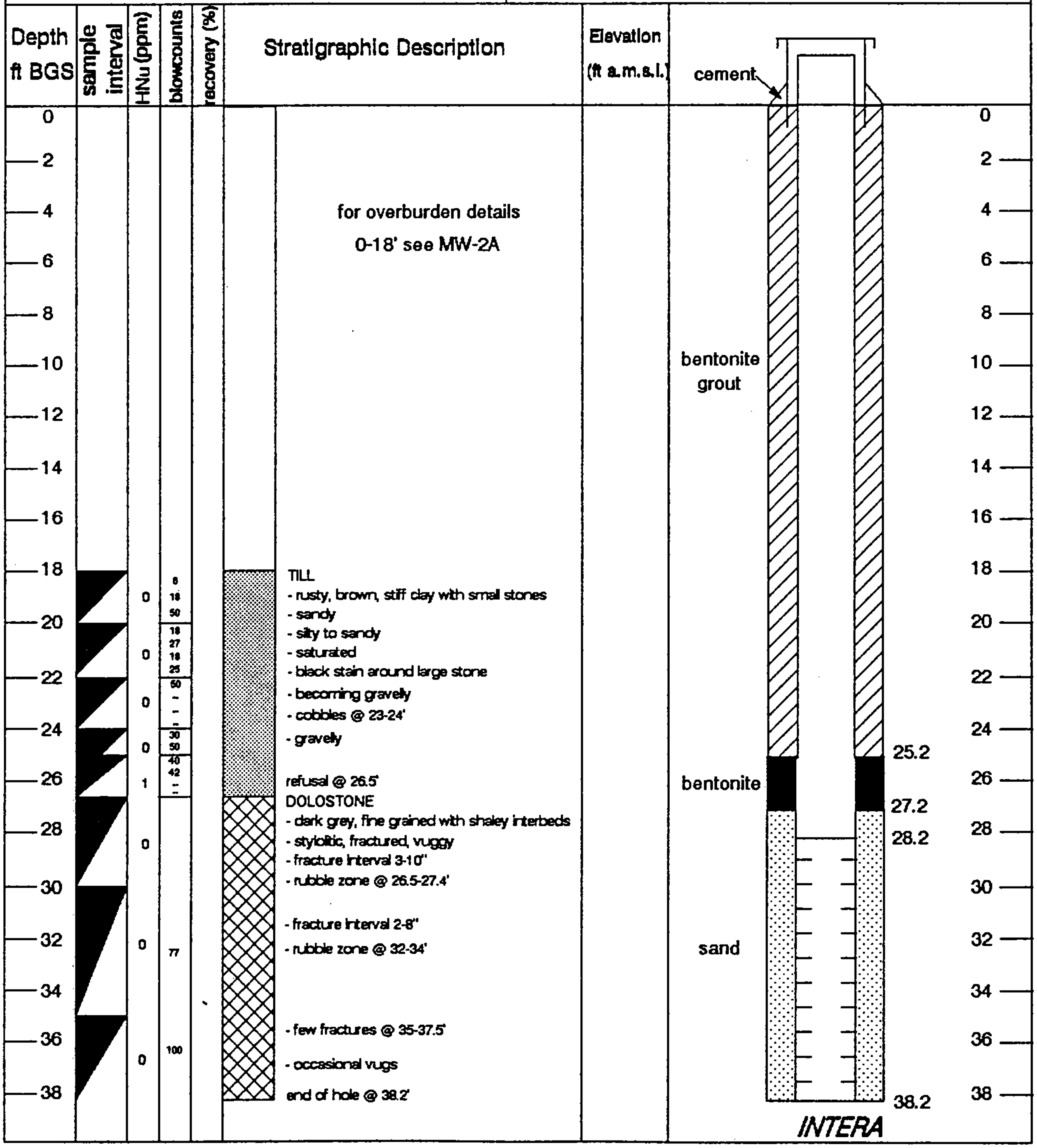
DOLOSTONE
- black, fine to medium grained
- inclined to near horizontal fractures at intervals of 4-6" with secondary mineralization
- fractures both open and sealed
- poor recovery
- black to grey
- fracture interval 1-5"
- horizontal to subhorizontal with white mineral coating
- vuggy porosity
- shaly interbeds
- black, grey, rusty brown
- no open fractures
- stylolites

hole collapsed on
July 31, 1992
Abandoned August 3, 1992

INTERA

# STRATIGRAPHIC AND INSTRUMENTATION LOG

| | | | |
|---|---|---|---|
| Project Name and No.: | Hyde Park PSA 91-022 | Borehole No.: | MW-2B |
| Client: | The Carborundum Company | Date Completed: | August 10, 1992 |
| Location: | Niagara Falls, N.Y. | Drilling Method: | Hollow Stem Auger and Diamond Coring |
| Reference Elevation: | | Drill Supervisor: | R.T. |



for overburden details
0-18' see MW-2A

TILL
- rusty, brown, stiff clay with small stones
- sandy
- silty to sandy
- saturated
- black stain around large stone
- becoming gravelly
- cobbles @ 23-24'
- gravelly

refusal @ 26.5'
DOLOSTONE
- dark grey, fine grained with shaley interbeds
- stylolitic, fractured, vuggy
- fracture interval 3-10"
- rubble zone @ 26.5-27.4'

- fracture interval 2-8"
- rubble zone @ 32-34'

- few fractures @ 35-37.5'

- occasional vugs

end of hole @ 38.2'

# STRATIGRAPHIC AND INSTRUMENTATION LOG

| | | | |
|---|---|---|---|
| Project Name and No.: | Hyde Park PSA 91-022 | Borehole No.: | MW-3A |
| Client: | The Carborundum Company | Date Completed: | August 5, 1992 |
| Location: | Niagara Falls, N.Y. | Drilling Method: | Hollow Stem Auger |
| Reference Elevation: | | Drill Supervisor: | R.T. |

| Depth ft BGS | sample interval | HNu (ppm) | blowcounts | recovery (%) | Elevation (ft a.m.s.l.) |
|---|---|---|---|---|---|
| 0–2 | | 0 | 4<br>3<br>3<br>4 | | |
| 2–4 | | 0 | 4<br>5<br>6<br>8 | | |
| 4–6 | | 0 | 9<br>10<br>10<br>13 | | |
| 6–8 | | 0 | 11<br>13<br>19<br>20 | | |
| 8–10 | | 0 | 11<br>20<br>21<br>22 | | |
| 10–12 | | 0 | 2<br>3<br>3<br>3 | | |
| 12–14 | | 0 | 3<br>4<br>4<br>5 | | |
| 14–16 | | 0 | 3<br>2<br>2<br>3 | | |
| 16–18 | | 0 | 3<br>2<br>2<br>1 | | |
| 18–20 | | 0 | 1<br>1<br>1<br>3 | | |

Depth ft BGS: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38

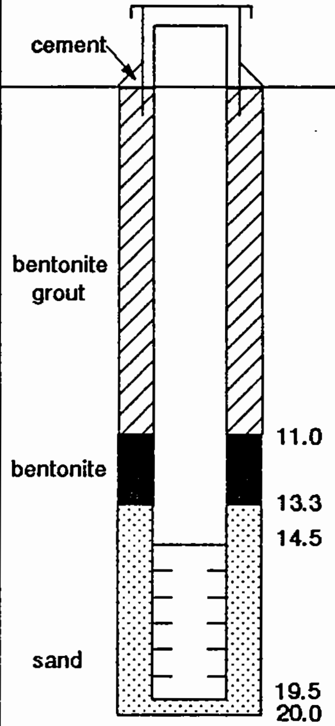
**Stratigraphic Description**

FILL
- black to brown clay with stones and organic debris
- moist
- root fragments
- mottled grey and black staining

SILTY CLAY
- brown silty clay
- mottled red and grey
- soft, moist
- rusty brown
- piece of steel, sticks, stones
- wet
- plastic clay
- no staining
- wet
- soft, silty clay
- 1" layer of black fill
- plastic to stiff clay overlying grey-brown, sticky, wet clay

TILL
- occasional small stones
- no staining
- bright red clay with grey sand

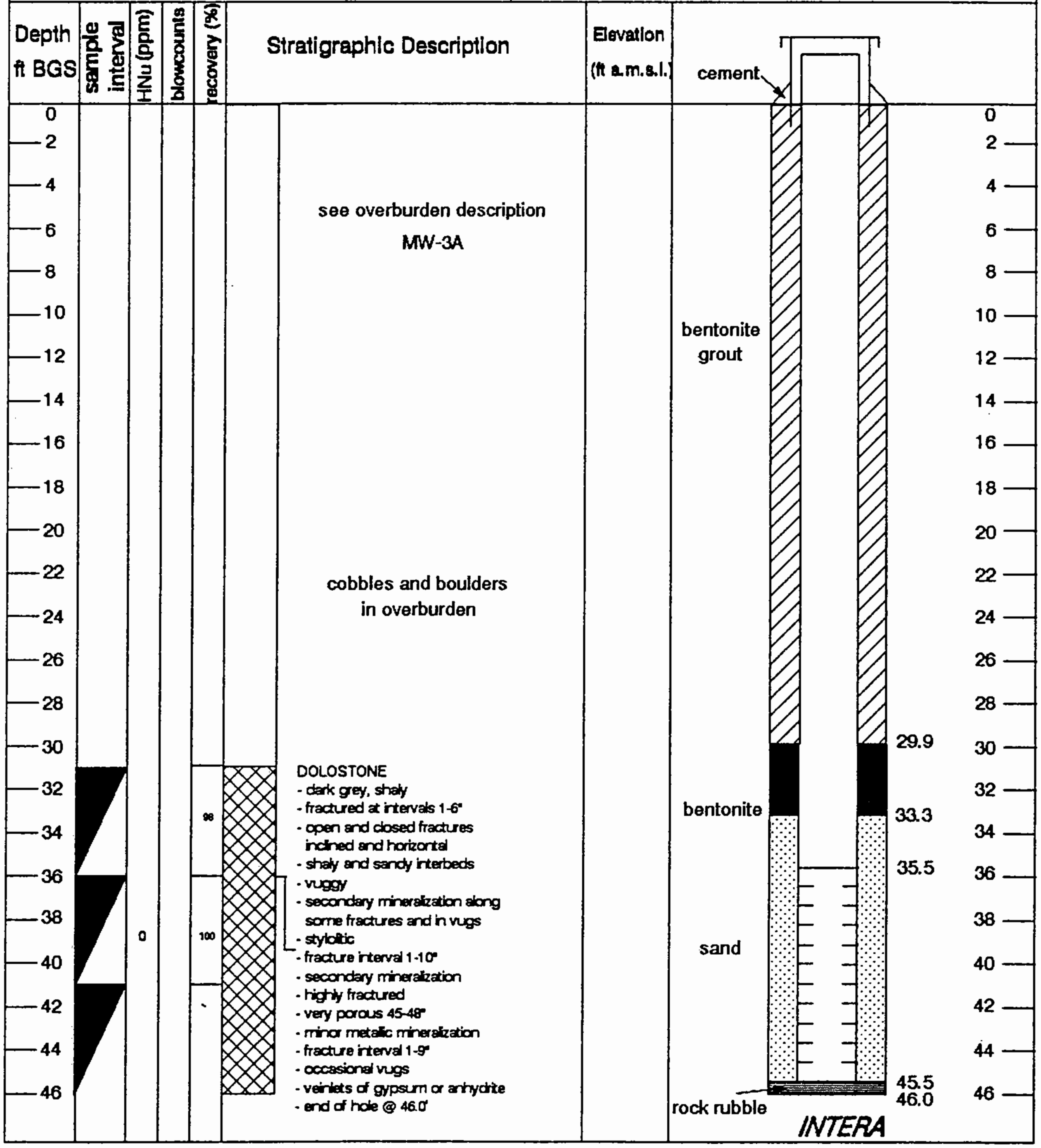
end of hole @ 20'



INTERA

# STRATIGRAPHIC AND INSTRUMENTATION LOG

| | | | |
|---|---|---|---|
| Project Name and No.: | Hyde Park PSA 91-022 | Borehole No.: | MW-3B |
| Client: | The Carborundum Company | Date Completed: | August 5, 1992 |
| Location: | Niagara Falls, N.Y. | Drilling Method: | Hollow Stem Auger and Diamond Coring |
| Reference Elevation: | | Drill Supervisor: | R.T. |



see overburden description MW-3A

cobbles and boulders in overburden

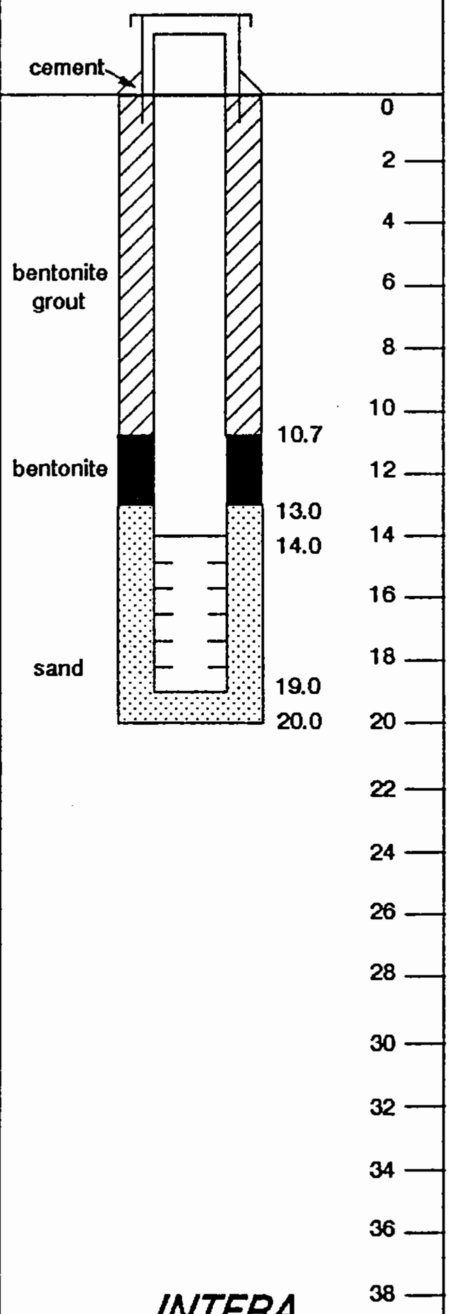
DOLOSTONE
- dark grey, shaly
- fractured at intervals 1-6"
- open and closed fractures inclined and horizontal
- shaly and sandy interbeds
- vuggy
- secondary mineralization along some fractures and in vugs
- stylolitic
- fracture interval 1-10"
- secondary mineralization
- highly fractured
- very porous 45-48"
- minor metallic mineralization
- fracture interval 1-9"
- occasional vugs
- veinlets of gypsum or anhydrite
- end of hole @ 46.0'

INTERA

# STRATIGRAPHIC AND INSTRUMENTATION LOG

| | | | |
|---|---|---|---|
| **Project Name and No.:** | Hyde Park PSA 91-022 | **Borehole No.:** | MW-4A |
| **Client:** | The Carborundum Company | **Date Completed:** | August 12, 1992 |
| **Location:** | Niagara Falls, N.Y. | **Drilling Method:** | Hollow Stem Auger |
| **Reference Elevation:** | | **Drill Supervisor:** | R.T. |

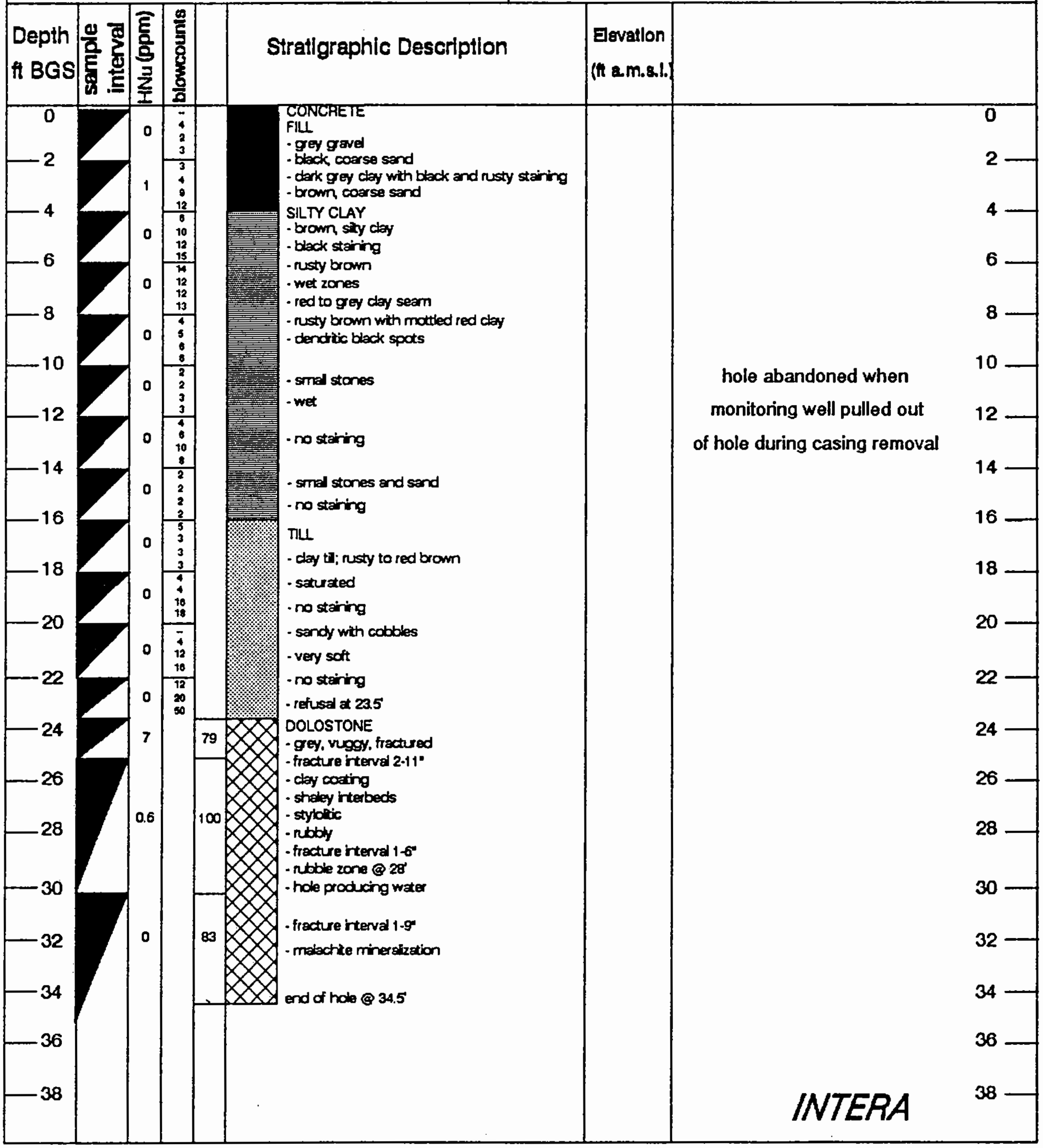
| Depth ft BGS | sample interval | HNu (ppm) | blowcounts | recovery (%) | Stratigraphic Description | Elevation (ft a.m.s.l.) |
|---|---|---|---|---|---|---|
| 0 | | | | | | |
| 2 | | | | | | |
| 4 | | | | | for overburden | |
| 6 | | | | | stratigraphy details | |
| 8 | | | | | see MW-4B | |
| 10 | | | | | | |
| 12 | | | | | | |
| 14 | | | | | | |
| 16 | | | | | | |
| 18 | | | | | | |
| 20 | | | | | end of hole @ 20.0' | |
| 22 | | | | | | |
| 24 | | | | | | |
| 26 | | | | | | |
| 28 | | | | | | |
| 30 | | | | | | |
| 32 | | | | | | |
| 34 | | | | | | |
| 36 | | | | | | |
| 38 | | | | | | |



INTERA

# STRATIGRAPHIC AND INSTRUMENTATION LOG

| | | | |
|---|---|---|---|
| Project Name and No.: | Hyde Park PSA 91-022 | Borehole No.: | MW-4B |
| Client: | The Carborundum Company | Date Completed: | Abandoned August 11, 1992 |
| Location: | Niagara Falls, N.Y. | Drilling Method: | Hollow Stem Auger and Diamond Coring |
| Reference Elevation: | | Drill Supervisor: | R.T. |



| HNu (ppm) | blowcounts | |
|---|---|---|
| 0 | -<br>4<br>2<br>3 | |
| 1 | 3<br>4<br>9<br>12 | |
| 0 | 6<br>10<br>12<br>15 | |
| 0 | 14<br>12<br>12<br>13 | |
| 0 | 4<br>5<br>6<br>6 | |
| 0 | 2<br>2<br>3<br>3 | |
| 0 | 4<br>6<br>10<br>8 | |
| 0 | 2<br>2<br>2<br>2 | |
| 0 | 5<br>3<br>3<br>3 | |
| 0 | 4<br>4<br>16<br>18 | |
| 0 | -<br>4<br>12<br>16 | |
| 0 | 12<br>20<br>50 | |
| 7 | | 79 |
| 0.6 | | 100 |
| 0 | | 83 |

CONCRETE

FILL
- grey gravel
- black, coarse sand
- dark grey clay with black and rusty staining
- brown, coarse sand

SILTY CLAY
- brown, silty clay
- black staining
- rusty brown
- wet zones
- red to grey clay seam
- rusty brown with mottled red clay
- dendritic black spots
- small stones
- wet
- no staining
- small stones and sand
- no staining

TILL
- clay till; rusty to red brown
- saturated
- no staining
- sandy with cobbles
- very soft
- no staining
- refusal at 23.5'

DOLOSTONE
- grey, vuggy, fractured
- fracture interval 2-11"
- clay coating
- shaley interbeds
- stylolitic
- rubbly
- fracture interval 1-6"
- rubble zone @ 28'
- hole producing water
- fracture interval 1-9"
- malachite mineralization

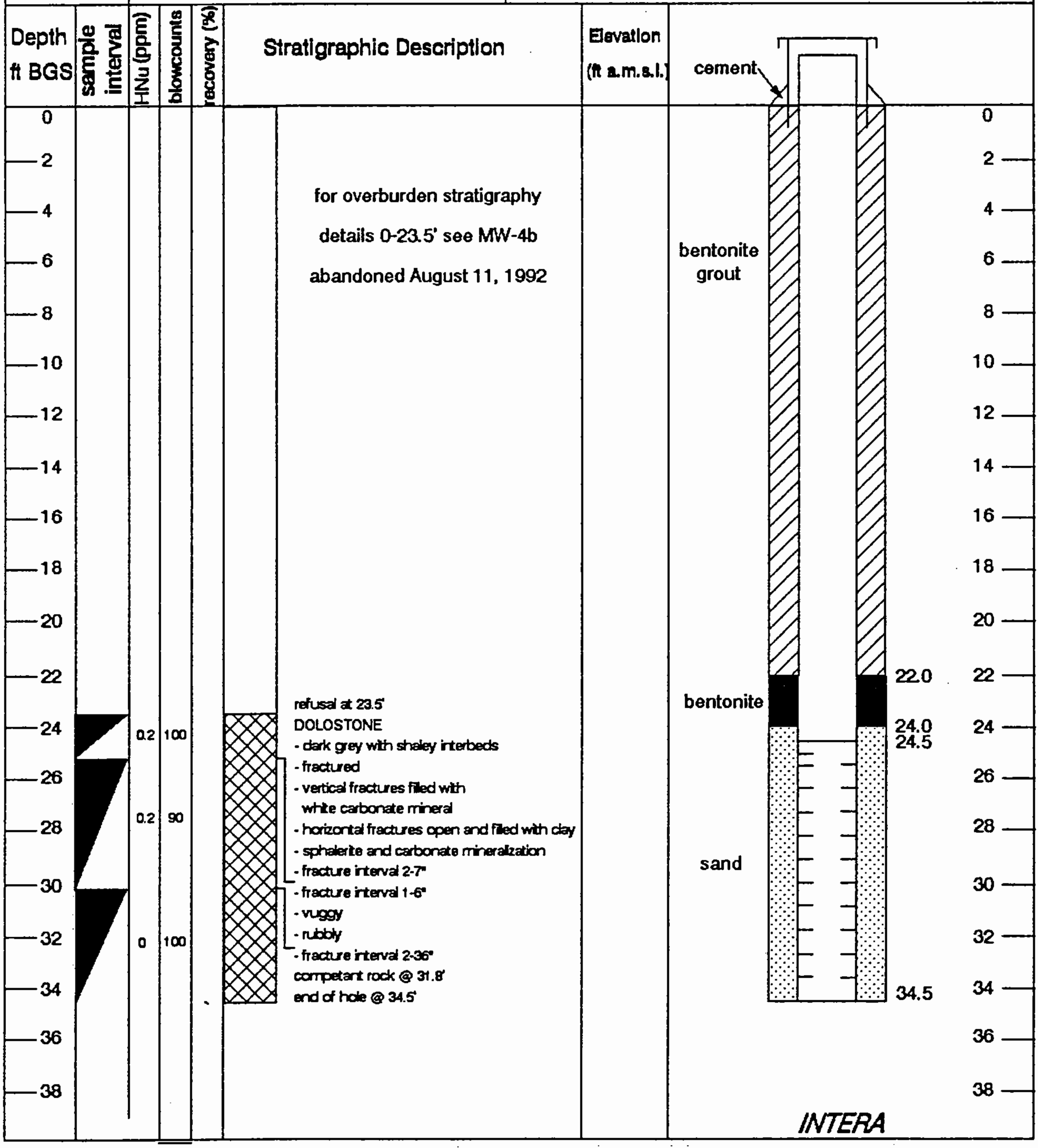
end of hole @ 34.5'

hole abandoned when monitoring well pulled out of hole during casing removal

INTERA

# STRATIGRAPHIC AND INSTRUMENTATION LOG

| | | | |
|---|---|---|---|
| **Project Name and No.:** | Hyde Park PSA 91-022 | **Borehole No.:** | MW-4B |
| **Client:** | The Carborundum Company | **Date Completed:** | August 12, 1992 |
| **Location:** | Niagara Falls, N.Y. | **Drilling Method:** | Hollow Stem Auger and Diamond Coring |
| **Reference Elevation:** | | **Drill Supervisor:** | R.T. |



for overburden stratigraphy details 0-23.5' see MW-4b abandoned August 11, 1992

refusal at 23.5'

DOLOSTONE
- dark grey with shaley interbeds
- fractured
- vertical fractures filled with white carbonate mineral
- horizontal fractures open and filled with clay
- sphalerite and carbonate mineralization
- fracture interval 2-7"
- fracture interval 1-6"
- vuggy
- rubbly
- fracture interval 2-36"

competant rock @ 31.8'

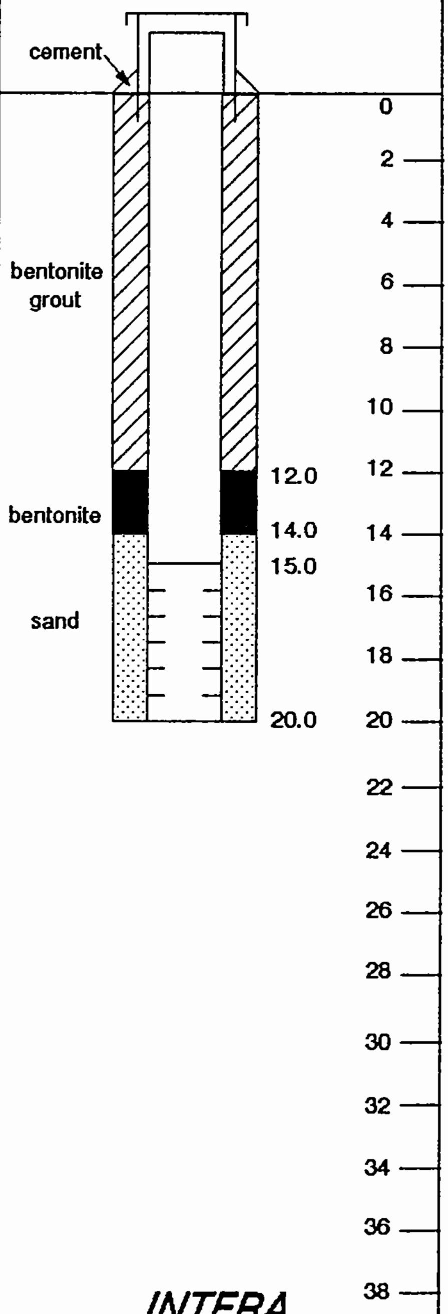
end of hole @ 34.5'

*INTERA*

# STRATIGRAPHIC AND INSTRUMENTATION LOG

| | | | |
|---|---|---|---|
| **Project Name and No.:** | Hyde Park PSA 91-022 | **Borehole No.:** | MW-5A |
| **Client:** | The Carborundum Company | **Date Completed:** | August 14, 1992 |
| **Location:** | Niagara Falls, N.Y. | **Drilling Method:** | Hollow Stem Auger |
| **Reference Elevation:** | | **Drill Supervisor:** | R.T. |

| Depth ft BGS | sample interval | HNu (ppm) | blowcounts | recovery (%) | Stratigraphic Description | Elevation (ft a.m.s.l.) |
|---|---|---|---|---|---|---|
| 0 | | | | | | |
| 2 | | | | | | |
| 4 | | | | | for details on overburden stratigraphy see MW-5B | |
| 6 | | | | | | |
| 8 | | | | | | |
| 10 | | | | | | |
| 12 | | | | | | |
| 14 | | | | | | |
| 16 | | | | | | |
| 18 | | | | | | |
| 20 | | | | | end of hole @ 20.0' | |
| 22 | | | | | | |
| 24 | | | | | | |
| 26 | | | | | | |
| 28 | | | | | | |
| 30 | | | | | | |
| 32 | | | | | | |
| 34 | | | | | | |
| 36 | | | | | | |
| 38 | | | | | | |

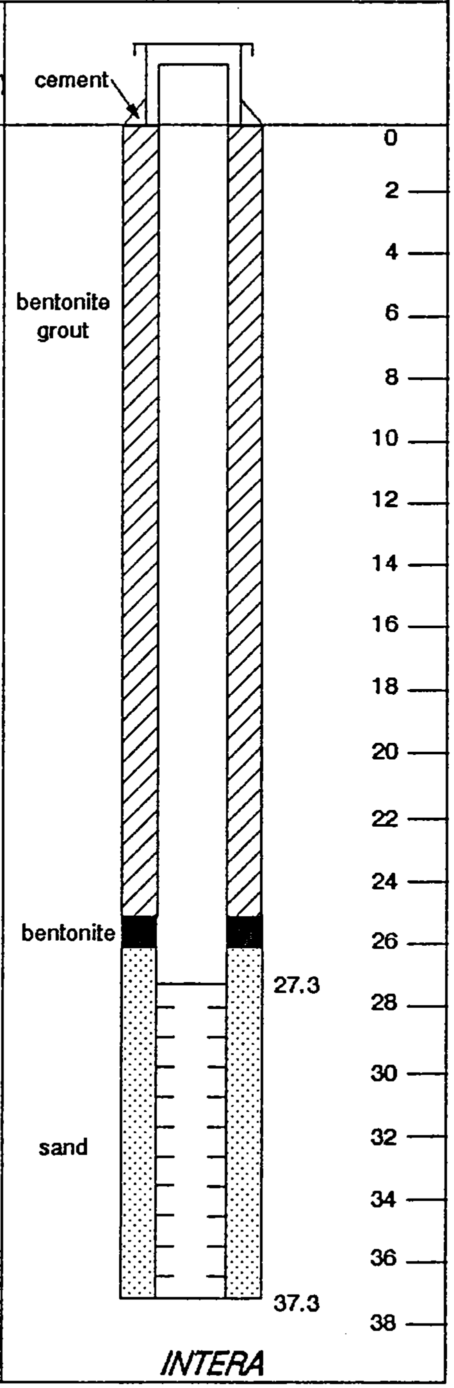


INTERA

# STRATIGRAPHIC AND INSTRUMENTATION LOG

| | | | |
|---|---|---|---|
| Project Name and No.: | Hyde Park PSA 91-022 | Borehole No.: | MW-5B |
| Client: | The Carborundum Company | Date Completed: | August 13, 1992 |
| Location: | Niagara Falls, N.Y. | Drilling Method: | Hollow Stem Auger and Diamond Coring |
| Reference Elevation: | | Drill Supervisor: | R.T. |

| Depth ft BGS | sample interval | HNu (ppm) | blowcounts | recovery (%) | Stratigraphic Description | Elevation (ft a.m.s.l.) |
|---|---|---|---|---|---|---|
| 0 | | 9.8 | -<br>10<br>10<br>7 | | ASPHALT<br>FILL<br>- grey, silty sand and gravel<br>- rusty brown clay and gravel | |
| 2 | | 32 | 5<br>6<br>7<br>9 | | SILTY CLAY<br>- rusty brown, silty clay; occasional sand | |
| 4 | | | 7<br>7<br>7<br>12 | | - no staining<br>- no sample<br>- stone jammed in spoon | |
| 6 | | 24 | 7<br>8<br>8<br>10 | | | |
| 8 | | 16.2 | 4<br>5<br>5<br>5 | | | |
| 10 | | 18.2 | 4<br>5<br>8<br>12 | | CLAY TILL<br>- rusty brown with sand and stones<br>- no staining | |
| 12 | | 4.6 | 16<br>13<br>12<br>16 | | - no staining<br>- cobble with fragments | |
| 14 | | 12.0 | 27<br>21<br>40<br>20 | | - no staining | |
| 16 | | 7.4 | 11<br>19<br>50 | | - with cobbles; no staining | |
| 18 | | 30 | 11<br>23<br>25<br>22 | | - no staining | |
| 20 | | 32 | 8<br>12<br>17<br>12 | | - becoming dark grey<br>- no staining | |
| 22 | | 19 | 27<br>50 | | - red, gravelly, silty till<br>- rusty brown to dark grey<br>- silty gravel and fragmented rock | |
| 24 | | 6.8 | >100 | | refusal @ 24.25' | |
| 26 | | 10 | | 100 | DOLOSTONE<br>- dark grey to black with shaley interbeds<br>- stylolites; slightly vuggy<br>- fractured<br>- fracture interval 3-18"<br>- small black crystals along fracture surface | |
| 30 | | 0 | | 77 | - dark grey to brown<br>- brecciated<br>- vuggy, crinoid stem<br>- sphalerite and carbonate<br>- secondary mineralization | |
| 36 | | 0 | | 100 | end of hole @ 37.3' | |
| 38 | | | | | | |



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**INTERA INC.** • 6850 Austin Center Boulevard • Suite 300 • Austin, Texas 78731, USA • Telephone: 512-346-2000 • Facsimile: 512-346-9436

# Remedial Investigation of
# the Former Carborundum Company
# Electric Products Division, Hyde Park Facility,
# Town of Niagara, Niagara County, New York
# APPENDICES TO DRAFT REPORT
# SITE NO. 932036

Prepared For: The Carborundum Company
Electric Products Division
1625 Buffalo Avenue
Niagara Falls, New York 14303

Prepared By: INTERA Inc.
Austin, Texas

94-085

January 1997

# APPENDIX B

## Stratigraphic Logs

## Monitor Well Boreholes

# BOREHOLE LOG

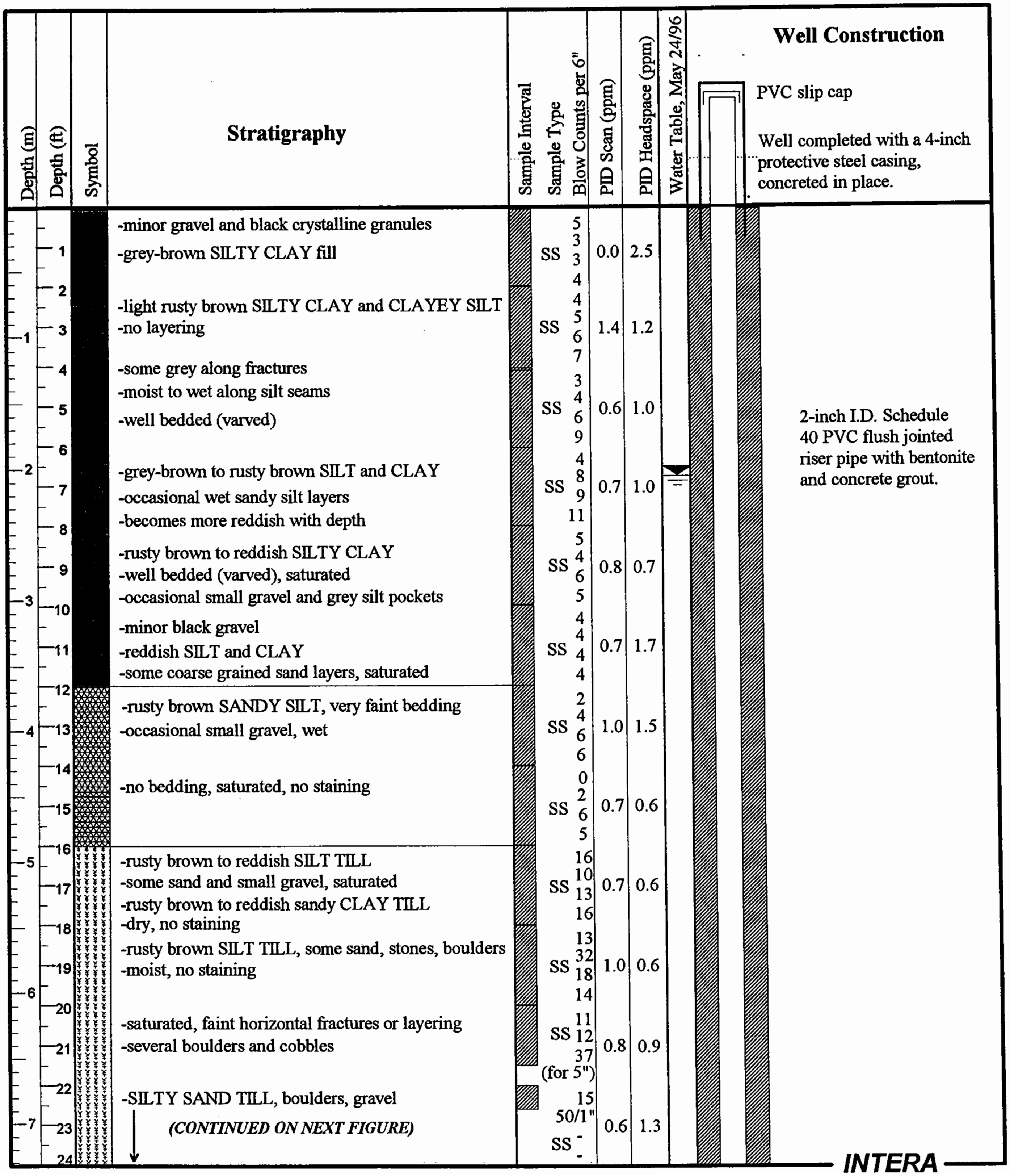
## MW-6

Client: *The Carborundum Company*
Project Title: *RI/FS, Former Hyde Park Facility*
Project Ref.: *94-085*

Date: *May 6, 1996*
Field Crew: *R.T. & G.H.*
Equipment: *H.S.A.*
Ground Elevation: *594.0ftASL*

File Name: MW6085.TCW

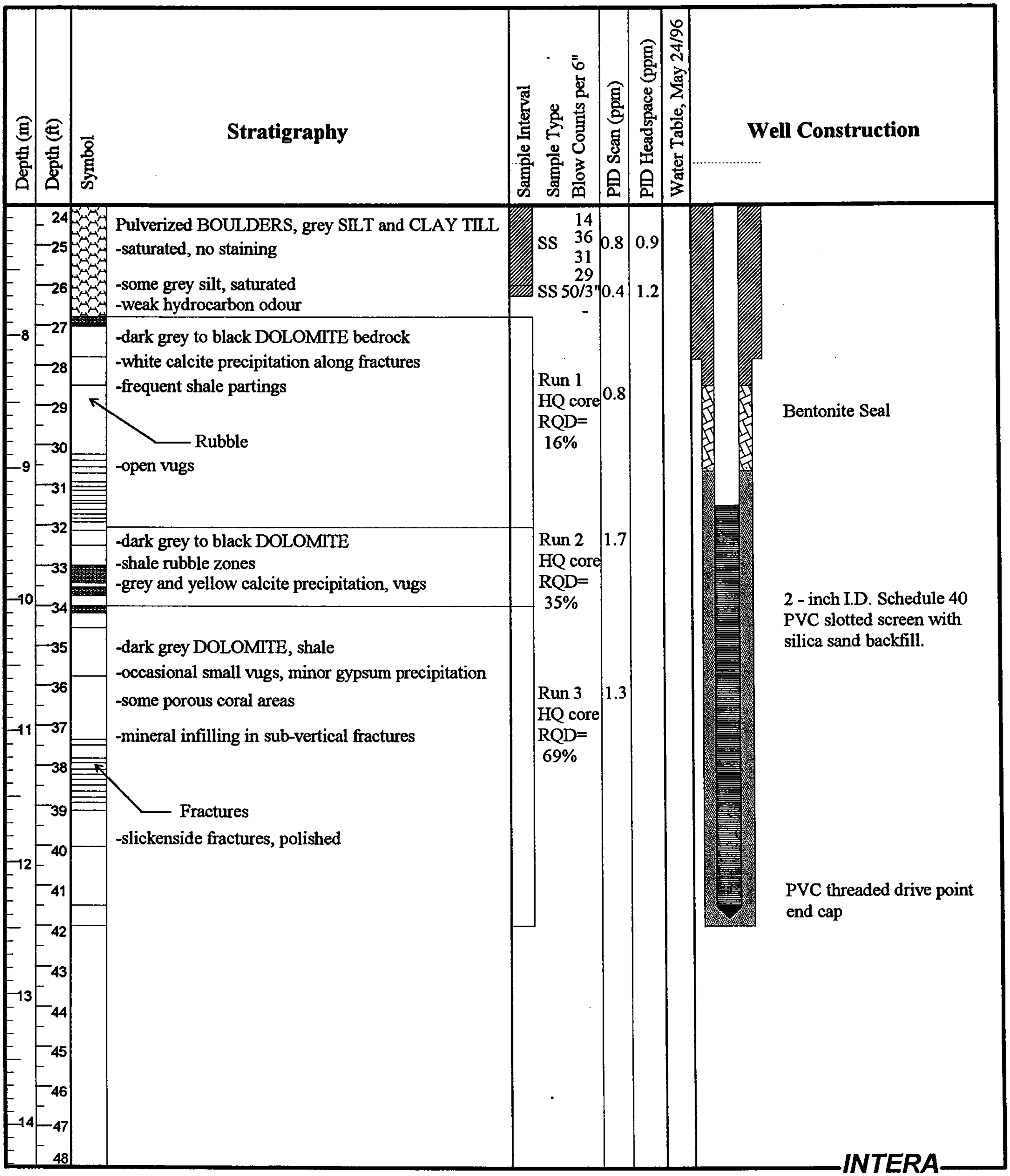
| Stratigraphy | Sample Type | Blow Counts per 6" | PID Scan (ppm) | PID Headspace (ppm) | Water Table, May 24/96 |
|---|---|---|---|---|---|
| -minor gravel and black crystalline granules<br>-grey-brown SILTY CLAY fill | SS | 5<br>3<br>3<br>4 | 0.0 | 2.5 | |
| -light rusty brown SILTY CLAY and CLAYEY SILT<br>-no layering | SS | 4<br>5<br>6<br>7 | 1.4 | 1.2 | |
| -some grey along fractures<br>-moist to wet along silt seams<br>-well bedded (varved) | SS | 3<br>4<br>6<br>9 | 0.6 | 1.0 | |
| -grey-brown to rusty brown SILT and CLAY<br>-occasional wet sandy silt layers<br>-becomes more reddish with depth | SS | 4<br>8<br>9<br>11 | 0.7 | 1.0 | ▼ |
| -rusty brown to reddish SILTY CLAY<br>-well bedded (varved), saturated<br>-occasional small gravel and grey silt pockets | SS | 5<br>4<br>6<br>5 | 0.8 | 0.7 | |
| -minor black gravel<br>-reddish SILT and CLAY<br>-some coarse grained sand layers, saturated | SS | 4<br>4<br>4<br>4 | 0.7 | 1.7 | |
| -rusty brown SANDY SILT, very faint bedding<br>-occasional small gravel, wet | SS | 2<br>4<br>6<br>6 | 1.0 | 1.5 | |
| -no bedding, saturated, no staining | SS | 0<br>2<br>6<br>5 | 0.7 | 0.6 | |
| -rusty brown to reddish SILT TILL<br>-some sand and small gravel, saturated<br>-rusty brown to reddish sandy CLAY TILL<br>-dry, no staining | SS | 16<br>10<br>13<br>16 | 0.7 | 0.6 | |
| -rusty brown SILT TILL, some sand, stones, boulders<br>-moist, no staining | SS | 13<br>32<br>18<br>14 | 1.0 | 0.6 | |
| -saturated, faint horizontal fractures or layering<br>-several boulders and cobbles | SS | 11<br>12<br>37<br>(for 5") | 0.8 | 0.9 | |
| -SILTY SAND TILL, boulders, gravel<br>↓ *(CONTINUED ON NEXT FIGURE)* | SS | 15<br>50/1"<br>-<br>- | 0.6 | 1.3 | |



INTERA

| **BOREHOLE LOG** | | **MW-6 (continued)** | |
|---|---|---|---|
| Client: | *The Carborundum Company* | Date: | *May 6, 1996* |
| Project Title: | *RI/FS, Former Hyde Park Facility* | Field Crew: | *R.T. & G.H.* |
| Project Ref.: | *94-085* | Equipment: | *H.S.A., air rotary* |
| | | Ground Elevation: | *594.0ftASL* |

File Name: W62085.TCW



| Stratigraphy | Sample Type / Blow Counts per 6" | PID Scan (ppm) | PID Headspace (ppm) |
|---|---|---|---|
| Pulverized BOULDERS, grey SILT and CLAY TILL<br>-saturated, no staining | SS 14<br>36<br>31<br>29 | 0.8 | 0.9 |
| -some grey silt, saturated<br>-weak hydrocarbon odour | SS 50/3"<br>- | 0.4 | 1.2 |
| -dark grey to black DOLOMITE bedrock<br>-white calcite precipitation along fractures<br>-frequent shale partings<br>-open vugs | Run 1<br>HQ core<br>RQD=<br>16% | 0.8 | |
| -dark grey to black DOLOMITE<br>-shale rubble zones<br>-grey and yellow calcite precipitation, vugs | Run 2<br>HQ core<br>RQD=<br>35% | 1.7 | |
| -dark grey DOLOMITE, shale<br>-occasional small vugs, minor gypsum precipitation<br>-some porous coral areas<br>-mineral infilling in sub-vertical fractures<br>-slickenside fractures, polished | Run 3<br>HQ core<br>RQD=<br>69% | 1.3 | |

INTERA

# BOREHOLE LOG

# MW-7A

Client: *The Carborundum Company*

Project Title: *RI/FS, Former Hyde Park Facility*

Project Ref.: *94-085*

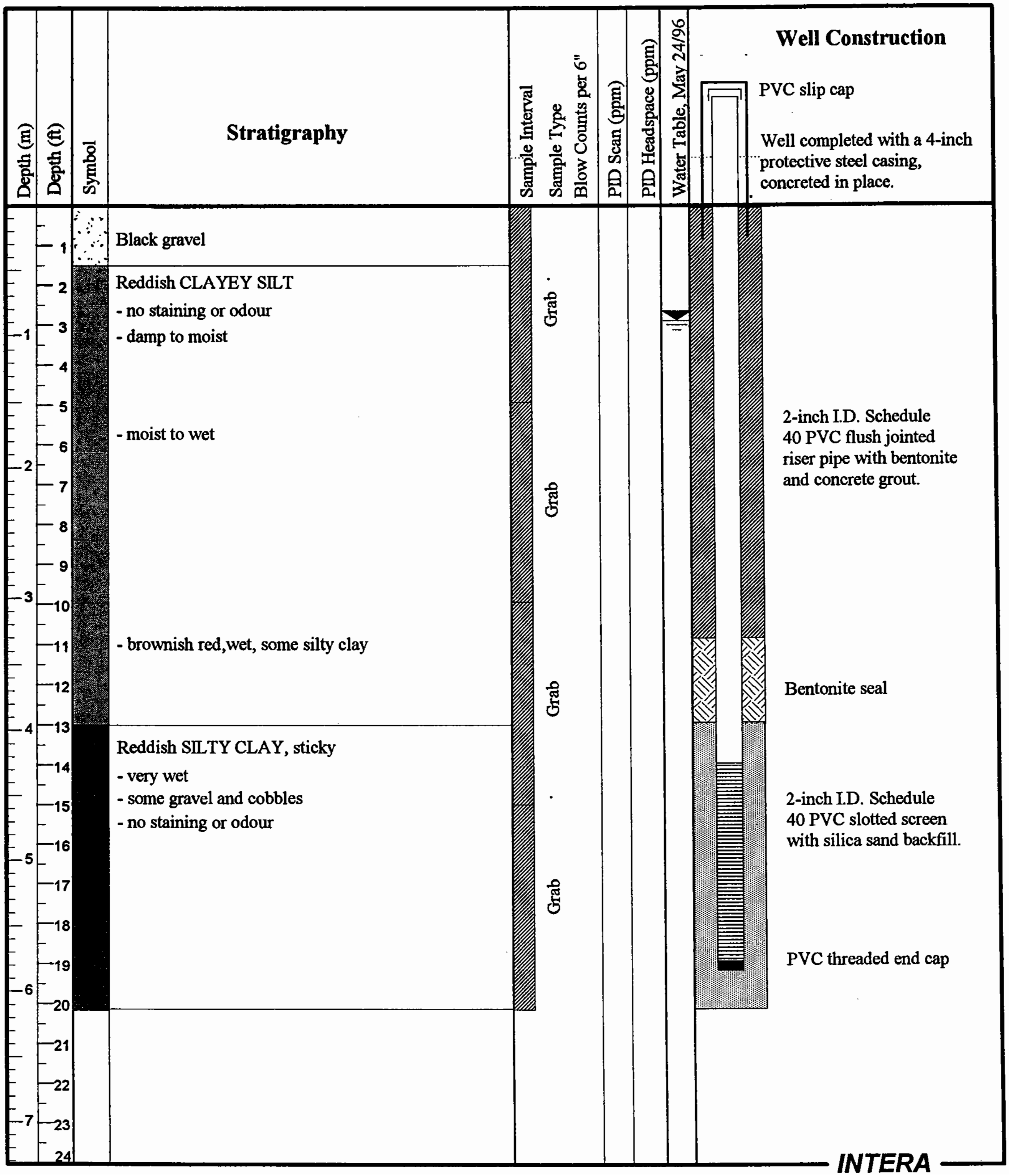
Date: *May 3, 1996*

Field Crew: *R.T. & G.H.*

Equipment: *H.S.A.*

Ground Elevation: *593.9ftASL*

File Name: MW7A085.TCW



**INTERA**

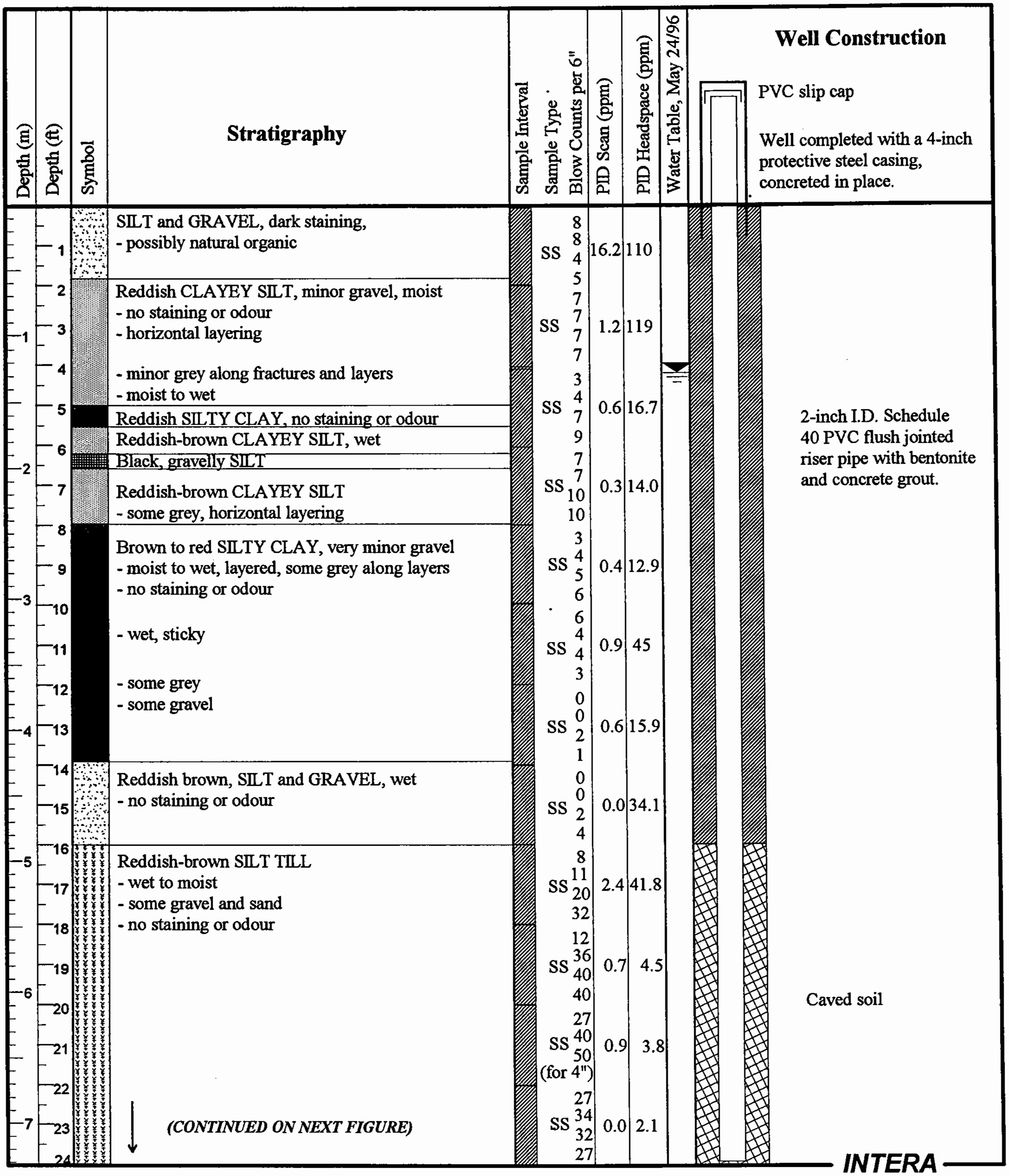
# BOREHOLE LOG

## MW-7B

Client: *The Carborundum Company*
Project Title: *RI/FS, Former Hyde Park Facility*
Project Ref.: *94-085*

Date: *May 2&3, 1996*
Field Crew: *R.T. & G.H.*
Equipment: *H.S.A., air rotary*
Ground Elevation: *594.0ftASL*

File Name: MW7B085.TCW



**Stratigraphy**

SILT and GRAVEL, dark staining,
- possibly natural organic

Reddish CLAYEY SILT, minor gravel, moist
- no staining or odour
- horizontal layering
- minor grey along fractures and layers
- moist to wet

Reddish SILTY CLAY, no staining or odour

Reddish-brown CLAYEY SILT, wet

Black, gravelly SILT

Reddish-brown CLAYEY SILT
- some grey, horizontal layering

Brown to red SILTY CLAY, very minor gravel
- moist to wet, layered, some grey along layers
- no staining or odour
- wet, sticky
- some grey
- some gravel

Reddish brown, SILT and GRAVEL, wet
- no staining or odour

Reddish-brown SILT TILL
- wet to moist
- some gravel and sand
- no staining or odour

↓ *(CONTINUED ON NEXT FIGURE)*

| Sample Type | Blow Counts per 6" | PID Scan (ppm) | PID Headspace (ppm) |
|---|---|---|---|
| SS | 8<br>8<br>4<br>5 | 16.2 | 110 |
| SS | 7<br>7<br>7<br>7 | 1.2 | 119 |
| SS | 3<br>4<br>7<br>9 | 0.6 | 16.7 |
| SS | 7<br>7<br>10<br>10 | 0.3 | 14.0 |
| SS | 3<br>4<br>5<br>6 | 0.4 | 12.9 |
| SS | 6<br>4<br>4<br>3 | 0.9 | 45 |
| SS | 0<br>0<br>2<br>1 | 0.6 | 15.9 |
| SS | 0<br>0<br>2<br>4 | 0.0 | 34.1 |
| SS | 8<br>11<br>20<br>32 | 2.4 | 41.8 |
| SS | 12<br>36<br>40<br>40 | 0.7 | 4.5 |
| SS | 27<br>40<br>50<br>(for 4") | 0.9 | 3.8 |
| SS | 27<br>34<br>32<br>27 | 0.0 | 2.1 |

**Well Construction**

PVC slip cap

Well completed with a 4-inch protective steel casing, concreted in place.

2-inch I.D. Schedule 40 PVC flush jointed riser pipe with bentonite and concrete grout.

Caved soil

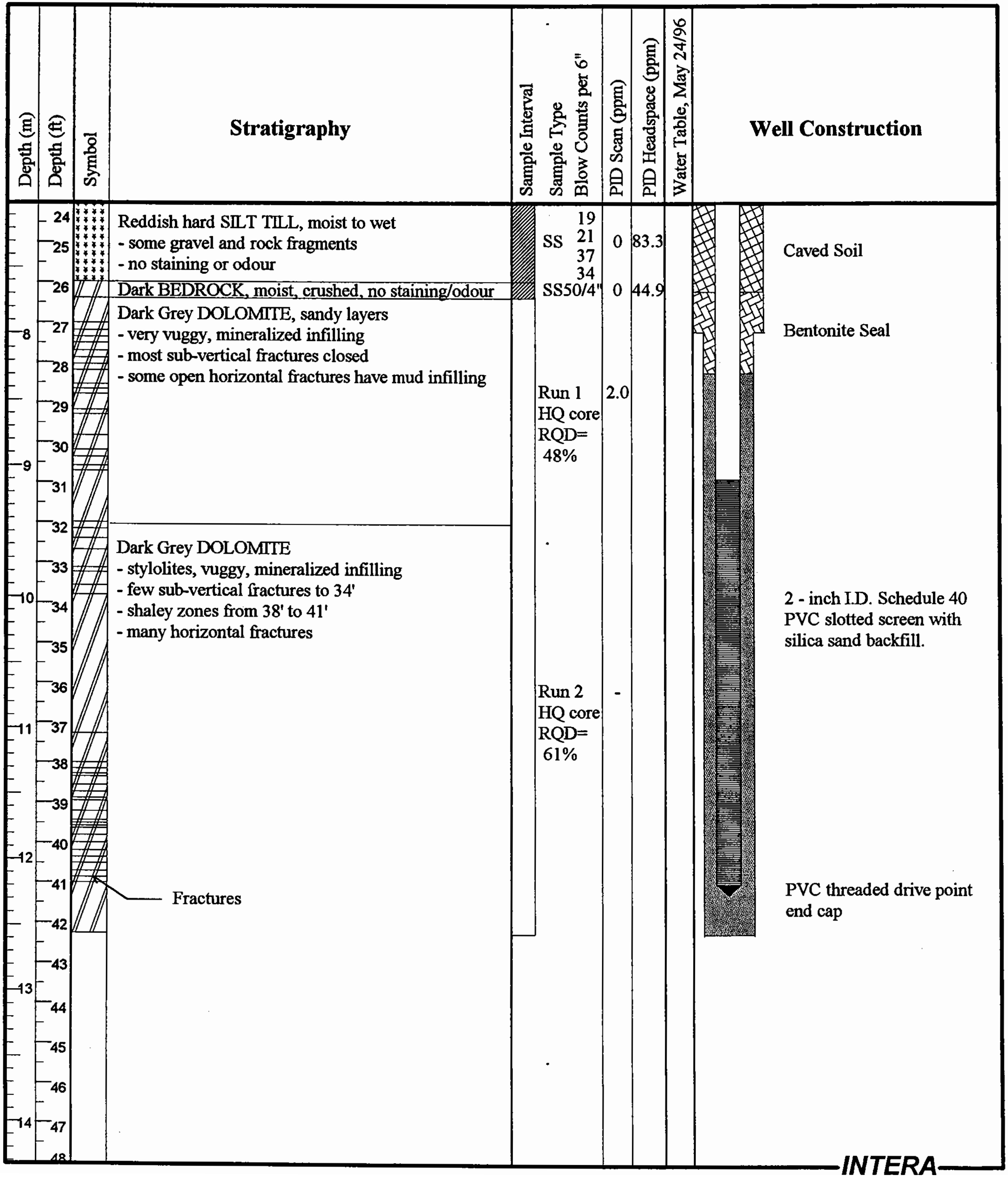
INTERA

# BOREHOLE LOG

# MW-7B (continued)

| | | | |
|---|---|---|---|
| Client: | *The Carborundum Company* | Date: | *May 2, 1996* |
| Project Title: | *RI/FS, Former Hyde Park Facility* | Field Crew: | *R.T. & G.H.* |
| Project Ref.: | *94-085* | Equipment: | *H.S.A., air rotary* |
| | | Ground Elevation: | *594.0ftASL* |

File Name: W7B2085.TCW



| Stratigraphy | Sample Type | Blow Counts per 6" | PID Scan (ppm) | PID Headspace (ppm) |
|---|---|---|---|---|
| Reddish hard SILT TILL, moist to wet<br>- some gravel and rock fragments<br>- no staining or odour | SS | 19<br>21<br>37<br>34 | 0 | 83.3 |
| Dark BEDROCK, moist, crushed, no staining/odour | SS | 50/4" | 0 | 44.9 |
| Dark Grey DOLOMITE, sandy layers<br>- very vuggy, mineralized infilling<br>- most sub-vertical fractures closed<br>- some open horizontal fractures have mud infilling | Run 1<br>HQ core<br>RQD=<br>48% | | 2.0 | |
| Dark Grey DOLOMITE<br>- stylolites, vuggy, mineralized infilling<br>- few sub-vertical fractures to 34'<br>- shaley zones from 38' to 41'<br>- many horizontal fractures | Run 2<br>HQ core<br>RQD=<br>61% | | - | |

# BOREHOLE LOG

# MW-8

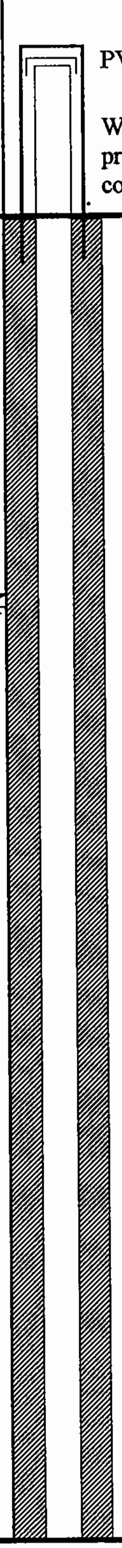
Client: *The Carborundum Company*
Project Title: *RI/FS, Former Hyde Park Facility*
Project Ref.: *94-085*

Date: *May 7, 1996*
Field Crew: *R.T. & G.H.*
Equipment: *H.S.A.*
Ground Elevation: *597.5ftASL*

File Name: MW8085.TCW

| Depth (m) | Depth (ft) | Symbol | Stratigraphy | Sample Interval | Sample Type | Blow Counts per 6" | PID Scan (ppm) | PID Headspace (ppm) | Water Table, May 24/96 |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | ░ | Black CLAYEY SILT, damp, minor roots<br>-some bedding, light minor bluff crushed rock<br>-minor coal fragements, no bedding, some reddish silt | ▨ | SS | 5<br>4<br>2<br>4 | 1.1 | 2.0 | |
| 1 | 3 | ■ | Brown and grey SILTY CLAY, damp<br>-minor roots, no staining or odour | ▨ | SS | 4<br>5<br>4<br>5 | 1.0 | 0.6 | |
| | 5 | ░ | Brown CLAYEY SILT, damp to moist<br>-minor sandy pockets<br>-no staining or odour | ▨ | SS | 3<br>6<br>7<br>10 | 0.6 | 3.3 | |
| 2 | 7 | ░ | - reddish brown, moist, layered<br>-greyish clay banding, minor sand,<br>-no staining or odour | ▨ | SS | 12<br>13<br>15<br>16 | 0.9 | 0.0 | ▼ |
| 3 | 9 | ▦ | Reddish brown SILT, moist to wet<br>-no significant layering<br>-no staining or odour | ▨ | SS | 5<br>7<br>10<br>7 | 0.7 | 0.0 | |
| | 11 | ░<br>■ | Reddish brown CLAYEY SILT, wet, sticky, layered<br>Reddish brown SILTY CLAY, wet<br>-soft, sticky, some grey clay near 14'<br>-no staining or odour | ▨ | SS | 8<br>5<br>5<br>5 | 0.8 | 0.0 | |
| 4 | 13 | ■ | | ▨ | SS | 1<br>1<br>2<br>4 | 0.0 | 0.0 | |
| | 15 | ■ | Brown CLAY, wet, very sticky<br>-no staining or odour | ▨ | SS | 0<br>0<br>0<br>2 | 0.3 | 3.2 | |
| 5 | 17 | ■ | -more grey<br>-reddish layering near 17.75'<br>-no staining or odour | ▨ | SS | 0<br>0<br>2<br>2 | 0.1 | 0.0 | |
| 6 | 19 | ▦ | Grey CLAY and red SILTY CLAY<br>-wet, 2" layers alternating<br>-no staining or odour | ▨ | SS | 0<br>0<br>0<br>0 | NA | 0.0 | |
| | 21 | ░ | Reddish brown CLAYEY SILT, wet, sticky<br>-some grey clay layers<br>-no staining ot odour | ▨ | SS | 0<br>2<br>2<br>1 | 0.0 | 0.2 | |
| 7 | 23 | ░ | ↓ *(CONTINUED ON NEXT FIGURE)* | ▨ | SS | 0<br>0<br>2<br>10 | 0.0 | 0.4 | |
| | 24 | | | | | | | | |

**Well Construction**



PVC slip cap

Well completed with a 4-inch protective steel casing, concreted in place.

2-inch I.D. Schedule 40 PVC flush jointed riser pipe with bentonite and concrete grout.

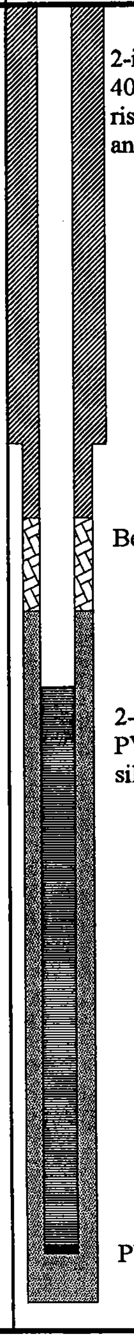
**INTERA**

| **BOREHOLE LOG** | **MW-8 (continued)** |
|---|---|
| Client: *The Carborundum Company* | Date: *May 7, 1996* |
| Project Title: *RI/FS, Former Hyde Park Facility* | Field Crew: *R.T. & G.H.* |
| Project Ref.: *94-085* | Equipment: *H.S.A., air rotary* |
| | Ground Elevation: *597.5ftASL* |

File Name: W82085.TCW

| Depth (m) | Depth (ft) | Stratigraphy | Sample Type | Blow Counts per 6" | PID Scan (ppm) | PID Headspace (ppm) | Water Table, May 20/96 |
|---|---|---|---|---|---|---|---|
| | 24 | Rusty brown SILT, CLAY and small stones, wet | | 10 | | | |
| | 25 | -sticky and soft, no bedding<br>-no staining or odour | SS | 6<br>8<br>8 | 0.0 | 0.4 | |
| | 26 | -dry silt till, gravel, clay and sand | | 11 | | | |
| 8 | 27 | | SS | 9<br>18<br>21 | 0.0 | 0.6 | |
| | 28 | Rusty brown, stiff, SILT TILL and SAND, dry<br>-small stones and cobbles<br>-no staining or odour | SS | 6<br>27<br>50/3"<br>- | 0.3 | 1.1 | |
| | 29 | | | | | | |
| 9 | 30 | | SS | 18<br>22<br>30<br>50/5" | 0.7 | 2.1 | |
| | 31 | | | | | | |
| | 32 | Dark grey DOLOMITE, stylolites, vuggy<br>-calcite infilling, inclined bedding | Run 1<br>RQD=<br>27% | | 0.3 | | |
| 10 | 33 | Dark grey DOLOMITE, stylolites, vuggy | Run 2<br>RQD=<br>59% | | 0.0 | | |
| | 34 | -shaley interbeds<br>-induced fractures along shale interbeds | | | | | |
| | 35 | | | | | | |
| | 36 | -cross bedding, dewatering structures at 36'<br>Dark grey DOLOMITE, stylolites, vuggy<br>-fairly massive, horizontal bedding | Run 3<br>RQD=<br>44% | | 0.0 | | |
| 11 | 37 | Dark grey DOLOMITE, stylolites, vuggy<br>-shaly interbeds, calcite and gypsum<br>-mineralization along fractures and in vugs | Run 4<br>RQD=<br>71% | | 0.0 | | |
| | 38 | | | | | | |
| | 39 | | | | | | |
| 12 | 40 | | | | | | |
| | 41 | vugs and fractures | | | | | |
| | 42 | | | | | | |
| 13 | 43 | -shaly interbeds | | | | | |
| | 44 | | | | | | |
| | 45 | | | | | | |
| | 46 | -infilled vug at 46' | | | | | |
| 14 | 47 | | | | | | |
| | 48 | | | | | | |

**Well Construction**



2-inch I.D. Schedule 40 PVC flush jointed riser pipe with bentonite and concrete grout.

Bentonite seal

2-inch I.D. Schedule 40 PVC slotted screen with silica sand backfill.

PVC threaded end cap

INTERA

# BOREHOLE LOG

# MW-9

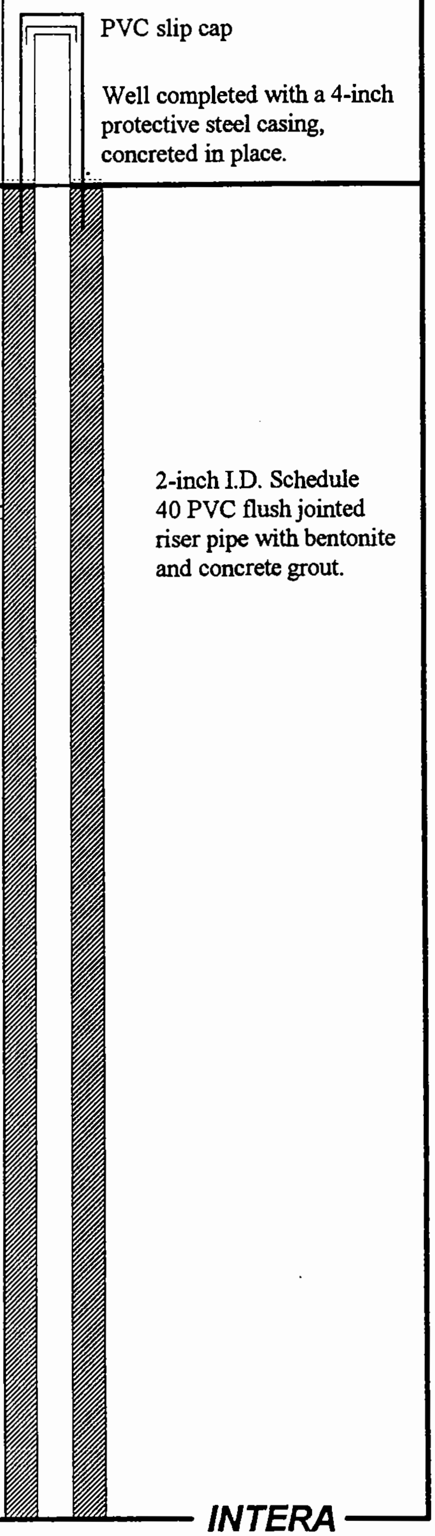
Client: *The Carborundum Company*
Project Title: *RI/FS, Former Hyde Park Facility*
Project Ref.: *94-085*

Date: *May 9, 1996*
Field Crew: *R.T. & G.H.*
Equipment: *H.S.A.*
Ground Elevation: *596.3ftASL*

File Name: MW9085.TCW

| Depth (m) | Depth (ft) | Stratigraphy | Sample Type | Blow Counts per 6" | PID Scan (ppm) | PID Headspace (ppm) | Water Table, May 24/96 |
|---|---|---|---|---|---|---|---|
| | 1 | -black silica carbide crystals<br>-black SILT, some sand<br>-light brown sandy SILT, no bedding, fractured<br>-black, grey and iron staining along fractures | SS | 2<br>2<br>5<br>8 | 0.4 | 0.9 | |
| 1 | 2<br>3 | -light brown CLAYEY SILT, some sandy<br>-black and grey along horizontal and vertical fractures | SS | 8<br>5<br>5<br>5 | 0.3 | 0.6 | |
| | 4<br>5 | -CLAY and SILT layers, varved, dry, stiff<br>-light grey silt along fractures and layers | SS | 2<br>6<br>11<br>16 | 1.4 | 2.4 | ▽ |
| 2 | 6<br>7 | -rusty brown to light brown CLAY and SILT, varved<br>-occasional gravel and light brown silt pockets<br>-moist, poorly bedded | SS | 13<br>10<br>15<br>15 | 1.9 | 18.1 | |
| 3 | 8<br>9 | -SILT, moist to wet, faintly bedded<br>-rusty brown to reddish SILT and CLAY<br>-varved, no staining | SS | 7<br>9<br>6<br>7 | 0.9 | 43.1 | |
| | 10<br>11 | -occasional gravel, dry, stiff<br>-very minor grey to black staining along vertical fractures | SS | 9<br>10<br>8<br>10 | 8.1 | 39.0 | |
| 4 | 12<br>13 | -rusty brown to dark brown SILTY CLAY and SANDY SILT, dry, varved<br>-occasional small to medium gravel, dry | SS | 2<br>4<br>5<br>6 | - | 43.9 | |
| | 14<br>15 | -light grey sand in vertical fractures<br>-some dark staining<br>-reddish to grey SILT and CLAY<br>-soft, dry, some grey staining | SS | 5<br>6<br>7<br>7 | 15.3 | 13.7 | |
| 5 | 16<br>17 | -red and grey SILTY CLAY, mottled, soft<br>-some reddish silt, wet, poorly bedded<br>-occasional gravel and cobbles | SS | 9<br>8<br>8<br>8 | 2.6 | 7.6 | |
| 6 | 18<br>19 | -gravel and cobbles | SS | 3<br>5<br>7<br>6 | - | - | |
| | 20<br>21 | -rusty brown to reddish SANDY SILT and SILTY CLAY, gravel and silt layers, varved<br>-rusty brown to reddish SANDY SILT TILL<br>-small gravel, wet, no staining | SS | 10<br>8<br>10<br>12 | 4.2 | 13.8 | |
| 7 | 22<br>23<br>24 | -some larger gravel and cobbles<br>*(CONTINUED ON NEXT FIGURE)*<br>↓ -moist to dry, no staining | SS | 15<br>18<br>21<br>25 | 1.0 | 4.5 | |

**Well Construction**



INTERA

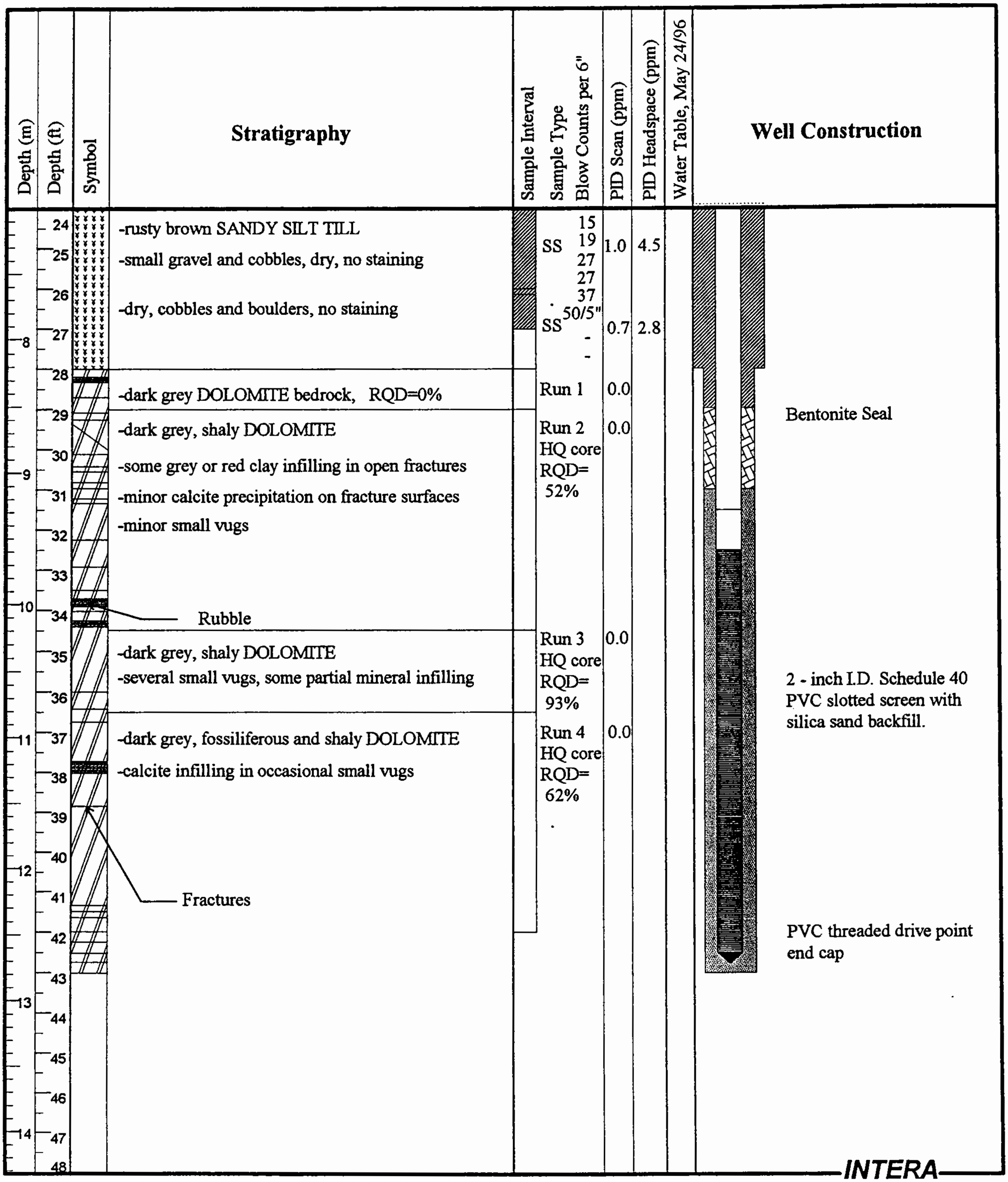
# BOREHOLE LOG

## MW-9 (continued)

Client: *The Carborundum Company*
Project Title: *RI/FS, Former Hyde Park Facility*
Project Ref.: *94-085*

Date: *May 9, 1996*
Field Crew: *R.T. & G.H.*
Equipment: *H.S.A., air rotary*
Ground Elevation: *596.3ftASL*

File Name: W92085.TCW



| Stratigraphy | Sample Type / Blow Counts per 6" | PID Scan (ppm) | PID Headspace (ppm) |
|---|---|---|---|
| -rusty brown SANDY SILT TILL<br>-small gravel and cobbles, dry, no staining | SS 15 19 27 27 | 1.0 | 4.5 |
| -dry, cobbles and boulders, no staining | SS 37 50/5" - - | 0.7 | 2.8 |
| -dark grey DOLOMITE bedrock, RQD=0% | Run 1 | 0.0 | |
| -dark grey, shaly DOLOMITE<br>-some grey or red clay infilling in open fractures<br>-minor calcite precipitation on fracture surfaces<br>-minor small vugs | Run 2 HQ core RQD= 52% | 0.0 | |
| -dark grey, shaly DOLOMITE<br>-several small vugs, some partial mineral infilling | Run 3 HQ core RQD= 93% | 0.0 | |
| -dark grey, fossiliferous and shaly DOLOMITE<br>-calcite infilling in occasional small vugs | Run 4 HQ core RQD= 62% | 0.0 | |

# BOREHOLE LOG

# MW-10A

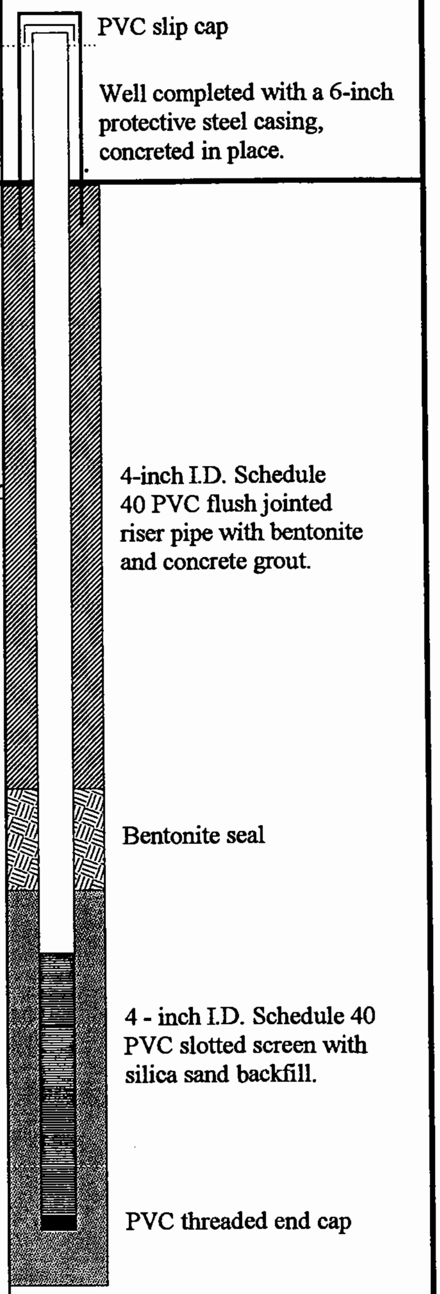
Client: *The Carborundum Company*
Project Title: *RI/FS, Former Hyde Park Facility*
Project Ref.: *94-085*

Date: *May 15, 1996*
Field Crew: *R.T. & G.H.*
Equipment: *H.S.A.*
Ground Elevation: *594.62ftASL*

File Name: MW10A085.TCW

| Depth (m) | Depth (ft) | Symbol | Stratigraphy | Sample Interval | Sample Type | Blow Counts per 6" | PID Scan (ppm) | PID Headspace (ppm) | Water Table, May 24/96 |
|---|---|---|---|---|---|---|---|---|---|
| | | | ASPHALT, underlain by dark brown sand and gravel | | | | | | |
| | 1 | | Dark grey SILTY SAND, moist, some gravel and silty clay fill, minor siliconcarbide fragments, black stained blebs along fractures (dry) | | SS | 3<br>3<br>3 | 3.2 | 2.2 | |
| 1 | 2<br>3 | | Grey to brown SILT and SAND<br>-grey to black staining in fractures, more prominant at 2' to 3', occasional light grey silt beds from 3' to 4'<br>-faint bedding at 4' | | SS | 6<br>6<br>6<br>10 | 3.5 | 1.7 | |
| | 4<br>5 | | Rusty brown to reddish SANDY SILT&SILTY CLAY<br>-occasional light grey, silt and clay beds, minor gravel<br>-moist<br>-no staining | | SS | 5<br>5<br>8<br>6 | 1.8 | 1.9 | ▽ |
| 2 | 6<br>7 | | -moist to wet silt beds<br>-no staining<br>-moist, some sticky | | SS | 6<br>6<br>7<br>6 | 1.8 | 1.5 | |
| | 8<br>9 | | -no staining | | SS | 3<br>4<br>4<br>4 | 1.4 | 1.5 | |
| 3 | 10<br>11 | | Rusty brown to red CLAY, saturated, sticky<br>-interbedded with silt, occasional grey clay seams and stones<br>-no staining | | SS | 5<br>4<br>5<br>3 | 1.5 | 2.1 | |
| 4 | 12<br>13 | | -some coarse sand and silt layers<br>-occasional black and grey silt blebs<br>-no staining | | SS | 1<br>3<br>2<br>2 | 2.0 | 1.7 | |
| | 14<br>15 | | Rusty brown SILT, SAND and CLAY TILL, saturated<br>-frequent black dolomite stones<br>-no staining | | SS | 3<br>6<br>7<br>7 | 1.5 | 1.3 | |
| 5 | 16<br>17 | | | | SS | 10<br>25<br>35<br>22 | 1.1 | 2.1 | |
| 6 | 18<br>19 | | Rusty brown, fine SILTY SAND, saturated<br>-slight hydrocarbon odour, no staining or sheen | | SS | 3<br>7<br>18<br>35/5" | 2.1 | 2.6 | |
| 7 | 20<br>21<br>22<br>23<br>24 | | | | | | | | |

**Well Construction**



INTERA

# BOREHOLE LOG

## MW-10B

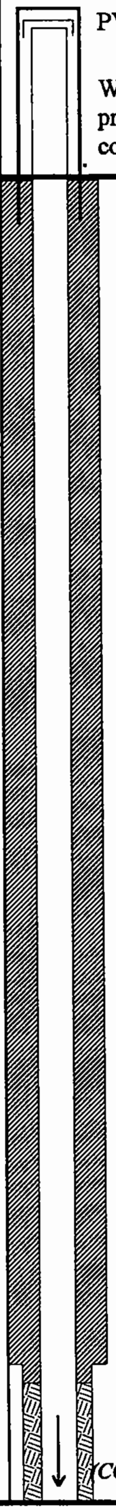
Client: *The Carborundum Company*
Project Title: *RI/FS, Former Hyde Park Facility*
Project Ref.: *94-085*

Date: *May 13, 1996*
Field Crew: *R.T. & G.H.*
Equipment: *H.S.A.*
Ground Elevation: *594.62ftASL*

File Name: MW10B085.TCW

| Depth (m) | Depth (ft) | Symbol | Stratigraphy | Sample Interval | Sample Type | Blow Counts per 6" | PID Scan (ppm) | PID Headspace (ppm) | Water Table, May 24/96 |
|---|---|---|---|---|---|---|---|---|---|
| | | ■ | ASPHALT, underlain by dark brown sand and gravel | | | | | | |
| | 1 | ░ | Dark grey SILTY SAND, moist, some gravel and silty clay fill, minor siliconcarbide fragments, black stained blebs along fractures (dry) | ▨ | SS | 3<br>3<br>3 | 3.2 | 2.2 | |
| 1 | 2<br>3 | ▦ | Grey to brown SILT and SAND<br>-grey to black staining in fractures, more prominant at 2' to 3', occasional light grey silt beds from 3' to 4'<br>-faint bedding at 4' | ▨ | SS | 6<br>6<br>6<br>10 | 3.5 | 1.7 | |
| | 4<br>5 | ▓ | Rusty brown to reddish SANDY SILT&SILTY CLAY<br>-occasional light grey, silt and clay beds, minor gravel<br>-moist<br>-no staining | ▨ | SS | 5<br>5<br>8<br>6 | 1.8 | 1.9 | ▼ |
| 2 | 6<br>7 | ▓ | -moist to wet silt beds<br>-no staining<br>-moist, some sticky | ▨ | SS | 6<br>6<br>7<br>6 | 1.8 | 1.5 | |
| | 8<br>9 | ▓ | -no staining | ▨ | SS | 3<br>4<br>4<br>4 | 1.4 | 1.5 | |
| 3 | 10<br>11 | ■ | Rusty brown to red CLAY, saturated, sticky<br>-interbedded with silt, occasional grey clay seams and stones<br>-no staining | ▨ | SS | 5<br>4<br>5<br>3 | 1.5 | 2.1 | |
| 4 | 12<br>13 | ■ | -some coarse sand and silt layers<br>-occasional black and grey silt blebs<br>-no staining | ▨ | SS | 1<br>3<br>2<br>2 | 2.0 | 1.7 | |
| | 14<br>15 | ░ | Rusty brown SILT, SAND and CLAY TILL, saturated<br>-frequent black dolomite stones<br>-no staining | ▨ | SS | 3<br>6<br>7<br>7 | 1.5 | 1.3 | |
| 5 | 16<br>17 | ░ | | ▨ | SS | 10<br>25<br>35<br>22 | 1.1 | 2.1 | |
| 6 | 18<br>19 | ░ | Rusty brown, fine SILTY SAND, saturated<br>-slight hydrocarbon odour, no staining or sheen | ▨ | SS | 3<br>7<br>18<br>35/5" | 2.1 | 2.6 | |
| | 20<br>21 | ░ | SAND and SILT TILL, minor gravel, saturated<br>-no sheen, slight hydrocarbon odour | ▨ | SS | 3<br>7<br>18 | 2.1 | 2.6 | |
| 7 | 22<br>23<br>24 | ▧ | Dark grey DOLOMITE with shale and stylolites<br>-several infilled vugs, vertical fractures<br>-no evidence of contamination<br>—— vugs and fractures | | | Run 1<br>RQD=<br>28% | 1.6 | | |

### Well Construction



PVC slip cap

Well completed with a 6-inch protective steel casing, concreted in place.

4-inch I.D. Schedule 40 PVC flush jointed riser pipe with bentonite and concrete grout.

Bentonite seal

(CONTINUED ON NEXT FIGURE)

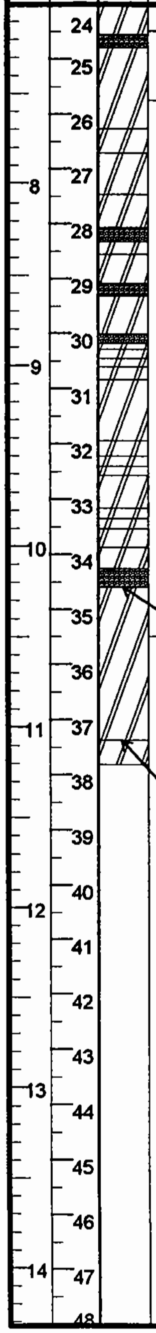
# BOREHOLE LOG

## MW-10B (continued)

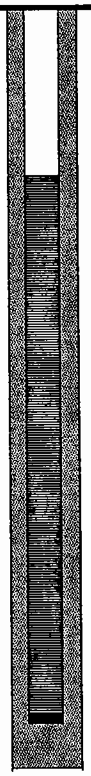
Client: *The Carborundum Company*
Project Title: *RI/FS, Former Hyde Park Facility*
Project Ref.: *94-085*

Date: *May 13, 1996*
Field Crew: *R.T. & G.H.*
Equipment: *H.S.A., air rotary*
Ground Elevation: *594.62ftASL*

File Name: W10B2085.TCW



| Stratigraphy | Sample Interval | Sample Type<br>Blow Counts per 6" | PID Scan (ppm) | PID Headspace (ppm) | Water Table, May 24/96 | Well Construction |
|---|---|---|---|---|---|---|
| Run 1 (cont'd) | | | | | | |
| Dark grey DOLOMITE, stylolites, calcite mineralization<br>-minor vugs, no open fractures | | Run 2<br>RQD=<br>100% | 0.5 | | | |
| Dark grey crystalline DOLOMITE with shale, stylolites<br>-infilled vugs<br>-occasional small vertical closed fractures<br>-no evidence of contamination<br>-partially infilled vugs with calcite crystals<br>rubble zone | | Run 3<br>RQD=<br>53% | 2.8 | | | 4 - inch I.D. Schedule 40 PVC slotted screen with silica sand backfill. |
| Shaley DOLOMITE<br>-occasional small, partially infilled vugs<br>-no evidence of contamination<br>vugs and fractures | | Run 4<br>HQ core<br>RQD=<br>100% | - | | | PVC threaded end cap |



INTERA

# BOREHOLE LOG

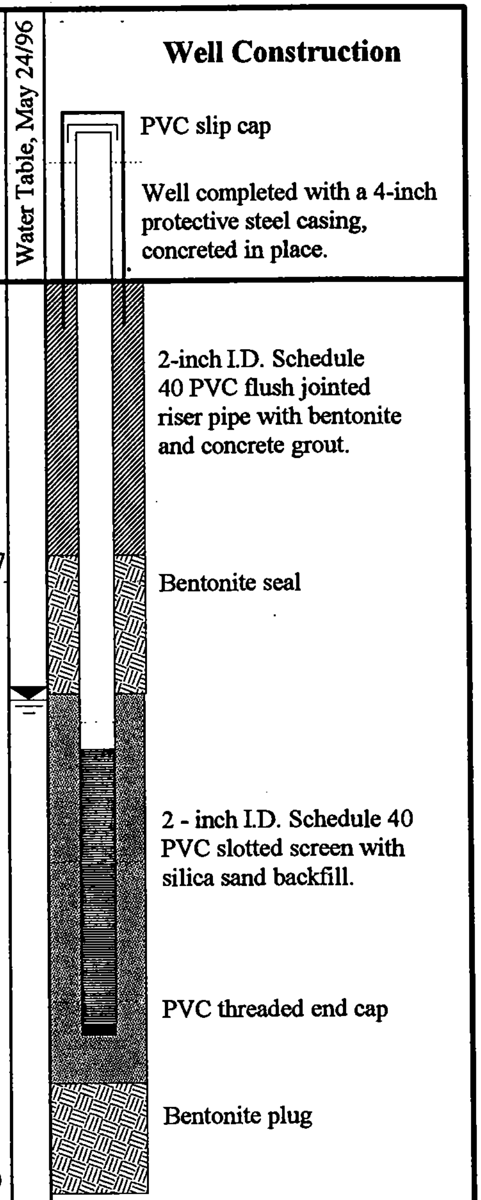
## MW-11A

Client: *The Carborundum Company*
Project Title: *RI/FS, Former Hyde Park Facility*
Project Ref.: *94-085*

Date: *May 20, 1996*
Field Crew: *R.T. & G.H.*
Equipment: *H.S.A., air rotary*
Ground Elevation: *593.3ftASL*

File Name: MW11A085.TCW

| Stratigraphy | Sample Type | Blow Counts per 6" | PID Scan (ppm) | PID Headspace (ppm) |
|---|---|---|---|---|
| ASPHALT, granular base | | - | 359 | |
| -reddish brown SANDY SILT, dry to damp<br>-some brick fragments, solvent or paint odour | SS | 8<br>5<br>3 | 229 | 427 |
| -brown SAND and SILT, damp to moist<br>-rock fragments, some black staining | SS | 6<br>3<br>3<br>3 | 6.6 | 133 |
| -brown CLAYEY SILT fill, some grey<br>-damp to moist, dark grey staining at 4' | SS | 1<br>3<br>3<br>3 | 8.0 | 12.7 |
| -reddish brown SILT, wet<br>-some clayey silt and sand layers<br>-small, dark stained, granular layer | SS | 6<br>6<br>8<br>7 | 61.8 | 149 |
| -grey-brown SILTY CLAY, moist to wet<br>-layered, no staining | SS | 1<br>2<br>3<br>3 | 0.0 | 0.0 |
| -reddish CLAYEY SILT, wet, massive<br>-layered grey clayey interbeds, sticky<br>-minor gravel, no staining | SS | 3<br>4<br>4<br>4 | 0.0 | 0.6 |
| -small to large gravel | SS | 0<br>0<br>0<br>5 | 20.9 | 3.1 |
| -reddish CLAYEY SILT TILL, wet, minor gravel | SS | 1<br>1<br>2<br>3 | 0.0 | 0.0 |
| -brown SILT TILL, saturated | SS | 11 | 0.0 | 0.0 |



INTERA

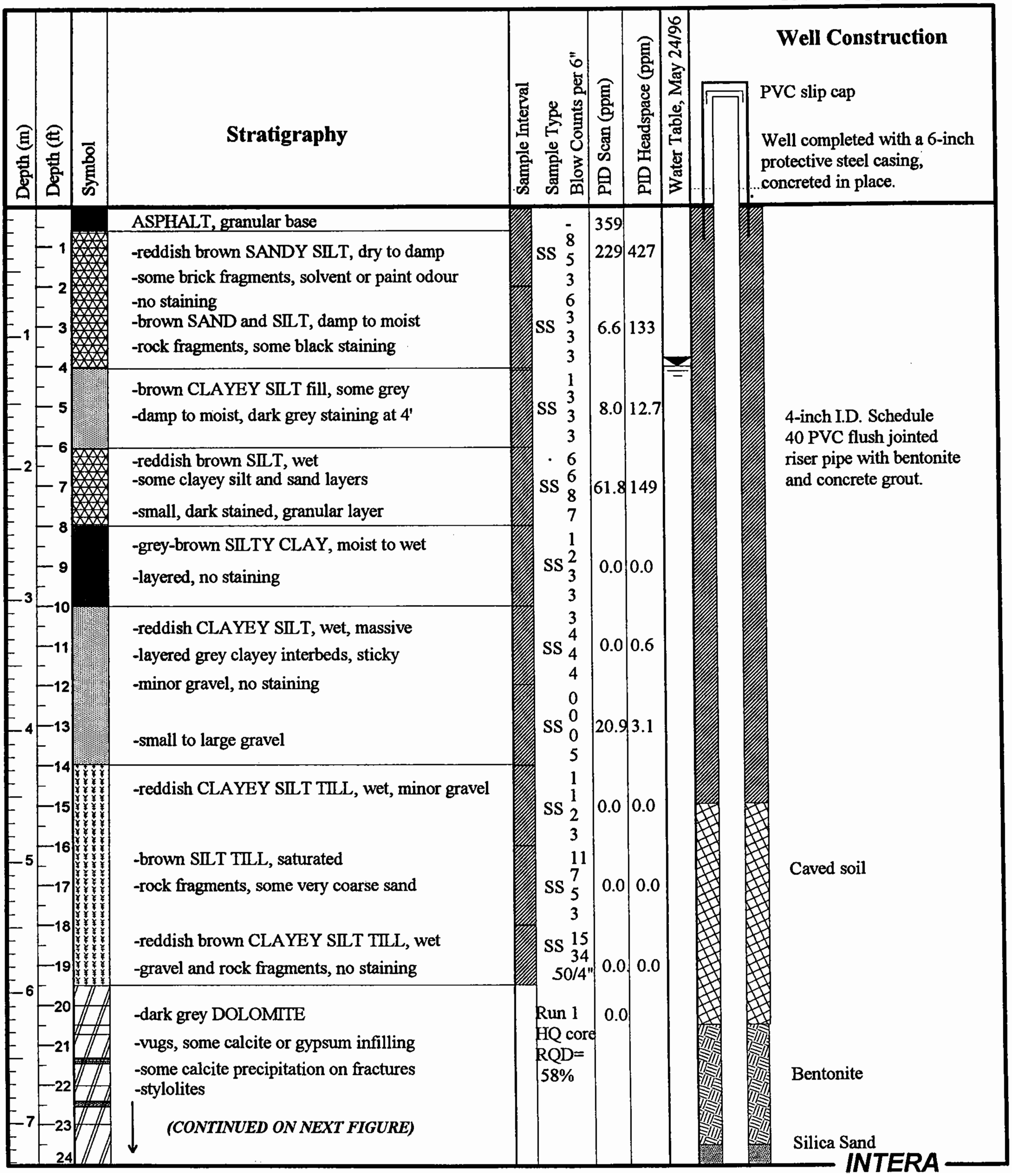
# BOREHOLE LOG

# MW-11B

Client: *The Carborundum Company*
Project Title: *RI/FS, Former Hyde Park Facility*
Project Ref.: *94-085*

Date: *May 20, 1996*
Field Crew: *R.T. & G.H.*
Equipment: *H.S.A., air rotary*
Ground Elevation: *593.3ftASL*

File Name: MW11B085.TCW



| Stratigraphy | Sample Type | Blow Counts per 6" | PID Scan (ppm) | PID Headspace (ppm) |
|---|---|---|---|---|
| ASPHALT, granular base<br>-reddish brown SANDY SILT, dry to damp<br>-some brick fragments, solvent or paint odour | SS | -<br>8<br>5<br>3 | 359<br>229 | 427 |
| -no staining<br>-brown SAND and SILT, damp to moist<br>-rock fragments, some black staining | SS | 6<br>3<br>3<br>3 | 6.6 | 133 |
| -brown CLAYEY SILT fill, some grey<br>-damp to moist, dark grey staining at 4' | SS | 1<br>3<br>3<br>3 | 8.0 | 12.7 |
| -reddish brown SILT, wet<br>-some clayey silt and sand layers<br>-small, dark stained, granular layer | SS | 6<br>6<br>8<br>7 | 61.8 | 149 |
| -grey-brown SILTY CLAY, moist to wet<br>-layered, no staining | SS | 1<br>2<br>3<br>3 | 0.0 | 0.0 |
| -reddish CLAYEY SILT, wet, massive<br>-layered grey clayey interbeds, sticky<br>-minor gravel, no staining | SS | 3<br>4<br>4<br>4 | 0.0 | 0.6 |
| -small to large gravel | SS | 0<br>0<br>0<br>5 | 20.9 | 3.1 |
| -reddish CLAYEY SILT TILL, wet, minor gravel | SS | 1<br>1<br>2<br>3 | 0.0 | 0.0 |
| -brown SILT TILL, saturated<br>-rock fragments, some very coarse sand | SS | 11<br>7<br>5<br>3 | 0.0 | 0.0 |
| -reddish brown CLAYEY SILT TILL, wet<br>-gravel and rock fragments, no staining | SS | 15<br>34<br>50/4" | 0.0 | 0.0 |
| -dark grey DOLOMITE<br>-vugs, some calcite or gypsum infilling<br>-some calcite precipitation on fractures<br>-stylolites | Run 1<br>HQ core<br>RQD=<br>58% |  | 0.0 |  |

*(CONTINUED ON NEXT FIGURE)*

INTERA

# BOREHOLE LOG

# MW-11B (continued)

Client: *The Carborundum Company*

Project Title: *RI/FS, Former Hyde Park Facility*

Project Ref.: *94-085*

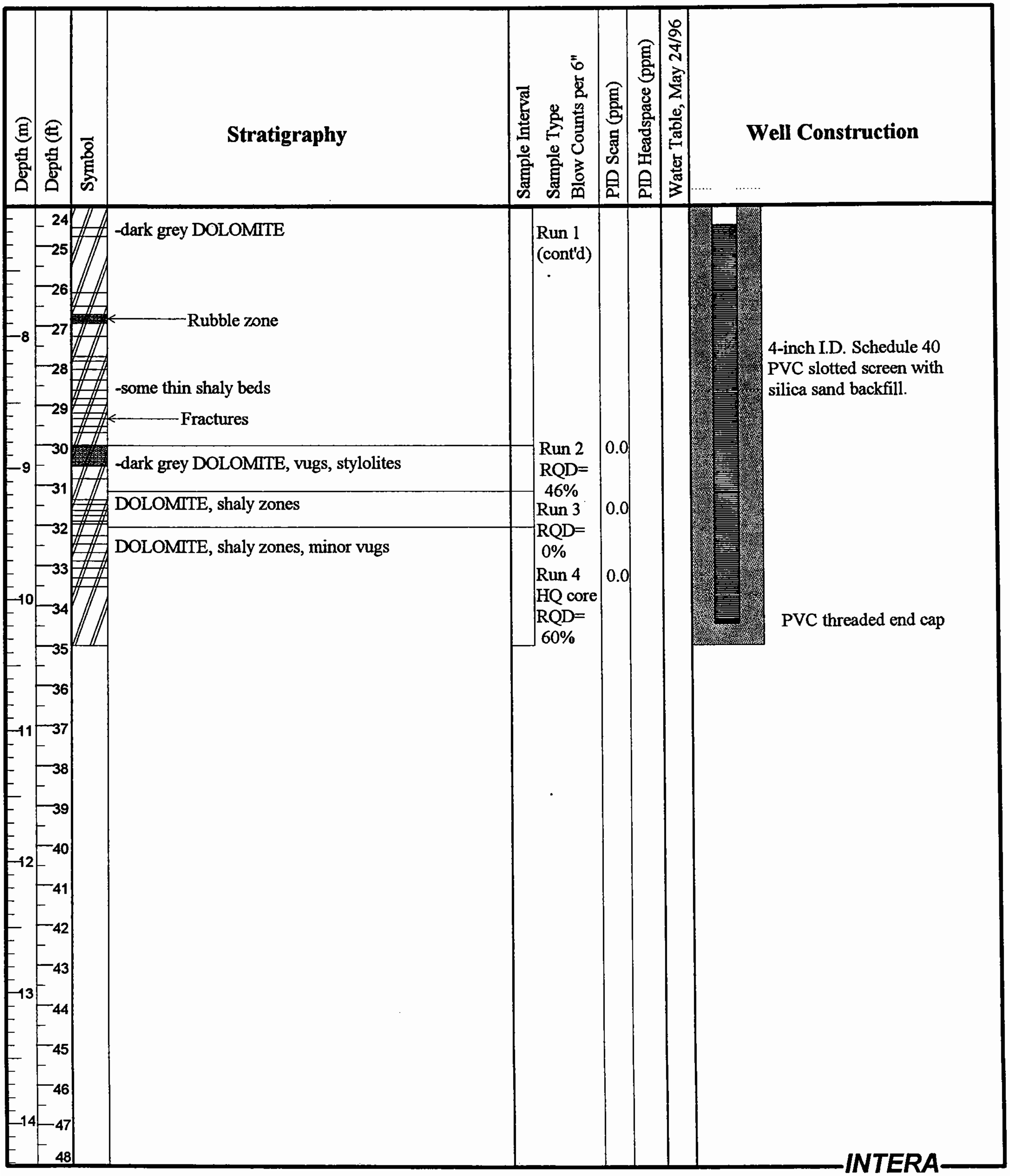
Date: *May 20, 1996*

Field Crew: *R.T. & G.H.*

Equipment: *H.S.A., air rotary*

Ground Elevation: *596.3ftASL*

File Name: W11B2085.TCW



**INTERA**

# BOREHOLE LOG

## MW-12A

Client: *The Carborundum Company*
Project Title: *RI/FS, Former Hyde Park Facility*
Project Ref.: *94-085*

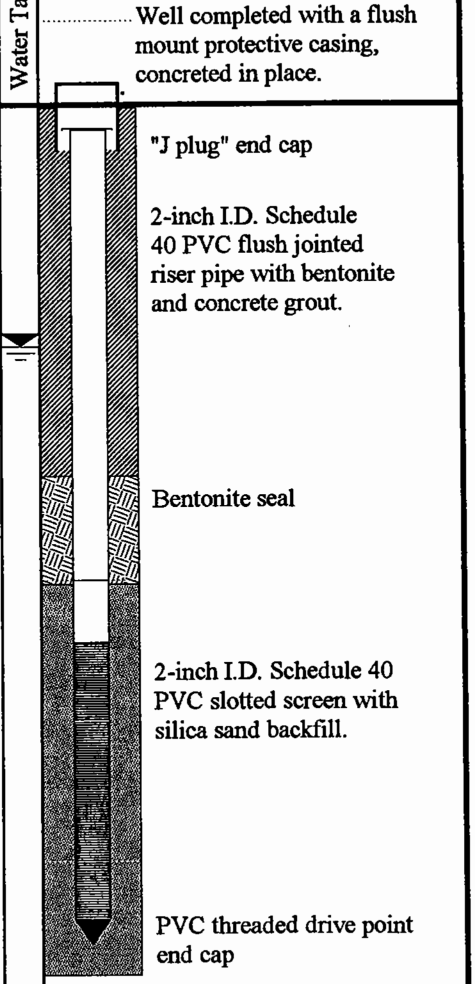
Date: *May 15, 1996*
Field Crew: *R.T. & G.H.*
Equipment: *H.S.A., air rotary*
Ground Elevation: *591.3ftASL*

File Name: MW12A085.TCW

| Stratigraphy | Sample Type | Blow Counts per 6" | PID Scan (ppm) | PID Headspace (ppm) |
|---|---|---|---|---|
| Grass and black to brown TOPSOIL<br>Dark brown to rusty brown SILT FILL, dry<br>-occasional stones and silt blebs, faint bedding | SS | 2<br>3<br>5<br>8 | 0.1 | 0.3 |
| Rusty brown SILT, dry<br>-occasional grey silt blebs, faint bedding<br>-infrequent red-brown clay seams and grey clay seams<br>-moist | SS | 15<br>10<br>10<br>12 | 0.5 | 0.4 |
| -no staining<br>-rusty brown to reddish<br>-moist to saturated<br>-no staining or odour | SS | 3<br>6<br>7<br>8 | 0.4 | 0.3 |
| -massive, moist<br>-occasional sand seams and stony silt beds<br>-varved silt and silty clay | SS | 7<br>7<br>7<br>5 | 0.2 | 0.3 |
| -minor black organic staining on occasional seams and vertical fractures, possible natural organics<br>-silt and silty clay varves<br>-some grey, silty clay beds, wet, sticky | SS | 2<br>2<br>4<br>4 | 0.2 | 0.3 |
| -no staining<br>-occasional grey clay seams, wet, sticky | SS | 4<br>5<br>4<br>3 | 0.5 | 0.6 |
| Rusty brown and reddish SILTand CLAY, wet<br>-occasional grey clay seams and silt blebs<br>-gravel and stones, faint layering<br>-possible reworked till | SS | 0<br>0<br>18<br>2 | 0.3 | 0.3 |
| Rusty brown SILT and CLAY TILL<br>-some sand and gravel, no staining<br>-boulder at 15.5' | SS | 4<br>4<br>5 | 0.0 | 0.7 |

Water Table, May 24/96

### Well Construction



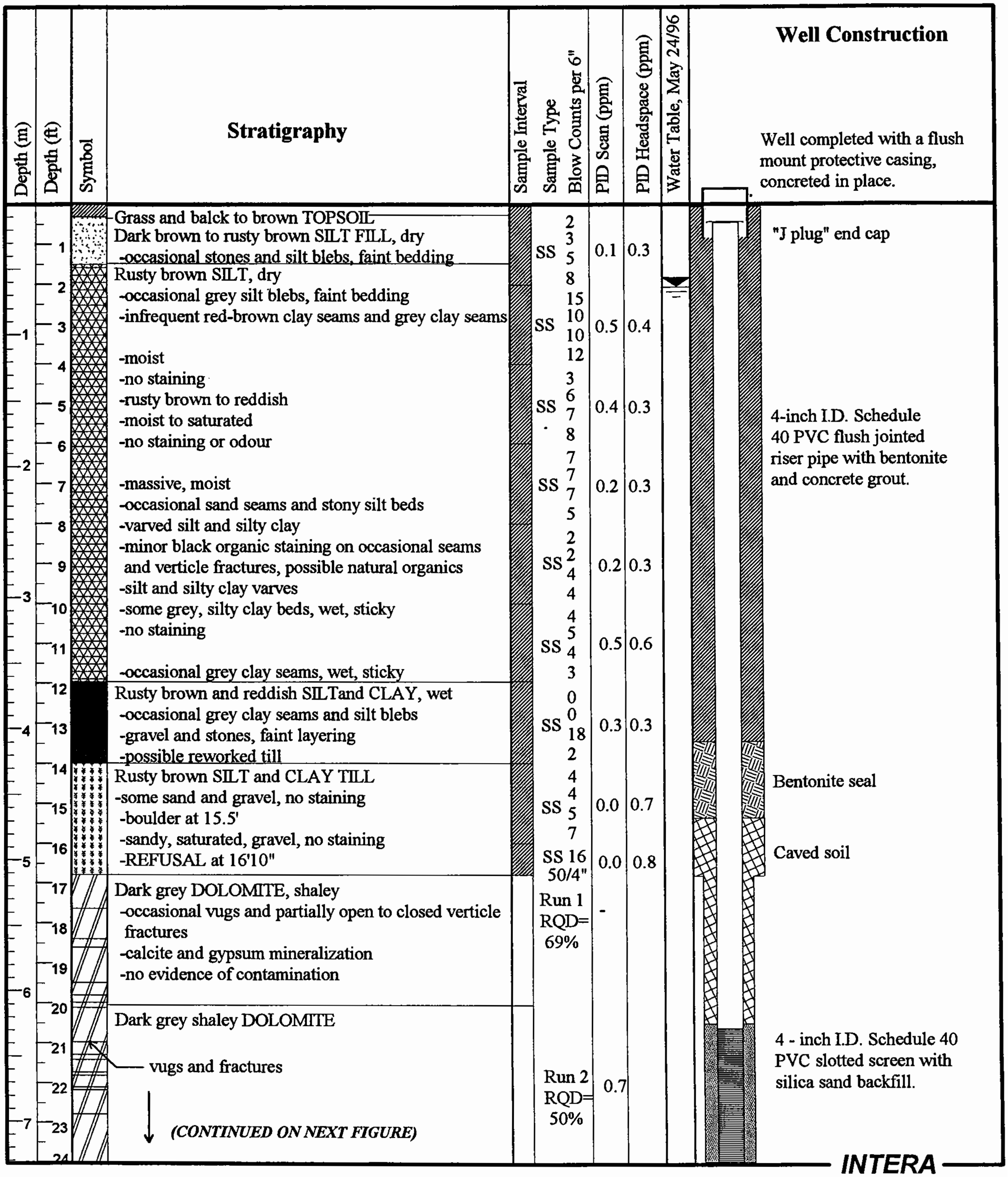
# BOREHOLE LOG

# MW-12B

Client: *The Carborundum Company*
Project Title: *RI/FS, Former Hyde Park Facility*
Project Ref.: *94-085*

Date: *May 15, 1996*
Field Crew: *R.T. & G.H.*
Equipment: *H.S.A., air rotary*
Ground Elevation: *591.3ftASL*

File Name: MW12B085.TCW



**Stratigraphy**

Grass and balck to brown TOPSOIL
Dark brown to rusty brown SILT FILL, dry
-occasional stones and silt blebs, faint bedding

Rusty brown SILT, dry
-occasional grey silt blebs, faint bedding
-infrequent red-brown clay seams and grey clay seams
-moist
-no staining
-rusty brown to reddish
-moist to saturated
-no staining or odour
-massive, moist
-occasional sand seams and stony silt beds
-varved silt and silty clay
-minor black organic staining on occasional seams and verticle fractures, possible natural organics
-silt and silty clay varves
-some grey, silty clay beds, wet, sticky
-no staining
-occasional grey clay seams, wet, sticky

Rusty brown and reddish SILTand CLAY, wet
-occasional grey clay seams and silt blebs
-gravel and stones, faint layering
-possible reworked till

Rusty brown SILT and CLAY TILL
-some sand and gravel, no staining
-boulder at 15.5'
-sandy, saturated, gravel, no staining
-REFUSAL at 16'10"

Dark grey DOLOMITE, shaley
-occasional vugs and partially open to closed verticle fractures
-calcite and gypsum mineralization
-no evidence of contamination

Dark grey shaley DOLOMITE

vugs and fractures

*(CONTINUED ON NEXT FIGURE)*

| Sample Type | Blow Counts per 6" | PID Scan (ppm) | PID Headspace (ppm) |
|---|---|---|---|
| SS | 2<br>3<br>5<br>8 | 0.1 | 0.3 |
| SS | 15<br>10<br>10<br>12 | 0.5 | 0.4 |
| SS | 3<br>6<br>7<br>8 | 0.4 | 0.3 |
| SS | 7<br>7<br>7<br>5 | 0.2 | 0.3 |
| SS | 2<br>2<br>4<br>4 | 0.2 | 0.3 |
| SS | 4<br>5<br>4<br>3 | 0.5 | 0.6 |
| SS | 0<br>0<br>18<br>2 | 0.3 | 0.3 |
| SS | 4<br>4<br>5<br>7 | 0.0 | 0.7 |
| SS | 16<br>50/4" | 0.0 | 0.8 |
| Run 1 RQD= 69% | | - | |
| Run 2 RQD= 50% | | 0.7 | |

**Well Construction**

Well completed with a flush mount protective casing, concreted in place.

"J plug" end cap

4-inch I.D. Schedule 40 PVC flush jointed riser pipe with bentonite and concrete grout.

Bentonite seal

Caved soil

4 - inch I.D. Schedule 40 PVC slotted screen with silica sand backfill.

INTERA

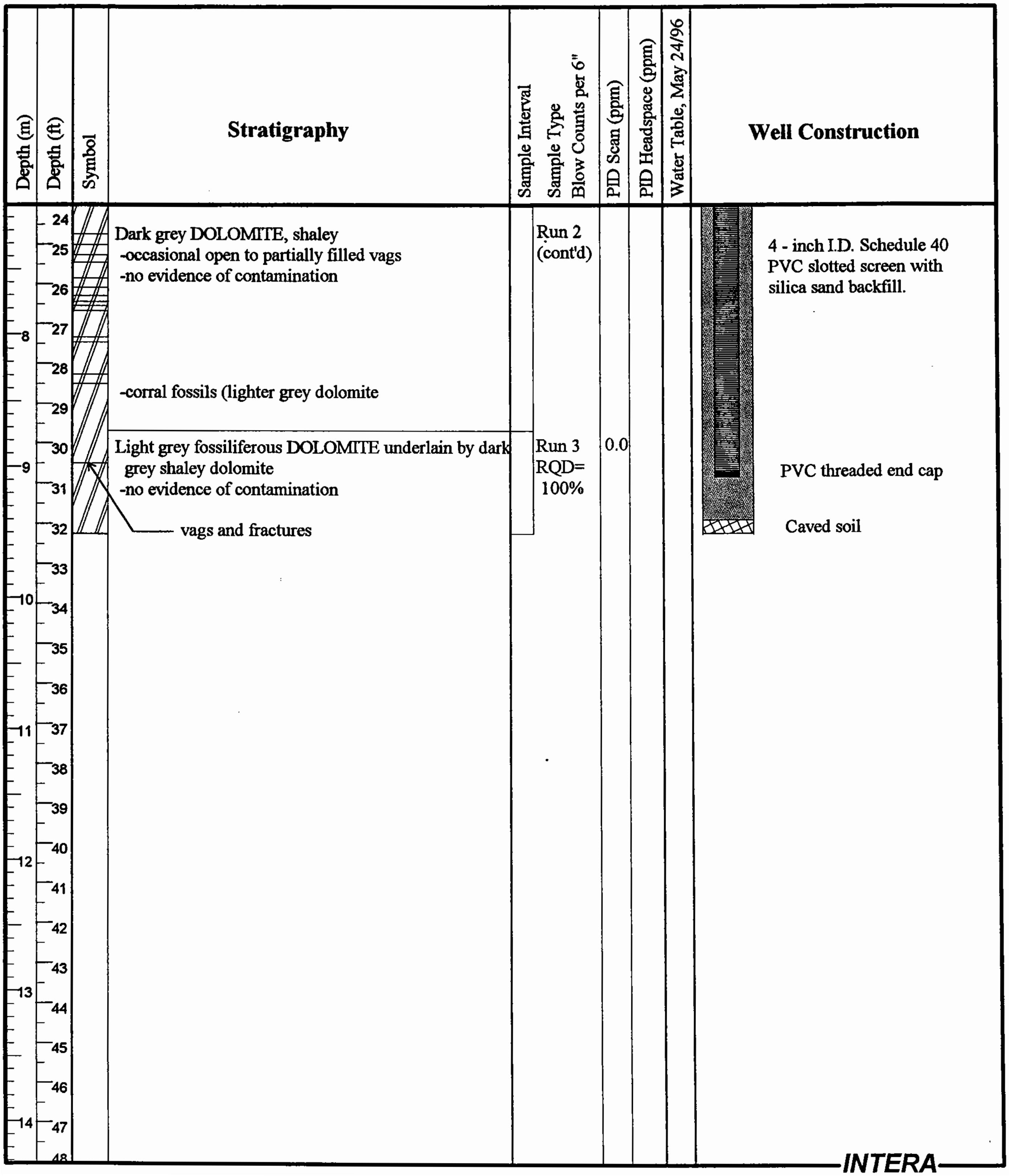
# BOREHOLE LOG

## MW-12B (continued)

Client: *The Carborundum Company*
Project Title: *RI/FS, Former Hyde Park Facility*
Project Ref.: *94-085*

Date: *May 15, 1996*
Field Crew: *R.T. & G.H.*
Equipment: *H.S.A., air rotary*
Ground Elevation: *591.3ftASL*

File Name: W12B2085.TCW



Dark grey DOLOMITE, shaley
-occasional open to partially filled vags
-no evidence of contamination

-corral fossils (lighter grey dolomite

Light grey fossiliferous DOLOMITE underlain by dark grey shaley dolomite
-no evidence of contamination

vags and fractures

Run 2 (cont'd)

Run 3 RQD= 100%

0.0

4 - inch I.D. Schedule 40 PVC slotted screen with silica sand backfill.

PVC threaded end cap

Caved soil

INTERA

# BOREHOLE LOG

## MW-13A

Client: *The Carborundum Company*
Project Title: *RI/FS, Former Hyde Park Facility*
Project Ref.: *94-085*

Date: *May 23, 1996*
Field Crew: *R.T. & G.H.*
Equipment: *H.S.A., air rotary*
Ground Elevation: *595.61ftASL*

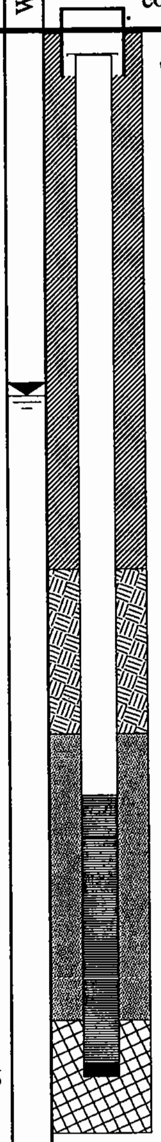
File Name: MW13A085.TCW

| Stratigraphy | Sample Type | Blow Counts per 6" | PID Scan (ppm) | PID Headspace (ppm) |
|---|---|---|---|---|
| Dark brown to black GRAVEL and SAND<br>Reddish brown CLAYEY SILT, damp to moist<br>-some dark staining at 1' | SS | -<br>3<br>3<br>3 | 3.2 | 2.2 |
| -lighter brown clayey layers, silt is massive and more saturated<br>-no staining | SS | 6<br>6<br>6<br>10 | 3.5 | 1.7 |
| Brown SANDY to CLAYEY SILT, damp to moist<br>-minor gravel, layered, small sandy lenses<br>-no staining | SS | 5<br>5<br>8<br>6 | 1.8 | 1.9 |
| Reddish brown SILT, wet<br>-lighter brown clayey silt layers<br>-minor gravel, minor sand lenses<br>-no staining | SS | 6<br>6<br>7<br>6 | 1.8 | 1.5 |
| -some reddish clayey silt, minor gravel<br>-minor grey and yellow sand lenses<br>-no staining | SS | 3<br>4<br>4<br>4 | 1.4 | 1.5 |
| -rock fragments<br>-no staining | SS | 5<br>4<br>5<br>3 | 1.5 | 2.1 |
| -rock fragments<br>-no staining | SS | 1<br>3<br>2<br>2 | 2.0 | 1.7 |
| Reddish brown SANDY SILT TILL<br>-much gravel and rock fragments<br>-no staining | SS | 3<br>6<br>7<br>7 | 1.5 | 1.3 |
| Reddish brown, medium to fine SAND, wet<br>-minor rock fragments to 16.5'<br>-no obvious bedding<br>-no staining | SS | 10<br>25<br>35<br>22 | 1.1 | 2.1 |
| -silty | SS | 3<br>7<br>18<br>35/5" | 2.1 | 2.6 |

Water Table, May 24/96

**Well Construction**

Well completed with a flush mount protective casing, concreted in place.



"J plug" end cap

2-inch I.D. Schedule 40 PVC flush jointed riser pipe with bentonite and concrete grout.

Bentonite seal

2-inch I.D. Schedule 40 PVC slotted screen with silica sand backfill.

PVC threaded end cap

-sand and silt (partial cave material)
-mostly natural sand

INTERA

# BOREHOLE LOG

# MW-13B

Client: *The Carborundum Company*
Project Title: *RI/FS, Former Hyde Park Facility*
Project Ref.: *94-085*

Date: *May 23, 1996*
Field Crew: *R.T. & G.H.*
Equipment: *H.S.A., air rotary*
Ground Elevation: *595.61ftASL*

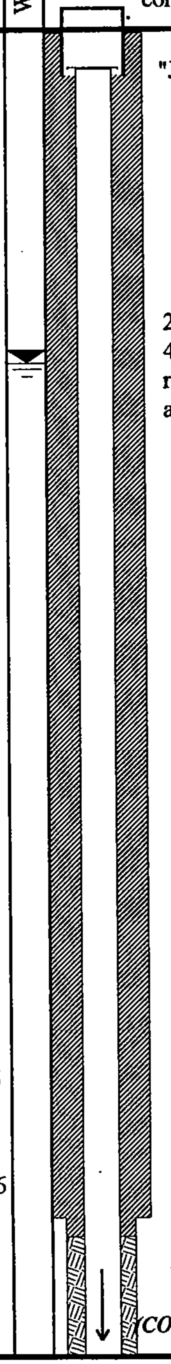
File Name: MW13B085.TCW

| Stratigraphy | Sample Type | Blow Counts per 6" | PID Scan (ppm) | PID Headspace (ppm) |
|---|---|---|---|---|
| Dark brown to black GRAVEL and SAND<br>Reddish brown CLAYEY SILT, damp to moist<br>-some dark staining at 1' | SS | -<br>3<br>3<br>3 | 3.2 | 2.2 |
| -lighter brown clayey layers, silt is massive and more saturated<br>-no staining | SS | 6<br>6<br>6<br>10 | 3.5 | 1.7 |
| Brown SANDY to CLAYEY SILT, damp to moist<br>-minor gravel, layered, small sandy lenses<br>-no staining | SS | 5<br>5<br>8<br>6 | 1.8 | 1.9 |
| Reddish brown SILT, wet<br>-lighter brown clayey silt layers<br>-minor gravel, minor sand lenses<br>-no staining | SS | 6<br>6<br>7<br>6 | 1.8 | 1.5 |
| -some reddish clayey silt, minor gravel<br>-minor grey and yellow sand lenses<br>-no staining | SS | 3<br>4<br>4<br>4 | 1.4 | 1.5 |
| -rock fragments<br>-no staining | SS | 5<br>4<br>5<br>3 | 1.5 | 2.1 |
| -rock fragments<br>-no staining | SS | 1<br>3<br>2<br>2 | 2.0 | 1.7 |
| Reddish brown SANDY SILT TILL<br>-much gravel and rock fragments<br>-no staining | SS | 3<br>6<br>7<br>7 | 1.5 | 1.3 |
| Reddish brown, medium to fine SAND, wet<br>-minor rock fragments to 16.5'<br>-no obvious bedding<br>-no staining | SS | 10<br>25<br>35<br>22 | 1.1 | 2.1 |
| -silty | SS | 3<br>7<br>18<br>35/5" | 2.1 | 2.6 |
| Reddish brown hard SILT TILL, gravel, no staining | SS | 3<br>7<br>18 | 2.1 | 2.6 |
| Dark grey DOLOMITE with shale and stylolites<br>-vugs, stylolites, mostly horizontal fractures, calcite infilling<br>-some shaley zones, mud infilling in open fractures<br>-no evidence of contamination<br>— vugs and fractures | | Run 1<br>RQD=<br>28% | 1.6 | |

Water Table, May 24/96

## Well Construction

Well completed with a flush mount protective casing, concreted in place.



"J plug" end cap

2-inch I.D. Schedule 40 PVC flush jointed riser pipe with bentonite and concrete grout.

Bentonite seal

(CONTINUED ON NEXT FIGURE)

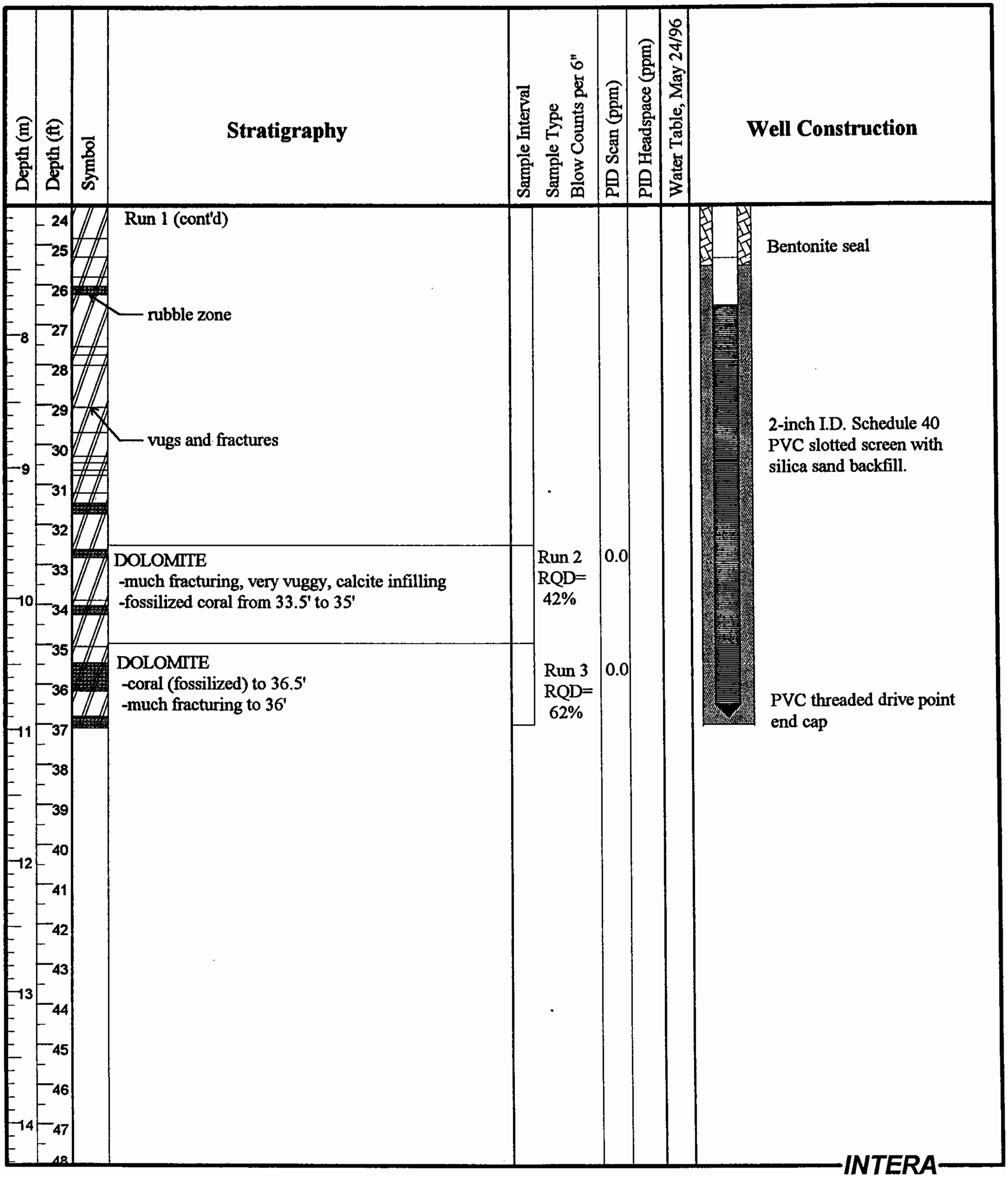
# BOREHOLE LOG

## MW-13B (continued)

Client: *The Carborundum Company*
Project Title: *RI/FS, Former Hyde Park Facility*
Project Ref.: *94-085*

Date: *May 23, 1996*
Field Crew: *R.T. & G.H.*
Equipment: *H.S.A., air rotary*
Ground Elevation: *595.61ftASL*

File Name: W13B2085.TCW



| Stratigraphy | Sample Type<br>Blow Counts per 6" | PID Scan (ppm) | PID Headspace (ppm) |
|---|---|---|---|
| Run 1 (cont'd) | | | |
| DOLOMITE<br>-much fracturing, very vuggy, calcite infilling<br>-fossilized coral from 33.5' to 35' | Run 2<br>RQD=<br>42% | 0.0 | |
| DOLOMITE<br>-coral (fossilized) to 36.5'<br>-much fracturing to 36' | Run 3<br>RQD=<br>62% | 0.0 | |

# BOREHOLE LOG

## MW-14A

Client: *The Carborundum Company*
Project Title: *RI/FS, Former Hyde Park Facility*
Project Ref.: *94-085*

Date: *May 21, 1996*
Field Crew: *R.T. & G.H.*
Equipment: *H.S.A., air rotary*
Ground Elevation: *593.3ftASL*

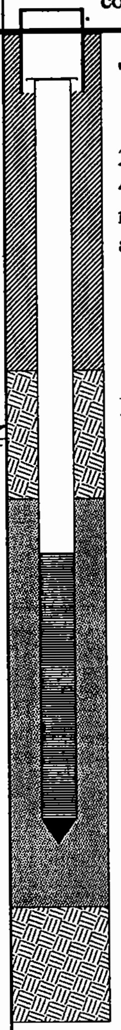
File Name: MW14A085.TCW

| Stratigraphy | Sample Type | Blow Counts per 6" | PID Scan (ppm) | PID Headspace (ppm) |
|---|---|---|---|---|
| Brown SAND and GRAVEL<br>Brown CLAYEY SILT, dry to damp, some dark staining | SS | 10<br>10<br>5<br>6 | 0.0 | 3.4 |
| Reddish brown SANDY SILT, dry to damp<br>-blocky, layered, some clayey bands<br>-no staining | SS | 7<br>11<br>8<br>8 | 0.0 | 1.6 |
| Reddish brown CLAYEY SILT, moist<br>-layered with massively bedded silt approx. 1" thick<br>-some light yellow and grey layers in clayey silt<br>-no staining | SS | 6<br>5<br>6<br>6 | 0.0 | 1.2 |
| -moist to wet<br>-no staining | SS | 5<br>5<br>5<br>5 | 0.0. | 1.0 |
| -layered, occasional grey pockets in silty layers<br>-no staining | SS | 2<br>3<br>5<br>5 | 0.0 | 0.8 |
| -some silt, minor gravel<br>-layered, wet, no staining | SS | 7<br>6<br>6<br>5 | 0.2 | 1.0 |
| SILTY CLAY and CLAYEY SILT<br>-very wet, soft, sticky<br>-minor gravel, some grey banding | SS | 0<br>0<br>0<br>3 | 0.5 | 0.8 |
| Reddish SILT and SAND, minor gravel, wet<br>-some layered clayeye silt, possible reworked till<br>-no staining | SS | 0<br>0<br>2<br>5 | 0.6 | 1.0 |
| SILT TILL, gravel, rock fragments, wet<br>-no staining | SS | 7<br>8<br>8 | 1.0 | 1.4 |
| Grey DOLOMITE bedrock | | 50/1" | | |

Water Table, May 24/96

**Well Construction**

Well completed with a flush mount protective casing, concreted in place.



"J plug" end cap

2-inch I.D. Schedule 40 PVC flush jointed riser pipe with bentonite and concrete grout.

Bentonite seal

2-inch I.D. Schedule 40 PVC slotted screen with silica sand backfill.

PVC threaded drive point end cap

Bentonite plug

INTERA

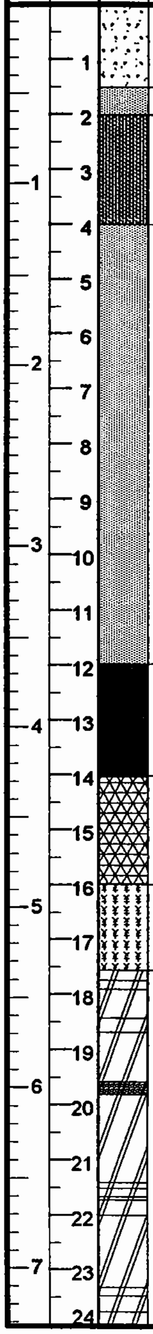
# BOREHOLE LOG

# MW-14B

Client: *The Carborundum Company*
Project Title: *RI/FS, Former Hyde Park Facility*
Project Ref.: *94-085*

Date: *May 22, 1996*
Field Crew: *R.T. & G.H.*
Equipment: *H.S.A., air rotary*
Ground Elevation: *593.3ftASL*

File Name: MW14B085.TCW



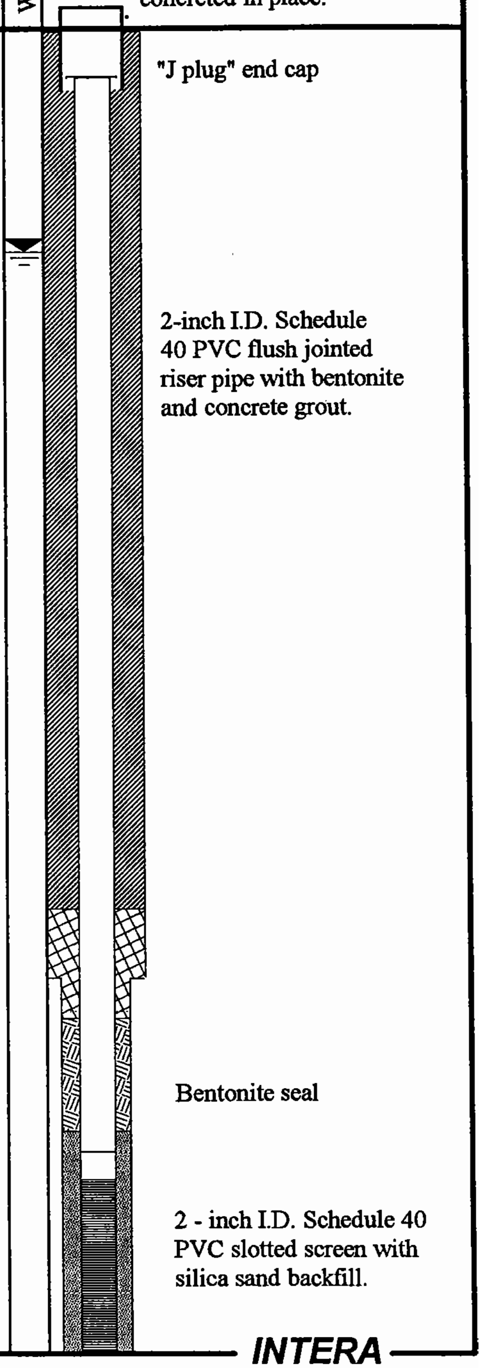
| Stratigraphy | Sample Type | Blow Counts per 6" | PID Scan (ppm) | PID Headspace (ppm) |
|---|---|---|---|---|
| Brown SAND and GRAVEL<br>Brown CLAYEY SILT, dry to damp, some dark staining | SS | 10<br>10<br>5<br>6 | 0.0 | 3.4 |
| Reddish brown SANDY SILT, dry to damp<br>-blocky, layered, some clayey bands<br>-no staining | SS | 7<br>11<br>8<br>8 | 0.0 | 1.6 |
| Reddish brown CLAYEY SILT, moist<br>-layered with massively bedded silt approx. 1" thick<br>-some light yellow and grey layers in clayey silt<br>-no staining | SS | 6<br>5<br>6<br>6 | 0.0 | 1.2 |
| -moist to wet<br>-no staining | SS | 5<br>5<br>5<br>5 | 0.0. | 1.0 |
| -layered, occasional grey pockets in silty layers<br>-no staining | SS | 2<br>3<br>5<br>5 | 0.0 | 0.8 |
| -some silt, minor gravel<br>-layered, wet, no staining | SS | 7<br>6<br>6<br>5 | 0.2 | 1.0 |
| SILTY CLAY and CLAYEY SILT<br>-very wet, soft, sticky<br>-minor gravel, some grey banding | SS | 0<br>0<br>0<br>3 | 0.5 | 0.8 |
| Reddish SILT and SAND, minor gravel, wet<br>-some layered clayeye silt, possible reworked till<br>-no staining | SS | 0<br>0<br>2<br>5 | 0.6 | 1.0 |
| SILT TILL, gravel, rock fragments, wet<br>-no staining | SS | 7<br>8<br>8 | 1.0 | 1.4 |
| Dark grey DOLOMITE bedrock<br>-stylolites, calcite crystals<br>-vugs with calcite infilling | Run 1<br>RQD=<br>68% |  | 0.0 |  |

(CONTINUED ON NEXT FIGURE)

—— vugs and fractures

**Well Construction**

Well completed with a flush mount protective casing, concreted in place.



INTERA

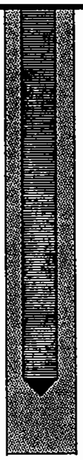
# BOREHOLE LOG

## MW-14B (continued)

Client: *The Carborundum Company*
Project Title: *RI/FS, Former Hyde Park Facility*
Project Ref.: *94-085*

Date: *May 22, 1996*
Field Crew: *R.T. & G.H.*
Equipment: *H.S.A., air rotary*
Ground Elevation: *593.3ftASL*

File Name: W14B2085.TCW

| Depth (m) | Depth (ft) | Symbol | Stratigraphy | Sample Interval | Sample Type | Blow Counts per 6" | PID Scan (ppm) | PID Headspace (ppm) | Water Table, May 24/96 | Well Construction |
|---|---|---|---|---|---|---|---|---|---|---|
| | 24 |  | Run 1 (cont'd) | | | | | | |  |
| | 25 | | Dark grey DOLOMITE<br>-calcite infilling along fractures<br>-stylolites, thin shale beds containing several induced fractures<br>-more vuggy from 27' to 32' | | Run 2<br>RQD=<br>49% | | 0.0 | | | 2-inch I.D. Schedule 40 PVC slotted screen with silica sand backfill. |
| | 26 | | | | | | | | | |
| 8 | 27 | | | | | | | | | |
| | 28 | | rubble zone | | | | | | | |
| | 29 | | | | | | | | | |
| 9 | 30 | | | | | | | | | |
| | 31 | | -large calcite crystals at 31.5'<br>-corally at 31-32' | | | | | | | PVC threaded drive point end cap |
| | 32 | | vugs and fractures | | | | | | | |
| | 33 | | | | | | | | | |
| 10 | 34 | | | | | | | | | |
| | 35 | | | | | | | | | |
| | 36 | | | | | | | | | |
| 11 | 37 | | | | | | | | | |
| | 38 | | | | | | | | | |
| | 39 | | | | | | | | | |
| 12 | 40 | | | | | | | | | |
| | 41 | | | | | | | | | |
| | 42 | | | | | | | | | |
| | 43 | | | | | | | | | |
| 13 | 44 | | | | | | | | | |
| | 45 | | | | | | | | | |
| | 46 | | | | | | | | | |
| 14 | 47 | | | | | | | | | |
| | 48 | | | | | | | | | |

DE&S
Duke Engineering & Services

# Phase II Remedial Investigation of the Former Carborundum Company Electric Products Division, Hyde Park Facility
# Town of Niagara,
# Niagara County, New York
# SITE NO. 932036

## FINAL REPORT

Prepared for: BP America
200 Public Square, 7-1
Cleveland, Ohio
44114-2375

Prepared by: Duke Engineering &
Services (Canada) Inc.
Markham, Ontario

Project No. TM7077

~~May~~, 1998
August
KH

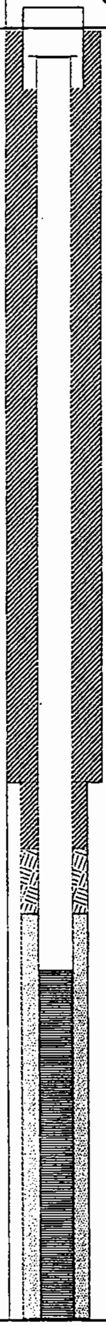
# BOREHOLE LOG

## MW-15

| | | | |
|---|---|---|---|
| Client: | *The Carborundum Company* | Date: | *Nov. 20, 1997* |
| Project Title: | *Phase II RI* | Field Crew: | *G.H.* |
| Project Ref.: | *7077* | Equipment: | *H.S.A., air rotary* |
| | | Ground Elevation: | *591.98ftASL* |

File Name: MW157077.TCW

| Depth (m) | Depth (ft) | Stratigraphy | Sample Type | Blow Counts per 6" | PID Scan (ppm) | PID Headspace (ppm) | Water Table, May 24/96 | Well Construction |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Well completed with a flush mount protective casing, concreted in place. |
| | | Asphalt over concrete | | | | | | "J plug" end cap |
| | 1 | Brown CLAYEY SILT, moist | | | | | | |
| | 2 | -no odour<br>-no staining | | | | | | |
| 1 | 3 | | | | | | | |
| | 4 | | | | | | | |
| | 5 | -minor gray pockets<br>-no staining or odour | SS | 7<br>8<br>30 | | 0.7 | | 2-inch I.D. Schedule 40 PVC flush jointed riser pipe with bentonite and concrete grout. |
| 2 | 6 | | | | | | | |
| | 7 | | | | | | | |
| | 8 | -moist to wet<br>-becoming reddish brown | | | | | | |
| | 9 | | | | | | | |
| 3 | 10 | Reddish brown SILT to CLAYEY SILT<br>-some gray zones<br>-finely bedded<br>-no staining or odour | SS | 3<br>4<br>4<br>8 | | 0.7 | | |
| | 11 | | | | | | | |
| | 12 | | | | | | | |
| 4 | 13 | | | | | | | |
| | 14 | Grey DOLOMITE bedrock<br>-stylolites, calcite crystals<br>-vugs with calcite infilling | Run 1<br>RQD=<br>83% | | | | | |
| | 15 | | | | | | | Bentonite seal |
| 5 | 16 | | | | | | | |
| | 17 | | Run 2<br>RQD=<br>81% | | 0.0 | | | |
| | 18 | | | | | | | |
| 6 | 19 | | | | | | | |
| | 20 | | | | | | | |
| | 21 | | | | | | | |
| | 22 | | Run 3<br>RQD=<br>79% | | | | | 2 - inch I.D. Schedule 40 PVC slotted screen with silica sand backfill. |
| 7 | 23 | *(CONTINUED ON NEXT FIGURE)* | | | | | | |
| | 24 | vugs and fractures | | | | | | |



DE&S

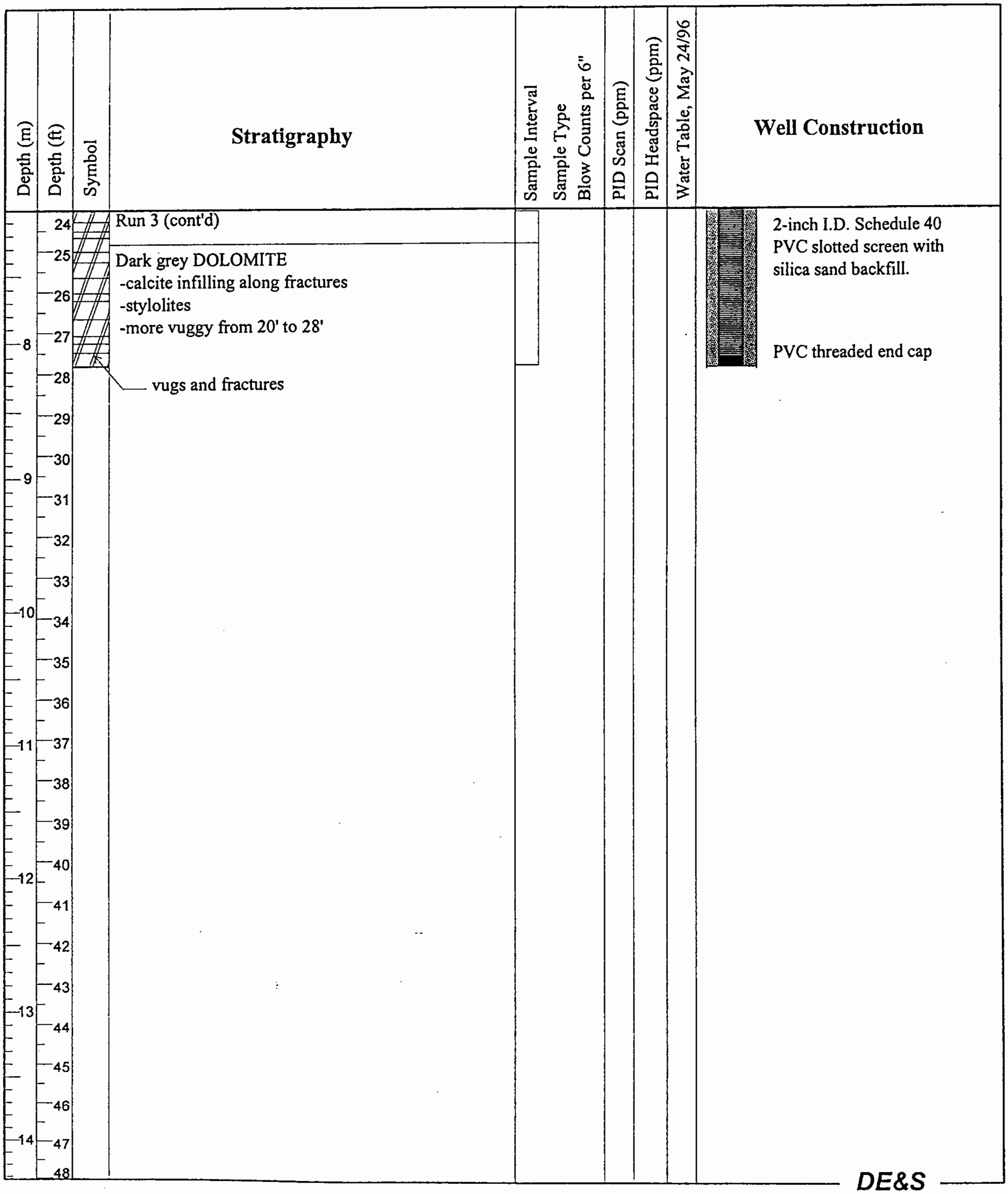
# BOREHOLE LOG

# MW-15 (continued)

Client: *The Carborundum Company*
Project Title: *Phase II RI*
Project Ref.: *7077*

Date: *Nov. 20, 1997*
Field Crew: *G.H.*
Equipment: *H.S.A., air rotary*
Ground Elevation: *591.98ftASL*

File Name: W15B7077.TCW



Run 3 (cont'd)

Dark grey DOLOMITE
-calcite infilling along fractures
-stylolites
-more vuggy from 20' to 28'

2-inch I.D. Schedule 40 PVC slotted screen with silica sand backfill.

PVC threaded end cap

Duke Engineering & Services℠
A Duke Energy Company

# SUMMARY OF FIRST YEAR OF GROUNDWATER MONITORING PROGRAM AT THE FORMER CARBORUNDUM COMPANY – ELECTRIC PRODUCTS DIVISION, HYDE PARK FACILITY, TOWN OF NIAGARA, NIAGARA COUNTY, NEW YORK, SITE NO. 932036

***DRAFT REPORT***

Prepared For:
BP
4850 E 49th St., MBC3-149
Cleveland, Ohio 44125

Prepared By:
Duke Engineering & Services Inc.

TM0013-003
March 2001

**Project No:** TM0013-004

# Log of Borehole: MW-16A

**Client:** BP Amoco

**Location:** Former Carborundum Company Facility

**Supervisor:** EW

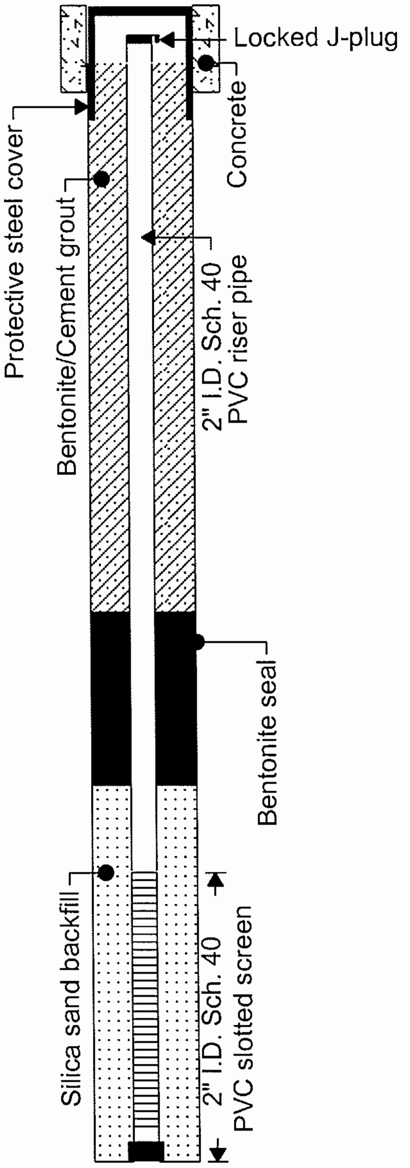
**Ground Elevation:** 592.60 ftASL

**Riser Elevation:** 591.64 ftASL

**Sheet:** 1 of 1

| SUBSURFACE PROFILE | | | | SAMPLE | | | |
|---|---|---|---|---|---|---|---|
| Depth ft | Depth m | Symbol | Description | Number | Recovery (%) | CGI (ppm) | PID (ppm) |
| 0 | 0 | | Ground Surface | | | | |
| 1<br>2 | | | ***Gravel*** | SS1 | 40 | | 0.0 |
| 3<br>4 | 1 | | ***Silty Clay Fill***<br>Brown silty clay fill with minor gravel, becoming small stones at 4ft BGS.<br>Becoming damp to wet at 7ft BGS.<br>Minor natural organic material at 11ft BGS. | SS2 | 30 | | 0.0 |
| 5<br>6 | | | | SS3 | 25 | | 0.0 |
| 7<br>8 | 2 | | | SS4 | 60 | | 0.0 |
| 9<br>10 | 3 | | | SS5 | 10 | | 0.0 |
| 11<br>12 | | | | SS6 | 10 | | 0.0 |
| 13<br>14 | 4 | | | SS7 | 25 | | 0.0 |
| 15<br>16 | | | ***Clay Till***<br>Brown, moderately stiff clay till mixed with various size stones and minor gray silt seams. | SS8 | 85 | | 0.0 |
| 17<br>18 | 5 | | | SS9 | 75 | | 0.0 |
| 19<br>20 | 6 | | | SS10 | 10 | | 0.0 |

Well Construction Details



Drill Date: Oct. 26, 2000

Drill Company: SJB Services Inc.

Drill Method: H.S.A.

**Duke Engineering & Services (Canada), Inc.**
*A Duke Energy Company*
240 Duncan Mill Rd., Suite 103
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Tel: 416-447-9400
Fax: 416-447-9405

**Project No:** TM0013-004

# Log of Borehole: MW-16B

**Client:** BP Amoco

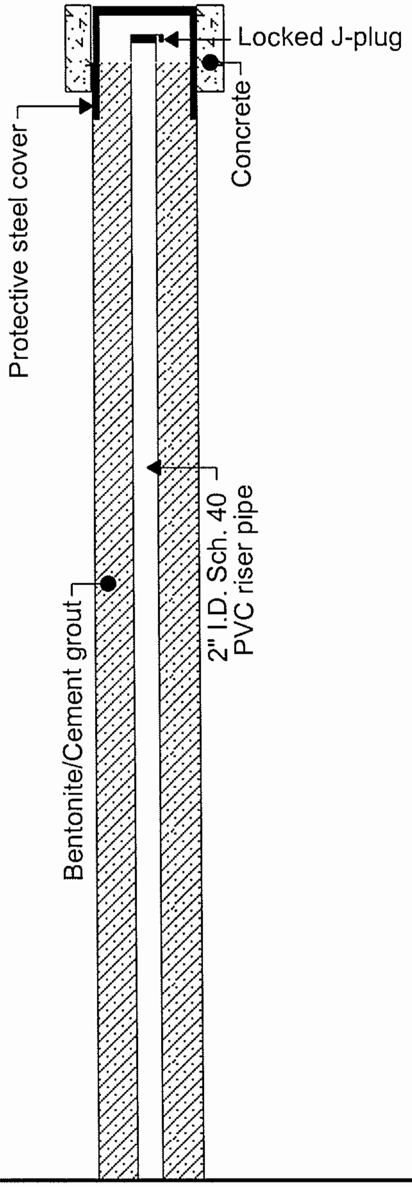
**Location:** Former Carborundum Company Facility

**Supervisor:** EW

**Ground Elevation:** 592.60 ftASL

**Riser Elevation:** 592.38 ftASL

**Sheet:** 1 of 2

| SUBSURFACE PROFILE | | | | SAMPLE | | | | |
|---|---|---|---|---|---|---|---|---|
| Depth | | Symbol | Description | Number | Recovery (%) | CGI (ppm) | PID (ppm) | Well Construction Details |
| ft | m | | Ground Surface | | | | | |
| 0<br>1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11<br>12<br>13<br>14<br>15<br>16<br>17<br>18<br>19<br>20 | 0<br>1<br>2<br>3<br>4<br>5<br>6 | | Auguered to bedrock surface and installed temporary 4" diameter steel casing in order to advance core.<br>See MW-16A log for description of overburden materials. | | | | |  |

Drill Date: Oct. 25, 2000

Drill Company: SJB Services Inc.

Drill Method: H.S.A. & HQ Core

**Duke Engineering & Services (Canada), Inc.**
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Tel: 416-447-9400
Fax: 416-447-9405

**Project No:** TM0013-004

# Log of Borehole: MW-16B

**Client:** BP Amoco

**Location:** Former Carborundum Company Facility

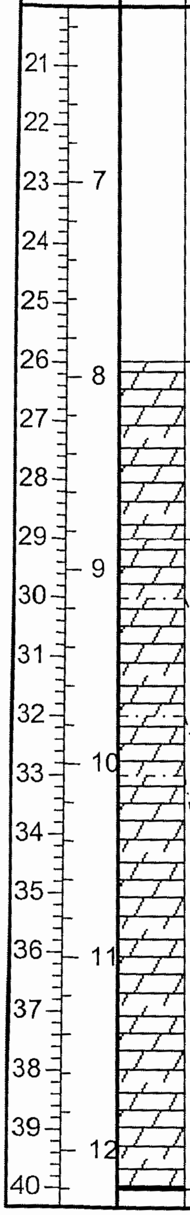
**Supervisor:** EW

**Ground Elevation:** 592.60 ftASL

**Riser Elevation:** 592.38 ftASL

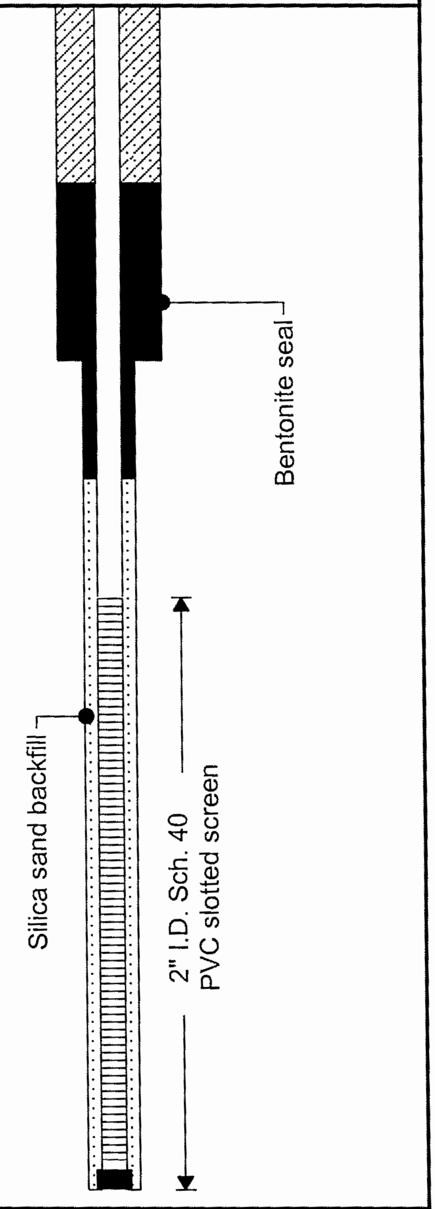
**Sheet:** 2 of 2

## SUBSURFACE PROFILE



| Description | Number | Recovery (%) | CGI (ppm) | PID (ppm) |
|---|---|---|---|---|
| **Bedrock Surface at 26ft BGS** | | | | |
| ***Dolomite***<br>RQD = 31%<br>Highly fractured with gravel-like pieces at 26.5 and 27.5ft. Several vugs along with crystal and gray silt deposits. | un | 94 | | 0.0 |
| ***Dolomite***<br>RQD = 0%<br>Highly fractured with several pieces smaller than 1". | un | 58 | | 0.0 |
| | un | 100 | | 0.0 |
| ***Dolomite***<br>RQD = 21%<br>Brown silt and shale seams throughout. 0.3 to 0.5ft fracture frequency. | un | 100 | | 0.0 |
| ***Dolomite***<br>RQD = 0%<br>Highly fractured with a large vertical void from 32.5 to 33ft.<br>***Dolomite***<br>RQD = 70%<br>Large vertical fracture from 33.5 to 34ft and at 35ft.<br>Small vugs and stylolites from 34 to 35ft.<br>0.3ft fracture frequency from 36 to 39ft with shale seams. | un | 93 | | 0.0 |

Well Construction Details



Drill Date: Oct. 25, 2000

Drill Company: SJB Services Inc.

Drill Method: H.S.A. & HQ Core

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**Project No:** TM0013-004

# Log of Borehole: MW-17A

**Client:** BP Amoco

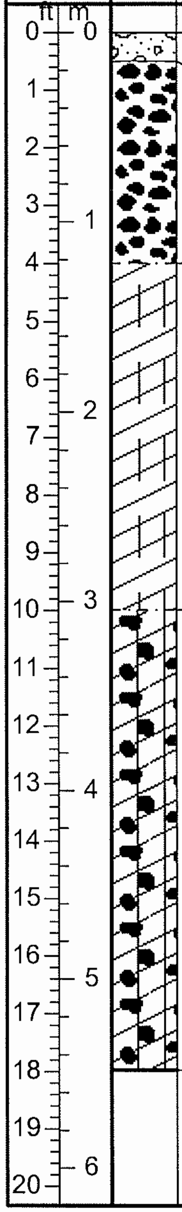
**Location:** Former Carborundum Company Facility

**Supervisor:** EW

**Ground Elevation:** 593.44 ftASL

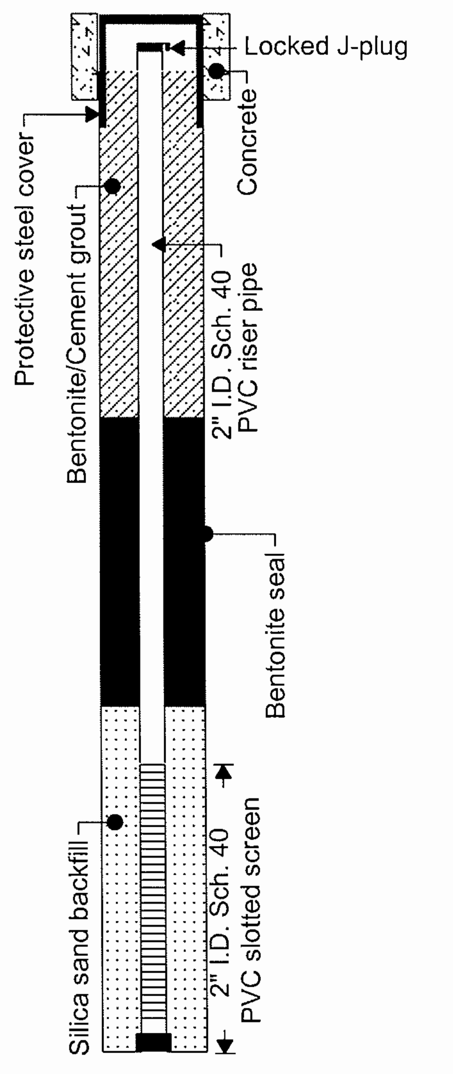
**Riser Elevation:** 592.90 ftASL

**Sheet:** 1 of 1



| SUBSURFACE PROFILE | SAMPLE | | | |
|---|---|---|---|---|
| Description | Number | Recovery (%) | CGI (ppm) | PID (ppm) |
| Ground Surface | | | | |
| ***Concrete*** | -- | -- | | -- |
| ***Fill Material***<br>Fill material including brick pieces, black sand and slag. | SS1 | 10 | | 0.0 |
| | SS2 | 0 | | 0.0 |
| ***Silty Clay***<br>Reddish brown silty clay with 4" thick dark sand seams at 7ft BGS and 9ft BGS. Becoming damp to wet at 8ft BGS. | SS3 | 100 | | 0.0 |
| | SS4 | 100 | | 0.0 |
| | SS5 | 75 | | 0.0 |
| ***Clay Till***<br>Reddish brown wet clay till with various size stones and dark sand seams. Appears to become dry at 17.25ft BGS. | SS6 | 50 | | 0.0 |
| | SS7 | 50 | | 0.0 |
| | SS8 | 40 | | 0.0 |
| | SS9 | 100 | | 0.0 |
| End of Borehole | | | | |

Well Construction Details



Drill Date: Oct. 27, 2000

Drill Company: SJB Services Inc.

Drill Method: H.S.A.

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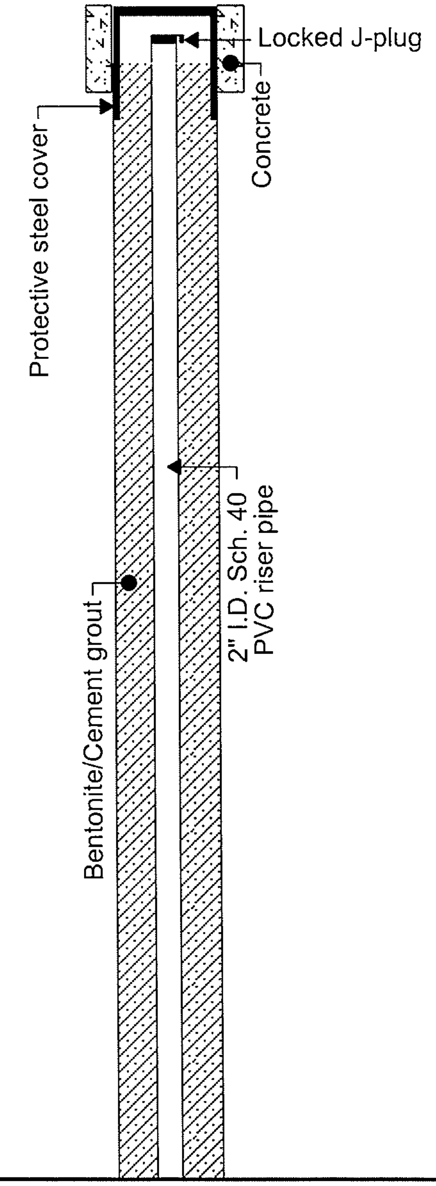
Tel: 416-447-9400
Fax: 416-447-9405

**Project No:** TM0013-004

# Log of Borehole: MW-17B

**Client:** BP Amoco
**Location:** Former Carborundum Company Facility
**Supervisor:** EW
**Ground Elevation:** 593.45 ftASL
**Riser Elevation:** 593.11 ftASL
**Sheet:** 1 of 2

| SUBSURFACE PROFILE | | | SAMPLE | | | | Well Construction Details |
|---|---|---|---|---|---|---|---|
| Depth | Symbol | Description | Number | Recovery (%) | CGI (ppm) | PID (ppm) | |
| ft m | | Ground Surface | | | | | |
| 0 0<br>1<br>2<br>3<br>1<br>4<br>5<br>6<br>2<br>7<br>8<br>9<br>3<br>10<br>11<br>12<br>13<br>4<br>14<br>15<br>16<br>5<br>17<br>18<br>19<br>6<br>20 | | Augured to bedrock surface and installed temporary 4" diameter steel casing in order to advance core.<br>See MW-17A log for description of overburden materials. | | | | |  |

Drill Date: Oct. 27, 2000
Drill Company: SJB Services Inc.
Drill Method: H.S.A. & HQ Core

Duke Engineering & Services (Canada), Inc.
*A Duke Energy Company*
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Tel: 416-447-9400
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# Log of Borehole: MW-17B

**Project No:** TM0013-004

**Client:** BP Amoco

**Location:** Former Carborundum Company Facility

**Supervisor:** EW

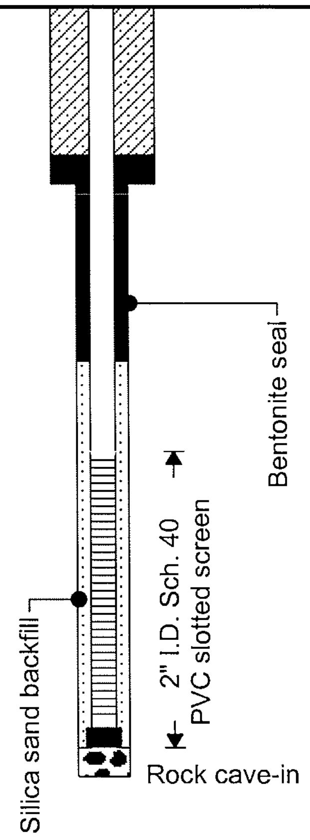
**Ground Elevation:** 593.45 ftASL

**Riser Elevation:** 593.11 ftASL

**Sheet:** 2 of 2

| SUBSURFACE PROFILE | | | SAMPLE | | | |
|---|---|---|---|---|---|---|
| Depth | Symbol | Description | Number | Recovery (%) | CGI (ppm) | PID (ppm) |
| 21<br>22<br>23 – 7 | | **Bedrock Surface at 23ft BGS** | | | | |
| 24<br>25<br>26 – 8<br>27<br>28 | ▨ | ***Dolomite***<br>RQD = 76%<br>Shale seams at 26.5ft.<br>0.5 to 0.7ft fracture frequency, with gravel-like material from 25.5 to 26ft.<br>Vertical fractures from 23 to 24ft. | un | 93 | | 0.0 |
| 29 – 9<br>30<br>31<br>32<br>33 – 10 | ▨ | ***Dolomite***<br>RQD = 50%<br>Shale seams starting at 30.5ft.<br>Vugs and stylolites starting at 30.5ft with a 0.5ft frequency.<br>Gravel-like pieces from 29.75 to 30.2ft.<br>0.3-0.5ft fracture frequency. | un | 100 | | 0.0 |
| 34<br>35<br>36 – 11<br>37<br>38<br>39 – 12<br>40 | | End of Borehole | | | | |

Well Construction Details



Drill Date: Oct. 27, 2000

Drill Company: SJB Services Inc.

Drill Method: H.S.A. & HQ Core

**Duke Engineering & Services (Canada), Inc.**
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Fax: 416-447-9405

**Project No:** TM0013-004

# Log of Borehole: MW-18A

**Client:** BP Amoco

**Location:** Former Carborundum Company Facility

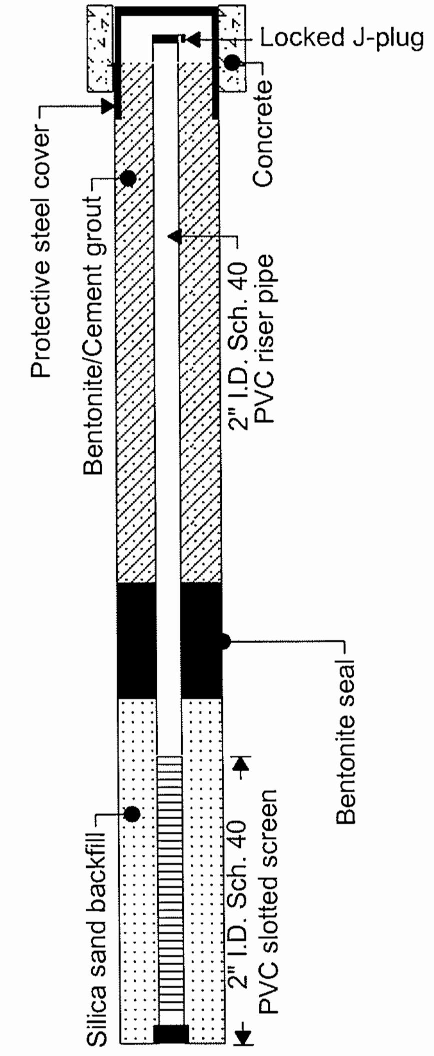
**Supervisor:** EW

**Ground Elevation:** 594.00 ftASL

**Riser Elevation:** 593.78 ftASL

**Sheet:** 1 of 1

| SUBSURFACE PROFILE | | | SAMPLE | | | | Well Construction Details |
|---|---|---|---|---|---|---|---|
| Depth<br>ft m | Symbol | Description | Number | Recovery (%) | CGI (ppm) | PID (ppm) | |
| 0 0 | | Ground Surface | | | | | |
| | | ***Asphalt*** | -- | -- | | -- | |
| | | ***Clay Till***<br>Brown clay till with large stones | SS1 | 80 | | 0.0 | |
| | | | SS2 | 10 | | 0.0 | |
| | | | SS3 | 0 | | 0.0 | |
| | | ***Silty Clay Till***<br>Reddish brown silty clay till with small stones.<br>Becoming damp to wet at 10ft BGS.<br>Mixed with medium grain sand from approximately 13.5 to 14ft BGS.<br>Appears to become dry at 16ft BGS. | SS4 | 20 | | 0.0 | |
| | | | SS5 | 30 | | 0.0 | |
| | | | SS6 | 50 | | 0.0 | |
| | | | SS7 | 80 | | 0.0 | |
| | | | SS8 | <1 | | 0.0 | |
| | | | SS9 | 100 | | 0.0 | |
| 20 6 | | End of Borehole | | | | | |



Drill Date: Oct. 30, 2000

Drill Company: SJB Services Inc.

Drill Method: H.S.A.

**Duke Engineering & Services (Canada), Inc.**
*A Duke Energy Company*
240 Duncan Mill Rd., Suite 103
Toronto, Ontario M3B 1Z4
Tel: 416-447-9400
Fax: 416-447-9405

**Project No:** TM0013-004

# Log of Borehole: MW-18B

**Client:** BP Amoco

**Ground Elevation:** 594.00 ftASL

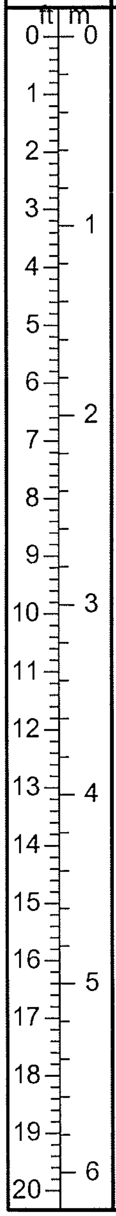
**Location:** Former Carborundum Company Facility

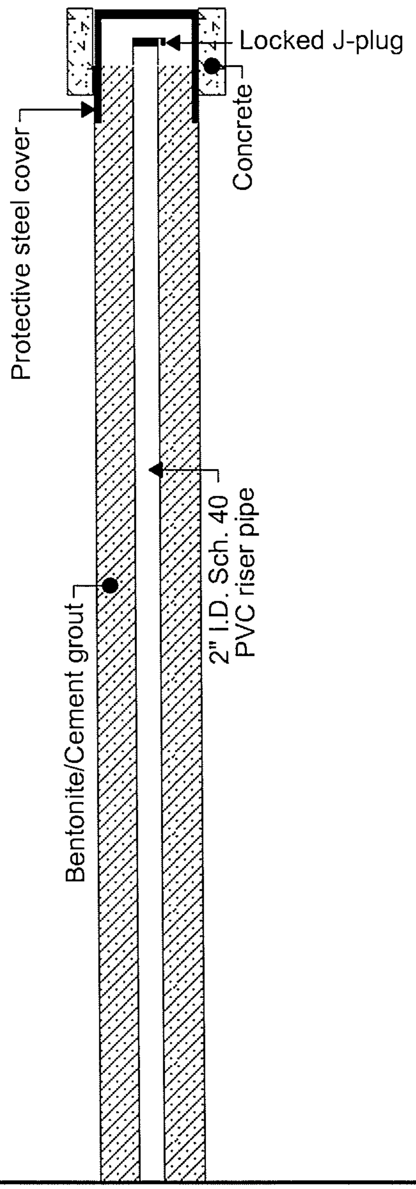
**Riser Elevation:** 593.43 ftASL

**Supervisor:** EW

**Sheet:** 1 of 2

| SUBSURFACE PROFILE | | | SAMPLE | | | | |
|---|---|---|---|---|---|---|---|
| Depth | Symbol | Description | Number | Recovery (%) | CGI (ppm) | PID (ppm) | Well Construction Details |
| | | Ground Surface | | | | | |
| | | Auguered to bedrock surface and installed temporary 4" diameter steel casing in order to advance core.<br>See MW-18A log for description of overburden materials. | | | | | |





Drill Date: Oct. 30, 2000

Drill Company: SJB Services Inc.

Drill Method: H.S.A. & HQ Core

**Duke Engineering & Services (Canada), Inc.**

*A Duke Energy Company*

240 Duncan Mill Rd., Suite 103
Toronto, Ontario M3B 1Z4

Tel: 416-447-9400
Fax: 416-447-9405

**Project No:** TM0013-004

# Log of Borehole: MW-18B

**Client:** BP Amoco

**Location:** Former Carborundum Company Facility

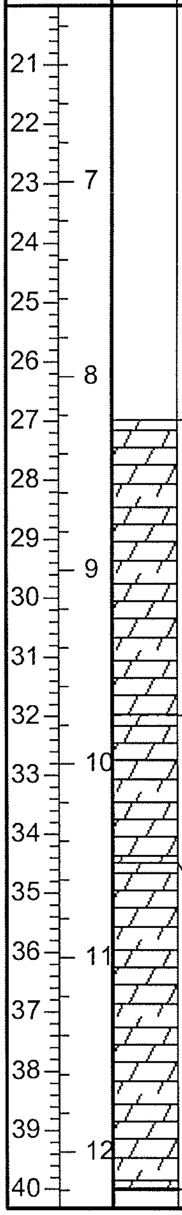
**Supervisor:** EW

**Ground Elevation:** 594.00 ftASL

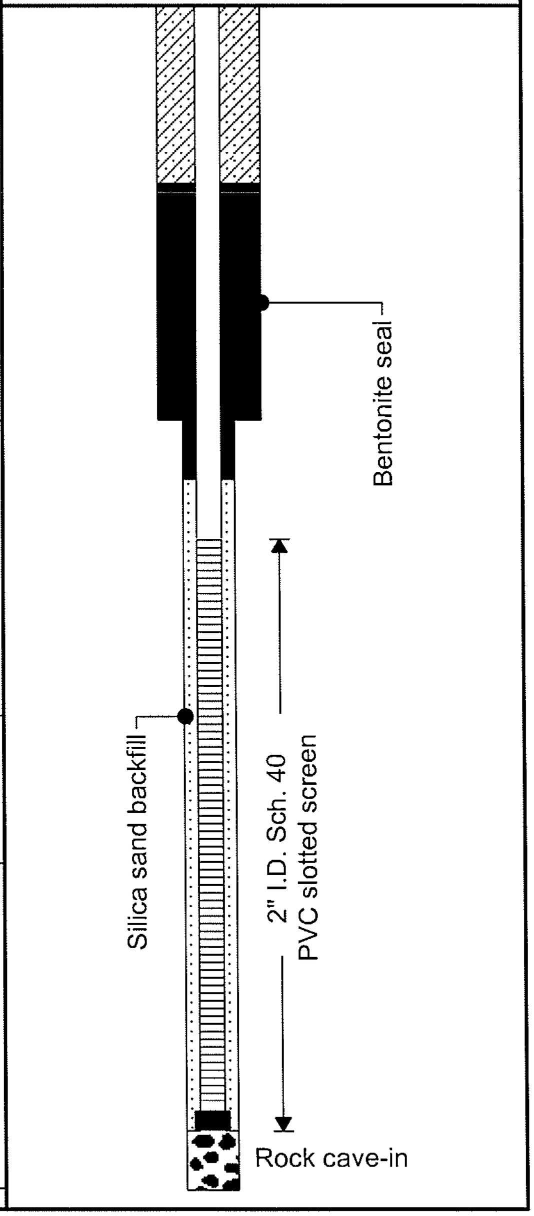
**Riser Elevation:** 593.43 ftASL

**Sheet:** 2 of 2

| SUBSURFACE PROFILE | | | SAMPLE | | | |
|---|---|---|---|---|---|---|
| Depth | Symbol | Description | Number | Recovery (%) | CGI (ppm) | PID (ppm) |
| | | **Bedrock Surface at 26.5ft BGS** | | | | |
| | | ***Dolomite***<br>RQD = 26%<br>Brown silt seams and crystals to 29ft with occasional shale seams starting at 30ft.<br>Highly fractured to 31ft.<br>Large vertical fracture at 31ft. | un | 95 | | 0.0 |
| | | ***Dolomite***<br>RQD = 40%<br>Gravel-like pieces to 32.5ft. and from 33.5 to 34ft.<br>Large vugs and semi-open fractures from 32.5 to 33.5ft.<br>Void from 34.1 to 34.5ft. | un | 93 | | 0.0 |
| | | ***Dolomite***<br>RQD = 62%<br>Shale seams starting at 38ft.<br>0.3 to 0.5ft fracture frequency. | un | 100 | | 0.0 |



Well Construction Details



Drill Date: Oct. 30, 2000

Drill Company: SJB Services Inc.

Drill Method: H.S.A. & HQ Core

**Duke Engineering & Services (Canada), Inc.**
*A Duke Energy Company*
240 Duncan Mill Rd., Suite 103
Toronto, Ontario M3B 1Z4
Tel: 416-447-9400
Fax: 416-447-9405

**Project No:** TM0013-004

# Log of Borehole: MW-19A

**Client:** BP Amoco

**Ground Elevation:** 595.44 ftASL

**Location:** Former Carborundum Company Facility

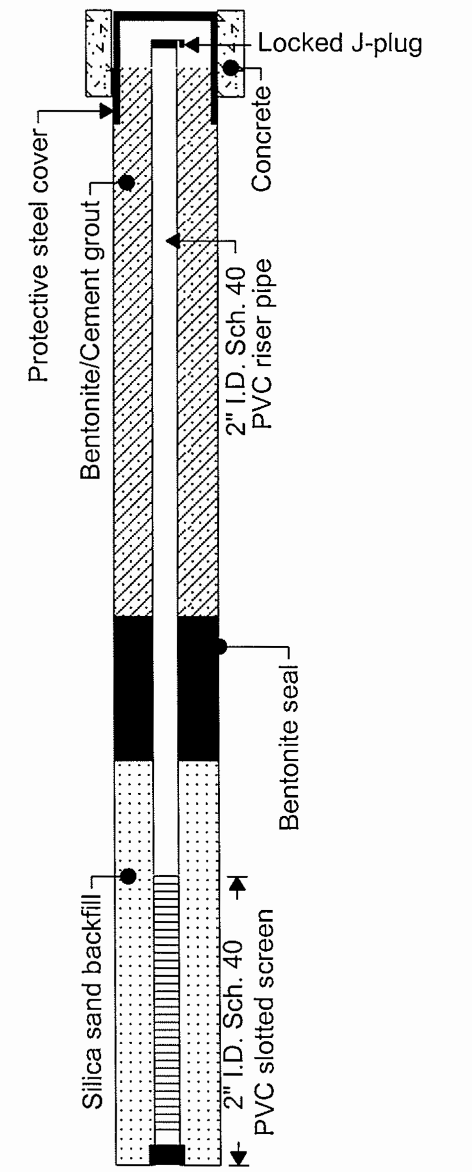
**Riser Elevation:** 594.95 ftASL

**Supervisor:** EW

**Sheet:** 1 of 1

| SUBSURFACE PROFILE | | | SAMPLE | | | |
|---|---|---|---|---|---|---|
| Depth | Symbol | Description | Number | Recovery (%) | CGI (ppm) | PID (ppm) |
| ft m | | Ground Surface | | | | |
| | | ***Asphalt*** | -- | -- | | -- |
| | | ***Silty Clay Fill***<br>Brown silty clay fill with minor gravel | SS1 | 100 | | 0.0 |
| | | | SS2 | 50 | | 0.0 |
| | | ***Silt Fill***<br>Brown/gray silt fill, becoming damp to wet at approximately 5ft BGS | SS3 | 60 | | 0.0 |
| | | | SS4 | 100 | | 0.0 |
| | | ***Sandy Silt Fill***<br>Brown sandy silt fill, with minor small stones beginning at 12ft BGS | SS5 | 100 | | 0.0 |
| | | | SS6 | 60 | | 0.0 |
| | | | SS7 | 90 | | 0.0 |
| | | | SS8 | 60 | | 0.0 |
| | | ***Silty Clay***<br>Brown, saturated silty clay, moderately plastic | SS9 | 70 | | 0.0 |
| | | | SS10 | 40 | | 0.0 |

Well Construction Details



Drill Date: Oct. 23, 2000

Drill Company: SJB Services Inc.

Drill Method: H.S.A.

**Duke Engineering & Services (Canada), Inc.**
*A Duke Energy Company*
240 Duncan Mill Rd., Suite 103
Toronto, Ontario M3B 1Z4
Tel: 416-447-9400
Fax: 416-447-9405

**Project No:** TM0013-004

# Log of Borehole: MW-19B

**Client:** BP Amoco

**Ground Elevation:** 595.43 ftASL

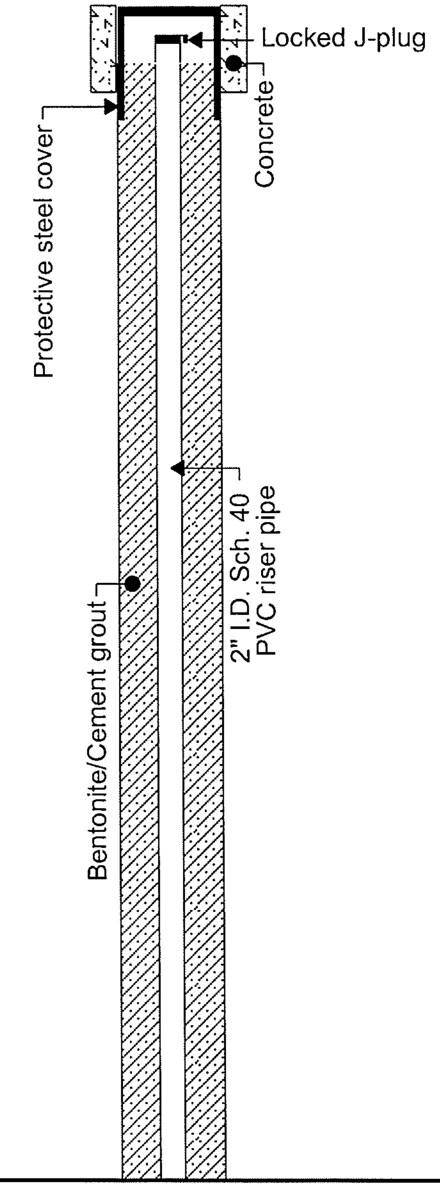
**Location:** Former Carborundum Company Facility

**Riser Elevation:** 594.65 ftASL

**Supervisor:** EW

**Sheet:** 1 of 2

| SUBSURFACE PROFILE | | | SAMPLE | | | | |
|---|---|---|---|---|---|---|---|
| Depth<br>ft m | Symbol | Description | Number | Recovery (%) | CGI (ppm) | PID (ppm) | Well Construction Details |
| 0 / 0 | | Ground Surface | | | | | |
| 0–20 ft / 0–6 m | | Auguered to bedrock surface and installed temporary 4" diameter steel casing in order to advance core.<br>See MW-19A log for description of overburden materials. | | | | | |



Drill Date: Oct. 24, 2000

Drill Company: SJB Services Inc.

Drill Method: H.S.A. & HQ Core

**Duke Engineering & Services (Canada), Inc.**
*A Duke Energy Company*
240 Duncan Mill Rd., Suite 103
Toronto, Ontario M3B 1Z4
Tel: 416-447-9400
Fax: 416-447-9405

**Project No:** TM0013-004

# Log of Borehole: MW-19B

**Client:** BP Amoco

**Ground Elevation:** 595.43 ftASL

**Location:** Former Carborundum Company Facility

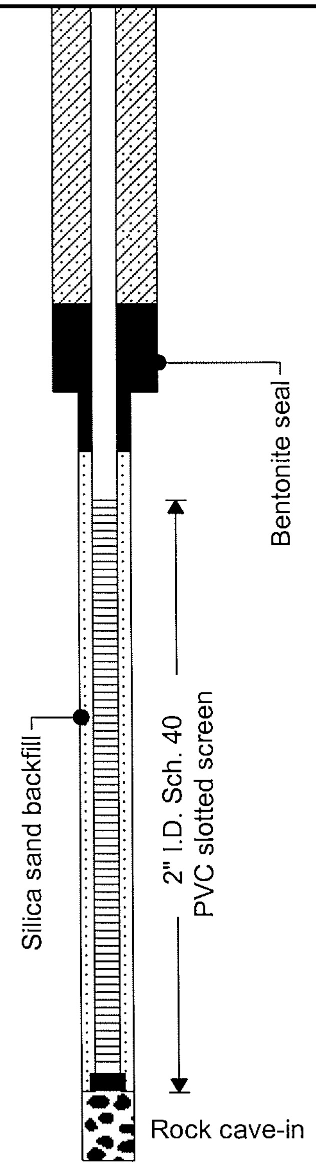
**Riser Elevation:** 594.65 ftASL

**Supervisor:** EW

**Sheet:** 2 of 2

| SUBSURFACE PROFILE | | | SAMPLE | | | |
|---|---|---|---|---|---|---|
| Depth | Symbol | Description | Number | Recovery (%) | CGI (ppm) | PID (ppm) |
| 21<br>22<br>23 7<br>24<br>25<br>26 8 | | **Bedrock Surface at 26ft BGS** | | | | |
| 27 | | ***Dolomite***<br>RQD = 0%<br>Highly fractured with gravel-like pieces | un | 60 | | 0.0 |
| 28<br>29<br>9<br>30 | | ***Dolomite***<br>RQD = 17%<br>Highly fractured with gravel-like pieces from 28 to 29ft<br>Less fractured from 29 to 29.5ft. | un | 67 | | 0.0 |
| 31<br>32<br>33 10<br>34<br>35<br>36 11<br>37<br>38<br>39 12 | | ***Dolomite***<br>RQD = 66%<br>Shale seams from 31 to 32ft.<br>Large vugs and crystals from 32.5 to 34ft and from 37.5 to 38.5ft.<br>Highly fractured from 35.5 to 36.5ft with shale seams. | un | 100 | | 0.0 |
| 40 | | End of Borehole | | | | |

Well Construction Details



Drill Date: Oct. 24, 2000

Drill Company: SJB Services Inc.

Drill Method: H.S.A. & HQ Core

**Duke Engineering & Services (Canada), Inc.**
*A Duke Energy Company*
240 Duncan Mill Rd., Suite 103
Toronto, Ontario M3B 1Z4
Tel: 416-447-9400
Fax: 416-447-9405

# PARSONS

Hyde Park Pilot Test
Niagara Falls, New York

Atlantic Richfield (Former Carborundum Plant)
July 2008

Date Started : 7/9/2008
Date Completed : 7/9/2008
Drilling Method : 4 1/4" ID H.S.A.
Sampling Method : Split-Spoon
Drilling Firm : NORTHCOAST DRLG
Lead Driller : Jason
Geologist : Scott Dillman
Project Manager : Mark Raybuck
Reviewed By : Scott Dillman
Regulatory Agency : NYSDEC

## LOG OF BORING/WELL INJ-1

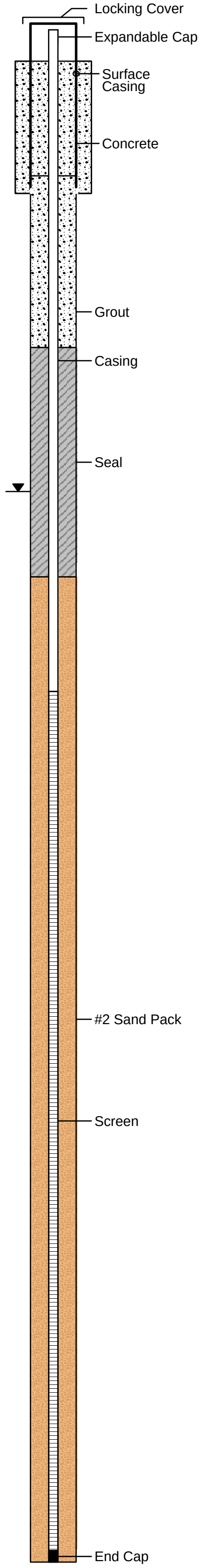
(Page 1 of 1)

PID Model : MiniRay
PID Calibration : 100 ppm Isobutylene

Water Levels
▼ After Completion: 9.01 ft (TOC) 7/10/2008
▽

| Depth in feet | Surf. Elev. | DESCRIPTION | USCS | GRAPHIC | PID-ppm | Recovery Inches | Blow Count |
|---|---|---|---|---|---|---|---|
| 0 | | Reddish brown SILT and CLAY, trace gravel. Wet at 2 feet. | ML | | 0.0 | NA | NA |
| 5 | | Reddish brown SILT, some clay, stiff, gray mottling, damp, no odor or stain. | ML | | 0.0 | 16 | 2-2-4-5 |
| 7 | | Reddish brown SILT, some clay, semi-stiff, slight plasticity, moist, no odor or stain. | ML | | 0.0 | 18 | 3-4-5-6 |
| 9 | | As above but moist and sticky. | ML | | 0.0 | 18 | 2-1-3-1 |
| 11 | | Reddish brown SILT, little-some clay, trace sand, mottled, wet soft, no stain or odor. | ML | | 0.0 | 17 | WOH-WOH-2-1 |
| 13 | | Reddish brown SILT, little sand, trace gravel, wet, soft, no stain or odor. | ML | | 0.0 | 9 | 1-3-6-2 |
| 15 | | Upper 6 inches as above. Reddish brown fine to medium SAND, little silt, trace gravel and coarse sand, no odor or stain. | SM | | 0.0 | 13 | 2-4-4-8 |
| 17 | | Reddish brown SILT, little clay, little coarse sand and gravel, dense. Till. Damp-moist, no odor or stain. | ML | | 0.0 | 14 | 24-36-50/4" |
| 19 | | Reddish brown SILT, trace clay, trace coarse sand and gravel, dense, damp. Till. no odor or stain. | ML | | 0.0 | 24 | 42-39-29-19 |
| 21 | | Reddish brown SILT as above. Upper 6 inches of sample dilatent SILT (auger fill?). | ML | | 0.0 | 8 | 7-24-27-18 |
| 23 | | Reddish brown SILT, little to some coarse gravel, trace coarse sand, dense, moist-damp. Till. No stain or odor. | ML | | 0.0 | 15 | 14-30-44-38 |
| 25 | | Till as above upper 2 inches. Rest of sample was dark gray dolomite gravel. Auger refusal at 26.25 feet. | Dolo | | 0.0 | 10 | 10-30-50/4" |

Well: INJ-1
TOC Height:



### Monitoring Well Construction Information

CONSTRUCTION
Boring Diameter : ~8" O.D.
WELL RISER
Material : PVC Sch 40
Diameter : 2-Inch
Joints : Threaded
WELL SCREEN
Material : PVC Sch 40
Diameter : 2-Inch
Joints : Threaded
Opening : 0.02-inch slots
Length : 15-feet
SAND PACK
Material : #2 Silica Filter Sand
SEAL
Material : Bentonite Pellets
GROUT
Material : Bentonite Hole Plug
WELL HEAD
Protection : Locking Pro-Cover
Well Cap : Expandable Plug
Well Pad : 2'x2'x8"

# PARSONS

Hyde Park Pilot Test
Niagara Falls, New York

Atlantic Richfield (Former Carborundum Plant)
July 2008

Date Started : 7/7/2008
Date Completed : 7/7/2008
Drilling Method : 4 1/4" ID H.S.A.
Sampling Method : Split-Spoon
Drilling Firm : NORTHCOAST DRLG
Lead Driller : Jason
Geologist : Scott Dillman
Project Manager : Mark Raybuck
Reviewed By : Scott Dillman
Regulatory Agency : NYSDEC

## LOG OF BORING/WELL INJ-2

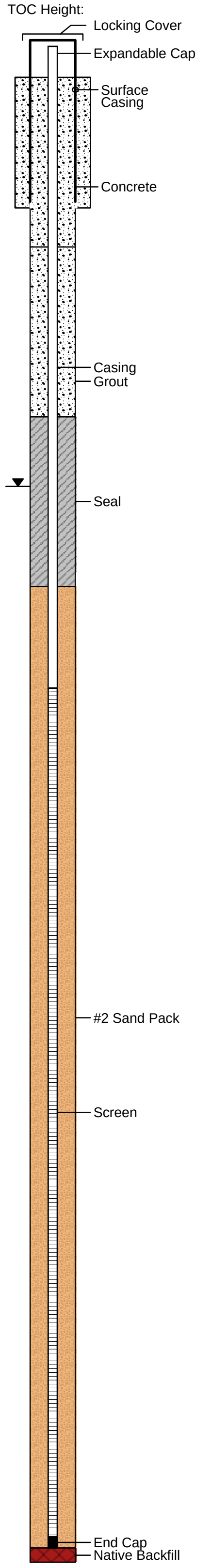
(Page 1 of 1)

PID Model : MiniRay
PID Calibration : 100 ppm Isobutylene

Water Levels
▼ After Completion: 8.73 ft (TOC) 7/10/2008
▽

| Depth in feet | Surf. Elev. | DESCRIPTION | USCS | GRAPHIC | PID-ppm | Recovery Inches | Blow Count |
|---|---|---|---|---|---|---|---|
| 0 | | Reddish brown SILT and CLAY, moist, no odor or stain. | ML | 🟥 | 0.0 | NA | NA |
| 5 | | Auger from 5 feet to 20 feet. No sampling. | | | | NA | A-A-A |
| 8 | | | | | | NA | A-A-A-A |
| 10 | | | | | | NA | A-A-A-A |
| 12 | | | | | | NA | A-A-A-A |
| 14 | | | | | | NA | A-A-A-A |
| 16 | | | | | | NA | A-A-A-A |
| 18 | | | | | | NA | A-A-A-A |
| | | | | | | NA | A-A |
| 20 | | Reddish brown SILT, some clay, little gravel, little sand in lenses in bottom 6 inches of sample, wet, no stain or odor. | ML | 🟥 | | | |
| 22 | | Auger to refusal at 26.5 feet. Dark gray dolomite at bottom of boring. | | | 0.0 | 18 | 20-25-30-35 |
| 23 | | | | | | NA | A-A-A-A |
| 25 | | | | | | NA | A-A-A-A |
| | | | | | | NA | A |

Well: INJ-2
TOC Height:



### Monitoring Well Construction Information

CONSTRUCTION
Boring Diameter : ~8" O.D.

WELL RISER
Material : PVC Sch 40
Diameter : 2-Inch
Joints : Threaded

WELL SCREEN
Material : PVC Sch 40
Diameter : 2-Inch
Joints : Threaded
Opening : 0.02-inch slots
Length : 15-feet

SAND PACK
Material : #2 Silica Filter Sand

SEAL
Material : Bentonite Pellets

GROUT
Material : Bentonite Hole Plug

WELL HEAD
Protection : Locking Pro-Cover
Well Cap : Expandable Plug
Well Pad : 2'x2'x8"

Hyde Park Pilot Test
Niagara Falls, New York

Atlantic Richfield (Former Carborundum Plant)
September 2008

| | |
|---|---|
| Date Started | : 9/17/2009 |
| Date Completed | : 10/2/2009 |
| Drilling Method | : 6 1/4" ID HSA/HQ Coring |
| Sampling Method | : Split-Spoon/Core |
| Drilling Firm | : NORTHCOAST DRLG |
| Lead Driller | : |
| Geologist | : B. Adams |
| Project Manager | : Mark Raybuck |
| Reviewed By | : B. Adams |
| Regulatory Agency | : NYSDEC |

# BORING/WELL INJ-03

(Page 1 of 1)

| | |
|---|---|
| PID Model | : MiniRay |
| PID Calibration | : 100 ppm Isobutylene |

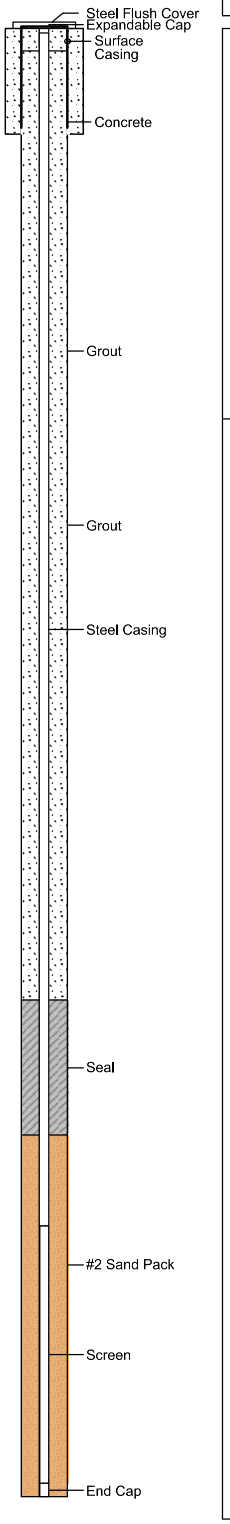
Water Levels

▼ After Completion: ____ ft (TOC) insert date here

▽

| Depth in feet | Surf. Elev. | DESCRIPTION | USCS | GRAPHIC | PID-ppm | Recovery Inches | Blow Count |
|---|---|---|---|---|---|---|---|
| 0 | | Concrete surface. | AR | | | | |
| | | Black SILT and CLAY, trace sand and gravel subbase. | ML-CL | | 0.0 | NA | HAND |
| 2 | | Reddish brown CLAY, some silt, damp, no odor, no stain. | CL | | 0.0<br>0.0 | NA<br>NA | HAND<br>HAND |
| 7 | | Reddish brown SILT, some clay, firm, damp, no odor or staining. | ML | | 0.0 | 19 | 3-5-6 |
| 9 | | Reddish brown SILT, some clay, soft, moist to wet. | ML | | 0.0 | 20 | 1-1-3-4 |
| 10 | | Reddish brown, SILT, trace clay, trace sand and gravel, soft, wet. | ML | | 0.0 | 20 | 1-1-1-1 |
| 12 | | No recovery (dark grey gravel in shoe). | | | NA | 0 | 8-11-13-14 |
| 13 | | | GM | | | | |
| 14 | | Reddish brown, fine to medium SAND, trace silt, loose to medium dense, wet. | SM | | 0.0 | 14 | 10-5-21-21 |
| 16 | | Reddish brown, fine to medium SAND, trace silt, medium dense, dark grey dolomite cobbles, wet. | SM | | 0.0<br>0.0 | 13<br>12 | 18-19-21-21<br>18-21-30-11 |
| 20 | | Reddish brown SAND and SILT, trace fine sand. | SM | | | | |
| | | Dark grey DOLOMITE GRAVEL cobbles. | GM | | 0.0 | 4 | 50/5" |
| 22 | | Dark grey, fine to medium SAND, some silt, trace dolomite cobbles. | SM | | NA | 3 | 50/5" |
| 23 | | Dark grey dolomite bedrock. | DO | | | | |
| 24 | | Auger refusal at 24 feet. Drill socket into bedrock with roller bit from 24 to 26 feet. | DO | | NA | NA | ROLLER |
| 26 | | RQD = 35%. Hard grey dolomite with fractures. | DO | | 0.0 | 55' of 60" | HQ Core |
| 31 | | RQD = 68%. Hard grey dolomite. | DO | | 0.0 | 21" of 24" | HQ Core |
| 33 | | | | | | | |
| 34 | | | | | | | |

Well: INJ-03
TOC Height:



## Monitoring Well Construction Information

CONSTRUCTION

| | |
|---|---|
| Boring Diameter | : ~10" O.D. upper, ~6" lower |
| WELL RISER | |
| Material | : Stainless Steel |
| Diameter | : 4-Inch |
| Joints | : Threaded |
| WELL SCREEN | |
| Material | : Stainless Steel |
| Diameter | : 4-Inch |
| Joints | : Threaded |
| Opening | : 0.02-inch slots |
| Length | : 6-feet |
| SAND PACK | |
| Material | : #2 Silica Filter Sand |
| SEAL | |
| Material | : Bentonite Pellets |
| GROUT | |
| Material | : Cement-Bentonite |
| WELL HEAD | |
| Protection | : Bolt Down Flush Cover |
| Well Cap | : Expandable Plug |
| Well Pad | : 2'x2'x8" |

Hyde Park Pilot Test
Niagara Falls, New York

Atlantic Richfield (Former Carborundum Plant)
September 2008

| | |
|---|---|
| Date Started | : 9/29/2009 |
| Date Completed | : 10/2/2009 |
| Drilling Method | : 6 1/4" ID HSA/HQ Coring |
| Sampling Method | : Split-Spoon/Core |
| Drilling Firm | : NORTHCOAST DRLG |
| Lead Driller | : |
| Geologist | : B. Adams |
| Project Manager | : Mark Raybuck |
| Reviewed By | : B. Adams |
| Regulatory Agency | : NYSDEC |

# BORING/WELL INJ-04

(Page 1 of 1)

| | |
|---|---|
| PID Model | : MiniRay |
| PID Calibration | : 100 ppm Isobutylene |

Water Levels

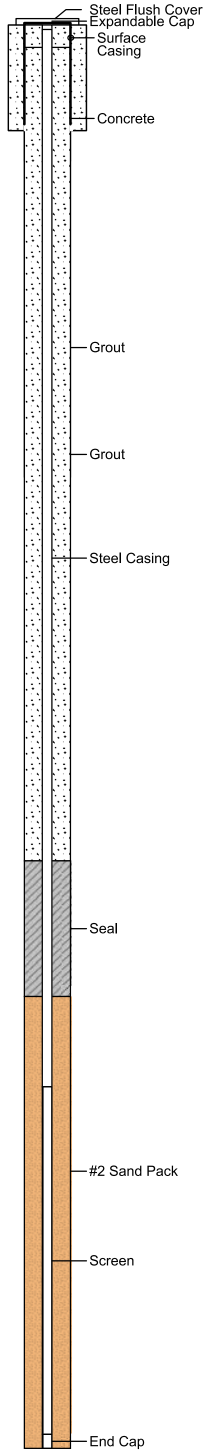
▼ After Completion: ____ ft (TOC) insert date here

▽

| Depth in feet | Surf. Elev. | DESCRIPTION | USCS | GRAPHIC | PID-ppm | Recovery Inches | Blow Count |
|---|---|---|---|---|---|---|---|
| | | Blacktop asphalt. | AR | ■ | | | |
| | | GRAVEL and SAND subbase fill material. | GM | ▨ | 0.0 | NA | HAND |
| | | Brown CLAY, trace silt, stiff, dry, no staining or odors. | CL | 🟥 | 0.0 | NA | HAND |
| | | Brown CLAY, trace silt, firm, damp, no stainin or odors. | CL | 🟥 | 0.0 | NA | HAND |
| | | Drilled to 11', no samples. | | | | | |
| | | Reddish brown, SILT, some sand, and fine to medium dolomite gravel, soft, moist to wet. | ML | 🟥 | NA | NA | 3-3-4-6 |
| | | Drilled to 18', no samples. | | | | | |
| | | Reddish brown SILT, some dolomite gravel, very stiff, dampl. | ML | 🟥 | NA | NA | 15-20-18-20 |
| | | Reddish brown SAND seam. | SM | 🟥 | | | |
| | | Reddish brown SILT, wet. | ML | 🟥 | | | |
| | | Drilled to auger refusal at 22 feet. | | | | | |
| | | Drilled socket into bedrock with roller bit from 22 to 24 feet. | DO | ▨ | NA | NA | ROLLER |
| | | RQD = 50%.<br>Lost 1.5' in boring, fell out of core barrel. | DO | ▨ | 0.0 | 60" of 60' | HQ Core |
| | | RQD = 40%<br>Lost one foot of recovery in boring. | DO | ▨ | 0.0 | 30" of 36' | HQ Core |

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34

Well: INJ-04
TOC Height:



## Monitoring Well Construction Information

CONSTRUCTION

| | |
|---|---|
| Boring Diameter | : ~10" O.D. upper, ~6" lower |

WELL RISER

| | |
|---|---|
| Material | : Stainless Steel |
| Diameter | : 4-Inch |
| Joints | : Threaded |

WELL SCREEN

| | |
|---|---|
| Material | : Stainless Steel |
| Diameter | : 4-Inch |
| Joints | : Threaded |
| Opening | : 0.02-inch slots |
| Length | : 8-feet |

SAND PACK

| | |
|---|---|
| Material | : #2 Silica Filter Sand |

SEAL

| | |
|---|---|
| Material | : Bentonite Pellets |

GROUT

| | |
|---|---|
| Material | : Cement-Bentonite |

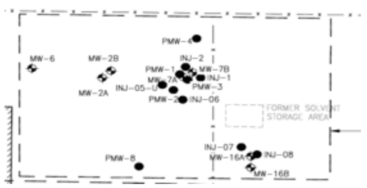
WELL HEAD

| | |
|---|---|
| Protection | : Bolt Down Flush Cover |
| Well Cap | : Expandable Plug |
| Well Pad | : 2'x2'x8" |

**PARSONS**

Hyde Park Injection Well Borings
Town of Niagara, Niagara County, New York

Atlantic Richfield Company
October 2011



Date Started : 10/12/2011
Date Completed : 10/12/2011
Drilling Method : 6.25" ID HSA
Sampling Method : Split-Spoon
Drilling Firm : GeoLogic
Lead Driller : Scott Breeds
Geologist : Rob Piurek
Project Manager : Mark Raybuck
Reviewed By : Jim Schuetz
Regulatory Agency : NYSDEC

# BORING/WELL INJ-5L

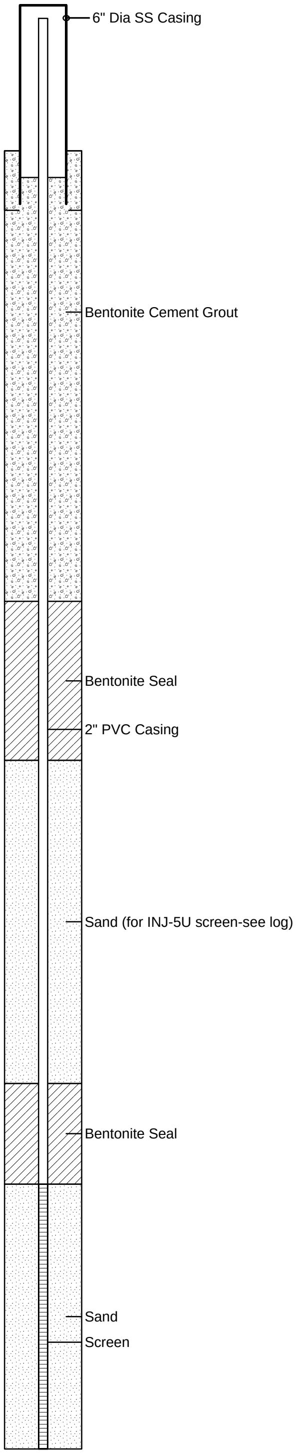
(Page 1 of 1)

PID Model : MiniRae
PID Calibration : 100 ppm Isobutylene
Location : North of Pilot Test area

Water Levels
▼ During Drilling: 7.5'
▽ Static: 7.84' bgs on 10/28/11

| Depth in feet | Surf. Elev. | DESCRIPTION | USCS | GRAPHIC | PID-ppm | Recovery % | Blow Count |
|---|---|---|---|---|---|---|---|
| -3 | | | | | | | |
| -2 | | | | | | | |
| -1 | | | | | | | |
| 0 | | Soft dig from 0' - 6.5'. No samples collected. | | | | | |
| | | 6.5'-13': CLAY and silt, brown, moist to wet, soft-medium stiff. | CL | | | | |
| 7 | | | | | 0.0 | 85 | 1<br>1<br>3<br>4 |
| 9 | | | | | 0.0 | 100 | 4<br>5<br>4<br>5 |
| 11 | | | | | 0.0 | 100 | 2<br>1<br>1<br>1 |
| 13 | | 13'-18': SAND, fine to medium sand, with some silt, trace gravel, brown, loose-dense, wet. | SP | | 0.0 | 100 | 2<br>1<br>1<br>1 |
| 15 | | | | | 0.0 | 50 | 1<br>2<br>3<br>3 |
| 16 | | Moist at 16'. | | | | | |
| 17 | | | | | 0.0 | 100 | 8<br>12<br>19<br>30 |
| 18 | | 18'-20': SAND and SILT, fine sand, with some gravel, red-brown, damp-dry, hard, till. | SM | | | | |
| 19 | | | | | 0.0 | 80 | 45<br>40<br>50/0.3<br>- |
| 20 | | 20'-24.3': SAND and SILT, fine sand, trace gravel, brown, dry, hard, till. | SM | | | | |
| 21 | | | | | 0.9 | 100 | 26<br>24<br>26<br>28 |
| 23 | | | | | 0.2 | 65 | 7<br>12<br>14<br>22 |
| | | 24.3'-25.5': GRAVEL, weathered and broken dolomite bedrock with some fine-coarse sand, gray, wet. | GW | | | | |
| 25 | | | | | 1.6 | 70 | 10<br>22<br>28 |
| 26 | | Auger refusal at 25' 6". | | | | | |

Well: INJ-5L
TOC Height: 596.0



## Monitoring Well Construction Information

CONSTRUCTION
Boring Diameter : 11"
WELL RISER
Material : Schedule 40 PVC
Diameter : 1.5"
Joints : None
WELL SCREEN
Material : PVC- 0.020" slot
Diameter : 1.5"
Placement : 19.5' to 24.5'

SAND PACK
Type : #10-20 Sand

SEAL
Material : Bentonite
GROUT
Material : Cement-Bentonite
WELL HEAD
Protection : 6"-diameter SS Pro-casing
Well Cap : Threaded cap
Well Pad : 12" circular concrete pad

Notes:

Drilling Method
0'-6.5': Soft dig w/ Air knife

6.5'-25.5': 6.25" ID HSA (11" boring diameter)

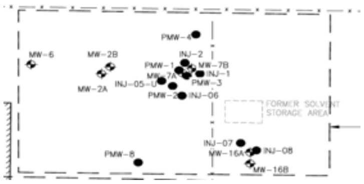
Blow counts were measured every 6 inches with 140 lb. hammer and 30" drop.

INJ-5L was installed in the same auger boring as INJ-5U.

**PARSONS**

Hyde Park Injection Well Borings
Town of Niagara, Niagara County, New York

Atlantic Richfield Company
October 2011



Date Started : 10/12/2011
Date Completed : 10/12/2011
Drilling Method : 6.25" ID HSA
Sampling Method : Split-Spoon
Drilling Firm : GeoLogic
Lead Driller : Scott Breeds
Geologist : Rob Piurek
Project Manager : Mark Raybuck
Reviewed By : Jim Schuetz
Regulatory Agency : NYSDEC

# BORING/WELL INJ-5U

(Page 1 of 1)

PID Model : MiniRae
PID Calibration : 100 ppm Isobutylene
Location : North of Pilot Test area

Water Levels
▼ During Drilling: 7.5'
▽ Static: 7.03' bgs on 10/28/11

| Depth in feet | Surf. Elev. | DESCRIPTION | USCS | GRAPHIC | PID-ppm | Recovery % | Blow Count |
|---|---|---|---|---|---|---|---|
| -3 | | | | | | | |
| -2 | | | | | | | |
| -1 | | | | | | | |
| 0 | | See INJ-05AL for subsurface soil information. | | | | | |
| 1 | | | | | | | |
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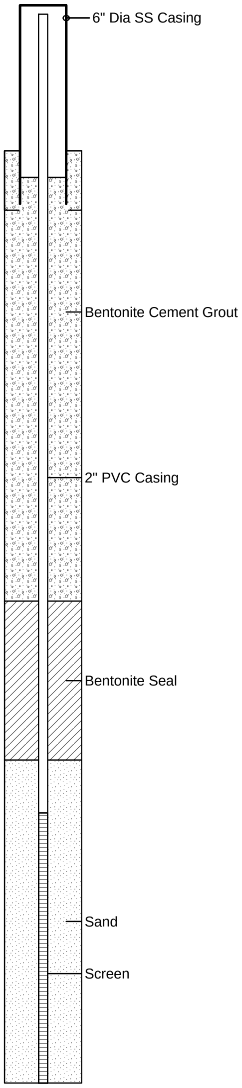
| 21 | | | | | | | |
| 22 | | | | | | | |
| 23 | | | | | | | |
| 24 | | | | | | | |
| 25 | | | | | | | |
| 26 | | Auger refusal at 25' 6". | | | | | |

Well: INJ-5U
TOC Height: 596.08



## Monitoring Well Construction Information

CONSTRUCTION
Boring Diameter : 11"
WELL RISER
Material : Schedule 40 PVC
Diameter : 1.5"
Joints : None
WELL SCREEN
Material : PVC- 0.020" slot
Diameter : 1.5"
Placement : 12.5' to 17.6'

SAND PACK
Type : #10-20 Sand

SEAL
Material : Bentonite
GROUT
Material : Cement-Bentonite
WELL HEAD
Protection : 6"-diameter SS Pro-casing
Well Cap : Threaded cap
Well Pad : 12" circular concrete pad

Notes:

Drilling Method
0'-6.5': Soft dig w/ Air knife

6.5'-25.5': 6.25" ID HSA (11" boring diameter)

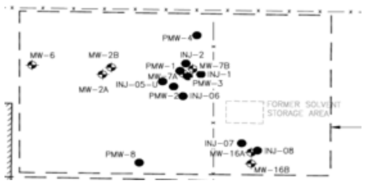
Blow counts were measured every 6 inches with 140 lb. hammer and 30" drop.

INJ-5U was installed in the same auger boring as INJ-5L.

**PARSONS**

Hyde Park Injection Well Borings
Town of Niagara, Niagara County, New York

Atlantic Richfield Company
October 2011



Date Started : 10/13/2011
Date Completed : 10/17/2011
Drilling Method : 6.25" ID HSA
Sampling Method : Split-Spoon
Drilling Firm : GeoLogic
Lead Driller : Scott Breeds
Geologist : Rob Piurek
Project Manager : Mark Raybuck
Reviewed By : Jim Schuetz
Regulatory Agency : NYSDEC

# BORING/WELL INJ-6L

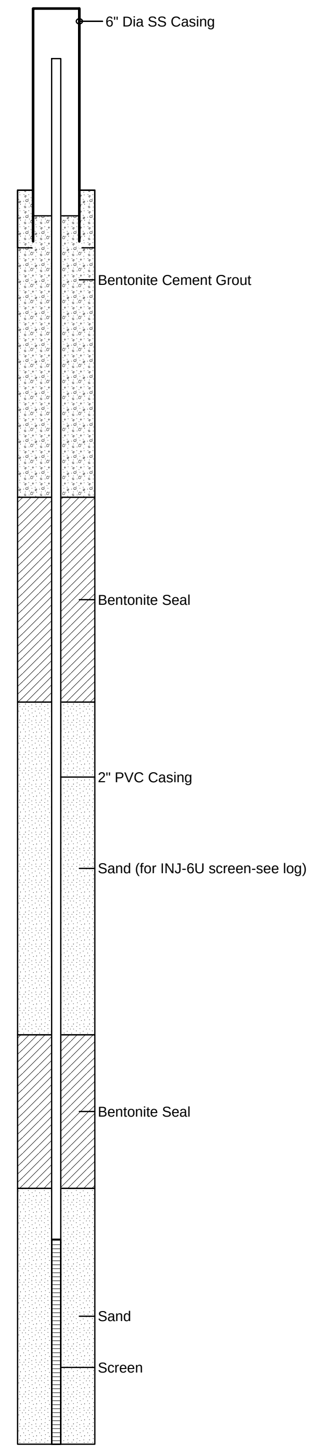
(Page 1 of 1)

PID Model : MiniRae
PID Calibration : 100 ppm Isobutylene
Location : North of Pilot Test area

Water Levels
▼ During Drilling: 6.5'
▽ Static: 7.80' bgs on 10/28/11

| Depth in feet | Surf. Elev. | DESCRIPTION | USCS | GRAPHIC | PID-ppm | Recovery % | Blow Count |
|---|---|---|---|---|---|---|---|
| -4 to 0 | | | | | | | |
| 0-6.5 | | Soft dig from 0' - 6.5'. No samples collected. | | | | | |
| 6.5-8 | | 6.5'-8': CLAY and SILT, brown, damp, stiff, trace gray mottles. | CL | ▨ | 0.0 | 100 | 1<br>4<br>6<br>8 |
| 8-15.5 | | 8'-15.5': CLAY and SILT, red-brown, damp, soft-medium stiff, weak and soft. | CL | ▨ | 0.0<br>3.2<br>0.8<br>0.2 | 100<br>100<br>100<br>45 | 4<br>5<br>5<br>5<br>2<br>3<br>2<br>3<br>3<br>2<br>2<br>1<br>3<br>3<br>4 |
| 15.5-18 | | 15.5'-18': SAND, fine sand, with some silt, trace gravel, brown, moist, medim dense. | SP | | 2.9 | 100 | 5<br>9<br>14<br>29<br>48 |
| 18-22 | | 18'-22': SILT, with some fine sand, little gravel, red-brown, dry, hard, till. | ML | | 0.2<br>0.3 | 100<br>100 | 25<br>36<br>55<br>50/0.3<br>20<br>26<br>24<br>32 |
| 22-24 | | 22'-24': SILT, with some fine sand, brown, dry, hard, till. | ML | | 1.7 | 100 | 20<br>25<br>35<br>50/0.3 |
| 24-25.5 | | 24'-25.5': GRAVEL, weathered and broken dolomite bedrock with some sand, gray, moist. | GW | | 0.3 | 40 | 25<br>20<br>50/0.2 |
| 26 | | Auger refusal at 25' 6". | | | | | |

Well: INJ-6L
TOC Height: 595.97



## Monitoring Well Construction Information

CONSTRUCTION
Boring Diameter : 11"
WELL RISER
Material : Schedule 40 PVC
Diameter : 1.5"
Joints : None
WELL SCREEN
Material : PVC- 0.020" slot
Diameter : 1.5"
Placement : 20.5' to 24.5'

SAND PACK
Type : #10-20 Sand

SEAL
Material : Bentonite
GROUT
Material : Cement-Bentonite
WELL HEAD
Protection : 6"-diameter SS Pro-casing
Well Cap : Threaded cap
Well Pad : 12" circular concrete pad

Notes:

Drilling Method
0'-6.5': Soft dig w/ Air knife

6.5'-25.5': 6.25" ID HSA (11" boring diameter)

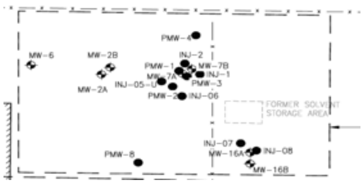
Blow counts were measured every 6 inches with 140 lb. hammer and 30" drop.

INJ-06AL was installed in the same auger boring as INJ-06AU.

**PARSONS**

Hyde Park Injection Well Borings
Town of Niagara, Niagara County, New York

Atlantic Richfield Company
October 2011



| | |
|---|---|
| Date Started | : 10/13/2011 |
| Date Completed | : 10/17/2011 |
| Drilling Method | : 6.25" ID HSA |
| Sampling Method | : Split-Spoon |
| Drilling Firm | : GeoLogic |
| Lead Driller | : Scott Breeds |
| Geologist | : Rob Piurek |
| Project Manager | : Mark Raybuck |
| Reviewed By | : Jim Schuetz |
| Regulatory Agency | : NYSDEC |

# BORING/WELL INJ-6U

(Page 1 of 1)

| | |
|---|---|
| PID Model | : MiniRae |
| PID Calibration | : 100 ppm Isobutylene |
| Location | : North of Pilot Test area |

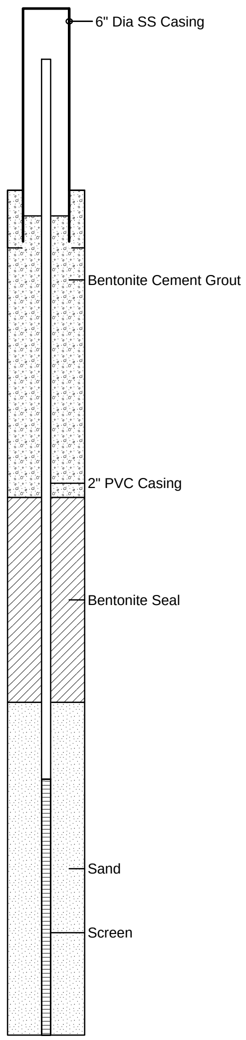
Water Levels

▼ During Drilling: 6.5'

▽ Static: 3.95' bgs on 10/28/11

| Depth in feet | Surf. Elev. | DESCRIPTION | USCS | GRAPHIC | PID-ppm | Recovery % | Blow Count |
|---|---|---|---|---|---|---|---|
| 0 | | See INJ-06AL for subsurface soil information. | | | | | |
| | | End of boring at 25' 6". | | | | | |

Well: INJ-6U
TOC Height: 595.96



## Monitoring Well Construction Information

CONSTRUCTION

| | |
|---|---|
| Boring Diameter | : 11" |

WELL RISER

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 1.5" |
| Joints | : None |

WELL SCREEN

| | |
|---|---|
| Material | : PVC- 0.020" slot |
| Diameter | : 1.5" |
| Placement | : 11.5' to 16.5' |

SAND PACK

| | |
|---|---|
| Type | : #10-20 Sand |

SEAL

| | |
|---|---|
| Material | : Bentonite |

GROUT

| | |
|---|---|
| Material | : Cement-Bentonite |

WELL HEAD

| | |
|---|---|
| Protection | : 6"-diameter SS Pro-casing |
| Well Cap | : Threaded cap |
| Well Pad | : 12" circular concrete pad |

Notes:

Drilling Method
0'-6.5': Soft dig w/ Air knife

6.5'-25.5': 6.25" ID HSA (11" boring diameter)

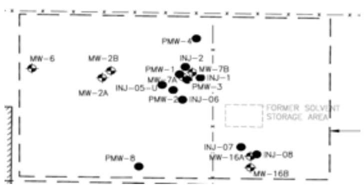
Blow counts were measured every 6 inches with 140 lb. hammer and 30" drop.

INJ-6U was installed in the same auger boring as INJ-6L.

**PARSONS**

Hyde Park Injection Well Borings
Town of Niagara, Niagara County, New York

Atlantic Richfield Company
October 2011



Date Started : 10/14/2011
Date Completed : 10/14/2011
Drilling Method : 6.25" ID HSA
Sampling Method : Split-Spoon
Drilling Firm : GeoLogic
Lead Driller : Scott Breeds
Geologist : Rob Piurek
Project Manager : Mark Raybuck
Reviewed By : Jim Schuetz
Regulatory Agency : NYSDEC

# BORING/WELL INJ-7

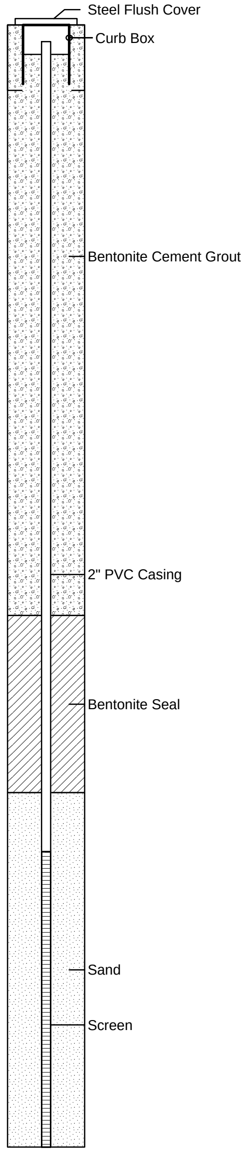
(Page 1 of 1)

PID Model : MiniRae
PID Calibration : 100 ppm Isobutylene
Location : Northeast of Pilot Test area

Water Levels
▼ During Drilling: not measured
▽ Static: 17.48' bgs on 10/28/11

| Depth in feet | Surf. Elev. | DESCRIPTION | USCS | GRAPHIC | PID-ppm | Recovery % | Blow Count |
|---|---|---|---|---|---|---|---|
| 0 | | Soft dig from 0' - 6.5'. No samples collected. | | | | | |
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | | | | | | | |
| 5 | | | | | | | |
| 6 | | 6.5'-18': CLAY, with some silt, trace fine gravel, brown, very soft, damp. | | | | | 1<br>1 |
| 7 | | | | | 0.0 | 10 | 1<br>1 |
| 8 | | | | | | | 2<br>3 |
| 9 | | | | | 0.2 | 20 | 3<br>3 |
| 10 | | | | | | | 2<br>3 |
| 11 | | | | | 0.2 | 30 | 3<br>4 |
| 12 | | | CL | | | | 5<br>7 |
| 13 | | | | | 0.1 | 60 | 9<br>9 |
| 14 | | | | | | | 5<br>7 |
| 15 | | | | | 0.9 | 15 | 5<br>4 |
| 16 | | | | | | | 4<br>5 |
| 17 | | | | | 1.2 | 15 | 5<br>5 |
| 18 | | 18'-19': SILT and CLAY, with trace gravel, brown, moist, hard. | ML | | 0.2 | 20 | 15<br>50/0.3 |
| 19 | | Auger refusal at 19'. | | | | | |
| 20 | | | | | | | |
| 21 | | | | | | | |
| 22 | | | | | | | |
| 23 | | | | | | | |
| 24 | | | | | | | |
| 25 | | | | | | | |
| 26 | | | | | | | |

Well: INJ-7
TOC Height: 592.76



## Monitoring Well Construction Information

CONSTRUCTION
Boring Diameter : 11"
WELL RISER
Material : Schedule 40 PVC
Diameter : 1.5"
Joints : None
WELL SCREEN :
Material : PVC- 0.020" slot
Diameter : 1.5"
Placement : 14' to 19'

SAND PACK
Type : #10-20 Sand

SEAL
Material : Bentonite
GROUT
Material : Cement-Bentonite
WELL HEAD
Protection : Flush-mount curb box
Well Cap : Threaded cap
Well Pad : 12" circular concrete pad

Notes:

Drilling Method
0'-6.5': Soft dig w/ Air knife

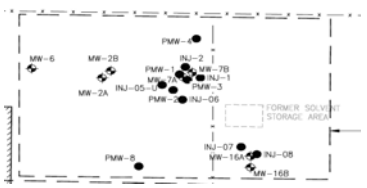
6.5'-19.0': 6.25" ID HSA (11" boring diameter)

Blow counts were measured every 6 inches with 140 lb. hammer and 30" drop.

PARSONS

Hyde Park Injection Well Borings
Town of Niagara, Niagara County, New York

Atlantic Richfield Company
October 2011



Date Started : 10/13/2011
Date Completed : 10/18/2011
Drilling Method : 6.25" ID HSA
Sampling Method : Split-Spoon
Drilling Firm : GeoLogic
Lead Driller : Scott Breeds
Geologist : Rob Piurek
Project Manager : Mark Raybuck
Reviewed By : Jim Schuetz
Regulatory Agency : NYSDEC

# BORING/WELL INJ-8

(Page 1 of 1)

PID Model : MiniRae
PID Calibration : 100 ppm Isobutylene
Location : Northeast of Pilot Test area

Water Levels
▼ During Drilling: not measured
▽ Static: 4.43' bgs on 10/28/11

| Depth in feet | Surf. Elev. | DESCRIPTION | USCS | GRAPHIC | PID-ppm | Recovery % | Blow Count |
|---|---|---|---|---|---|---|---|
| 0 | | Soft dig from 0' - 6.5'. No samples collected.<br>Auger down to 22'. No samples collected. See INJ-07 for soil stratigraphy. | | | | | |
| 1 | | | | | | | |
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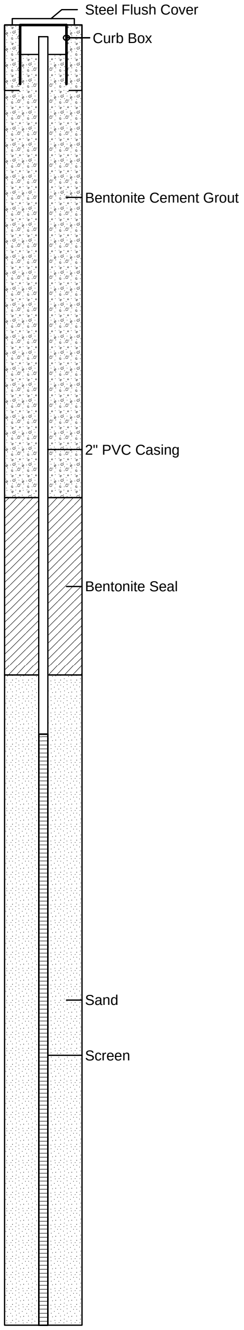
| 17 | | | | | | | |
| 18 | | | | | | | |
| 19 | | | | | | | |
| 20 | | | | | | | |
| 21 | | | | | | | |
| 22 | | End of boring at 22'. | | | | | |
| 23 | | | | | | | |
| 24 | | | | | | | |
| 25 | | | | | | | |
| 26 | | | | | | | |

Well: INJ-8
TOC Height: 592.98



## Monitoring Well Construction Information

CONSTRUCTION
Boring Diameter : 11"
WELL RISER
Material : Schedule 40 PVC
Diameter : 1.5"
Joints : None
WELL SCREEN
Material : PVC- 0.020" slot
Diameter : 1.5"
Placement : 12' to 22'

SAND PACK
Type : #10-20 Sand

SEAL
Material : Bentonite
GROUT
Material : Cement-Bentonite
WELL HEAD
Protection : Flush-mount curb box
Well Cap : Threaded cap
Well Pad : 12" circular concrete pad

Notes:

Drilling Method
0'-6.5': Soft dig w/ Air knife

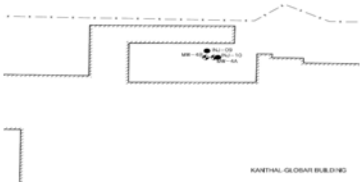
6.5'-19.0': 6.25" ID HSA (11" boring diameter)

Blow counts were measured every 6 inches with 140 lb. hammer and 30" drop.

**PARSONS**

Hyde Park Injection Well Borings
Town of Niagara, Niagara County, New York

Atlantic Richfield Company
October 2011



Date Started : 10/17/2011
Date Completed : 10/18/2011
Drilling Method : 6.25" ID HSA
Sampling Method : Split-Spoon
Drilling Firm : GeoLogic
Lead Driller : Scott Breeds
Geologist : Rob Piurek
Project Manager : Mark Raybuck
Reviewed By : Jim Schuetz
Regulatory Agency : NYSDEC

# BORING/WELL INJ-9

(Page 1 of 1)

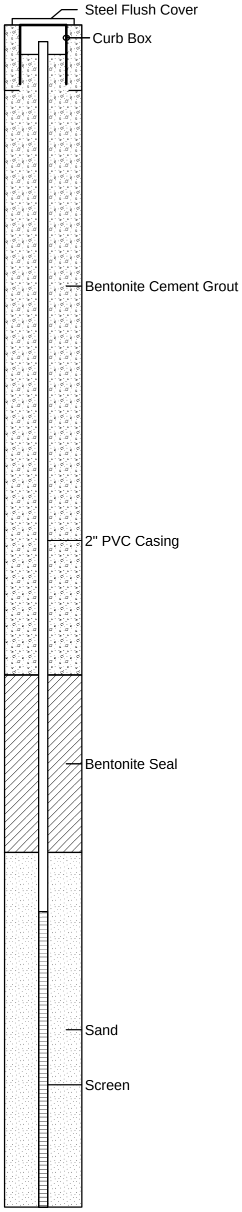
PID Model : MiniRae
PID Calibration : 100 ppm Isobutylene
Location : North of Kanthal-Globar Building

Water Levels
▼ During Drilling: not measured
▽ Static: 3.66' bgs on 10/28/11

| Depth in feet | Surf. Elev. | DESCRIPTION | USCS | GRAPHIC |
|---|---|---|---|---|
| 0 - 6.5 | | Soft dig from 0' - 6.5'. No samples collected. | | |
| 6.5 - 16 | | 6.5'-16': CLAY, with some silt, trace gravel from 7'-8', red-brown, damp, soft-stiff.<br>trace fine gravel at 11.5'<br>trace fine gravel at 13'<br>trace fine gravel at 15'-16' | CL | ▨ |
| 16 - 18 | | 16'-18': SILT and SAND, fine sand, some clay and gravel, red-brown, wet, loose, till. | ML | ▥ |
| 18 - 20 | | 18'-20': SAND, fine sand well graded, trace gravel and silt, gray, wet, medium dense. | SW | ░ |
| 20 | | End of boring at 20'. | | |

| Depth in feet | PID-ppm | Recovery % | Blow Count |
|---|---|---|---|
| 7 | 0.1 | 100 | wh<br>wh<br>3<br>4 |
| 9 | 0.3 | 100 | 6<br>6<br>9<br>6 |
| 11 | 0.5 | 100 | wh<br>wh<br>2<br>2 |
| 13 | 0.1 | 90 | 2<br>3<br>3<br>4 |
| 15 | 0.0 | 70 | 2<br>2<br>3<br>2 |
| 17 | 0.0 | 65 | 3<br>3<br>2<br>4 |
| 19 | 0.4 | 70 | 2<br>4<br>6<br>4 |

Well: INJ-9
TOC Height: 591.62



## Monitoring Well Construction Information

CONSTRUCTION
Boring Diameter : 11"
WELL RISER
Material : Schedule 40 PVC
Diameter : 1.5"
Joints : None
WELL SCREEN
Material : PVC- 0.020" slot
Diameter : 1.5"
Placement : 15' to 20'

SAND PACK
Type : #10-20 Sand

SEAL
Material : Bentonite
GROUT
Material : Cement-Bentonite
WELL HEAD
Protection : Flush-mount curb box
Well Cap : Threaded cap
Well Pad : 12" circular concrete pad

Notes:

Drilling Method
0'-6.5': Soft dig w/ Air knife

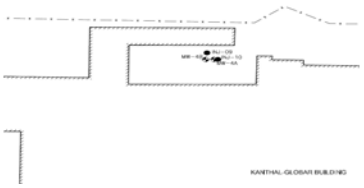
6.5'-20.0': 6.25" ID HSA (11" boring diameter)

Blow counts were measured every 6 inches with 140 lb. hammer and 30" drop.

**PARSONS**

Hyde Park Injection Well Borings
Town of Niagara, Niagara County, New York

Atlantic Richfield Company
October 2011



Date Started : 10/17/2011
Date Completed : 10/18/2011
Drilling Method : 6.25" ID HSA
Sampling Method : Split-Spoon
Drilling Firm : GeoLogic
Lead Driller : Scott Breeds
Geologist : Rob Piurek
Project Manager : Mark Raybuck
Reviewed By : Jim Schuetz
Regulatory Agency : NYSDEC

# BORING/WELL INJ-10

(Page 1 of 1)

PID Model : MiniRae
PID Calibration : 100 ppm Isobutylene
Location : North of Kanthal-Globar Building

Water Levels
▼ During Drilling: not measured
▽ Static: 3.53' bgs on 10/28/11

| Depth in feet | Surf. Elev. | DESCRIPTION | USCS | GRAPHIC | PID-ppm | Recovery % | Blow Count |
|---|---|---|---|---|---|---|---|
| 0 | | Soft dig from 0' - 6.5'. No samples collected.<br>Auger down to 22'. No samples collected. See INJ-09 for soil stratigraphy. | | | | | |
| 1 | | | | | | | |
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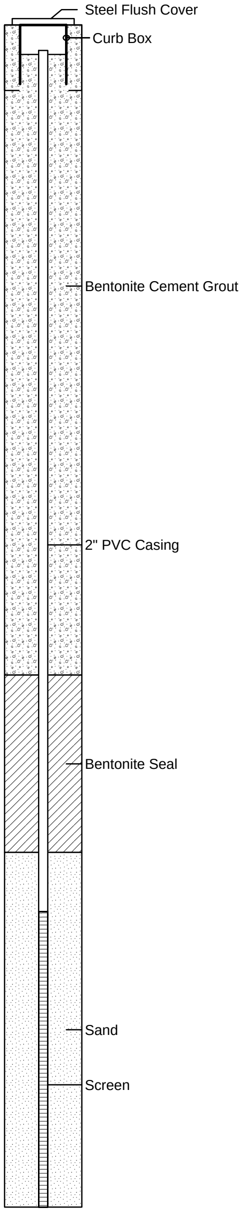
| 14 | | | | | | | |
| 15 | | | | | | | |
| 16 | | | | | | | |
| 17 | | | | | | | |
| 18 | | | | | | | |
| 19 | | | | | | | |
| 20 | | End of boring at 20'. | | | | | |
| 21 | | | | | | | |
| 22 | | | | | | | |
| 23 | | | | | | | |
| 24 | | | | | | | |
| 25 | | | | | | | |
| 26 | | | | | | | |

Well: INJ-10
TOC Height: 591.49



## Monitoring Well Construction Information

CONSTRUCTION
Boring Diameter : 11"
WELL RISER
Material : Schedule 40 PVC
Diameter : 1.5"
Joints : None
WELL SCREEN :
Material : PVC- 0.020" slot
Diameter : 1.5"
Placement : 15' to 20'

SAND PACK
Type : #10-20 Sand

SEAL
Material : Bentonite
GROUT
Material : Cement-Bentonite
WELL HEAD
Protection : Flush-mount curb box
Well Cap : Threaded cap
Well Pad : 12" circular concrete pad

Notes:

Drilling Method
0'-6.5': Soft dig w/ Air knife

6.5'-20.0': 6.25" ID HSA (11" boring diameter)

Blow counts were measured every 6 inches with 140 lb. hammer and 30" drop.

# PARSONS

Hyde Park Pilot Test
Niagara Falls, New York

Atlantic Richfield (Former Carborundum Plant)
July 2008

Date Started : 7/7/2008
Date Completed : 7/9/2008
Drilling Method : 4 1/4" ID H.S.A.
Sampling Method : Split-Spoon
Drilling Firm : NORTHCOAST DRLG
Lead Driller : Jason
Geologist : Scott Dillman
Project Manager : Mark Raybuck
Reviewed By : Scott Dillman
Regulatory Agency : NYSDEC

## BORING/WELL PMW-1

(Page 1 of 1)

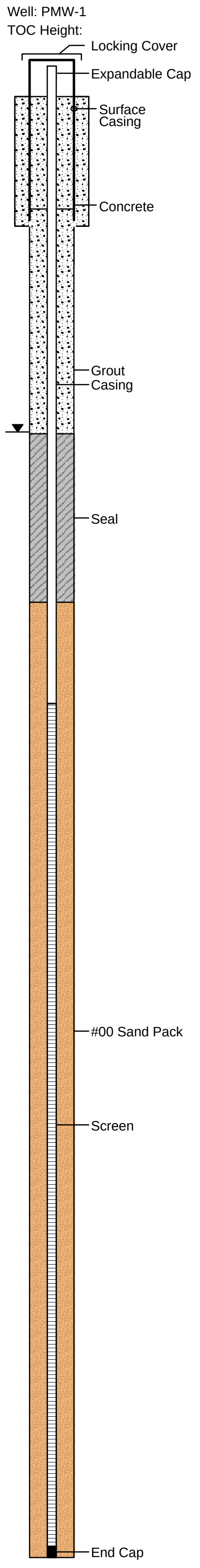
PID Model : MiniRay
PID Calibration : 100 ppm Isobutylene

Water Levels

▼ After Completion: 8.47 ft (TOC) 7/10/2008

▽

| Depth in feet | Surf. Elev. | DESCRIPTION | USCS | GRAPHIC | PID-ppm | Recovery Inches | Blow Count |
|---|---|---|---|---|---|---|---|
| 0 | | Reddish brown SILT and CLAY, trace gravel, water at 2.5 feet, no odor or stain. | | 🟥 | | | |
| 2.5 | | | ML | 🟥 | 0.0 | NA | NA |
| 5 | | Auger from 5 feet to 20 feet. No sampling. | | | | | |
| 6 | | | | | | NA | A-A-A-A |
| 8 | | | | | | NA | A-A-A-A |
| 10 | | | | | | NA | A-A-A-A |
| 12 | | | | | | NA | A-A-A-A |
| 14 | | | | | | NA | A-A-A-A |
| 16 | | | | | | NA | A-A-A-A |
| 18 | | | | | | NA | A-A-A-A |
| 19.5 | | | | | | NA | A-A |
| 20 | | Reddish brown SILT, some clay, trace coarse sand and gravel, dense, moist, no stain or odor. | | 🟥 | | | |
| 21 | | | ML | 🟥 | | | |
| 22 | | | | | 0.0 | 18 | 15-25-22-25 |
| 22 | | Auger to refusal at 26 feet. Dark gray dolomite at bottom of boring. | | | | | |
| 23 | | | | | | NA | A-A-A-A |
| 25 | | | | | | NA | A-A-A-A |
| 26 | | | | | | | |



### Monitoring Well Construction Information

CONSTRUCTION
Boring Diameter : ~8" O.D.
WELL RISER
Material : PVC Sch 40
Diameter : 2-Inch
Joints : Threaded
WELL SCREEN
Material : PVC Sch 40
Diameter : 2-Inch
Joints : Threaded
Opening : 0.01-inch slots
Length : 15-feet
SAND PACK
Material : #00 Silica Filter Sand
SEAL
Material : Bentonite Pellets
GROUT
Material : Bentonite Hole Plug
WELL HEAD
Protection : Locking Pro-Cover
Well Cap : Expandable Plug
Well Pad : 2'x2'x8"

# PARSONS

Hyde Park Pilot Test
Niagara Falls, New York

Atlantic Richfield (Former Carborundum Plant)
July 2008

| | |
|---|---|
| Date Started | : 7/7/2008 |
| Date Completed | : 7/9/2008 |
| Drilling Method | : 4 1/4" ID H.S.A. |
| Sampling Method | : Split-Spoon |
| Drilling Firm | : NORTHCOAST DRLG |
| Lead Driller | : Jason |
| Geologist | : Scott Dillman |
| Project Manager | : Mark Raybuck |
| Reviewed By | : Scott Dillman |
| Regulatory Agency | : NYSDEC |

## BORING/WELL PMW-2

(Page 1 of 1)

| | |
|---|---|
| PID Model | : MiniRay |
| PID Calibration | : 100 ppm Isobutylene |

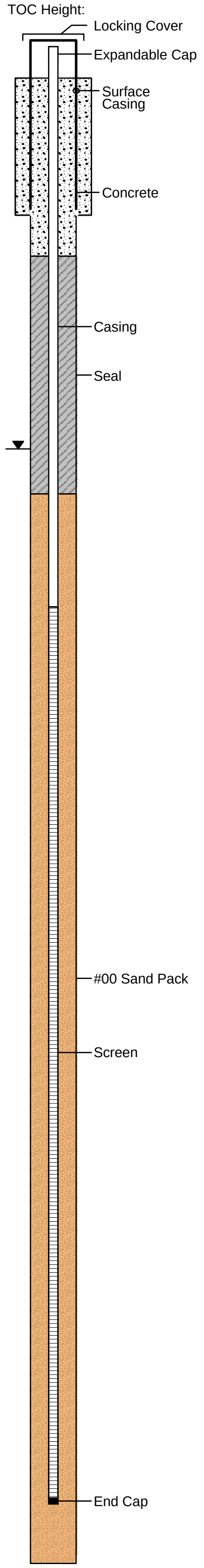
Water Levels

▼ After Completion: 8.74 ft (TOC) 7/10/2008

▽

| Depth in feet | Surf. Elev. | DESCRIPTION | USCS | GRAPHIC | PID-ppm | Recovery Inches | Blow Count |
|---|---|---|---|---|---|---|---|
| 0 | | Reddish brown SILT and CLAY, trace gravel, moist-wet, no odor or stain. | ML | 🟥 | 0.0 | NA | NA |
| 5 | | Auger from 5 feet to 15 feet. No sampling. | | | | | |
| 6 | | | | | | NA | A-A-A-A |
| 8 | | | | | | NA | A-A-A-A |
| 10 | | | | | | NA | A-A-A-A |
| 12 | | | | | | NA | A-A-A-A |
| 14 | | | | | | NA | A-A-A-A |
| 15 | | Reddish brown SILT and fine-medium SAND, trace gravel, wet, no stain or odor. | ML | 🟥 | 0.0 | 12 | WOH-3-17-16 |
| 17 | | Auger to 25 feet. No sampling. | | | | | |
| 18 | | | | | | NA | A-A-A-A |
| 20 | | | | | | NA | A-A-A-A |
| 22 | | | | | | NA | A-A-A-A |
| 24 | | | | | | NA | A-A-A-A |
| 25 | | Dark grey, SAND and GRAVEL, little silt, loose, wet, no odor, no stain. | | | 0.0 | NA | 50/5" |

Well: PMW-2
TOC Height:



## Monitoring Well Construction Information

CONSTRUCTION

| | |
|---|---|
| Boring Diameter | : ~8" O.D. |

WELL RISER

| | |
|---|---|
| Material | : PVC Sch 40 |
| Diameter | : 2-Inch |
| Joints | : Threaded |

WELL SCREEN

| | |
|---|---|
| Material | : PVC Sch 40 |
| Diameter | : 2-Inch |
| Joints | : Threaded |
| Opening | : 0.01-inch slots |
| Length | : 15-feet |

SAND PACK

| | |
|---|---|
| Material | : #00 Silica Filter Sand |

SEAL

| | |
|---|---|
| Material | : Bentonite Pellets |

GROUT

| | |
|---|---|
| Material | : None |

WELL HEAD

| | |
|---|---|
| Protection | : Locking Pro-Cover |
| Well Cap | : Expandable Plug |
| Well Pad | : 2'x2'x8" |

# PARSONS

Hyde Park Pilot Test
Niagara Falls, New York

Atlantic Richfield (Former Carborundum Plant)
July 2008

Date Started : 7/9/2008
Date Completed : 7/9/2008
Drilling Method : 4 1/4" ID H.S.A.
Sampling Method : Split-Spoon
Drilling Firm : NORTHCOAST DRLG
Lead Driller : Jason
Geologist : Scott Dillman
Project Manager : Mark Raybuck
Reviewed By : Scott Dillman
Regulatory Agency : NYSDEC

## BORING/WELL PMW-3

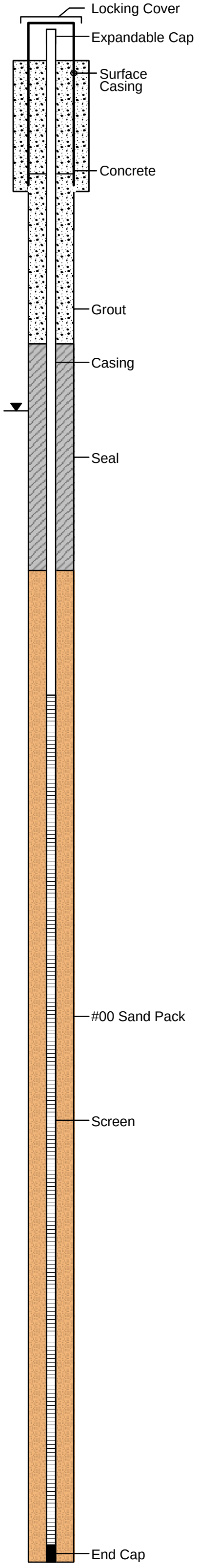
(Page 1 of 1)

PID Model : MiniRay
PID Calibration : 100 ppm Isobutylene

Water Levels
▼ After Completion: 8.68 ft (TOC) 7/10/2008
▽

| Depth in feet | Surf. Elev. | DESCRIPTION | USCS | GRAPHIC | PID-ppm | Recovery Inches | Blow Count |
|---|---|---|---|---|---|---|---|
| 0 | | Reddish brown SILT and CLAY, trace brick, moist, no odor or stain. | | 🟥 | | | |
| 2.5 | | | ML | 🟥 | 0.0 | NA | NA |
| 5 | | Auger from 5 feet to 15 feet. No sampling. | | | | | |
| 6 | | | | | | NA | A-A-A-A |
| 8 | | | | | | NA | A-A-A-A |
| 10 | | | | | | NA | A-A-A-A |
| 12 | | | | | | NA | A-A-A-A |
| 14 | | | | | | NA | A-A-A-A |
| 15 | | Reddish fine-medium SAND, trave gravel, loose, wet (may be fall-in/wash from above? Reddish brown SILT, little fine sand, trace gravel. | | 🟥 | | | |
| 16 | | | ML | 🟥 | 0.0 | 14 | 1-7-6-13 |
| 17 | | Augered from 17 to 25 feet. No sampling. | | | | | |
| 18 | | | | | | NA | A-A-A-A |
| 20 | | | | | | NA | A-A-A-A |
| 22 | | | | | | NA | A-A-A-A |
| 24 | | | | | | NA | A-A-A-A |
| 25 | | Reddish brown SILT, some fine-medium sand. Dark gray dolomite gravel at bottom of boring. Auger refusal at 26.5 feet. | ML | 🟥 | 0.0 | NA | 20-50/2" |

Well: PMW-3
TOC Height:



## Monitoring Well Construction Information

| | |
|---|---|
| CONSTRUCTION | |
| Boring Diameter | : ~8" O.D. |
| WELL RISER | |
| Material | : PVC Sch 40 |
| Diameter | : 2-Inch |
| Joints | : Threaded |
| WELL SCREEN | |
| Material | : PVC Sch 40 |
| Diameter | : 2-Inch |
| Joints | : Threaded |
| Opening | : 0.01-inch slots |
| Length | : 15-feet |
| SAND PACK | |
| Material | : #00 Silica Filter Sand |
| SEAL | |
| Material | : Bentonite Pellets |
| GROUT | |
| Material | : Bentonite Hole Plug |
| WELL HEAD | |
| Protection | : Locking Pro-Cover |
| Well Cap | : Expandable Plug |
| Well Pad | : 2'x2'x8" |

# PARSONS

Hyde Park Pilot Test
Niagara Falls, New York

Atlantic Richfield (Former Carborundum Plant)
July 2008

Date Started : 7/1/2008
Date Completed : 7/2/2008
Drilling Method : 4 1/4" ID H.S.A.
Sampling Method : Split-Spoon
Drilling Firm : NORTHCOAST DRLG
Lead Driller : Jason
Geologist : Scott Dillman
Project Manager : Mark Raybuck
Reviewed By : Scott Dillman
Regulatory Agency : NYSDEC

## BORING/WELL PMW-4

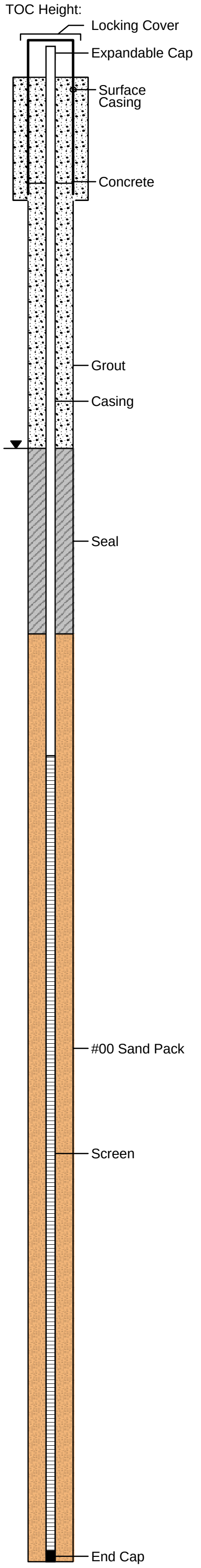
(Page 1 of 1)

PID Model : MiniRay
PID Calibration : 100 ppm Isobutylene

Water Levels
▼ After Completion: 9.50 ft (TOC) 7/10/2008
▽

| Depth in feet | Surf. Elev. | DESCRIPTION | USCS | GRAPHIC | PID-ppm | Recovery Inches | Blow Count |
|---|---|---|---|---|---|---|---|
| 0 | | Reddish brown SILT and CLAY, moist, no odor or stain. Hit solid obstruction at 4.5 feet in original location. Moved location about 3 feet to west. | ML | | 0.0 | NA | NA |
| 5 | | Reddish brown SILT, some clay, stiff, damp-moist, no odor or stain. | ML | | 0.0 | 18 | 6-7-10-10 |
| | | | | | 0.0 | 18 | 3-5-7-7 |
| 9 | | Reddish-brown Silt as above changing to sticky soft CLAY, little silt, moist-wet, no odor or stain, . | ML | | 0.0 | 14 | 1-2-1-2 |
| 11 | | Reddish brown CLAY, little silt, soft, sticky, some roll, wet, no odor or stain. | CL | | 0.0 | 16 | 1-2-1-1 |
| 13 | | As above. Silt content increased with depth to some. No odor or stain. | CL | | 0.0 | 20 | WOH-1-1-1 |
| 15 | | Reddish brown SILT, some clay, fine-medium sand lenses up to 1 inch in lower sample with trace gravel, wet. | ML-CL | | 0.0 | 12 | 1-2-3-5 |
| 17 | | Reddish brown fine-medium SAND, little silt, trace clay and gravel. Compaction increased with depth. Reddish brown, SAND and SILT, little coarse sand and gravel, Till, slight odor. | SM | | 0.0 | 14 | WOH-8-18-32 |
| 19 | | Dark gray dolomite gravel/cobble. Poor recovery. | GM | | 0.0 | 3 | 50/5" |
| 21 | | Reddish brown SILT, some sand, little gravel, Till, moist, no odor or stain. | ML | | 0.0 | 5 | 10-42-50/3" |
| 23 | | Reddish brown SILT, some sand, little coarse sand-gravel, dense, Till, moist, no odor or stain. Some loose silty sand, caved material from above on top of sample. | ML | | 0.0 | 14 | 20-13-15-30 |
| 25 | | Dense Till as above. | ML | | 0.0 | 12 | 10-32-50/5" |
| 27 | | Dark gray dolomite gravel. | GM | | 0.0 | 0.5 | 50/5" |
| 28 | | | | | | | |

Well: PMW-4
TOC Height:



## Monitoring Well Construction Information

CONSTRUCTION
Boring Diameter : ~8" O.D.
WELL RISER
Material : PVC Sch 40
Diameter : 2-Inch
Joints : Threaded
WELL SCREEN
Material : PVC Sch 40
Diameter : 2-Inch
Joints : Threaded
Opening : 0.01-inch slots
Length : 15-feet
SAND PACK
Material : #00 Silica Filter Sand
SEAL
Material : Bentonite Pellets
GROUT
Material : Bentonite Hole Plug
WELL HEAD
Protection : Locking Pro-Cover
Well Cap : Expandable Plug
Well Pad : 2'x2'x8"

**PARSONS**

Hyde Park Pilot Test
Niagara Falls, New York

Atlantic Richfield (Former Carborundum Plant)
September 2008

Date Started : 9/22/2009
Date Completed : 10/2/2009
Drilling Method : 6 1/4" ID HSA/HQ Coring
Sampling Method : Split-Spoon/Core
Drilling Firm : NORTHCOAST DRLG
Lead Driller :
Geologist : B. Adams
Project Manager : Mark Raybuck
Reviewed By : B. Adams
Regulatory Agency : NYSDEC

# BORING/WELL PMW-5

(Page 1 of 1)

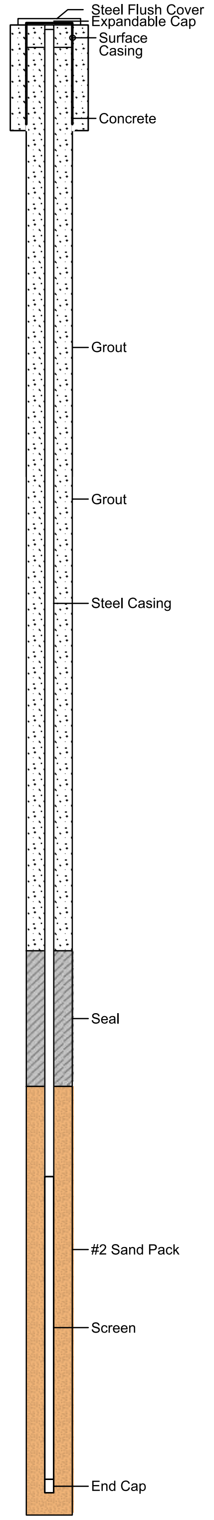
PID Model : MiniRay
PID Calibration : 100 ppm Isobutylene

Water Levels
▼ After Completion: ____ ft (TOC) insert date here
▽

Depth in feet: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34

| Surf. Elev. | DESCRIPTION | USCS | GRAPHIC | PID-ppm | Recovery Inches | Blow Count |
|---|---|---|---|---|---|---|
| | Concrete. | AR | ▨ | | | |
| | Black SAND and GRAVEL subbase fill. | CL | ▨ | 0.0 | NA | HAND |
| | Brown CLAY, stiff, dry, no staining or odors. | CL | ▨ | 0.0 | NA | HAND |
| | Brown CLAY, trace silt, soft to firm, damp, no staining or odors. | CL | ▨ | 0.0 | NA | HAND |
| | Drilled to 11', no samples. | | | | | |
| | Reddish brown SILT, firm to stiff, trace fine sand, trace fine to medium dolomite gravel. | ML | ▨ | 0.0 | 14 | 3-7-8-12 |
| | Drilled to 18', no samples. | | | | | |
| | Dark grey dolomite rock cobble layer. | GM | ▨ | | | |
| | | | | | | |
| | Reddish brown fine-grained SAND, medium dense, wet, no staining or odors. | SM | ▨ | NA | NA | 8-8-13-14 |
| | Drilled to 23.5', no samples. 6 1/4" I.D. HSA | | | | | |
| | Auger refusal at 23.5 feet. Drill socket into bedrock with rollerbit from 23.5 to 25.5 feet. | DO | ▨ | | | ROLLER |
| | RQD = 50%. DOLOMITE bedrock, hard, some fractures. | DO | ▨ | 0.0 | 43.7" of 48" | HQ Core |
| | RQD = 0%. Heavily fractured DOLOMITE bedrock. | DO | ▨ | NA | 48" of 48" | HQ Core |
| | CLAY layer. | CL | | | | |
| | Lost 6" of recovery in borehole. | DO | ▨ | | | |

Well: PMW-5
TOC Height:



## Monitoring Well Construction Information

CONSTRUCTION
Boring Diameter : ~10" O.D. upper, ~6" lower

WELL RISER
Material : Stainless Steel
Diameter : 4-Inch
Joints : Threaded

WELL SCREEN
Material : Stainless Steel
Diameter : 4-Inch
Joints : Threaded
Opening : 0.02-inch slots
Length : 9-feet

SAND PACK
Material : #2 Silica Filter Sand

SEAL
Material : Bentonite Pellets

GROUT
Material : Cement-Bentonite

WELL HEAD
Protection : Bolt Down Flush Cover
Well Cap : Expandable Plug
Well Pad : 2'x2'x8"

PARSONS

Hyde Park Pilot Test
Niagara Falls, New York

Atlantic Richfield (Former Carborundum Plant)
September 2008

Date Started : 9/17/2009
Date Completed : 10/2/2009
Drilling Method : 6 1/4" ID HSA/HQ Coring
Sampling Method : Split-Spoon/Core
Drilling Firm : NORTHCOAST DRLG
Lead Driller :
Geologist : B. Adams
Project Manager : Mark Raybuck
Reviewed By : B. Adams
Regulatory Agency : NYSDEC

# BORING/WELL PMW-6

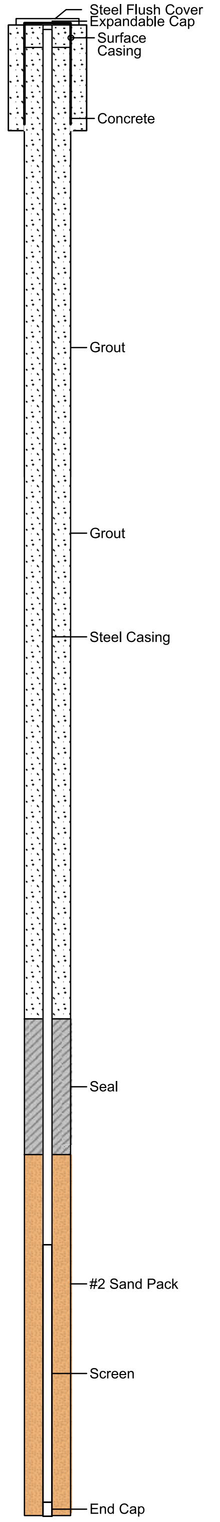
(Page 1 of 1)

PID Model : MiniRay
PID Calibration : 100 ppm Isobutylene

Water Levels
▼ After Completion: ____ ft (TOC) insert date here
▽

| Depth in feet | Surf. Elev. | DESCRIPTION | USCS | GRAPHIC | PID-ppm | Recovery Inches | Blow Count |
|---|---|---|---|---|---|---|---|
| 0 | | Concrete surface. | AR | | | | |
| 1 | | Black stained SILT and CLAY, trace sand and gravel, subbase. | | | 0.0 | NA | HAND |
| 2 | | | ML-CL | | | | |
| 3 | | | | | 0.0 | NA | HAND |
| 4 | | Reddish brown SILT and CLAY, damp, no stain or odors. | | | | | |
| 5 | | | ML-CL | | 0.0 | NA | HAND |
| 6 | | Reddish brown SILT, some clay, damp, firm, no staining or odors. | | | | | |
| 7 | | | ML | | 0.0 | 13 | 6-4-8 |
| 8 | | Reddish brown SILT, some clay, damp to moist, soft, no staining or odors. | | | | | |
| 9 | | | ML | | 0.0 | 24 | 2-2-2-2 |
| 10 | | Reddish brown SILT and CLAY, trace fine sand, trace dolostone gravel cobbles, soft, wet. | | | | | |
| 11 | | | ML-CL | | 0.0 | 8 | 4-5-7-7 |
| 12 | | Dark grey, SAND, with dark grey, fine dolostone cobbles, medium dense, no staining or odors. | | | | | |
| 13 | | | SM | | 0.0 | 5 | 12-11-13-7 |
| 14 | | No Recovery, pushed a rock. | | | | | |
| 15 | | | | | 0.0 | 0 | 13-11-15-18 |
| 16 | | | GM | | | | |
| 17 | | | | | 0.0 | 0 | 11-12-10-20 |
| 18 | | Reddish brown SILT, stiff to very stiff, damp, no staining or odors. | | | | | |
| 19 | | | ML | | 0.0 | 18 | 11-18-20-20 |
| 20 | | Reddish brown SILT, stiff, moist to wet, no staining or odors. | | | | | |
| 21 | | | ML | | NA | 13 | 10-12-10-16 |
| 22 | | Same as above (wet). | ML | | NA | NA | 1-8-9-50/1" |
| 23 | | Dolomite bedrock. Auger refusal at 23 feet. Drill socket into bedrock with rollerbit from 23 to 27 feet. using 3 7/8" rotary bit. | | | | | |
| 24 | | | | | | | |
| 25 | | | DO | | NA | NA | ROLLER |
| 26 | | | | | | | |
| 27 | | RQD = 42%. Hard grey dolomite with fractures. | | | | | |
| 28 | | | DO | | NA | 26" of 36" | HQ Core |
| 29 | | | | | | | |
| 30 | | RQD = 50%. Hard grey dolomite. | | | | | |
| 31 | | | DO | | NA | 34" of 36" | HQ Core |
| 32 | | CLAY layer. | CL | | | | |
| 33 | | Lost 6" of recovery in borehole. | DO | | | | |
| 34 | | | | | | | |

Well: PMW-6
TOC Height:



## Monitoring Well Construction Information

CONSTRUCTION
Boring Diameter : ~10" O.D. upper, ~6" lower
WELL RISER
Material : Stainless Steel
Diameter : 4-Inch
Joints : Threaded
WELL SCREEN
Material : Stainless Steel
Diameter : 4-Inch
Joints : Threaded
Opening : 0.02-inch slots
Length : 6-feet
SAND PACK
Material : #2 Silica Filter Sand
SEAL
Material : Bentonite Pellets
GROUT
Material : Cement-Bentonite
WELL HEAD
Protection : Bolt Down Flush Cover
Well Cap : Expandable Plug
Well Pad : 2'x2'x8"

Hyde Park Pilot Test
Niagara Falls, New York

Atlantic Richfield (Former Carborundum Plant)
September 2008

| | |
|---|---|
| Date Started | : 9/25/2009 |
| Date Completed | : 10/2/2009 |
| Drilling Method | : 6 1/4" ID HSA/HQ Coring |
| Sampling Method | : Split-Spoon/Core |
| Drilling Firm | : NORTHCOAST DRLG |
| Lead Driller | : |
| Geologist | : B. Adams |
| Project Manager | : Mark Raybuck |
| Reviewed By | : B. Adams |
| Regulatory Agency | : NYSDEC |

# BORING/WELL PMW-7

(Page 1 of 1)

| | |
|---|---|
| PID Model | : MiniRay |
| PID Calibration | : 100 ppm Isobutylene |

Water Levels

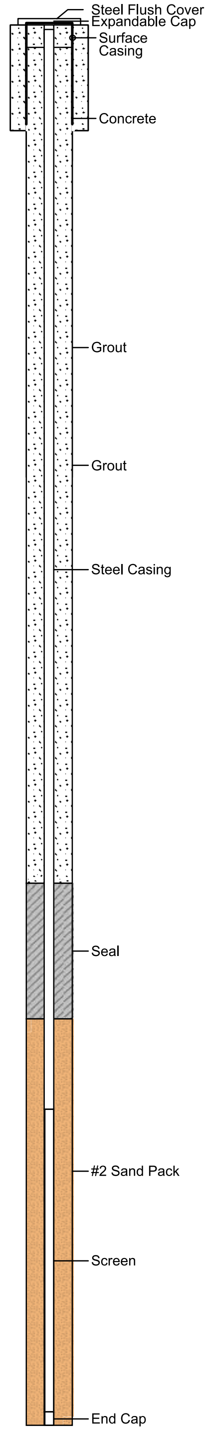
▼ After Completion: ____ ft (TOC) insert date here

▽

| Depth in feet | Surf. Elev. | DESCRIPTION | USCS | GRAPHIC | PID-ppm | Recovery Inches | Blow Count |
|---|---|---|---|---|---|---|---|
| 0 | | Blacktop asphalt. | AR | ■ | | | |
| | | SAND and GRAVEL slag fill material, subbase. | GP | ▒ | 0.0 | NA | HAND |
| | | Dry, brown CLAY, trace silt. | CL | ▨ | 0.0 | NA | HAND |
| 4 | | Dry, brown and grey CLAY, trace silt. | ML | ▥ | 0.0 | NA | HAND |
| | | Drilled to 11', 6 1/4 I.D. HSA. No samples. | | | | | |
| 11 | | Brown SILT, some fine sand, some fine to medium dolomite gravel, moist to wet, soft | GM | ▦ | NA | 14 | 1-1-1-2 |
| 13 | | Drilled to 18', 61/4" I.D. HSA. No samples. | | | | | |
| 18 | | No recovery. | | | NA | 0 | 40-51/5" |
| 20 | | Drilled to refusal, 6 1/4" I.D. HSA. No samples (22.5'). | | | | | |
| | | Auger refusal at 22.5 feet. 6 1/4" I.D. HSA. Drill socket into bedrock with roller bit from 22.5 to 24.5 feet. | DO | ▨ | NA | NA | ROLLER |
| | | RQD = 75%. Hard, grey dolomite bedrock, few fractures. | DO | ▨ | 0.0 | 47" of 54" | HQ Core |
| | | | DO | ▨ | | | |
| | | SAND layer. | SM | ▥ | | | |
| | | RQD = 17%. | DO | ▨ | NA | 48" of 48" | HQ Core |
| | | 12" fell out back into boring. | DO | ▨ | | | |

Depth in feet: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34

Well: PMW-7
TOC Height:



## Monitoring Well Construction Information

| | |
|---|---|
| CONSTRUCTION | |
| Boring Diameter | : ~10" O.D. upper, ~6" lower |
| WELL RISER | |
| Material | : Stainless Steel |
| Diameter | : 4-Inch |
| Joints | : Threaded |
| WELL SCREEN | |
| Material | : Stainless Steel |
| Diameter | : 4-Inch |
| Joints | : Threaded |
| Opening | : 0.02-inch slots |
| Length | : 7-feet |
| SAND PACK | |
| Material | : #2 Silica Filter Sand |
| SEAL | |
| Material | : Bentonite Pellets |
| GROUT | |
| Material | : Cement-Bentonite |
| WELL HEAD | |
| Protection | : Bolt Down Flush Cover |
| Well Cap | : Expandable Plug |
| Well Pad | : 2'x2'x8" |

# PARSONS

Hyde Park Pilot Test
Niagara Falls, New York

Atlantic Richfield (Former Carborundum Plant)
July 2008

Date Started : 7/1/2008
Date Completed : 7/11/2008
Drilling Method : 4 1/4" ID HSA/HQ Coring
Sampling Method : Split-Spoon/Core
Drilling Firm : NORTHCOAST DRLG
Lead Driller : Jason
Geologist : Scott Dillman
Project Manager : Mark Raybuck
Reviewed By : Scott Dillman
Regulatory Agency : NYSDEC

## BORING/WELL PMW-8

(Page 1 of 1)

PID Model : MiniRay
PID Calibration : 100 ppm Isobutylene

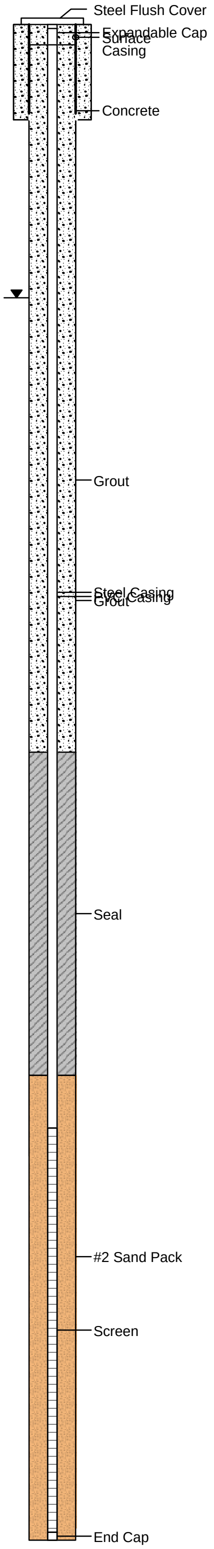
Water Levels
▼ After Completion: 6.46 ft (TOC) 7/10/2008
▽

Depth in feet: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38

Surf. Elev.

| DESCRIPTION | USCS | PID-ppm | Recovery Inches | Blow Count |
|---|---|---|---|---|
| Asphalt 0-6 inches. Reddish brown SILT, little clay, damp, moist at 4.5 feet, no odor or stain. | ML | 0.0 | NA | HAND |
| Reddish brown SILT, little-some clay, stiff, damp-moist, stiff, no odor or stain. | ML | 0.0 | 18 | 3-4-3-5 |
| Reddish-brown Silt, some clay, damp, moist at bottom, stiff, no odor or stain . | ML | 0.0 | 18 | 3-4-6-7 |
| Reddish brown CLAY, some silt, plastic, will roll, moist-wet, no odor or stain. | CL | 0.0 | 14 | 3-1-1-3 |
| As above grading to SILT, little-some clay, little fine-medium sand, trace coarse sand. Sand in lenses. Till. Wet, no odor or stain. | CL-SL | 0.0 | 16 | 1-2-1-6 |
| Reddish brown SILT, some fine-medium sand, trace coarse sand and gravel, trace clay, wet grading to moist, no odor or stain. | ML | 0.0<br>0.0 | 20<br>12 | 3-4-5-10<br>10-12-18-19 |
| Reddish brown SILT, little clay, little fine-medium sand, trace little-coarse sand and gravel, dense-compacted, Till damp. | ML | 0.0 | 14 | 11-22-26-33 |
| Reddish brown SAND and SILT, little gravel, trace clay, dense, moist, no odor or stain. | SM-ML | 0.0 | 3 | 10-13-23-50/5" |
| Till as above. | ML | 0.0 | 5 | 10-28-50/5" |
| Cobble in shoe. Poor recovery. | ML | 0.0 | 14 | 14-39-50/5" |
| Reddish brown SILT and SAND, little coarse sand and gravel, trace cobble, dense, moist-wet, no odor or stain. Auger refusal at 26.5 feet. | ML | 0.0 | 12 | 13-29-50/2" |
| Drill socket into bedrock with rollerbit from 26.5 to 28.5 feet. | Dolo | 0.0 | 0.5 | ROLLER |
| HQ Core. Drillers noted multiple fractures during drilling based on water loss and drilling properties. Gray-dark gray dolomite, healed fractures and vugs, gypsum crystals in vugs, some open vugs. Open fractures at 12-14 inches, 23-24 inches, and 33-35 inches and vugs 39-41 inches from top of core. Bottom 6 inches of core not recovered. RQD = 33% | Dolo | NA | 41" of 60" | HQ Core |
| HQ core. Gray-dark gray dolomite. Upper 26 inches had scattered fractures and vugs. Next 32 inches had massive dolomite. One vug with gypsum crystal fill. Bottom 2 inches had bedding plane fractures. RQD = 53%. Boring terminated at 37.5 feet. | Dolo | NA | 60" of 48" | HQ Core |

Well: PMW-8
TOC Height:



## Monitoring Well Construction Information

CONSTRUCTION
Boring Diameter : ~8" O.D. upper, ~4" lower
WELL RISER
Material : PVC Sch 40
Diameter : 2-Inch
Joints : Threaded
WELL SCREEN
Material : PVC Sch 40
Diameter : 2-Inch
Joints : Threaded
Opening : 0.01-inch slots
Length : 10-feet
SAND PACK
Material : #2 Silica Filter Sand
SEAL
Material : Bentonite Pellets
GROUT
Material : Cement-Bentonite
WELL HEAD
Protection : Bolt Down Flush Cover
Well Cap : Expandable Plug
Well Pad : 2'x2'x8"
STEEL CASING
Diameter : 4-inch
Placment : Near surface to 28 ft.

Hyde Park Pilot Test
Niagara Falls, New York

Atlantic Richfield (Former Carborundum Plant)
September 2008

Date Started : 9/18/2009
Date Completed : 10/2/2009
Drilling Method : 6 1/4" ID HSA/HQ Coring
Sampling Method : Split-Spoon/Core
Drilling Firm : NORTHCOAST DRLG
Lead Driller :
Geologist : B. Adams
Project Manager : Mark Raybuck
Reviewed By : B. Adams
Regulatory Agency : NYSDEC

# BORING/WELL PMW-9

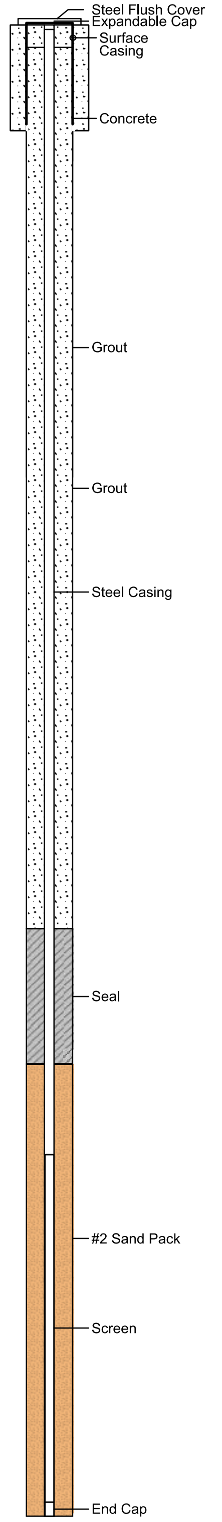
(Page 1 of 1)

PID Model : MiniRay
PID Calibration : 100 ppm Isobutylene

Water Levels
▼ After Completion: ____ ft (TOC) insert date here
▽

| Depth in feet | Surf. Elev. | DESCRIPTION | USCS | GRAPHIC | PID-ppm | Recovery Inches | Blow Count |
|---|---|---|---|---|---|---|---|
| 0<br>1<br>2<br>3<br>4 | | Limestone gravel FILL. | AR | | 0.0<br>0.0 | NA<br>NA | HAND<br>HAND |
| 5<br>6 | | Dry, brown and black CLAY, some silt, firm. | CL | | 0.0 | NA | HAND |
| 7<br>8 | | Reddish brown SILT, soft to firm, damp, no staining or odors. | ML | | 0.0 | 16 | 3-5-7 |
| 9 | | Same as above, firm, damp, trace rounded gravel. | ML | | 0.0 | 19 | 3-6-8-6 |
| 10<br>11 | | Reddish-brown SILT, trace dolomite gravel, trace fine sand, soft, moist, no staining or odors. | ML | | 0.0 | 16 | 1-2-3-3 |
| 12<br>13 | | Brown CLAY, stiff, some fine to medium dolomite gravel, no staining or odors. | CL | | 0.0 | 7 | 8-10-13-14 |
| 14<br>15 | | Poor recovery, dark grey SAND, some dolomite gravel. | SW | | 0.0 | 2 | 25-44-50/4" |
| 16<br>17 | | Poor recovery, same as above (wet). | SW | | 0.0 | 1 | 47-35-32-45 |
| 18<br>19 | | Reddish-brown, fine-graded, SAND and SILT, wet, no staining or odors. | SW-ML | | 0.0 | 15 | WOH-3-5-9 |
| 20<br>21 | | Dark grey, dolomite cobbles, trace sand, wet. | GP | | 0.0 | 6 | 45-50/5" |
| 22 | | Dark grey DOLOMITE bedrock. | DO | | NA | NA | 50/4" |
| 23<br>24 | | Auger refusal at 23 feet. Drill socket into bedrock with rollerbit from 23 to 25 feet. | DO | | 0.0 | 0.5 | ROLLER |
| 25<br>26<br>27<br>28 | | Advanced first core run (25'-29') using 3 5/8" core. RQD = 75%. Hard DOLOMITE bedrock. | DO | | 0.0 | 48" of 48" | HQ Core |
| 29 | | RQD = 38% | DO | | | | |
| 30 | | CLAY layer. | CL | | | | |
| 31<br>32<br>33 | | Hard DOLOMITE bedrock. Run #2 - 29'-33' | DO | | NA | 48" of 48" | HQ Core |
| 34 | | | | | | | |

Well: PMW-9
TOC Height:



## Monitoring Well Construction Information

CONSTRUCTION
Boring Diameter : ~10" O.D. upper, ~6" lower
WELL RISER
Material : Stainless Steel
Diameter : 4-Inch
Joints : Threaded
WELL SCREEN
Material : Stainless Steel
Diameter : 4-Inch
Joints : Threaded
Opening : 0.01-inch slots
Length : 8-feet
SAND PACK
Material : #2 Silica Filter Sand
SEAL
Material : Bentonite Pellets
GROUT
Material : Cement-Bentonite
WELL HEAD
Protection : Bolt Down Flush Cover
Well Cap : Expandable Plug
Well Pad : 2'x2'x8"

# APPENDIX D

# HISTORICAL TIMELINE AND SITE SUMMARY

# HISTORICAL TIMELINE AND SITE SUMMARY

*Former Carborundum Company, Hyde Park Facility, Niagara New York*
*NYSDEC Site No. 932036*

## PRELIMINARY SITE ASSESSMENTS 1985-1993

1985 – The Carborundum Company retained Earth Dimensions Inc. (East Aurora, New York) to complete a Preliminary Site Assessment, which included soil sampling and monitoring well installation to characterize soil and groundwater contamination at the Site (Earth Dimensions Inc., 1985.)

- 1987 – In 1987, the United States Environmental Protection Agency completed a preliminary assessment and referred the Site to the State of New York. (NUS Corporation Superfund Division, December 1987).

- 1990 – NYSDEC contracted URS Consultants Inc. to perform a data records search for preliminary assessment and hazard ranking of the Site. A site visit including field measurements for air quality and radioactivity was performed (URS Consultants, Inc., December 1990).

- June 9, 1992 The Carborundum Company (BP America) and the NYSDEC executed Preliminary Site Assessment Consent Order on June 9, 1992.

- 1992 –INTERA was retained by the Carborundum Company and performed a preliminary assessment of the risk to human health and the environment. This assessment included soil sampling (6 locations), coupled overburden/bedrock monitoring well installation (MW-1A/B to MW-5A/B), and groundwater sampling. Sampling was conducted for VOCS, SVOCS, pesticides, dioxin, PCBs, Metals, and cyanide. TCE, 1,2-DCE, and vinyl chloride were the major organic contaminants in overburden and bedrock groundwater. VOCs were detected in some soil sampling locations. PAHs were detected in the area of the former railroad spur. The recommendations included further soil sampling in the material storage area to delineate areas of contamination (INTERA, May 1993).

- 1993 –INTERA performed follow-up borehole drilling and soil sampling to further delineate the extent of soil contamination at the Site. No report was prepared.

## ORDER on CONSENT – September 7, 1995

- The Carborundum Corporation (BP America) and the NYSDEC executed an Order on Consent to undertake a Remedial Investigation to assess nature and extent of contamination at the Hyde Park Facility on September 7, 1995.

- February 1996 – BP prepared a Citizen Participation Plan, for the Carborundum Globar Site Remedial Investigation/Feasibility Study.

## REMEDIAL INVESTIGATIONS 1995-1997

- INTERA (a DE&S company), conducted a Remedial Investigation at the site starting in August 1995. The investigation included collecting soil samples from test pits and boreholes, installing shallow and deep monitoring wells (MW-6 to MW-14A/B), sampling groundwater wells, a fish and wildlife survey, and a risk assessment (INTERA, Inc., August 1997). Groundwater from 13 of the 14 bedrock wells and 6 of 11 overburden wells sampled during the 1996 RI contained VOCs above Ambient Water Quality Standards (TOGS 1.1.1). Four areas at the Site were found to contain VOCs (mainly chlorinated VOCs), PAHs, acetone, and/or xylenes in soil samples above NYSDEC Recommended Soil Cleanup Objectives (SCGs).

  DE&S (formerly INTERA) conducted a Phase II Remedial Investigation at the Site. The purpose of the Phase II investigation was to determine groundwater quality across the Site and in bedrock downgradient of the facility, determine the soil quality on the eastern property boundary, and incorporate the new data into the existing risk assessment for the Site. The Phase II investigation included surface soil sampling, subsurface soil sampling from boreholes and one new downgradient bedrock monitoring well (MW-15), and groundwater sampling (DE&S, August 1998). No VOCs were found in the surface soil samples. Subsurface samples from the eastern fence line detected VOCs at concentrations that exceeded NYSDEC soil cleanup objectives and the extent of contamination was adjusted to include a larger area. The report recommended an interim remedial measure (IRM) be undertaken to remove contaminated soil from the property.

## OU1 IRM INVESTIGATIONS, FEASIBILITY STUDY, & ROD

- January 1999 – NYSDEC issued an Interim Remedial Measure Decision Document (NYSDEC, 1999).

- 1998/1999 – DE&S completed an IRM for on-site soil removal from five areas (refined from four in the RI) where COCs exceeded the TAGM 4046 soil cleanup objectives (NYSDEC 1994). Completed tasks/objectives included: a borehole investigation in September 1998, which refined the lateral and vertical extent of soil contamination through boreholes (39) and a soil sampling program within the fenced area of the facility; excavation and testing via a test-pit program (67 pits - approximately one per 800 $ft^2$) for pre-characterization of soils for disposal; excavation of on-site contaminated soils and disposal of soils at appropriate facilities; verification sampling; and backfill of excavated areas with clean backfill. On-site storm sewers and associated pipe bedding materials that provided site drainage and which had low-level VOCs detected during the RI were also excavated. Approximately 35,606 tons of contaminated soil were removed from the Site. Excavation was conducted up to the property boundaries, with some soils containing VOCs above the SCGs left along the easter property boundary (DE&S, 1999a, b, c, d). DE&S also conducted post-IRM groundwater sampling (DE&S 2000a).

- January 2000 – A Feasibility Study was completed that discussed the results of the IRM program and evaluated the options available to address groundwater contamination (DE&S, 2000b).

- October 2000 – The Record of Decision for the on-site soil (OU#1) and Groundwater (OU#2) was issued following completion of the RI/FS and the implementation of the 1999 on-site IRM. The Site was divided into three operable units: OU#1 for on-site soil; OU#2 for groundwater; and OU#3 for off-site soils east of the Site. The NYSDEC selected No Further Action for OU#1, and No Further Action with groundwater monitoring for OU#2 after the 1999 IRM removed most of the contaminated soil from the Site (NYSDEC, 2000). A separate investigation and IRM was planned for OU#3 at the time of the OU1/OU2 ROD issuance.

- January 4, 2001 – Elm Holdings Inc. (BP America) and the NYSDEC executed an amended Order on Consent to undertake the groundwater monitoring remedy at the Hyde Park Facility on January 4, 2001.

- Amended Order on Consent with Elm Holdings Inc.

OU3 INVESTIGATIONS, IRM, and ROD 2001-2002

- August 2001 – A work plan for investigating OU3 was prepared by INTERA in March 2001 (DE&S 2001a) and approved by the NYSDEC in May 2001. In August 2001, INTERA (formerly DE&S) completed an investigation of the approximately 0.5-acre OU#3 area, collecting 10 surface soil samples (VOCs & SVOCs) and 44 soil samples from 20 test pit for site contaminants of concern (VOCs) in the offsite soil area east of the facility. The investigation confirmed TCE and 1,2-DCE were present above the site SCGs at depths of approximately 10-16.5 ft bgs, estimated the volumes of soil to be addressed, and recommended the IRM program be continued to address the soil contamination identified in OU#3 (INTERA, 2002a).

- December 2002 – INTERA completed an IRM excavation of OU3 off-site contaminated soils as well as the contaminated soil remaining along the eastern property boundary of the Site that could not be removed during the IRM in 1999. The IRM also included disposal of soils at appropriate facilities; verification sampling; and backfill of excavated areas with clean backfill. A total of 2,612 tons of soil were excavated (695 tons clean soil, 1710 tons non-hazardous soils, and 208 tons of Action Level soils). All verification samples from the OU3, off-site property, had VOC concentrations below cleanup criteria. Two samples from the excavation floor in the on-site excavation area contained COCs above cleanup-objectives at a depth of approximately 21 ft bgs. NYSDEC was consulted and it was determined that the deep contamination would not pose a health risk and therefore no further excavation was conducted (INTERA, 2004a).

- August 2004 – The Record of Decision for the off-site Soil (OU#3) was issued. The NYSDEC selected No Further Action for OU#3 following completion of the IRM (NYSDEC, 2004).

OU2 GROUNDWATER MONITORING 2000-2010

- September 2000 – DE&S completed a groundwater monitoring work plan detailing the program and schedule for monitoring groundwater in accordance with the ROD for OU#2 (DE&S, 2000c). The initial groundwater event took place in October 2000. For the first 5-years, groundwater sampling events followed under execution of the work plan with two events per year (Spring/Fall) (INTERA, 2001a, 2002b, 2002c, 2003a, 2003b, 2004a,2004b,2004c, 2005). Initially all Site wells were monitored (MW-1 through MW-8 and MW-10 through MW-19). MW-9 was abandoned during the OU1 IRM excavation work. All other wells except for bedrock wells MW-6, MW-8, and MW-15 were part of an overburden/bedrock well pair. Three sewer manholes (MH1, MW2, & MW3) were also sampled. All sampled wells were analyzed for a Site-specific VOCs list and 9 overburden/bedrock pairs (MW-couplets 1, 3, 4, 7, 10, 14, 16, 17, and 18) were also sampled for select MNA parameters as follows:

Site Specific VOCs sample list:

- Trichloroethene
- 1,2-dichloroethene (cis & trans)
- Vinyl chloride
- 1,1-dichloroethane
- Benzene

Additional MNA parameters:

- Methane, ethane, ethane, propane, propene
- TOC, BOD, COD
- Iron II & III
- Chloride, nitrate, nitrite, sulfate
- Sulfide

Ferrous iron (Fe+2) was sampled as a field analysis because the parameter is difficult to preserve in oxygen-rich environment/has a short hold time for analyses. Purge water was discharged per a City of Niagara Falls wastewater discharge permit.

The fifth-year summary report (INTERA, 2005a) indicated that groundwater contamination was still present on Site. NYSDEC requested in correspondence dated September 28, 2005, that the groundwater monitoring program be continued for another five years on an annual basis with an alternating spring/fall schedule (NYSDEC, 2005; INTERA,2006a, 2006b).

In Fall 2007 Parsons took over the groundwater monitoring program on behalf of Atlantic Richfield Company (a BP affiliated company). The Fall 2007 report stated that propene, a natural attenuation parameter, was eliminated from the sampling plan following discussions with the NYSDEC (Parsons 2008a). Sewer water samples collected between 2000-2009 had generally low levels (5 ug/L) of TCE and DEC detected in both upstream and downstream samples. Sewer sampling was discontinued following the 2nd 5-year summary report in 2010 (Parsons, 2010)

SVI INVESTIGATION 2006-2007

- July 27, 2006 – The NYSDEC wrote a letter to request that a work plan be developed to investigate the soil vapor to indoor air intrusion pathway at the Site. Parsons, on behalf of Atlantic Richfield Company, issued a work plan on November 16, 2006 (Parsons, 2006a).

- March and July 2007 –A Soil Vapor Intrusion Assessment at the Site post-dated the remedial action and RODs for OU1 to OU3. The initial sampling was performed March 8-9, 2007 at six soil vapor points on the west and south sides of the Site (Parsons, 2007a). A supplemental sampling was performed for one location on July 26, 2007 (Parsons, 2007b). One soil vapor point analytical result detected TCE at a concentration of 4.5 mcg/m$^3$ on the northwest corner of the Site alongside Hyde Park Boulevard. In 2007, the State of New York did not have any standards, criteria or guidance values for concentrations of volatile chemicals in soil vapor or indoor air. A co-located ambient air sample detected TCE at 1.14 mcg/m$^3$ and 1,2-DCE at 1.83 mcg/ m$^3$ respectively. The 2017 update to the NYSDOH Guidance for Evaluating Soil Vapor Intrusion (NYSDOH, 2006, amended through 2017), presents decision matrices for paired sub-slab vapor and indoor air samples. Both TCE and cis-1,2-DCE are Matrix A compounds. If the soil vapor and indoor air results were applied to Matrix A as sub-slab vapor and indoor air samples, respectively, the matrix recommendation would be "Identify Source(s) and Resample or Mitigate." All other soil vapor and ambient air samples collected were non-detect. An email was received from NYSDEC stating that no further action was required regarding soil vapor on December 5, 2008 (NYSDEC, 2008). If the building use changes in the future, the site remedy requires evaluation of the potential for soil vapor intrusion and the possibility of adverse impacts on indoor air, and compliance with NYSDOH Guidance for Evaluating Soil Vapor Intrusion to address potential human exposures.

BIOREMEDIATION INJECTIONS and PERFORMANCE MONITORING 2007-2014

- 2006/2007 – Although natural attenuation was occurring, progress towards remediation goals were slow. Parsons evaluated remedial alternatives in the 2006 Remedial Alternatives Report (Parsons, 2006b) that was submitted to NYSDEC. Application of enhanced in situ bioremediation was chosen as the preferred alternative and a work plan for pilot testing was prepared (Parsons, 2008b).

- July 2008-May 2010 – Separate pilot tests were designed for overburden and bedrock. The objective of the field-scale pilot tests was to determine if in situ bioremediation was a viable treatment option for chlorinated COCs in groundwater at the site. Overburden Baseline Performance monitoring took place in August of 2008 prior to the initial 2008 overburden injection event. The overburden injection pilot test was conducted around MW-7A in the area of the highest TCE concentrations from the groundwater monitoring. For the overburden, two injection wells (INJ-1 and INJ-2) were installed for overburden slow-release substrate (SRS®) emulsified vegetable oil (EVO) diluted with site groundwater and microorganism injections. Four overburden performance monitoring wells and one bedrock performance monitoring well (PMW 1 to PMW-4 and PMW-8 respectively) were installed and used in combination with existing site wells to monitor the pilot test effectiveness. EVO injections took place in September 2008 and microbial bioaugmentation (pH buffered with sodium bicarbonate) was completed in October 2008. Four rounds of performance groundwater monitoring followed through March 2009. The bedrock pilot test was conducted around MW-17B. Two injection wells (INJ-3 and INJ-4) and four bedrock PMWs (PMW-5 to PMW-7 and PMW-9) were installed. Bedrock Baseline Groundwater Monitoring took place in October 2009. EVO injections took place in November 2009 concurrent with a second round of overburden injections around MW-7A. Initial bedrock and a second overburden microbial bioaugmentation was completed in December 2009. Five rounds of performance groundwater monitoring followed through November 2010. Terra Systems, Inc. (TSI) SRS®-SD was used for all overburden injections, SRS®-FR was used for all bedrock injections, and TSI-DC® bioaugmentation culture was used for microorganism bioaugmentation.

For the performance monitoring additional MNA and other parameters were added to the sampling program to properly evaluate the results of the pilot tests. Site-specific VOCs, TOC, volatile fatty acids (VFAs), sulfate, bromide, chloride, methane, ethane, and ethene were all analyzed. Field tests for ferrous iron, divalent manganese, alkalinity, hydrogen sulfide, and carbon dioxide were collected. Field parameters including temperature, pH, dissolved oxygen (DO), oxidation-reduction potential (ORP) and specific conductance were also monitored. Samples were also collected to evaluate the subsurface microbial communities. Samples were analyzed for the presence of specific microorganisms including Dehalococcoides(DHC) and Dehalobacter(DHB), As well as the TCE and VC reductase genes. DHC/DHB can completely degrade CVOCs (including transformation of VC to ethene).

Results of the initial overburden pilot test was presented in a letter report in July 2009 (Parsons, 2009). A more complete overburden and bedrock report was issued along with the 2010 annual groundwater monitoring report (Parsons, 2010a) and supplemental groundwater monitoring event report (Parsons, 2011). These reports concluded that there was a rapid transformation of TCE to degradation products at all the injection and performance monitoring wells treated with substrate and that enhanced in-situ bioremediation of chlorinated ethenes was a viable treatment option for groundwater at the Site and the bioaugmentation culture appeared to enhance the populations of dechlorinating microbes.

- October 2011 – Following the Fall 2011 annual groundwater monitoring event (Parson, 2012), a third round of overburden injections took place around MW-4A, MW-7A, and MW-16A. Eight additional injection wells were installed for the 2011 substrate application (INJ-5U, INJ-5L, INJ-6U, INJ-6L, INJ-7, INJ-8, INJ-9, INJ-10) and performance monitoring was performed for a year following the injections (Parsons, 2013).

- A fourth round of overburden and bedrock substrate injections and bioaugmentation took place in September/October 2013 at the following existing well locations. (INJ-1, INJ-2, INJ-3, INJ-4, MW-16B, MW-18B, INJ-9, INJ-10). At INJ-3 and INJ-4 and iron amendment was added to decrease hydrogen sulfide formation, a limiting factor on the rate of CVOC biodegradation. Dye tracer injections were also competed at MW-16B and MW-18B using Flourescein and Rhodamine WT, respectively. Performance and dye tracer monitoring followed. After the 12-month performance monitoring event (Parson, 2015), the annual groundwater monitoring has continued to monitor MNA progress at the Site. The remedial objective of enhancing the natural attenuation process in groundwater was achieved through the bioremediation injections conducted between 2008 and 2013.

CLASSIFICATION CHANGE: CLASS 2 to CLASS 4

- March 26, 2013 – A Letter was issued from NYSDEC to 3425 Hyde Park Boulevard LLC to notify of a change of classification for the Site from Class 2 to Class 4.

## 2015-2021 RECENT GROUNDWATER MONITORING

- In correspondence dated April 3, 2014 Parsons requested to discontinue sampling downgradient well MW-15 (Parsons 2014). The NYSDEC responded by switching MW-15 to a five-year monitoring frequency in a letter dated April 8, 2014 (NYSDEC, 2014). Sampling was discontinued at MW-2B, MW-4A, MW-8, and MW-11B as of an October 6, 2018 letter from the NYSDEC to Mr. Randy Coil (BP) (NYSDEC, 2018).

- In Spring 2016, AECOM Technical Services Inc. (AECOM) took over monitoring activities for the site on behalf of Elm Holdings Inc. The recent 5-year monitoring reports 2016-2020 in conjunction with 3-year PRR reports for 2013-2018 and 2019-2020 and the Fall 2021 annual groundwater report summarize how MNA has continued to progress since the last injection in 2013 (AECOM, 2021; AECOM, 2022). In general, substrate and bioaugmentation injections have been successful in decreasing levels of chlorinated VOCs in both overburden and bedrock groundwater in the injection areas. Due largely to flow in bedrock fractures, the VOC decreases have also been observed downgradient of the injection areas and in offsite wells, and to date, little rebound has been observed. Groundwater samples for natural attenuation monitoring have been collected since October 2000 and continue to indicate that natural attenuation processes are active. The Site groundwater will continue to be monitored.

## NOVEMBER 2016 -MEMBRANE INTERFACE PROBE/HYDRAULIC PROFILING TOOL STUDY

- On November 29 and 30, 2016, AECOM, on behalf of Elm Holdings Inc., conducted an investigation of subsurface conditions at the Site using a Membrane Interface Probe/Hydraulic Profiling Tool (MIP/HPT). The MIP/HPT study was completed to provide additional data to supplement the site conceptual model, with respect to deeper overburden lithology and groundwater quality. The MIP/HPT study focused on three areas of monitoring wells: MW-10A/MW-5A, MW-17A, and MW-18A. Nine investigation points were completed. The MIP logs show VOC impacts peak at just above refusal, which has been interpreted to be the top of glacial till based on review of boring logs from surrounding wells. HPT logs show limited hydraulic conductivity nearer ground surface with an increase in hydraulic conductivity near the bottom each sample point (approximately 15 to 20 feet bgs). The full results are presented in the 2019 Remedy Enhancement Evaluation Work Plan (AECOM 2019b).

## EMERGENT CONTAMINANT SAMPLING

- In a letter dated September 6, 2018, NYSDEC requested that Elm Holdings sample Site groundwater for emerging contaminants 1,4-dioxane and per- and polyfluoroalkyl substances (PFAS) as part of a state-wide survey of remediation sites (NYSDEC, 2018b). AECOM collect samples from wells MW-8 (upgradient), MW-11B (downgradient), and MW-17B (representative of Site conditions). Groundwater sampling was conducted on October 4-5, 2018. The results of the sampling were presented in a letter report (AECOM 2019a). As of 2021, proposed guidance values for TOGS 1.1.1 for 1.4 dioxane, PFOS, and PFOA, are (0.36 µg/L, 0.0027 µg/L, and 0.0067 µg/L respectively. In 2018, 1,4-dioxane was detected at each well ranging from 0.61 µg/L to 1.5 µg/L. PFOA was detected at each well ranging from estimated 0.0012 to 0.015 µg/L. PFOS was not detected at any of the wells (AECOM, 2019a).

## SITE DOCUMENTS

*Former Carborundum Company, Hyde Park Facility, Niagara New York*
*NYSDEC Site No. 932036*

AECOM, 2019a. Letter to NYSDEC. Revised Summary of Emerging Contaminants Groundwater Sampling. Former Carborundum Company, Globar 3425 Hyde Park Boulevard, Town of Niagara, Niagara County, New York NYSDEC Site No. Emerging Contaminants Groundwater Sampling Work Plan. March 28, 2019.

AECOM, 2019b. Letter Report to NYSDEC. Former Carborundum Company, Globar 3425 Hyde Park Boulevard, Town of Niagara, Niagara County, New York NYSDEC Site No. 932036, 2019 Remedy Enhancement Evaluation Work Plan. October 4, 2019.

AECOM, 2018a. Site Management Periodic Review Report and IC/EC Certification for period April 1, 2013 to July 31, 2018, Former Carborundum Company, Globar 3425 Hyde Park Boulevard, Town of Niagara, Niagara County, New York NYSDEC Site No. 932036, August 30, 2018.

AECOM, 2021a. Five-Year Review Report (2016-2020), Former Carborundum Company, Hyde Park Facility, Town of Niagara, Niagara County, New York NYSDEC Site No. 932036. March 2021.

AECOM, 2021b. Site Management Periodic Review Report and IC/EC Certification for period July 31, 2018 to July 31, 2021, Former Carborundum Company, Globar 3425 Hyde Park Boulevard, Town of Niagara, Niagara County, New York NYSDEC Site No. 932036, August 31, 2021.

AECOM, 2022. Fall 2021 Annual Groundwater Monitoring Report, Former Carborundum Company, Hyde Park Facility, Town of Niagara, Niagara County, New York NYSDEC Site No. 932036, March 29, 2022.

BP Oil, 1996. Citizen Participation Plan, for the Carborundum Globar Site Remedial Investigation/Feasibility Study, Niagara Falls, New York, February 12, 1996. BP Oil.

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# APPENDIX E

# SITE-SPECIFIC SOIL CLEANUP OBJECTIVES

## Table E-1: NYSDEC Soil Clean-Up Objectives and Action Level Concentrations for VOCs
## Former Carborundum Company, Hyde Park Facility
## Niagara, New York

| Contaminants of Concern | Cleanup Objective (µg/kg) | Action Level (µg/kg) |
|---|---|---|
| Trichloroethene | 880 | 64,000 |
| 1,2-Dichloroethene (total) | 410 | 2.8E+06 |
| Acetone | 200 | 8.0E+06 |
| Vinyl chloride | 200 | 360 |
| Xylenes (total) | 1680 | 2.0E+08 |
| Ethylbenzene | 7700 | 8.0E+06 |
| Toluene | 2100 | 2.0E+07 |
| Methylene chloride | 150 | 93,000 |

1. Recommended Soil Cleanum Objectives Calculated based on 1.4% TOC in Soil (NYSDEC TAGM HWR-94-4046, January 24, 1994, revised March 1998)
2. Soil Action Level (NYSDEC TAGM #3028, November 30, 1992)

# Table E-2: NYSDEC Soil Clean-Up Objectives for PAHs
Former Carborundum Company, Hyde Park Facility
Niagara, New York

| Contaminants of Concern | Cleanup Objective (µg/kg) |
|---|---|
| Acenaphthylene | 57,600 |
| Anthracene | 50,000 |
| Benzo(a)anthracene | 3,860 |
| Benzo(a)pyrene | 15,400 |
| Benzo(b)fluoranthene | 1,500 |
| Benzo(k)fluoranthene | 1,500 |
| Chrysene | 560 |
| Dibenz(a,h)anthracene | 14 |
| Fluoanthene | 50,000 |
| Fluorene | 50,000 |
| Indeno(1,2,3-cd)pyrene | 4,480 |
| Naphthalene | 18,200 |
| Phenanthrene | 50,000 |
| pyrene | 50,000 |

1. Recommended Soil Cleanum Objectives Calculated based on 1.4% TOC in Soil (NYSDEC TAGM HWR-94-4046, January 24, 1994, revised March 1998)

## NYSDEC Soil Cleanup Objectives

Calculation of Allowable Soil Concentration

as per NYSDEC TAGM 4046 January 24, 1994, revised March 1998

DATA:

geometric mean of total organic carbon (TOC) soil sample results from RI =1.4%

EQUATIONS:

$f = TOC\%/100$

$Cs=f*Cw*Koc$

Soil Cleanup Objective (SCO) = Cs*100

VARIABLES:

Cs = calculated allowable soil concentration

Cw = groundwater standards in ppb from TAGM 4046

Koc = partition coefficient from TAGM 4046

SAMPLE CALCULATION FOR VINYL CHLORIDE:

f = 1.4%/100 0.014

Cs = 0.014*0.002*57 0.0016

SCO = 0.0016*100 0.16 ppm

160 ppb

SCO was calculated for each COC. The Soil Cleanup Objective used during the IRM was the higher of the calculated SCO and the SCO from TAGM 4046. Some compounds have a maximum SCO, as indicated in TAGM 4046.

| **VOCs:** | **Cw (ppm)** | **Koc** | **Cs (ppm)** | **Calculated SCO(ppm)** | **Calculated SCO (ppb)** | **SCO from TAGM* (ppb)** | **Soil Cleanup Objective** |
|---|---|---|---|---|---|---|---|
| vinyl chloride | 0.002 | 57 | 0.0016 | 0.16 | 160 | 200 | 200 |
| methylene chloride | 0.005 | 21 | 0.0015 | 0.15 | 147 | 100 | 150 |
| acetone | 0.05 | 2.2 | 0.0015 | 0.15 | 154 | 200 | 200 |
| 1,2-dichloroethene (total) | 0.005 | 59 | 0.0041 | 0.41 | 413 | 300 | 410 |
| trichloroethene | 0.005 | 126 | 0.0088 | 0.88 | 882 | 700 | 880 |
| toluene | 0.005 | 300 | 0.0210 | 2.10 | 2,100 | 1,500 | 2,100 |
| ethyl benzene | 0.005 | 1,100 | 0.0770 | 7.70 | 7,700 | 5,500 | 7,700 |
| total xylenes | 0.005 | 240 | 0.0168 | 1.68 | 1,680 | 1,200 | 1,680 |

| **PAHs:** | **Cw (ppm)** | **Koc** | **Cs (ppm)** | **Calculated SCO(ppm)** | **Calculated SCO (ppb)** | **SCO from TAGM* (ppb)** | **Soil Cleanup Objective** |
|---|---|---|---|---|---|---|---|
| acenaphthylene | 0.02 | 2,056 | 0.5757 | 57.57 | 57,568 | 41,000 | 57,600 |
| anthracene | 0.05 | 14,000 | 9.8 | 980 | 980,000 | 50,000 | 50,000 |
| benzo(a)anthracene | 0.000002 | 1,380,000 | 0.0386 | 3.86 | 3,864 | 220 | 3,860 |
| benzo(a)pyrene | 0.000002 | 5,500,000 | 0.1540 | 15.40 | 15,400 | 61 | 15,400 |
| benzo(b)fluoranthene | 0.000002 | 550,000 | 0.0154 | 1.54 | 1,540 | 1,100 | 1,500 |
| benzo(k)fluoranthene | 0.000002 | 550,000 | 0.0154 | 1.54 | 1,540 | 1,100 | 1,500 |
| chrysene | 0.000002 | 200,000 | 0.0056 | 0.56 | 560 | 400 | 560 |
| dibenz(a,h)anthracene | 0.05 | 33,000,000 | 23100 | 2310000 | 2,310,000,000 | 14 | 14 |
| fluoranthene | 0.05 | 38,000 | 26.6 | 2660 | 2,660,000 | 50,000 | 50,000 |
| fluorene | 0.05 | 7,300 | 5.11 | 511 | 511,000 | 50,000 | 50,000 |
| indeno(1,2,3-cd)pyrene | 0.000002 | 1,600,000 | 0.0448 | 4.48 | 4,480 | 3,200 | 4,480 |
| naphthalene | 0.01 | 1,300 | 0.1820 | 18.20 | 18,200 | 13,000 | 18,200 |
| phenanthrene | 0.05 | 4,365 | 3.0555 | 305.55 | 305,550 | 50,000 | 50,000 |
| pyrene | 0.05 | 13,295 | 9.3065 | 930.65 | 930,650 | 50,000 | 50,000 |

* based on 1% TOC

# APPENDIX F

# MONITORING WELL GROUNDWATER ANALYTICCAL RESULT SUMMARY

# MONITORING WELL GROUNDWATER ANALYTICAL RESULT SUMMARY
## HYDE PARK FACILITY
## NIAGARA, NEW YORK

**Well ID:** **MW- 1A**

| Date | PCE (µg/L) | TCE (µg/L) | Cis-1,2-DCE (µg/L) | Trans-1,2-DCE (µg/L) | 1,1-DCE (µg/L) | Vinyl Chloride (µg/L) | Ethane (µg/L) | Ethene (µg/L) | Methane (µg/L) | 1,1,1-Trichloroethane (µg/L) | 1,1-Dichloroethane (µg/L) | Chloroethane (µg/L) | Dissolved Iron (mg/L) | BOD (mg/L) | COD (mg/L) | TOC (mg/L) | Chloride (mg/L) | Sulfate (mg/L) | Sulfide (mg/L) | Nitrate (mg/L) | Nitrite (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10/31/2007 | 5 U | 5 U | 5 U | 5 U | 5 U | 2 U | | | | 5 U | 5 U | 5 U | | | | | | | | | |
| 4/23/2008 | 5 U | 5 U | 5 U | 5 U | 5 U | 2 U | 1 U | 1 U | 2.6 | 5 U | 5 U | 5 U | | 2 U | 6.02 | 1.53 | 112 | 109 | 1 U | 0.05 U | 0.05 U |
| 10/27/2009 | 5 U | 5 U | 5 U | 5 U | 5 U | 5 U | 5 U | 5 U | 30 | 5 U | 5 U | 5 U | | 1.7 U | 16.5 J | 2 | 140 J | 141 | 0.16 U | 0 R | 0.05 U |

| | |
|---|---|
| J | Indicates an estimated value. |
| U | Analyte was not detected above the reporting limit. |
| UJ | The analyte was not detected. The reporting limit is an approximate value. |
| J- | Indicates estimated value, biased low. |
| J+ | Indicates estimated value, biased high. |
| D | Result reported from a secondary dilution analysis. |
| R | The sample results are rejected. |

# MONITORING WELL GROUNDWATER ANALYTICAL RESULT SUMMARY
## HYDE PARK FACILITY
## NIAGARA, NEW YORK

**Well ID:** **MW- 1B**

| Date | PCE (µg/L) | TCE (µg/L) | Cis-1,2-DCE (µg/L) | Trans-1,2-DCE (µg/L) | 1,1-DCE (µg/L) | Vinyl Chloride (µg/L) | Ethane (µg/L) | Ethene (µg/L) | Methane (µg/L) | 1,1,1-Trichloroethane (µg/L) | 1,1-Dichloroethane (µg/L) | Chloroethane (µg/L) | Dissolved Iron (mg/L) | BOD (mg/L) | COD (mg/L) | TOC (mg/L) | Chloride (mg/L) | Sulfate (mg/L) | Sulfide (mg/L) | Nitrate (mg/L) | Nitrite (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10/30/2007 | 5 U | 5 U | 11 | 5 U | 5 U | 16 | 0.36 J | 0.97 J | 160 | 5 U | 5 U | 5 U |  | 2 U | 5 UJ | 4.23 | 97.6 | 301 | 1 U |  |  |
| 4/23/2008 | 5 U | 5 U | 1.2 J | 5 U | 5 U | 1.9 J | 1 U | 1 U | 64 | 5 U | 0.71 J | 5 U |  | 2 U | 13 | 4.06 | 70 | 181 | 1 U | 0.05 U | 0.05 U |
| 10/27/2009 | 5 U | 5 U | 1.3 J | 5 U | 5 U | 1.7 J | 5 U | 5 U | 59 | 5 U | 5 U | 5 U |  | 1.6 U | 32.5 J | 4.5 | 71.8 J | 218 | 0.16 U | 0 R | 0.05 U |

| | |
|---|---|
| J | Indicates an estimated value. |
| U | Analyte was not detected above the reporting limit. |
| UJ | The analyte was not detected. The reporting limit is an approximate value. |
| J- | Indicates estimated value, biased low. |
| J+ | Indicates estimated value, biased high. |
| D | Result reported from a secondary dilution analysis. |
| R | The sample results are rejected. |

### MONITORING WELL GROUNDWATER ANALYTICAL RESULT SUMMARY
### HYDE PARK FACILITY
### NIAGARA, NEW YORK

**Well ID:** **MW- 2A**

| Date | PCE (µg/L) | TCE (µg/L) | Cis-1,2-DCE (µg/L) | Trans-1,2-DCE (µg/L) | 1,1-DCE (µg/L) | Vinyl Chloride (µg/L) | Ethane (µg/L) | Ethene (µg/L) | Methane (µg/L) | 1,1,1-Trichloroethane (µg/L) | 1,1-Dichloroethane (µg/L) | Chloroethane (µg/L) | Dissolved Iron (mg/L) | BOD (mg/L) | COD (mg/L) | TOC (mg/L) | Chloride (mg/L) | Sulfate (mg/L) | Sulfide (mg/L) | Nitrate (mg/L) | Nitrite (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11/1/2007 | 5 U | 0.91 J | 9.8 | 5 U | 5 U | 1.9 J | | | | 5 U | 7.1 | 4.9 J | | | | | | | | | |
| 4/28/2008 | 5 U | 5 U | 0.38 J | 5 U | 2.4 J | 2 U | | | | 2 J | 14 | 1.2 J | | | | | | | | | |
| 10/28/2009 | 5 U | 5 U | 5 U | 5 U | 6 | 1.3 J | | | | 7.6 | 26 | 1.2 J | | | | | | | | | |
| 5/11/2010 | 5 U | 5 U | 5 U | 5 U | 4.3 J | 1.2 J | 5 U | 5 U | 30 | 4.9 J | 18 | 1.7 J | | | | | | | | | |

| | |
|---|---|
| J | Indicates an estimated value. |
| U | Analyte was not detected above the reporting limit. |
| UJ | The analyte was not detected. The reporting limit is an approximate value. |
| J- | Indicates estimated value, biased low. |
| J+ | Indicates estimated value, biased high. |
| D | Result reported from a secondary dilution analysis. |
| R | The sample results are rejected. |

# MONITORING WELL GROUNDWATER ANALYTICAL RESULT SUMMARY
# HYDE PARK FACILITY
# NIAGARA, NEW YORK

**Well ID:** **MW- 2B**

| Date | PCE (µg/L) | TCE (µg/L) | Cis-1,2-DCE (µg/L) | Trans-1,2-DCE (µg/L) | 1,1-DCE (µg/L) | Vinyl Chloride (µg/L) | Ethane (µg/L) | Ethene (µg/L) | Methane (µg/L) | 1,1,1-Trichloroethane (µg/L) | 1,1-Dichloroethane (µg/L) | Chloroethane (µg/L) | Dissolved Iron (mg/L) | BOD (mg/L) | COD (mg/L) | TOC (mg/L) | Chloride (mg/L) | Sulfate (mg/L) | Sulfide (mg/L) | Nitrate (mg/L) | Nitrite (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11/1/2007 | 5 U | 5 U | 48 | 5 U | 5 U | 59 | | | | 5 U | 5 U | 5 U | | | | | | | | | |
| 4/28/2008 | 5 U | 5 U | 41 | 5 U | 5 U | 62 | | | | 5 U | 5 U | 5 U | | | | | | | | | |
| 10/28/2009 | 5 U | 5 U | 9.1 | 5 U | 5 U | 16 | | | | 5 U | 5 U | 5 U | | | | | | | | | |
| 5/11/2010 | 5 U | 5 U | 3.7 J | 5 U | 5 U | 7.6 | 1.9 J | 55 | 2300 | 5 U | 5 U | 5 U | | | | | | | | | |
| 10/20/2011 | 5 U | 5 U | 1.8 J | 5 U | 5 U | 2.6 J | | | | 5 U | 5 U | 5 U | | | | | | | | | |
| 6/13/2012 | 5 U | 5 U | 2.7 J | 5 U | 5 U | 8.6 | | | | 5 U | 5 U | 5 U | | | | | | | | | |
| 8/30/2013 | 5 U | 5 U | 2.3 J | 5 U | 5 U | 4 J | | | | 5 U | 5 U | 5 U | | | | | | | | | |
| 4/3/2014 | 1 U | 1 U | 1 | 0.72 J | 1 U | 2.2 | | | | 1 UJ | 0.92 J | 1 U | | | | | | | | | |
| 11/20/2015 | 1 U | 1 U | 0.87 J | 0.56 J | 1 U | 3.4 | | | | 1 U | 0.65 J | 1 U | | | | | | | | | |
| 4/19/2016 | 1.0 U | 1.0 U | 0.95 J | 1.0 U | 1.0 U | 2.2 | | | | 1.0 U | 0.96 J | 1.0 U | | | | | | | | | |
| 9/12/2017 | 1.0 U | 1.0 U | 0.77 J | 1.0 U | 1.0 U | 1.8 | | | | 1.0 U | 0.5 J | 1.0 U | | | | | | | | | |
| 4/25/2018 | 1.0 U | 1.0 U | 1.3 | 1.0 U | 1.0 U | 2.6 | | | | 1.0 U | 1.0 U | 1.0 U | | | | | | | | | |

| | |
|---|---|
| J | Indicates an estimated value. |
| U | Analyte was not detected above the reporting limit. |
| UJ | The analyte was not detected. The reporting limit is an approximate value. |
| J- | Indicates estimated value, biased low. |
| J+ | Indicates estimated value, biased high. |
| D | Result reported from a secondary dilution analysis. |
| R | The sample results are rejected. |

# MONITORING WELL GROUNDWATER ANALYTICAL RESULT SUMMARY
## HYDE PARK FACILITY
## NIAGARA, NEW YORK

**Well ID:** **MW- 3A**

| Date | PCE (µg/L) | TCE (µg/L) | Cis-1,2-DCE (µg/L) | Trans-1,2-DCE (µg/L) | 1,1-DCE (µg/L) | Vinyl Chloride (µg/L) | Ethane (µg/L) | Ethene (µg/L) | Methane (µg/L) | 1,1,1-Trichloroethane (µg/L) | 1,1-Dichloroethane (µg/L) | Chloroethane (µg/L) | Dissolved Iron (mg/L) | BOD (mg/L) | COD (mg/L) | TOC (mg/L) | Chloride (mg/L) | Sulfate (mg/L) | Sulfide (mg/L) | Nitrate (mg/L) | Nitrite (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10/31/2007 | 5 U | 5 U | 0.9 J | 5 U | 5 U | 2 U | 0.54 J | 1 U | 6 | 5 U | 5 U | 5 U |  | 2 U | 19 J | 3.21 | 16.4 | 319 | 3.64 |  |  |
| 4/24/2008 | 5 U | 0.21 J | 0.71 J | 5 U | 5 U | 2 U | 1 U | 1 U | 12 | 5 U | 5 U | 5 U |  | 2 U | 6.92 | 2.89 | 0.2 U | 292 | 1 U | 0.05 U | 0.05 U |
| 8/12/2008 | 5 U | 5 U | 0.89 J | 5 U | 5 U | 5 U | 5 U | 5 U | 25 | 5 U | 5 U |  |  |  |  | 2.6 | 17.6 | 318 |  |  |  |
| 10/6/2008 | 5 U | 1.9 J | 11 | 5 U | 5 U | 5 U | 5 U | 5 U | 19 J | 5 U | 5 U | 5 U |  |  |  | 2.3 | 19.4 J | 347 |  |  |  |
| 12/8/2008 | 5 U | 1.4 J | 5 U | 5 U | 5 U | 5 U | 5 U | 5 U | 7.7 J | 5 U | 5 U | 5 U |  |  |  | 4.9 | 23.3 | 444 |  |  |  |
| 1/26/2009 | 5 U | 5 U | 1 J | 5 U | 5 U | 5 U | 5 U | 5 U | 7.3 J | 5 U | 5 U | 5 U |  |  |  |  |  |  |  |  |  |
| 3/16/2009 | 5 U | 5 U | 0.99 J | 5 U | 5 U | 5 U | 5 U | 5 U | 5 J | 5 U | 5 U | 5 U |  |  |  | 3.7 | 27.3 | 334 |  |  |  |
| 10/27/2009 | 5 U | 5 U | 5 U | 5 U | 5 U | 5 U | 5 U | 5 U | 14 J | 5 U | 5 U | 5 U |  | 1.9 U | 25.6 J | 2.2 | 15.9 J | 250 | 0.16 U | 0 R | 0.05 U |

| | |
|---|---|
| J | Indicates an estimated value. |
| U | Analyte was not detected above the reporting limit. |
| UJ | The analyte was not detected. The reporting limit is an approximate value. |
| J- | Indicates estimated value, biased low. |
| J+ | Indicates estimated value, biased high. |
| D | Result reported from a secondary dilution analysis. |
| R | The sample results are rejected. |

# MONITORING WELL GROUNDWATER ANALYTICAL RESULT SUMMARY
# HYDE PARK FACILITY
# NIAGARA, NEW YORK

**Well ID:** **MW- 3B**

| Date | PCE (μg/L) | TCE (μg/L) | Cis-1,2-DCE (μg/L) | Trans-1,2-DCE (μg/L) | 1,1-DCE (μg/L) | Vinyl Chloride (μg/L) | Ethane (μg/L) | Ethene (μg/L) | Methane (μg/L) | 1,1,1-Trichloroethane (μg/L) | 1,1-Dichloroethane (μg/L) | Chloroethane (μg/L) | Dissolved Iron (mg/L) | BOD (mg/L) | COD (mg/L) | TOC (mg/L) | Chloride (mg/L) | Sulfate (mg/L) | Sulfide (mg/L) | Nitrate (mg/L) | Nitrite (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10/31/2007 | 5 U | 5 U | 1.9 J | 5 U | 5 U | 2.2 | 1 U | 1 U | 220 | 5 U | 5 U | 5 U |  | 2 U | 5 UJ | 3.19 | 134 | 395 | 1 U |  |  |
| 4/25/2008 | 5 U | 5 U | 2.1 J | 5 U | 5 U | 2.2 | 0.6 J | 1 U | 180 | 5 U | 5 U | 5 U |  | 4.17 | 14.1 | 3.64 | 132 | 333 | 1 U | 0.05 U | 0.05 U |
| 10/27/2009 | 5 U | 5 U | 1.5 J | 5 U | 5 U | 2.9 J | 5 U | 5 U | 170 | 5 U | 5 U | 5 U |  | 2.2 U | 16.5 J | 3.8 | 121 J | 254 | 0.9 | 0 R | 0.05 U |

| | |
|---|---|
| J | Indicates an estimated value. |
| U | Analyte was not detected above the reporting limit. |
| UJ | The analyte was not detected. The reporting limit is an approximate value. |
| J- | Indicates estimated value, biased low. |
| J+ | Indicates estimated value, biased high. |
| D | Result reported from a secondary dilution analysis. |
| R | The sample results are rejected. |

# MONITORING WELL GROUNDWATER ANALYTICAL RESULT SUMMARY
# HYDE PARK FACILITY
# NIAGARA, NEW YORK

**Well ID:** **MW- 4A**

| Date | PCE (µg/L) | TCE (µg/L) | Cis-1,2-DCE (µg/L) | Trans-1,2-DCE (µg/L) | 1,1-DCE (µg/L) | Vinyl Chloride (µg/L) | Ethane (µg/L) | Ethene (µg/L) | Methane (µg/L) | 1,1,1-Trichloroethane (µg/L) | 1,1-Dichloroethane (µg/L) | Chloroethane (µg/L) | Dissolved Iron (mg/L) | BOD (mg/L) | COD (mg/L) | TOC (mg/L) | Chloride (mg/L) | Sulfate (mg/L) | Sulfide (mg/L) | Nitrate (mg/L) | Nitrite (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10/31/2007 | 5 U | 34 | 200 | 3.2 J | 1.8 J | 56 | 0.55 J | 5.6 | 130 | 5 U | 12 | 5 U | | 2 U | 5 UJ | 1.87 | 106 | 242 | 1 U | | |
| 4/29/2008 | 5 U | 34 | 200 | 3.1 J | 1.6 J | 53 | 0.55 J | 5.6 | 130 | 5 U | 15 | 5 U | | 2 U | 6.62 | 1.52 | 117 | 231 | 1 U | 0.05 U | 0.05 U |
| 11/3/2009 | 5 U | 130 | 110 | 5.7 | 2.5 J | 41 | 5 U | 4.6 J | 83 | 5 U | 17 | 5 U | | 2.6 U | 50 U | 1.7 J | 97.1 | 244 | 0.16 U | 0.1 U | 0.05 U |
| 5/14/2010 | 5 U | 94 | 250 | 4.9 J | 2.6 J | 45 | 5 U | 5.7 | 110 | 5 U | 21 | 5 U | | 2.1 U | 50 U | 1.8 | 109 | 249 | 0.16 U | 0.1 U | 0.05 U |
| 10/25/2011 | 5 U | 160 | 150 | 8.1 | 3.8 J | 73 | 5 U | 12 | 170 | 5 U | 18 | 5 U | 0.0146 J | 3.1 U | 50 U | 2.1 | 95.9 J | 263 J | 0.16 U | 0.1 U | 0.05 U |
| 3/14/2012 | | | | | | | | | | | | | | | | | | | | | |
| 3/15/2012 | 50 UJ | 65 J | 97 J | 9.5 J | 50 UJ | 14 J | 5.7 | 20 | 1200 | 50 UJ | 18 J | 50 UJ | 0.0523 J | | | 999 | 160 | 46.3 | | | |
| 6/12/2012 | 5 U | 7.5 | 140 | 2.9 J | 0.81 J | 20 | 5 U | 3.9 J | 3700 | 5 U | 5.4 | 7.8 | 3.22 | | 1350 | 434 | 89.8 | 5 U | | 0.1 U | 0.05 U |
| 6/13/2012 | | | | | | | | | | | | | | | | | | | 0.34 | | |
| 6/25/2012 | | | | | | | | | | | | | | 796 | | | | | | | |
| 11/29/2012 | 5 U | 5.5 | 120 | 4.2 J | 0.92 J | 39 | 5 U | 48 | 7900 | 5 U | 3.6 J | 21 | 4.85 | | | 397 | 37.8 | 5 U | | | |
| 9/3/2013 | 5 U | 4.2 J | 31 | 3.5 J | 5 U | 11 | 1.4 J | 60 J | 11000 | 5 U | 1.3 J | 17 | | 551 J | 1040 J | 251 | 82.9 | 1.6 J | 0.074 J | 0.1 UJ | 0.05 U |
| 1/22/2014 | 5 U | 1.1 J | 7.5 | 2.4 J | 5 U | 7.2 | 5 U | 65 | 22000 | 5 U | 5 U | 12 | 39.4 | | | 362 | 87.3 | 5 U | 0.16 U | | |
| 4/3/2014 | 1 U | 1.2 | 3.7 | 2.1 | 1 U | 4.1 | 4.2 J | 47 | 25000 | 1 U | 1 U | 12 | 36.2 | 342 | 640 | 205 | 99 | 5 U | 0.17 | 0.1 UJ | 0.018 J |
| 10/14/2014 | 1 U | 0.57 J | 5.3 | 2.2 | 1 U | 5.8 | 3.5 J | 56 | 19000 J | 1 UJ | 1.1 | 9.1 | 57.6 | | | 159 | 83.8 | 2.5 J | 0.16 U | | |
| 11/18/2015 | 1 U | 1.2 | 1.3 | 1 U | 1 U | 1.1 | 5.2 | 18 | 17000 | 1 U | 1 | 3 | 14.5 | 70.6 | 443 | 36.6 | 123 | 5.6 | 0.085 J | 0.1 U | 0.05 U |
| 4/21/2016 | 1.0 U | 3.4 | 2.8 | 1.0 U | 1.0 U | 1.1 | 4.3 J | 8.6 | 26000 D | 1.0 U | 1.4 | 3 | 9.67 | 34.3 | 181 | 20.4 | 179 | 7.6 | 0.069 J | 0.10 U | 0.050 U |
| 9/11/2017 | 1.0 U | 1.3 | 0.68 J | 1.0 U | 1.0 UJ | 2.6 | 3.9 | 5.5 | 5400 D | 1.0 U | 1.4 | 2.7 | 11 | 27 | 48 | 17 | 26 | 2.1 J | 1.0 U | 0.25 U | 0.050 UJ |
| 4/23/2018 | 1.0 U | 0.44 J | 1.1 | 0.51 J | 1.0 U | 0.96 J | 10 U | 10 U | 21000 | 1.0 U | 1.8 | 2.5 | 14 | 7.6 | 23 | 7.2 | 110 | 3.7 J | 1.0 U | 0.25 U | 0.050 UJ |

| | |
|---|---|
| J | Indicates an estimated value. |
| U | Analyte was not detected above the reporting limit. |
| UJ | The analyte was not detected. The reporting limit is an approximate value. |
| J- | Indicates estimated value, biased low. |
| J+ | Indicates estimated value, biased high. |
| D | Result reported from a secondary dilution analysis. |
| R | The sample results are rejected. |

# MONITORING WELL GROUNDWATER ANALYTICAL RESULT SUMMARY
## HYDE PARK FACILITY
## NIAGARA, NEW YORK

**Well ID:** **MW- 4B**

| Date | PCE (µg/L) | TCE (µg/L) | Cis-1,2-DCE (µg/L) | Trans-1,2-DCE (µg/L) | 1,1-DCE (µg/L) | Vinyl Chloride (µg/L) | Ethane (µg/L) | Ethene (µg/L) | Methane (µg/L) | 1,1,1-Trichloroethane (µg/L) | 1,1-Dichloroethane (µg/L) | Chloroethane (µg/L) | Dissolved Iron (mg/L) | BOD (mg/L) | COD (mg/L) | TOC (mg/L) | Chloride (mg/L) | Sulfate (mg/L) | Sulfide (mg/L) | Nitrate (mg/L) | Nitrite (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10/31/2007 | 5 U | 5 U | 23 | 5 U | 5 U | 11 | 0.39 J | 0.39 J | 200 | 5 U | 1.4 J | 5 U | | 2 U | 5.52 J | 3.15 | 152 | 316 | 2.59 | | |
| 4/29/2008 | 5 U | 5 U | 12 | 5 U | 5 U | 13 | 0.43 J | 0.66 J | 260 | 5 U | 5 U | 5 U | | 2 U | 8.98 | 3.29 | 152 | 247 | 1 U | 0.05 U | 0.05 U |
| 11/3/2009 | 5 U | 5 U | 9.7 | 5 U | 5 U | 9.5 | 5 U | 5 U | 140 | 5 U | 5 U | 5 U | | 3 U | 25.6 J | 2.9 J | 190 | 267 | 0.16 J | 0.1 U | 0.05 U |
| 5/14/2010 | 5 U | 5 U | 2.8 J | 5 U | 5 U | 12 | 5 U | 5 U | 160 | 5 U | 5 U | 5 U | | 2.7 U | 13.3 J | 3.4 | 165 | 305 | 0.16 U | 0.1 U | 0.05 U |
| 1/16/2014 | 5 U | 5 U | 11 | 5 U | 5 U | 15 | 5 U | 2.8 J | 150 | 5 U | 1.1 J | 5 U | 0.459 | | | 3.9 | 142 | 298 J+ | 0.16 U | | |

| | |
|---|---|
| J | Indicates an estimated value. |
| U | Analyte was not detected above the reporting limit. |
| UJ | The analyte was not detected. The reporting limit is an approximate value. |
| J- | Indicates estimated value, biased low. |
| J+ | Indicates estimated value, biased high. |
| D | Result reported from a secondary dilution analysis. |
| R | The sample results are rejected. |

# MONITORING WELL GROUNDWATER ANALYTICAL RESULT SUMMARY
# HYDE PARK FACILITY
# NIAGARA, NEW YORK

**Well ID:** **MW- 5A**

| Date | PCE (µg/L) | TCE (µg/L) | Cis-1,2-DCE (µg/L) | Trans-1,2-DCE (µg/L) | 1,1-DCE (µg/L) | Vinyl Chloride (µg/L) | Ethane (µg/L) | Ethene (µg/L) | Methane (µg/L) | 1,1,1-Trichloroethane (µg/L) | 1,1-Dichloroethane (µg/L) | Chloroethane (µg/L) | Dissolved Iron (mg/L) | BOD (mg/L) | COD (mg/L) | TOC (mg/L) | Chloride (mg/L) | Sulfate (mg/L) | Sulfide (mg/L) | Nitrate (mg/L) | Nitrite (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10/29/2007 | | | | | | | | | | | | | | | 5 UJ | | | | | | |
| 10/30/2007 | 5 U | 0.59 J | 2.6 J | 5 U | 5 U | 2 U | 1 U | 1 U | 0.74 J | 5 U | 5 U | 5 U | | 2 U | | 1.14 | 569 | 172 | 1 U | | |
| 4/22/2008 | 5 U | 0.47 J | 37 | 0.35 J | 5 U | 16 | 2 | 4.7 | 22 | 5 U | 5 U | 5 U | | 2 U | 12.2 | 1.44 | 542 | 164 | 1 U | 0.613 | 0.05 U |
| 10/29/2009 | 5 U | 5 U | 5.9 | 5 U | 5 U | 1.8 J | 5 U | 5 U | 5.5 J | 5 U | 5 U | 5 U | | 1.7 U | 23.3 J | 1.1 | 263 | 148 J | 0.16 U | 0.85 | 0.05 U |
| 5/13/2010 | 5 U | 5 U | 110 | 0.97 J | 5 U | 84 | 1.8 J | 45 | 100 | 5 U | 5 U | 5 U | | 1.6 U | 15.6 J | 1.3 | 188 | 126 | 0.16 U | 0.7 | 0.05 U |
| 10/21/2011 | 5 U | 5 U | 5.7 | 5 U | 5 U | 3.3 J | 5 U | 1.5 J | 9.6 J | 5 U | 5 U | 5 U | 0.0265 J | 3.1 U | 50 U | 1.5 | 204 | 164 | 0.16 U | 0.75 | 0.05 U |
| 6/12/2012 | 5 U | 5 U | 88 | 1 J | 5 U | 82 | 2.8 J | 34 | 130 | 5 U | 5 U | 1 J | 0.2 U | 3.2 U | 50 U | 0.98 J | 120 | 116 | 0.16 U | 0.57 | 0.05 U |
| 8/28/2013 | 5 U | 5 U | 110 | 1.4 J | 5 U | 190 | 9.5 | 100 | 460 | 5 U | 1.3 J | 5 U | | 4.3 U | 50 U | 1.2 | 106 J | 91.7 | 0.16 U | 0.35 | 0.05 U |
| 4/2/2014 | 1 U | 1 U | 240 | 2.3 | 1 U | 300 | 16 | 110 | 1100 | 1 UJ | 3.3 | 2.1 | 0.4 U | 4.1 U | 50 U | 2.3 | 128 J- | 63.3 J+ | 0.16 U | 0.13 | 0.05 U |
| 11/17/2015 | 1 U | 1 U | 150 | 1.6 | 1 U | 140 | 5.4 | 39 | 2000 | 1 U | 1.4 | 1.5 | 0.4 U | | 50 U | 1 U | 102 | 102 | 0.16 U | 0.61 | 0.05 U |
| 11/20/2015 | | | | | | | | | | | | | | 6 U | | | | | | | |
| 4/19/2016 | 1.0 U | 1.0 U | 340 D | 5.4 | 1.0 U | 340 D | 12 | 87 | 7500 | 1.0 U | 4.2 | 1.0 U | 0.400 U | 7.3 | 24.4 J | 1.2 | 151 | 70.2 | 0.10 U | 0.56 | 0.050 U |
| 9/13/2017 | 2.0 U | 2.0 U | 61 | 0.74 J | 2.0 U | 68 | 2.1 | 9.8 | 460 | 2.0 U | 0.88 J | 2.0 U | 0.100 U | 2.0 U | 12 | 0.76 J | 69 | 99 | 1.0 U | 0.25 U | 0.050 U |
| 4/24/2018 | 13 U | 13 U | 250 | 13 U | 13 U | 310 | 18 | 69 | 4200 | 13 U | 3.3 J | 13 U | 0.200 U | 4 | 4.2 J | 1.5 | 120 | 60 | 1.0 U | 0.13 J | 0.050 UJ |
| 12/3/2019 | 1.0 U | 0.47 J | 9.5 | 1.0 U | 1.0 U | 11 | 2.1 | 3.7 | 140 | 1.0 U | 1.0 U | 1.0 U | 0.20 U | 2.0 U | 4.1 J | 0.68 J | 89 | 97 | 1.0 U | 0.59 | |
| 3/18/2020 | 5.0 U | 0.52 J | 130 | 1.2 J | 5.0 U | 180 | 38 | 47 | 2600 | 5.0 U | 2.5 J | 5.0 U | 0.2 U | 1.3 J | 12 | 1.2 | 130 | 67 | 1.0 U | 0.098 J | 0.10 U |
| 12/6/2021 | 1.0 U | 1.0 U | 52 | 1.0 U | 1.0 U | 62 | 7.2 J | 7.1 | 470 | 1.0 U | 1 | 0.6 J | 0.05 U | 2.0 U | 17 | 1.5 | 76 | 87 | 1.0 U | 0.47 | 0.10 U |
| 5/10/2022 | 1.0 U | 1.0 U | 78 | 0.62 J | 1.0 U | 70 D | 32 | 32 | 2100 | 1.0 U | 1.9 | 1.0 U | 0.2 U | 6.0 U | 6.8 J | 1.0 U | 85 | 77 | 1.0 U | 0.24 | 0.10 U |

| | |
|---|---|
| J | Indicates an estimated value. |
| U | Analyte was not detected above the reporting limit. |
| UJ | The analyte was not detected. The reporting limit is an approximate value. |
| J- | Indicates estimated value, biased low. |
| J+ | Indicates estimated value, biased high. |
| D | Result reported from a secondary dilution analysis. |
| R | The sample results are rejected. |

# MONITORING WELL GROUNDWATER ANALYTICAL RESULT SUMMARY
## HYDE PARK FACILITY
## NIAGARA, NEW YORK

**Well ID:** **MW- 5B**

| Date | PCE (µg/L) | TCE (µg/L) | Cis-1,2-DCE (µg/L) | Trans-1,2-DCE (µg/L) | 1,1-DCE (µg/L) | Vinyl Chloride (µg/L) | Ethane (µg/L) | Ethene (µg/L) | Methane (µg/L) | 1,1,1-Trichloroethane (µg/L) | 1,1-Dichloroethane (µg/L) | Chloroethane (µg/L) | Dissolved Iron (mg/L) | BOD (mg/L) | COD (mg/L) | TOC (mg/L) | Chloride (mg/L) | Sulfate (mg/L) | Sulfide (mg/L) | Nitrate (mg/L) | Nitrite (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10/29/2007 | 5 U | 0.76 J | 61 | 0.66 J | 5 U | 49 | 1 U | 0.6 J | 86 | 5 U | 0.38 J | 5 U | | 2 U | 5 UJ | 4.26 | 83.2 | 230 | 1 U | | |
| 4/22/2008 | 5 U | 0.51 J | 58 | 0.5 J | 5 U | 57 | 0.37 J | 0.76 J | 80 | 5 U | 5 U | 5 U | | 2 U | 9.57 | 4.49 | 81 | 223 | 1.94 | 0.05 U | 0.05 U |
| 10/29/2009 | 5 U | 5 U | 39 | 5 U | 5 U | 37 | 5 U | 5 U | 50 | 5 U | 5 U | 5 U | | 1.7 U | 14.2 J | 4.9 | 112 | 229 J | 0.16 U | 0.1 U | 0.05 U |
| 5/13/2010 | 5 U | 1.1 J | 36 | 5 U | 5 U | 39 | 5 U | 5 U | 63 | 5 U | 5 U | 5 U | | 1.2 U | 15.6 J | 4.7 | 98.5 | 234 | 0.16 U | 0.1 U | 0.05 U |
| 11/9/2010 | 5 U | 5 U | 43 | 5 U | 5 U | 45 | 5 U | 1.1 J | 81 | 5 U | 5 U | 5 U | | | | 4.1 | 111 | 254 | | | |
| 10/21/2011 | 5 U | 5 U | 48 | 5 U | 5 U | 63 | 5 U | 5 U | 72 | 5 U | 5 U | 5 U | 0.0196 J | 2.5 U | 17.9 J | 4.9 | 130 | 358 | 0.16 U | 0.1 U | 0.05 U |
| 6/13/2012 | 5 U | 5 U | 33 | 5 U | 5 U | 34 | 5 U | 5 U | 50 | 5 U | 5 U | 5 U | 0.2 U | 3.7 U | 33.3 J | 3.4 | 187 | 255 | 0.16 U | 0.1 U | 0.05 U |
| 11/30/2012 | 5 U | 5 U | 39 | 5 U | 5 U | 44 | 5 U | 5 U | 66 | 5 U | 5 U | 5 U | | | | 3 | 166 | 267 | | | |
| 8/28/2013 | 5 U | 5 U | 32 | 5 U | 5 U | 44 | 5 U | 5 U | 41 | 5 U | 5 U | 5 U | | 2.8 U | 15.6 J | 4.5 | 119 J | 299 | 0.16 U | 0.1 U | 0.05 U |
| 4/3/2014 | 1 U | 1 | 16 | 1 U | 1 U | 29 | 5 U | 5 U | 63 | 1 UJ | 1 U | 1 U | 0.379 J | 4.4 U | 50 U | 5.3 | 100 | 240 | 0.16 U | 0.1 UJ | 0.05 U |
| 11/17/2015 | 1 U | 0.58 J | 34 | 1 U | 1 U | 65 | 5 U | 2.3 J | 120 | 1 U | 1 U | 1 U | 0.502 | 5.1 U | 17.5 J | 3.1 | 117 | 251 | 0.16 U | 0.1 U | 0.05 U |
| 4/19/2016 | 1.0 U | 1.0 U | 32 | 1.0 U | 1.0 U | 71 | 5.0 U | 1.6 J | 86 | 1.0 U | 1.0 U | 1.0 U | 0.332 J | 3.3 U | 24.4 J | 3 | 166 | 259 | 0.10 U | 0.10 U | 0.050 U |
| 9/13/2017 | 5.0 U | 5.0 U | 36 | 5.0 U | 5.0 U | 91 | 0.50 U | 2.2 | 110 | 5.0 U | 5.0 U | 5.0 U | 0.54 | 2.0 U | 17 | 3.4 | 110 | 240 | 1.0 U | 0.50 U | 0.050 U |
| 4/24/2018 | 1.0 U | 1.0 U | 32 | 1.0 U | 1.0 U | 78 | 1.0 U | 3.3 | 160 | 1.0 U | 0.3 J | 1.0 U | 0.4 | 2.0 U | 8.3 J | 3.6 | 110 | 240 | 1.0 U | 0.25 UJ | 0.050 UJ |
| 12/3/2019 | 2.0 U | 2.0 U | 32 | 2.0 U | 2.0 U | 90 | 0.66 J | 4.8 | 270 | 2.0 U | 2.0 U | 2.0 U | 0.41 | 2.0 U | 9.4 J | 3.3 | 110 | 240 | 1.1 | 0.25 U | |
| 3/18/2020 | 2.0 U | 2.0 U | 26 | 2.0 U | 2.0 U | 68 | 1.0 U | 2.9 | 160 | 2.0 U | 2.0 U | 2.0 U | 0.37 | 2.0 U | 10 | 3.2 | 140 | 220 | 1.0 U | 0.50 U | 0.10 U |
| 12/6/2021 | 2.0 U | 2.0 U | 40 | 2.0 U | 2.0 U | 140 | 7.5 U | 2.4 J | 300 | 2.0 U | 2.0 U | 2.0 U | 0.24 | 2.0 U | 35 | 4.5 | 120 | 230 | 1.0 U | 0.25 U | 0.25 U |
| 5/10/2022 | 1.0 U | 1.0 U | 35 | 1.0 U | 1.0 U | 71 D | 0.68 J | 3.2 | 250 | 1.0 U | 1.0 U | 1.0 U | 0.14 J | 12 U | 9.5 J | 2.6 | 140 | 200 | 1.0 U | 0.25 U | 0.25 U |

| | |
|---|---|
| J | Indicates an estimated value. |
| U | Analyte was not detected above the reporting limit. |
| UJ | The analyte was not detected. The reporting limit is an approximate value. |
| J- | Indicates estimated value, biased low. |
| J+ | Indicates estimated value, biased high. |
| D | Result reported from a secondary dilution analysis. |
| R | The sample results are rejected. |

## MONITORING WELL GROUNDWATER ANALYTICAL RESULT SUMMARY
## HYDE PARK FACILITY
## NIAGARA, NEW YORK

**Well ID:** **MW- 6**

| Date | PCE (µg/L) | TCE (µg/L) | Cis-1,2-DCE (µg/L) | Trans-1,2-DCE (µg/L) | 1,1-DCE (µg/L) | Vinyl Chloride (µg/L) | Ethane (µg/L) | Ethene (µg/L) | Methane (µg/L) | 1,1,1-Trichloroethane (µg/L) | 1,1-Dichloroethane (µg/L) | Chloroethane (µg/L) | Dissolved Iron (mg/L) | BOD (mg/L) | COD (mg/L) | TOC (mg/L) | Chloride (mg/L) | Sulfate (mg/L) | Sulfide (mg/L) | Nitrate (mg/L) | Nitrite (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11/1/2007 | 5 U | 5 U | 130 | 0.52 J | 5 U | 82 | | | | 5 U | 5 U | 5 U | | | | | | | | | |
| 4/29/2008 | 5 U | 5 U | 150 | 0.39 J | 5 U | 100 | | | | 5 U | 5 U | 5 U | | | | | | | | | |
| 10/30/2009 | 5 U | 5 U | 85 | 5 U | 5 U | 69 | | | | 5 U | 5 U | 5 U | | | | | | | | | |
| 5/12/2010 | 5 U | 5 U | 39 | 5 U | 5 U | 48 | 5 U | 23 | 310 | 5 U | 5 U | 5 U | | 3.6 U | 22.4 J | 3.9 | 140 J | 217 | 3.4 | 0.1 U | 0.05 U |
| 10/20/2011 | 5 U | 5 U | 33 | 5 U | 5 U | 57 | | | | 5 U | 5 U | 5 U | | | | | | | | | |
| 6/13/2012 | 5 U | 5 U | 30 | 5 U | 5 U | 47 | | | | 5 U | 5 U | 5 U | | | | | | | | | |
| 8/30/2013 | 5 U | 5 U | 24 | 5 U | 5 U | 42 | | | | 5 U | 5 U | 5 U | | | | | | | | | |
| 4/3/2014 | 1 U | 1 U | 18 | 1 U | 1 U | 39 | | | | 1 U | 1 U | 1 U | | | | | | | | | |
| 11/20/2015 | 1 U | 1 U | 20 | 1 U | 1 U | 57 | | | | 1 U | 1 U | 1 U | | | | | | | | | |
| 4/21/2016 | 1.0 U | 1.0 U | 18 | 1.0 U | 1.0 U | 59 | | | | 1.0 U | 1.0 U | 1.0 U | | | | | | | | | |
| 9/12/2017 | 5.0 U | 5.0 U | 16 | 5.0 U | 5.0 U | 79 | | | | 5.0 U | 5.0 U | 5.0 U | | | | | | | | | |
| 4/26/2018 | 1.0 U | 1.0 U | 12 | 1.0 U | 1.0 U | 48 | | | | 1.0 U | 1.0 U | 1.0 U | | | | | | | | | |
| 12/4/2019 | 1.0 U | 1.0 U | 10 | 1.0 U | 1.0 U | 78 | | | | 1.0 U | 1.0 U | 1.0 U | | | | | | | | | |
| 3/19/2020 | 1.0 U | 1.0 U | 11 | 1.0 U | 1.0 U | 72 | | | | 1.0 U | 1.0 U | 1.0 U | | | | | | | | | |
| 12/8/2021 | 2.0 U | 2.0 U | 13 | 2.0 U | 2.0 U | 98 | | | | 2.0 U | 2.0 U | 2.0 U | | | | | | | | | |
| 5/11/2022 | 1.0 U | 1.0 U | 12 | 1.0 U | 1.0 U | 61 DJ | | | | 1.0 U | 1.0 U | 1.0 U | | | | | | | | | |

| | |
|---|---|
| J | Indicates an estimated value. |
| U | Analyte was not detected above the reporting limit. |
| UJ | The analyte was not detected. The reporting limit is an approximate value. |
| J- | Indicates estimated value, biased low. |
| J+ | Indicates estimated value, biased high. |
| D | Result reported from a secondary dilution analysis. |
| R | The sample results are rejected. |

## MONITORING WELL GROUNDWATER ANALYTICAL RESULT SUMMARY
## HYDE PARK FACILITY
## NIAGARA, NEW YORK

**Well ID: MW- 7A**

| Date | PCE (µg/L) | TCE (µg/L) | Cis-1,2-DCE (µg/L) | Trans-1,2-DCE (µg/L) | 1,1-DCE (µg/L) | Vinyl Chloride (µg/L) | Ethane (µg/L) | Ethene (µg/L) | Methane (µg/L) | 1,1,1-Trichloroethane (µg/L) | 1,1-Dichloroethane (µg/L) | Chloro ethane (µg/L) | Dissolved Iron (mg/L) | BOD (mg/L) | COD (mg/L) | TOC (mg/L) | Chloride (mg/L) | Sulfate (mg/L) | Sulfide (mg/L) | Nitrate (mg/L) | Nitrite (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11/1/2007 | 25 U | 36 | 580 | 25 U | 9 J | 60 | 0.95 J | 8.5 | 10 | 25 U | 80 | 25 U | | 2 U | 7.97 J | 2.74 | 21 | 250 | 1 U | | |
| 4/28/2008 | 5 U | 210 | 1700 | 6.1 J | 24 | 130 | 0.44 J | 5.3 | 8.6 | 1.3 J | 220 | 5 U | | 2 U | 5.42 | 2.23 | 17.3 | 210 | 1 U | 0.05 U | 0.24 |
| 8/13/2008 | 13 U | 270 | 1800 | 5.9 J | 34 | 130 | 5 U | 7.2 | 21 | 4.1 J | 280 | | | | | 3.2 | 22.3 | 282 | | | |
| 10/8/2008 | 5 U | 58 | 1800 | 3.5 J | 25 | 210 | 5 U | 12 | 21 J | 5 U | 250 | 5 U | | | | 143 | 21.3 J | 60.4 | | | |
| 12/9/2008 | 10 U | 4.3 J | 1100 | 1.7 J | 9.6 J | 180 | 5 U | 27 | 24 | 10 U | 150 | 10 U | | | | 25.1 | 24.1 | 295 | | | |
| 1/27/2009 | 5 U | 3.2 J | 840 | 2.4 J | 7.6 | 390 | 5 U | 51 | 110 | 5 U | 230 | 5 U | | | | | | | | | |
| 3/17/2009 | 5 U | 2.9 J | 620 | 1.5 J | 3.6 J | 250 | 5 U | 69 | 210 | 5 U | 140 | 5 U | | | | 8.8 | 25 | 253 | | | |
| 10/15/2009 | 5 U | 2.7 J | 120 | 5 U | 5 U | 240 | 5 U | 110 | 760 | 5 U | 56 | 5 U | | | | 4.7 | 21.1 | 228 | | | |
| 10/30/2009 | 5 U | 1.8 J | 210 | 5 U | 5 U | 150 | 5 U | 51 | 260 | 5 U | 49 | 5 U | | 4.2 U | 23.3 J | 3.2 | 21.8 | 233 J | 2.2 | 0.1 U | 0.05 U |
| 11/18/2009 | | | | | | | | | | | | | | | | 1150 | | | | | |
| 12/14/2009 | 5 U | 5 U | 140 | 5 U | 5 U | 100 | 5.1 | 100 | 1900 | 5 U | 47 | 5 U | | | | 207 | 23.3 J | 56.2 J | | | |
| 2/9/2010 | 5 U | 5 U | 77 | 5 U | 5 U | 84 | 1.1 J | 92 | 1200 | 5 U | 48 | 5 U | | | | 40.1 J | 24.1 | 87.6 | | | |
| 4/1/2010 | 5 U | 5 U | 22 | 5 U | 5 U | 49 | | | | 5 UJ | 39 | 5 U | | | | | | | | | |
| 5/6/2010 | 5 U | 5 U | 65 | 5 U | 5 U | 50 | 5 U | 5 U | 15 U | 5 U | 33 | 5 U | | | | 95.5 | 20.9 J | 52.2 J | | | |
| 11/10/2010 | 5 U | 5 U | 44 | 5 U | 5 U | 18 | 43 J | 65 J | 16000 | 5 U | 15 | 23 | | | | 261 | 26.7 | 31.8 | | | |
| 10/27/2011 | 5 U | 5 U | 20 | 5 U | 5 U | 19 | 57 | 25 | 20000 | 5 U | 22 | 13 | 0.115 J | | | 25.1 | 28.7 | 57.1 | | | |
| 3/14/2012 | 25 U | 25 U | 11 J | 25 U | 25 U | 25 U | 20 | 8 | 6700 | 25 U | 18 J | 15 J | 4.09 | | | 1380 | 34.3 | 5 | | | |
| 6/14/2012 | 5 U | 1.2 J | 3.8 J | 5 U | 5 U | 5 U | 5.8 | 3.3 J | 6300 | 5 U | 9.1 | 22 | 3.6 | | | 573 | 24.3 | 5 U | | | |
| 11/28/2012 | 5 U | 5 U | 2.7 J | 5 U | 5 U | 1.3 J | 10 | 1.1 J | 16000 | 5 U | 13 | 16 | 0.691 | | | 204 | 26.2 | 5.7 | | | |
| 8/30/2013 | 5 U | 5 U | 3.9 J | 5 U | 5 U | 2.2 J | 11 | 3.5 J | 13000 | 5 U | 15 | 7.8 | | 277 J | 576 | 151 | 26 | 8.7 | 0.16 J | 0.1 U | 0.05 U |
| 1/15/2014 | 5 U | 5 U | 4 J | 5 U | 5 U | 1.8 J | 8.4 | 2.7 J | 17000 | 5 U | 16 | 13 | 39.4 | | | 1340 | 50.4 J+ | 5 U | 0.34 | | |
| 4/2/2014 | 1 U | 1 U | 3 | 1 U | 1 U | 1 | 6.3 | 1.2 J | 20000 | 1 U | 12 | 16 | 22.9 | 589 | 1250 | 453 | 25.5 | 2.3 J | 0.067 J | 0.1 U | 0.05 U |
| 10/9/2014 | 1 U | 1 U | 0.92 J | 1 U | 1 U | 0.94 J | 4.7 J | 5 U | 16000 | 1 U | 8.1 | 11 | 14.1 | | | 132 | 27.9 | 4 J | 0.11 J | | |
| 11/19/2015 | 1 U | 1 U | 1.5 | 1 U | 1 U | 3.1 | 2.8 J | 1.1 J | 5900 | 1 U | 11 | 4.8 | 7.85 | 99.3 | 293 J- | 84.3 | 24.6 | 20.2 | 0.22 | 0.1 U | 0.05 U |
| 4/20/2016 | 1.0 U | 1.0 U | 1.9 | 1.0 U | 1.0 U | 3.7 | 4 J | 1.3 J | 16000 D | 1.0 U | 12 | 4.2 | 2.18 | 62 | 217 | 50.1 | 27.4 | 5.1 | 0.5 | 0.10 U | 0.050 U |
| 9/12/2017 | 2.0 U | 2.0 U | 26 | 2.0 U | 2.0 U | 33 | 2.9 | 4.1 | 3400 D | 2.0 U | 61 J | 19 | 1.7 | 61 | 170 | 52 | 25 | 93 | 1.0 U | 0.25 U | 0.050 UJ |
| 4/25/2018 | 5.0 U | 5.0 U | 46 | 5.0 U | 5.0 U | 42 | 61 | 63 | 14000 | 5.0 U | 140 | 23 | 0.55 | 9.2 J | 97 | 32 | 25 | 56 | 1.1 | 0.25 U | 0.027 J |
| 12/4/2019 | 2.5 U | 2.5 U | 21 J | 2.5 U | 2.5 U | 35 J | 95 | 25 | 13000 D | 2.5 U | 69 | 44 | 1.5 | 14 J- | 42 | 17 | 12 | 70 | 1.0 U | 0.25 U | |
| 3/19/2020 | 2.0 U | 2.0 U | 50 | 2.0 U | 2.0 U | 45 | 80 | 20 | 16000 D | 2.0 U | 59 | 23 | 0.91 | | 36 | 12 | 8 | 82 | 2.1 | 0.50 UJ | 0.10 UJ |
| 12/8/2021 | 4.0 U | 7.3 | 150 | 4.0 U | 4.0 U | 150 | 170 U | 150 U | 13000 | 4.0 U | 90 | 16 | 1.5 | 7.9 | 36 | 14 | 14 | 89 | 0.8 J | 0.25 U | 0.25 U |
| 5/12/2022 | 1.0 U | 1.0 U | 17 | 1.0 U | 1.0 U | 33 | 53 | 46 | 13000 D | 1.0 U | 76 D | 16 | 0.95 | 6.7 | 39 | 7.4 | 11 | 120 | 3.1 | 0.10 UJ | 0.050 UJ |

| | |
|---|---|
| J | Indicates an estimated value. |
| U | Analyte was not detected above the reporting limit. |
| UJ | The analyte was not detected. The reporting limit is an approximate value. |
| J- | Indicates estimated value, biased low. |
| J+ | Indicates estimated value, biased high. |
| D | Result reported from a secondary dilution analysis. |
| R | The sample results are rejected. |

# MONITORING WELL GROUNDWATER ANALYTICAL RESULT SUMMARY
## HYDE PARK FACILITY
## NIAGARA, NEW YORK

**Well ID:** **MW- 7B**

| Date | PCE (µg/L) | TCE (µg/L) | Cis-1,2-DCE (µg/L) | Trans-1,2-DCE (µg/L) | 1,1-DCE (µg/L) | Vinyl Chloride (µg/L) | Ethane (µg/L) | Ethene (µg/L) | Methane (µg/L) | 1,1,1-Trichloroethane (µg/L) | 1,1-Dichloroethane (µg/L) | Chloroethane (µg/L) | Dissolved Iron (mg/L) | BOD (mg/L) | COD (mg/L) | TOC (mg/L) | Chloride (mg/L) | Sulfate (mg/L) | Sulfide (mg/L) | Nitrate (mg/L) | Nitrite (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11/1/2007 | 5 U | 5 U | 11 | 5 U | 5 U | 31 | 0.31 J | 1.9 | 220 | 5 U | 5 U | 5 U | | 2 U | 6.58 J | 3.41 | 157 | 298 | 1 U | | |
| 4/28/2008 | 5 U | 5 U | 10 | 5 U | 5 U | 45 | 0.44 J | 2.8 | 230 | 5 U | 5 U | 5 U | | 2 U | 11.6 | 3.45 | 130 | 278 | 1 U | 0.05 U | 0.05 U |
| 10/7/2008 | 5 UJ | 5 UJ | 19 J | 5 UJ | 5 UJ | 29 J | 5 U | 3.1 J | 220 J | 5 UJ | 5 UJ | 5 UJ | | | | 5 | 164 J | 271 | | | |
| 12/9/2008 | 5 U | 5 U | 21 | 5 U | 5 U | 33 | 5 U | 4.1 J | 250 | 5 U | 5 U | 5 U | | | | 9 | 153 | 384 | | | |
| 1/27/2009 | 5 U | 5 U | 13 | 5 U | 5 U | 29 | 5 U | 3.3 J | 220 | 5 U | 5 U | 5 U | | | | | | | | | |
| 3/17/2009 | 5 U | 5 U | 20 | 5 U | 5 U | 30 | 5 U | 2.1 J | 150 | 5 U | 5 U | 5 U | | | | 5.3 | 179 | 296 | | | |
| 10/15/2009 | 5 U | 5 U | 7.1 | 5 U | 5 U | 39 | 5 U | 3.3 J | 340 | 5 U | 5 U | 5 U | | | | 6.4 | 146 | 250 | | | |
| 10/30/2009 | 5 U | 5 U | 7.3 | 5 U | 5 U | 24 | | | | 5 U | 5 U | 5 U | | | | | | | | | |
| 12/14/2009 | 5 U | 5 U | 7.7 | 5 U | 5 U | 24 | 5 U | 3.6 J | 260 | 5 U | 5 U | 5 U | | | | 26.8 | 171 J | 220 J | | | |
| 2/9/2010 | 5 U | 5 U | 3.2 J | 5 U | 5 U | 21 | 5 U | 6.1 | 650 | 5 U | 5 U | 5 U | | | | 13.9 J | 157 | 248 | | | |
| 3/31/2010 | 5 U | 5 U | 3.8 J | 5 U | 5 U | 29 | | | | 5 U | 5 U | 5 U | | | | | | | | | |
| 5/6/2010 | 5 U | 5 U | 4.5 J | 5 U | 5 U | 31 | 5 U | 5 U | 15 U | 5 U | 5 U | 5 U | | | | 60.6 | 130 J | 244 J | | | |
| 11/11/2010 | 5 U | 5 U | 6.7 | 5 U | 5 U | 24 | 5 U | 4.2 J | 1200 | 5 U | 5 U | 5 U | | | | 17.5 | 168 | 239 | | | |
| 10/26/2011 | 5 U | 5 U | 6 | 5 U | 5 U | 25 | 5 U | 3.6 J | 3400 | 5 U | 5 U | 5 U | 0.0747 J | | | 8.4 | 168 | 218 J | | | |
| 3/15/2012 | 50 U | 50 U | 50 U | 50 U | 50 U | 11 J | 5 U | 9.3 | 4500 | 50 U | 50 U | 50 U | 0.0443 J | | | 68.1 | 153 | 122 | | | |
| 6/14/2012 | 5 U | 5 U | 1.6 J | 5 U | 5 U | 9.2 | 5 U | 7.9 | 2400 | 5 U | 5 U | 5 U | 0.2 U | | | 19.3 | 150 | 143 | | | |
| 11/27/2012 | 5 U | 5 U | 1.5 J | 5 U | 5 U | 9.5 | 5 U | 11 | 3300 | 5 U | 5 U | 5 U | 0.2 U | | | 8.7 | 173 | 178 | | | |
| 9/3/2013 | 5 U | 5 U | 1.2 J | 5 U | 5 U | 7.5 | 5 U | 11 | 6400 | 5 U | 5 U | 5 U | | 17.4 | 95 J | 11.5 | 146 J | 139 | 10.3 | 0.1 UJ | 0.05 U |
| 1/13/2014 | 5 U | 5 U | 5 U | 5 U | 5 U | 2 J | 5 U | 9.4 | 18000 | 5 U | 5 U | 5 U | 0.4 U | | | 70.1 | 145 | 61.7 | 47.9 | | |
| 4/2/2014 | 1 U | 1 U | 1 U | 1 U | 1 U | 5.5 | 5 U | 11 | 19000 | 1 U | 1 U | 1 U | 0.4 U | 366 | 772 | 132 | 136 | 117 | 33.3 | 1 U | 0.026 J |
| 10/10/2014 | 1 U | 1 U | 1.5 | 1 U | 1 U | 8 | 5 U | 7 | 13000 | 1 U | 1 U | 1 U | 0.4 U | | | 22.2 | 164 | 129 | 22.6 | | |
| 11/23/2015 | 1 U | 1 U | 1.2 | 1 U | 1 U | 6.1 | 5 U | 4.3 J | 11000 | 1 U | 1 U | 1 U | 0.4 U | 22.2 | 97.8 | 10.8 | 189 | 146 | 20.4 | 0.1 U | 0.05 U |
| 4/20/2016 | 1.0 U | 1.0 U | 0.82 J | 1.0 U | 1.0 U | 10 | 5.0 U | 5.6 | 5000 D | 1.0 U | 1.0 U | 1.0 U | 0.400 U | 27.1 | 142 | 6.9 | 172 | 162 | 16.5 | 0.10 U | 0.050 U |
| 9/12/2017 | 1.0 U | 1.0 U | 2.2 | 1.0 U | 1.0 U | 18 | 0.50 U | 1.9 | 370 | 1.0 U | 1.0 U | 1.0 U | 0.100 U | 9.6 | 41 | 4.8 | 170 | 180 | 1.1 | 0.25 U | 0.050 UJ |
| 4/25/2018 | 1.0 U | 1.0 U | 2.2 | 1.0 U | 1.0 U | 17 | 1.0 U | 6.4 | 240 | 1.0 U | 1.0 U | 1.0 U | 0.200 U | 2 | 29 | 4.7 | 140 | 260 | 1.0 U | 0.25 U | 0.050 U |
| 12/3/2019 | 1.0 U | 1.0 U | 1.3 | 1.0 U | 1.0 U | 10 | 0.58 J | 3.3 | 290 | 1.0 U | 1.0 U | 1.0 U | 0.20 U | 2.0 U | 12 | 3.3 | 180 | 190 | 7.1 | 0.25 U | |
| 3/19/2020 | 1.0 U | 1.0 U | 5.4 | 1.0 U | 1.0 U | 18 | 1.0 U | 6.4 | 230 | 1.0 U | 1.0 U | 1.0 U | 0.2 U | | 11 | 3.2 | 130 | 260 | 1.7 | 0.50 UJ | 0.10 UJ |
| 12/8/2021 | 1.0 U | 1.0 U | 1.5 | 1.0 U | 1.0 U | 18 | 7.5 U | 7.0 U | 160 | 1.0 U | 1.0 U | 1.0 U | 0.05 U | 2.0 U | 10 U | 4.6 | 240 | 200 | 0.8 J | 0.25 U | 0.25 U |
| 5/12/2022 | 1.0 U | 1.0 U | 1.9 | 1.0 U | 1.0 U | 12 | 0.61 J | 3.4 | 170 | 1.0 U | 1.0 U | 1.0 U | 0.2 U | 6.0 U | 16 | 3 | 170 | 270 | 0.73 J | 0.10 UJ | 0.050 UJ |

| | |
|---|---|
| J | Indicates an estimated value. |
| U | Analyte was not detected above the reporting limit. |
| UJ | The analyte was not detected. The reporting limit is an approximate value. |
| J- | Indicates estimated value, biased low. |
| J+ | Indicates estimated value, biased high. |
| D | Result reported from a secondary dilution analysis. |
| R | The sample results are rejected. |

## MONITORING WELL GROUNDWATER ANALYTICAL RESULT SUMMARY
## HYDE PARK FACILITY
## NIAGARA, NEW YORK

**Well ID:** **MW- 8**

| Date | PCE (µg/L) | TCE (µg/L) | Cis-1,2-DCE (µg/L) | Trans-1,2-DCE (µg/L) | 1,1-DCE (µg/L) | Vinyl Chloride (µg/L) | Ethane (µg/L) | Ethene (µg/L) | Methane (µg/L) | 1,1,1-Trichloroethane (µg/L) | 1,1-Dichloroethane (µg/L) | Chloroethane (µg/L) | Dissolved Iron (mg/L) | BOD (mg/L) | COD (mg/L) | TOC (mg/L) | Chloride (mg/L) | Sulfate (mg/L) | Sulfide (mg/L) | Nitrate (mg/L) | Nitrite (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10/31/2007 | 5 U | 5 U | 2.2 J | 5 U | 5 U | 1.8 J | | | | 5 U | 5 U | 5 U | | | | | | | | | |
| 4/25/2008 | 5 U | 5 U | 2.5 J | 5 U | 5 U | 2.6 | | | | 5 U | 5 U | 5 U | | | | | | | | | |
| 11/2/2009 | 5 U | 5 U | 2.1 J | 5 U | 5 U | 2.6 J | | | | 5 U | 5 U | 5 U | | | | | | | | | |
| 5/12/2010 | 5 U | 5 U | 2.3 J | 5 U | 5 U | 2.2 J | 5 U | 5 U | 140 | 5 U | 5 U | 5 U | | | | | | | | | |
| 10/24/2011 | 5 U | 5 U | 1.9 J | 5 U | 5 U | 2.1 J | | | | 5 U | 5 U | 5 U | | | | | | | | | |
| 6/12/2012 | 5 U | 5 U | 1.6 J | 5 U | 5 U | 1.1 J | | | | 5 U | 5 U | 5 U | | | | | | | | | |
| 8/30/2013 | 5 U | 5 U | 1.7 J | 5 U | 5 U | 1.8 J | | | | 5 U | 5 U | 5 U | | | | | | | | | |
| 4/3/2014 | 1 U | 1 U | 1.6 | 1 U | 1 U | 1.5 | | | | 1 U | 1 U | 1 U | | | | | | | | | |
| 11/23/2015 | 1 U | 1 U | 1.7 | 1 U | 1 U | 1.9 | | | | 1 U | 1 U | 1 U | | | | | | | | | |
| 4/22/2016 | 1.0 U | 1.0 U | 1.9 | 1.0 U | 1.0 U | 1.8 | | | | 1.0 U | 1.0 U | 1.0 U | | | | | | | | | |
| 9/13/2017 | 1.0 U | 1.0 U | 1.7 | 1.0 U | 1.0 U | 1.4 | | | | 1.0 U | 1.0 U | 1.0 U | | | | | | | | | |
| 4/23/2018 | 1.0 U | 1.0 U | 1.9 | 1.0 U | 1.0 U | 1.6 | | | | 1.0 U | 1.0 U | 1.0 U | | | | | | | | | |

| | |
|---|---|
| J | Indicates an estimated value. |
| U | Analyte was not detected above the reporting limit. |
| UJ | The analyte was not detected. The reporting limit is an approximate value. |
| J- | Indicates estimated value, biased low. |
| J+ | Indicates estimated value, biased high. |
| D | Result reported from a secondary dilution analysis. |
| R | The sample results are rejected. |

## MONITORING WELL GROUNDWATER ANALYTICAL RESULT SUMMARY
## HYDE PARK FACILITY
## NIAGARA, NEW YORK

**Well ID:** **MW-10A**

| Date | PCE (µg/L) | TCE (µg/L) | Cis-1,2-DCE (µg/L) | Trans-1,2-DCE (µg/L) | 1,1-DCE (µg/L) | Vinyl Chloride (µg/L) | Ethane (µg/L) | Ethene (µg/L) | Methane (µg/L) | 1,1,1-Trichloroethane (µg/L) | 1,1-Dichloroethane (µg/L) | Chloroethane (µg/L) | Dissolved Iron (mg/L) | BOD (mg/L) | COD (mg/L) | TOC (mg/L) | Chloride (mg/L) | Sulfate (mg/L) | Sulfide (mg/L) | Nitrate (mg/L) | Nitrite (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10/29/2007 | 5 U | 5 U | 300 | 12 | 0.68 J | 67 | 0.52 J | 4.6 | 19 | 5 U | 4.5 J | 5 U |  | 2 U | 8.32 J | 1.93 | 815 | 332 | 1 U |  |  |
| 4/22/2008 | 5 U | 5 U | 390 | 10 | 1.6 J | 97 | 4.4 | 11 | 60 | 5 U | 5.8 | 5 U |  | 2 U | 10.1 | 2.99 | 884 | 294 | 1 U | 0.05 U | 0.05 U |
| 10/29/2009 | 5 U | 5 U | 400 | 9.4 | 1.5 J | 140 | 5 U | 10 | 38 | 5 U | 6.4 | 5 U |  | 1.8 U | 46.2 J | 1.6 | 903 | 279 J | 0.16 U | 0.1 U | 0.05 U |
| 5/11/2010 | 5 U | 5 U | 390 | 7.6 | 1.3 J | 140 | 5 U | 17 | 71 | 5 U | 5.7 | 5 U |  | 1.7 U | 38.4 J | 1.5 | 784 | 250 | 0.16 U | 0.1 U | 0.05 U |
| 10/25/2011 | 5 U | 5 U | 630 | 11 | 1.2 J | 250 | 5 U | 29 | 66 | 5 U | 7.7 | 5 U | 0.0808 J | 2.8 U | 27 J | 1.9 | 770 J | 254 J | 0.16 U | 0.1 U | 0.05 U |
| 6/13/2012 | 5 U | 5 U | 620 | 13 | 1 J | 170 | 1.5 J | 43 | 120 | 5 U | 7 | 5 U | 0.2 U | 3.2 U | 31 J | 0.98 J | 621 | 264 | 0.16 U | 0.1 U | 0.05 U |
| 8/29/2013 | 5 U | 5 U | 570 | 9.9 | 5 U | 130 | 5 U | 28 | 130 | 5 U | 5.6 | 5 U |  | 2.9 UJ | 27 J | 1.8 | 481 | 193 | 0.16 U | 0.1 U | 0.05 U |
| 4/2/2014 | 1 U | 1 U | 560 | 8 | 0.6 J | 95 | 5 U | 24 | 170 | 1 UJ | 4.4 | 1 U | 0.719 | 3.9 U | 17.2 J | 2 | 438 J- | 228 J+ | 0.16 U | 0.1 U | 0.05 U |
| 11/18/2015 | 1 U | 1 U | 710 | 9.1 | 0.52 J | 130 | 5 U | 17 | 220 | 1 U | 5.3 | 1 U | 1.81 | 2.9 U | 22.1 J | 0.87 J | 434 | 170 | 0.16 U | 0.1 U | 0.05 U |
| 4/19/2016 | 1.0 U | 0.57 J | 960 D | 12 | 0.71 J | 83 | 5.0 U | 6.4 | 88 | 1.0 U | 5.4 | 1.0 U | 0.831 | 3.4 U | 33.6 J | 0.9 J | 523 | 216 | 0.10 U | 0.10 U | 0.050 U |
| 9/13/2017 | 20 U | 20 U | 590 | 6.8 J | 20 U | 130 | 0.38 J | 11 | 400 | 20 U | 20 UJ | 20 U | 1.4 | 2.0 U | 13 | 1.1 | 310 | 170 | 1.0 U | 0.50 U | 0.050 U |
| 4/25/2018 | 20 U | 20 U | 540 | 20 U | 20 U | 94 | 1.0 U | 12 | 640 | 20 U | 20 U | 20 U | 1.2 | 2.0 U | 10 | 1.4 | 260 | 160 | 1.0 U | 0.25 U | 0.050 U |
| 12/4/2019 | 25 U | 5 J | 500 | 25 U | 25 U | 130 | 2.4 | 36 | 2000 | 25 U | 25 U | 25 U | 1.1 | 2.0 UJ | 4.2 J | 1.4 | 200 | 150 | 1.0 U | 0.25 U |  |
| 3/18/2020 | 20 U | 7.6 J | 570 | 4.4 J | 20 U | 130 | 2.7 | 34 | 2400 | 20 U | 20 U | 20 U | 0.88 | 2.0 U | 8.3 J | 1.4 | 190 | 120 | 1.0 U | 0.50 U | 0.10 U |
| 12/6/2021 | 25 U | 13 J | 650 | 25 U | 25 U | 180 | 7.5 U | 14 | 880 | 25 U | 25 U | 25 U | 1.4 | 2.0 U | 26 | 2 | 220 | 150 | 1.0 U | 0.25 U | 0.25 U |
| 5/10/2022 | 13 U | 8.7 J | 540 | 13 U | 13 U | 85 | 2.2 | 20 | 1800 | 13 U | 13 U | 13 U | 0.84 | 6.0 U | 2.8 J | 1.0 U | 160 | 140 | 1.0 U | 0.25 U | 0.25 U |

| | |
|---|---|
| J | Indicates an estimated value. |
| U | Analyte was not detected above the reporting limit. |
| UJ | The analyte was not detected. The reporting limit is an approximate value. |
| J- | Indicates estimated value, biased low. |
| J+ | Indicates estimated value, biased high. |
| D | Result reported from a secondary dilution analysis. |
| R | The sample results are rejected. |

# MONITORING WELL GROUNDWATER ANALYTICAL RESULT SUMMARY
# HYDE PARK FACILITY
# NIAGARA, NEW YORK

**Well ID:** **MW-10B**

| Date | PCE (µg/L) | TCE (µg/L) | Cis-1,2-DCE (µg/L) | Trans-1,2-DCE (µg/L) | 1,1-DCE (µg/L) | Vinyl Chloride (µg/L) | Ethane (µg/L) | Ethene (µg/L) | Methane (µg/L) | 1,1,1-Trichloroethane (µg/L) | 1,1-Dichloroethane (µg/L) | Chloroethane (µg/L) | Dissolved Iron (mg/L) | BOD (mg/L) | COD (mg/L) | TOC (mg/L) | Chloride (mg/L) | Sulfate (mg/L) | Sulfide (mg/L) | Nitrate (mg/L) | Nitrite (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10/29/2007 | 5 U | 0.7 J | 220 | 1.9 J | 0.38 J | 130 | 0.43 J | 1.5 | 100 | 5 U | 0.69 J | 5 U | | 2 U | 5 UJ | 3.81 | 226 | 236 | 1 U | | |
| 4/22/2008 | 5 U | 0.46 J | 180 | 1.3 J | 5 U | 76 | 0.48 J | 1 J | 96 | 5 U | 0.54 J | 5 U | | 2 U | 12.7 | 4.22 | 87.4 | 198 | 1 U | 0.05 U | 0.05 U |
| 4/23/2008 | | | | | | | | | | | | | | | | | | | | | |
| 10/16/2009 | 5 U | 5 U | 420 | 3.1 J | 5 U | 120 | 5 U | 2.7 J | 110 | 5 U | 5 U | 5 U | | | | 3.8 | 121 | 239 | | | |
| 10/29/2009 | 5 U | 5 U | 370 | 3.8 J | 5 U | 150 | 5 U | 2.2 J | 94 | 5 U | 5 U | 5 U | | 2.1 U | 16.5 J | 4.6 | 107 | 245 J | 0.16 U | 0.1 U | 0.05 U |
| 12/16/2009 | 5 U | 5 U | 750 | 9 | 5 U | 260 | 5 U | 12 | 110 | 5 U | 5 U | 5 U | | | | 4.2 | 123 J | 268 J | | | |
| 2/10/2010 | 5 U | 5 U | 300 | 4 J | 5 U | 120 | 5 U | 3.7 J | 92 | 5 U | 5 U | 5 U | | | | 4.2 J | 87.5 | 253 | | | |
| 3/30/2010 | 5 U | 5 U | 270 | 3.1 J | 5 U | 90 | | | | 5 U | 5 U | 5 U | | | | | | | | | |
| 5/6/2010 | 5 U | 5 U | 220 | 2 J | 5 U | 83 | 5 U | 5 U | 15 U | 5 U | 5 U | 5 U | | 3.5 U | 50 U | 4.9 | 89.5 J | 244 J | 0.071 J | 0.1 U | 0.05 U |
| 11/9/2010 | 5 U | 5 U | 1100 | 13 | 1.9 J | 200 | 1.8 J | 13 | 130 | 5 U | 5 U | 5 U | | | | 3.2 | 272 | 225 | | | |
| 10/26/2011 | 10 U | 10 U | 960 | 11 | 1.8 J | 180 | 2.7 J | 24 | 300 | 10 U | 10 U | 10 U | 0.0459 J | 3.5 U | 13.4 J | 3.4 | 189 | 259 J | 0.16 U | 0.1 U | 0.05 U |
| 3/12/2012 | 5 U | 5 U | 260 | 3 J | 5 U | 49 | 5 U | 1.2 J | 53 | 5 U | 5 U | 5 U | 0.2 U | | | 3.8 | 104 | 245 | | | |
| 6/14/2012 | 5 U | 5 U | 280 | 1.7 J | 5 U | 110 | 5 U | 5.7 | 120 | 5 U | 5 U | 5 U | 0.2 U | 3.3 U | 12.9 J | 3.8 | 141 | 261 | 0.16 U | 0.1 U | 0.05 U |
| 11/27/2012 | 5 U | 5 U | 630 | 5.8 | 5 U | 130 | 5 U | 11 | 160 | 5 U | 5 U | 5 U | 0.2 U | | | 3 | 194 | 265 | | | |
| 8/29/2013 | 5 U | 5 U | 230 | 1.5 J | 5 U | 120 | 5 U | 9.2 | 220 | 5 U | 5 U | 5 U | | 3.1 UJ | 24.7 J | 2 | 156 | 246 | 0.16 U | 0.1 U | 0.05 U |
| 1/17/2014 | 5 U | 5 U | 150 | 5 U | 5 U | 27 | 5 U | 2 J | 38 | 5 U | 5 U | 5 U | 0.0884 J | | | 7.9 | 128 | 250 | 0.16 U | | |
| 4/2/2014 | 1 U | 1 U | 190 | 0.7 J | 1 U | 22 | 5 U | 2.3 J | 38 | 1 U | 1 U | 1 U | 0.076 J | 3.2 U | 50 U | 4.8 | 133 | 256 | 0.16 U | 0.1 U | 0.05 U |
| 10/14/2014 | 1 U | 1 U | 160 | 1 U | 1 U | 89 | 1.1 J | 210 | 1100 | 1 UJ | 1 U | 1 U | 0.05 J | | | 5 | 137 | 215 | 1.3 | | |
| 11/16/2015 | 1 U | 1 U | 190 | 0.68 J | 1 U | 190 | 2.1 J | 190 | 2900 | 1 U | 0.9 J | 1 U | 0.4 U | 6 U | 17.5 J | 3 | 145 | 207 | 0.71 | 0.1 U | 0.05 U |
| 4/19/2016 | 1.0 U | 1.0 U | 220 | 1.1 | 1.0 U | 6.1 | 5.0 U | 5.0 U | 9.1 | 1.0 U | 1.0 U | 1.0 U | 0.400 U | 3.6 U | 26.7 J | 2.9 | 160 | 272 | 0.10 U | 0.087 J | 0.050 U |
| 9/13/2017 | 10 U | 10 U | 360 | 10 U | 10 U | 270 | 4.5 | 130 | 3900 | 10 U | 10 UJ | 10 U | 0.24 | 2.0 U | 17 | 3.2 | 150 | 230 | 1.0 U | 0.50 U | 0.050 U |
| 4/25/2018 | 8.0 U | 8.0 U | 210 | 8.0 U | 8.0 U | 12 | 1.0 U | 1.0 U | 25 | 8.0 U | 8.0 U | 8.0 U | 0.14 J | 2.4 UJ | 10 U | 3.6 | 130 | 240 | 1.0 U | 0.25 U | 0.050 U |
| 12/4/2019 | 20 U | 20 U | 420 | 4 J | 20 U | 180 | 1.8 | 27 | 1500 | 20 U | 20 U | 20 U | 0.68 | 2.0 U | 10 U | 3 | 220 | 260 | 1.0 U | 0.25 U | |
| 3/18/2020 | 5.0 U | 5.0 U | 210 | 5.0 U | 5.0 U | 23 | 1.0 U | 1.9 | 78 | 5.0 U | 5.0 U | 5.0 U | 0.086 J | 2.0 U | 12 | 3.2 | 140 | 230 | 1.0 U | 0.50 U | 0.10 U |
| 12/6/2021 | 10 U | 10 U | 220 | 10 U | 10 U | 370 | 170 U | 150 U | 1900 | 10 U | 10 U | 10 U | 0.33 | 2.0 U | 40 | 4.6 | 140 | 220 | 1.0 U | 0.25 U | 0.25 U |
| 5/10/2022 | 6.3 U | 6.3 U | 320 | 6.3 U | 6.3 U | 140 | 1.1 | 25 | 2100 | 6.3 U | 6.3 U | 6.3 U | 0.19 J | 12 U | 11 | 2.9 | 140 | 220 | 1.0 U | 0.25 U | 0.25 U |

| | |
|---|---|
| J | Indicates an estimated value. |
| U | Analyte was not detected above the reporting limit. |
| UJ | The analyte was not detected. The reporting limit is an approximate value. |
| J- | Indicates estimated value, biased low. |
| J+ | Indicates estimated value, biased high. |
| D | Result reported from a secondary dilution analysis. |
| R | The sample results are rejected. |

# MONITORING WELL GROUNDWATER ANALYTICAL RESULT SUMMARY
# HYDE PARK FACILITY
# NIAGARA, NEW YORK

**Well ID:** **MW-11A**

| Date | PCE (µg/L) | TCE (µg/L) | Cis-1,2-DCE (µg/L) | Trans-1,2-DCE (µg/L) | 1,1-DCE (µg/L) | Vinyl Chloride (µg/L) | Ethane (µg/L) | Ethene (µg/L) | Methane (µg/L) | 1,1,1-Trichloroethane (µg/L) | 1,1-Dichloroethane (µg/L) | Chloro ethane (µg/L) | Dissolved Iron (mg/L) | BOD (mg/L) | COD (mg/L) | TOC (mg/L) | Chloride (mg/L) | Sulfate (mg/L) | Sulfide (mg/L) | Nitrate (mg/L) | Nitrite (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10/29/2007 | 5 U | 5 U | 5 U | 5 U | 5 U | 2 U | | | | 5 U | 5 U | 5 U | | | | | | | | | |
| 4/22/2008 | 5 U | 5 U | 5 U | 5 U | 5 U | 0.7 J | | | | 5 U | 5 U | 5 U | | | | | | | | | |
| 10/30/2009 | 5 U | 5 U | 5 U | 5 U | 5 U | 5 U | | | | 5 U | 5 U | 5 U | | | | | | | | | |
| 5/11/2010 | 5 U | 5 U | 5 U | 5 U | 5 U | 3.2 J | 5 U | 5 U | 51 | 5 U | 5 U | 5 U | | | | | | | | | |

| | |
|---|---|
| J | Indicates an estimated value. |
| U | Analyte was not detected above the reporting limit. |
| UJ | The analyte was not detected. The reporting limit is an approximate value. |
| J- | Indicates estimated value, biased low. |
| J+ | Indicates estimated value, biased high. |
| D | Result reported from a secondary dilution analysis. |
| R | The sample results are rejected. |

# MONITORING WELL GROUNDWATER ANALYTICAL RESULT SUMMARY
## HYDE PARK FACILITY
## NIAGARA, NEW YORK

**Well ID:** **MW-11B**

| Date | PCE (µg/L) | TCE (µg/L) | Cis-1,2-DCE (µg/L) | Trans-1,2-DCE (µg/L) | 1,1-DCE (µg/L) | Vinyl Chloride (µg/L) | Ethane (µg/L) | Ethene (µg/L) | Methane (µg/L) | 1,1,1-Trichloroethane (µg/L) | 1,1-Dichloroethane (µg/L) | Chloroethane (µg/L) | Dissolved Iron (mg/L) | BOD (mg/L) | COD (mg/L) | TOC (mg/L) | Chloride (mg/L) | Sulfate (mg/L) | Sulfide (mg/L) | Nitrate (mg/L) | Nitrite (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10/29/2007 | 5 U | 5 U | 140 | 1 J | 5 U | 80 | | | | 5 U | 0.39 J | 5 U | | | | | | | | | |
| 4/22/2008 | 5 U | 5 U | 100 | 0.77 J | 5 U | 64 | | | | 5 U | 5 U | 5 U | | | | | | | | | |
| 3/18/2009 | | | | | | | | | | | | | | | | 3.8 | | | | | |
| 10/16/2009 | 5 U | 5 U | 64 | 5 U | 5 U | 73 | 5 U | 14 | 170 | 5 U | 5 U | 5 U | | | | 3.4 | 172 | 221 | | | |
| 10/30/2009 | 5 U | 5 U | 56 | 5 U | 5 U | 48 | 5 U | 15 | 150 | 5 U | 5 U | 5 U | | 1.8 U | 21 J | 3.4 | 165 | 207 J | 0.3 | 0.1 U | 0.05 U |
| 12/16/2009 | 5 U | 5 U | 5.3 | 5 U | 5 U | 17 | 5 U | 81 | 190 | 5 U | 5 U | 5 U | | | | 7.4 | 148 J | 221 J | | | |
| 2/10/2010 | 5 U | 5 U | 2.3 J | 5 U | 5 U | 11 | 5 U | 130 | 760 | 5 U | 5 U | 5 U | | | | 11.7 J | 146 | 50.2 | | | |
| 3/30/2010 | 5 U | 5 U | 2.1 J | 5 U | 5 U | 7.1 | | | | 5 U | 5 U | 5 U | | | | | | | | | |
| 5/6/2010 | 5 U | 5 U | 1.9 J | 5 U | 5 U | 7.4 | 5 U | 5 U | 15 U | 5 U | 1.3 J | 5 U | | 64.7 J | 132 | 14.1 | 114 J | 101 J | 48.3 | 0.1 U | 0.05 U |
| 11/9/2010 | 5 U | 5 U | 1.4 J | 5 U | 5 U | 4.3 J | 5 U | 57 | 1100 | 5 U | 1.2 J | 5 U | | | | 3.9 | 125 | 208 | | | |
| 10/26/2011 | 5 U | 5 U | 2.2 J | 5 U | 5 U | 4.6 J | 5 U | 90 | 1500 | 5 U | 1.8 J | 5 U | 0.0859 J | 8.9 | 31.5 J | 3.8 | 157 | 245 J | 8.5 | 0.043 J | 0.05 U |
| 3/12/2012 | 5 U | 5 U | 1.4 J | 5 U | 5 U | 6.7 | 1.3 J | 72 | 5200 | 5 U | 1.5 J | 5 U | 0.0711 J | | | 9.5 | 117 | 118 | | | |
| 6/14/2012 | 5 U | 5 U | 1.8 J | 5 U | 5 U | 6.1 | 2.6 J | 110 | 7400 | 5 U | 1.4 J | 5 U | 0.2 U | 32 | 76.5 | 4.3 | 121 | 135 | 44.4 | 0.1 U | 0.05 U |
| 11/27/2012 | 5 U | 5 U | 0.83 J | 5 U | 5 U | 2.5 J | 3.9 J | 130 | 6800 | 5 U | 1.4 J | 5 U | 0.2 U | | | 3.9 | 143 | 164 | | | |
| 8/29/2013 | 5 U | 5 U | 5 U | 5 U | 5 U | 1.4 J | | | | 5 U | 1.9 J | 5 U | | | | | | | | | |
| 1/14/2014 | 5 U | 5 U | 5 U | 1.1 J | 5 U | 1.2 J | 4 J | 260 | 10000 | 5 U | 2.5 J | 5 U | 0.4 U | | | 8 | 141 | 120 | 23.8 | | |
| 4/2/2014 | 1 U | 1 U | 1 U | 0.92 J | 1 U | 1.2 | 3.5 J | 280 | 8300 | 1 U | 2 | 1 U | 0.4 U | | | 5.2 | 141 | 158 | 27.8 | | |
| 10/14/2014 | 1 U | 1 U | 1 U | 0.66 J | 1 U | 2.5 | 1.4 J | 86 | 4200 | 1 UJ | 1.2 | 1 U | 0.4 U | | | 5.3 | 143 | 160 | 11.1 | | |
| 11/17/2015 | 1 U | 1 U | 0.56 J | 0.57 J | 1 U | 1.7 | | | | 1 U | 1 | 1 U | | | | | | | | | |
| 4/22/2016 | 1.0 U | 1.0 U | 0.54 J | 0.76 J | 1.0 U | 9.7 | | | | 1.0 U | 1.7 | 1.0 U | | | | | | | | | |
| 9/14/2017 | 1.0 U | 1.0 U | 1.1 | 1.0 U | 1.0 U | 6.5 | | | | 1.0 U | 0.95 J | 1.0 U | | | | | | | | | |
| 4/24/2018 | 1.0 U | 1.0 U | 0.65 J | 0.74 J | 1.0 U | 1.9 | | | | 1.0 U | 1.9 | 1.0 U | | | | | | | | | |

| | |
|---|---|
| J | Indicates an estimated value. |
| U | Analyte was not detected above the reporting limit. |
| UJ | The analyte was not detected. The reporting limit is an approximate value. |
| J- | Indicates estimated value, biased low. |
| J+ | Indicates estimated value, biased high. |
| D | Result reported from a secondary dilution analysis. |
| R | The sample results are rejected. |

# MONITORING WELL GROUNDWATER ANALYTICAL RESULT SUMMARY
## HYDE PARK FACILITY
## NIAGARA, NEW YORK

**Well ID:** **MW-12A**

| Date | PCE (µg/L) | TCE (µg/L) | Cis-1,2-DCE (µg/L) | Trans-1,2-DCE (µg/L) | 1,1-DCE (µg/L) | Vinyl Chloride (µg/L) | Ethane (µg/L) | Ethene (µg/L) | Methane (µg/L) | 1,1,1-Trichloroethane (µg/L) | 1,1-Dichloroethane (µg/L) | Chloroethane (µg/L) | Dissolved Iron (mg/L) | BOD (mg/L) | COD (mg/L) | TOC (mg/L) | Chloride (mg/L) | Sulfate (mg/L) | Sulfide (mg/L) | Nitrate (mg/L) | Nitrite (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10/29/2007 | 5 U | 5 U | 150 | 1.3 J | 0.49 J | 39 | | | | 5 U | 3.2 J | 5 U | | | | | | | | | |
| 4/22/2008 | 5 U | 5 U | 130 | 1 J | 0.32 J | 23 | | | | 5 U | 2 J | 5 U | | | | | | | | | |
| 11/2/2009 | 5 U | 5 U | 64 | 5 U | 5 U | 38 | | | | 5 U | 2.7 J | 5 U | | | | | | | | | |
| 5/11/2010 | 5 U | 5 U | 16 | 5 U | 5 U | 16 | 5 U | 14 | 140 | 5 U | 1.6 J | 5 U | | | | | | | | | |
| 10/20/2011 | 5 U | 5 U | 19 | 5 U | 5 U | 16 | | | | 5 U | 1.8 J | 5 U | | | | | | | | | |
| 6/13/2012 | 5 U | 5 U | 19 | 5 U | 5 U | 13 | | | | 5 U | 1.8 J | 5 U | | | | | | | | | |
| 8/29/2013 | 5 U | 5 U | 22 | 5 U | 5 U | 14 | 5.6 | 7.2 | 210 | 5 U | 1.9 J | 5 U | | 4.4 U | 311 | 5.5 | 80.7 | 204 | 0.16 U | 0.1 U | 0.05 U |
| 4/3/2014 | 1 U | 1 U | 8.9 | 1 U | 1 U | 6.8 | 5 U | 2.4 J | 140 | 1 U | 0.89 J | 1 U | 0.962 | 4.7 U | 15 J | 5.6 | 69 | 179 | 0.16 U | 0.14 J- | 0.05 U |
| 11/17/2015 | 1 U | 1 U | 1.6 | 1 U | 1 U | 9.6 | 5 U | 5 U | 140 | 1 U | 0.7 J | 1 U | 2.27 | 3.8 U | 26.7 J | 7.7 | 63.6 | 119 | 0.079 J | 0.1 U | 0.05 U |
| 4/22/2016 | 1.0 U | 1.0 U | 9.5 | 1.0 U | 1.0 U | 8.8 | 5.0 U | 1.8 J | 170 | 1.0 U | 1.1 | 1.0 U | 0.847 | 3.4 UJ | 19.8 J | 3.4 | 96 | 192 | 0.10 U | 0.10 U | 0.050 U |
| 9/14/2017 | 1.0 U | 1.0 U | 21 | 0.34 J | 1.0 U | 13 | 0.31 J | 2.7 | 210 | 1.0 U | 1.6 | 1.0 U | 1.5 | 2.0 U | 49 | 4.2 | 330 | 650 | 1.0 U | 1.0 U | 0.050 U |
| 4/24/2018 | 1.0 U | 1.0 U | 16 | 1.0 U | 1.0 U | 9.2 | 1.0 U | 2 | 200 | 1.0 U | 0.91 J | 1.0 U | 0.6 | 2.0 U | 11 | 3.9 | 82 | 190 | 1.0 U | 0.25 UJ | 0.050 UJ |

| | |
|---|---|
| J | Indicates an estimated value. |
| U | Analyte was not detected above the reporting limit. |
| UJ | The analyte was not detected. The reporting limit is an approximate value. |
| J- | Indicates estimated value, biased low. |
| J+ | Indicates estimated value, biased high. |
| D | Result reported from a secondary dilution analysis. |
| R | The sample results are rejected. |

## MONITORING WELL GROUNDWATER ANALYTICAL RESULT SUMMARY
## HYDE PARK FACILITY
## NIAGARA, NEW YORK

**Well ID:** **MW-12B**

| Date | PCE (µg/L) | TCE (µg/L) | Cis-1,2-DCE (µg/L) | Trans-1,2-DCE (µg/L) | 1,1-DCE (µg/L) | Vinyl Chloride (µg/L) | Ethane (µg/L) | Ethene (µg/L) | Methane (µg/L) | 1,1,1-Trichloroethane (µg/L) | 1,1-Dichloroethane (µg/L) | Chloroethane (µg/L) | Dissolved Iron (mg/L) | BOD (mg/L) | COD (mg/L) | TOC (mg/L) | Chloride (mg/L) | Sulfate (mg/L) | Sulfide (mg/L) | Nitrate (mg/L) | Nitrite (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10/29/2007 | 5 U | 5 U | 110 | 1 J | 5 U | 76 | | | | 5 U | 1.8 J | 5 U | | | | | | | | | |
| 4/21/2008 | 5 U | 5 U | 140 | 1.6 J | 0.31 J | 70 | | | | 5 U | 1.6 J | 5 U | | | | | | | | | |
| 11/2/2009 | 5 U | 5 U | 2.6 J | 5 U | 5 U | 5 U | | | | 5 U | 5 U | 5 U | | | | | | | | | |
| 5/11/2010 | 5 U | 5 U | 11 | 5 U | 5 U | 5 U | 5 U | 5 U | 15 U | 5 U | 5 U | 5 U | | | | | | | | | |
| 11/9/2010 | 5 U | 5 U | 59 | 5 U | 5 U | 71 | 1.2 J | 3.3 J | 120 | 5 U | 5 U | 5 U | | | | 3.2 | 149 | 312 | | | |
| 10/20/2011 | 5 U | 5 U | 0.98 J | 5 U | 5 U | 5 U | | | | 5 U | 5 U | 5 U | | | | | | | | | |
| 6/13/2012 | 5 U | 5 U | 5.6 | 5 U | 5 U | 10 | | | | 5 U | 5 U | 5 U | | | | | | | | | |
| 8/29/2013 | 5 U | 5 U | 45 | 5 U | 5 U | 73 | 5 U | 15 | 160 | 5 U | 5 U | 5 U | | 4.2 U | 17.9 J | 4.1 | 143 | 230 | 0.093 J | 0.1 U | 0.05 U |
| 4/3/2014 | 1 U | 1 U | 57 | 1 U | 1 U | 75 | 5 U | 9.7 | 190 | 1 U | 1 U | 1 U | 0.4 U | 4.1 U | 50 U | 5.4 | 149 | 201 | 0.16 U | 0.1 UJ | 0.05 U |
| 11/16/2015 | 1 U | 1 U | 13 | 1 U | 1 U | 9.1 | 5 U | 5 U | 25 | 1 U | 1 U | 1 U | 0.111 J | 4.7 U | 22.1 J | 9.2 | 148 | 244 | 0.16 U | 0.2 J+ | 0.039 J |
| 4/22/2016 | 1.0 U | 1.0 U | 73 | 1.0 U | 1.0 U | 59 | 5.0 U | 2.6 J | 200 | 1.0 U | 1.0 U | 1.0 U | 0.0618 J | 3.5 UJ | 19.8 J | 3 | 177 | 204 | 0.10 U | 0.10 U | 0.050 U |
| 9/14/2017 | 2.0 U | 2.0 U | 52 | 2.0 U | 2.0 U | 110 | 0.45 J | 3.9 | 140 | 2.0 U | 0.66 J | 2.0 U | 0.032 J | 2.0 U | 17 | 2.7 | 280 | 530 | 1.0 U | 0.50 U | 0.050 U |
| 4/25/2018 | 2.5 U | 2.5 U | 62 | 2.5 U | 2.5 U | 73 | 1.0 U | 4.4 | 340 | 2.5 U | 2.5 U | 2.5 U | 0.027 J | 2.0 U | 12 | 3.5 | 150 | 190 | 1.0 U | 0.25 U | 0.050 U |
| 12/5/2019 | 2.5 U | 2.5 U | 65 | 2.5 U | 2.5 U | 94 | 0.89 J | 5.3 | 210 | 2.5 U | 2.5 U | 2.5 U | 0.20 U | 2.0 U | 10 U | 2.8 | 150 | 240 | 1.0 U | 0.25 U | |
| 3/19/2020 | 2.0 U | 2.0 U | 51 | 2.0 U | 2.0 U | 85 | 1.0 U | 5.9 | 410 | 2.0 U | 0.41 J | 2.0 U | 0.2 U | | 7.3 J | 3.1 | 150 | 220 | 0.67 J | 0.50 UJ | 0.10 UJ |
| 12/7/2021 | 1.0 UJ | 1.0 UJ | 73 J- | 1.0 UJ | 1.0 UJ | 49 DJ- | 7.5 U | 4.1 J | 330 | 1.0 UJ | 0.4 J- | 1.0 UJ | 0.048 J | 2.0 U | 100 | 6.3 | 77 | 72 | 1.0 U | 0.24 | 0.050 U |
| 5/11/2022 | 1.0 U | 1.0 U | 52 | 1.0 U | 1.0 U | 73 DJ | 0.91 J | 6.2 | 360 | 1.0 U | 0.48 J | 1.0 U | 0.2 U | 6.0 U | 13 | 2.8 | 180 | 220 | 1.0 U | 0.10 UJ | 0.050 UJ |

| | |
|---|---|
| J | Indicates an estimated value. |
| U | Analyte was not detected above the reporting limit. |
| UJ | The analyte was not detected. The reporting limit is an approximate value. |
| J- | Indicates estimated value, biased low. |
| J+ | Indicates estimated value, biased high. |
| D | Result reported from a secondary dilution analysis. |
| R | The sample results are rejected. |

## MONITORING WELL GROUNDWATER ANALYTICAL RESULT SUMMARY
## HYDE PARK FACILITY
## NIAGARA, NEW YORK

**Well ID: MW-13A**

| Date | PCE (µg/L) | TCE (µg/L) | Cis-1,2-DCE (µg/L) | Trans-1,2-DCE (µg/L) | 1,1-DCE (µg/L) | Vinyl Chloride (µg/L) | Ethane (µg/L) | Ethene (µg/L) | Methane (µg/L) | 1,1,1-Trichloroethane (µg/L) | 1,1-Dichloroethane (µg/L) | Chloroethane (µg/L) | Dissolved Iron (mg/L) | BOD (mg/L) | COD (mg/L) | TOC (mg/L) | Chloride (mg/L) | Sulfate (mg/L) | Sulfide (mg/L) | Nitrate (mg/L) | Nitrite (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10/30/2007 | 5 U | 5 U | 5 U | 5 U | 5 U | 2 U | | | | 5 U | 5 U | 5 U | | | | | | | | | |
| 4/29/2008 | | | | | | | | | | | | | | | | | | | | | |
| 10/29/2009 | 5 U | 5 U | 5 U | 5 U | 5 U | 5 U | | | | 5 U | 5 U | 5 U | | | | | | | | | |

| | |
|---|---|
| J | Indicates an estimated value. |
| U | Analyte was not detected above the reporting limit. |
| UJ | The analyte was not detected. The reporting limit is an approximate value. |
| J- | Indicates estimated value, biased low. |
| J+ | Indicates estimated value, biased high. |
| D | Result reported from a secondary dilution analysis. |
| R | The sample results are rejected. |

## MONITORING WELL GROUNDWATER ANALYTICAL RESULT SUMMARY
## HYDE PARK FACILITY
## NIAGARA, NEW YORK

**Well ID:** **MW-13B**

| Date | PCE (µg/L) | TCE (µg/L) | Cis-1,2-DCE (µg/L) | Trans-1,2-DCE (µg/L) | 1,1-DCE (µg/L) | Vinyl Chloride (µg/L) | Ethane (µg/L) | Ethene (µg/L) | Methane (µg/L) | 1,1,1-Trichloroethane (µg/L) | 1,1-Dichloroethane (µg/L) | Chloroethane (µg/L) | Dissolved Iron (mg/L) | BOD (mg/L) | COD (mg/L) | TOC (mg/L) | Chloride (mg/L) | Sulfate (mg/L) | Sulfide (mg/L) | Nitrate (mg/L) | Nitrite (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10/30/2007 | 5 U | 0.78 J | 82 | 1.1 J | 5 U | 59 | | | | 5 U | 0.61 J | 5 U | | | | | | | | | |
| 4/24/2008 | 5 U | 0.65 J | 65 | 0.51 J | 5 U | 56 | | | | 5 U | 0.48 J | 5 U | | | | | | | | | |
| 10/29/2009 | 5 U | 5 U | 88 | 5 U | 5 U | 68 | | | | 5 U | 5 U | 5 U | | | | | | | | | |
| 5/13/2010 | 5 U | 5 U | 46 | 5 U | 5 U | 47 | 5 U | 1 J | 65 | 5 U | 5 U | 5 U | | | | | | | | | |
| 10/21/2011 | 5 U | 5 U | 17 | 5 U | 5 U | 24 | | | | 5 U | 5 U | 5 U | | | | | | | | | |
| 6/13/2012 | 5 U | 5 U | 27 | 5 U | 5 U | 57 | | | | 5 U | 5 U | 5 U | | | | | | | | | |
| 8/30/2013 | 5 U | 5 U | 8.6 | 5 U | 5 U | 48 | | | | 5 U | 5 U | 5 U | | | | | | | | | |
| 4/3/2014 | 1 U | 1 U | 19 | 1 U | 1 U | 15 | | | | 1 UJ | 1 U | 1 U | | | | | | | | | |
| 11/17/2015 | 1 U | 1 U | 18 | 1 U | 1 U | 21 | | | | 1 U | 1 U | 1 U | | | | | | | | | |
| 4/21/2016 | 1.0 U | 1.0 U | 9.9 | 1.0 U | 1.0 U | 12 | | | | 1.0 U | 1.0 U | 1.0 U | | | | | | | | | |
| 9/13/2017 | 1.0 U | 1.0 U | 22 | 1.0 U | 1.0 U | 38 | | | | 1.0 U | 1.0 UJ | 1.0 U | | | | | | | | | |
| 4/24/2018 | 1.0 U | 1.0 U | 7.8 | 1.0 U | 1.0 U | 9.7 | | | | 1.0 U | 1.0 U | 1.0 U | | | | | | | | | |
| 12/3/2019 | 1.0 U | 0.19 J | 16 | 1.0 U | 1.0 U | 21 | | | | 1.0 U | 0.17 J | 1.0 U | | | | | | | | | |
| 3/19/2020 | 1.0 U | 1.0 U | 1.6 | 1.0 U | 1.0 U | 2 | | | | 1.0 U | 1.0 U | 1.0 U | | | | | | | | | |
| 12/6/2021 | 2.0 U | 2.0 U | 3.7 | 2.0 U | 2.0 U | 6.4 | | | | 2.0 U | 2.0 U | 2.0 U | | | | | | | | | |
| 5/11/2022 | 1.0 U | 1.0 U | 4.1 | 1.0 U | 1.0 U | 5.2 | | | | 1.0 U | 1.0 U | 1.0 U | | | | | | | | | |

| | |
|---|---|
| J | Indicates an estimated value. |
| U | Analyte was not detected above the reporting limit. |
| UJ | The analyte was not detected. The reporting limit is an approximate value. |
| J- | Indicates estimated value, biased low. |
| J+ | Indicates estimated value, biased high. |
| D | Result reported from a secondary dilution analysis. |
| R | The sample results are rejected. |

## MONITORING WELL GROUNDWATER ANALYTICAL RESULT SUMMARY
## HYDE PARK FACILITY
## NIAGARA, NEW YORK

**Well ID:** **MW-14A**

| Date | PCE (µg/L) | TCE (µg/L) | Cis-1,2-DCE (µg/L) | Trans-1,2-DCE (µg/L) | 1,1-DCE (µg/L) | Vinyl Chloride (µg/L) | Ethane (µg/L) | Ethene (µg/L) | Methane (µg/L) | 1,1,1-Trichloroethane (µg/L) | 1,1-Dichloroethane (µg/L) | Chloroethane (µg/L) | Dissolved Iron (mg/L) | BOD (mg/L) | COD (mg/L) | TOC (mg/L) | Chloride (mg/L) | Sulfate (mg/L) | Sulfide (mg/L) | Nitrate (mg/L) | Nitrite (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10/30/2007 | 5 U | 5 U | 1.6 J | 5 U | 5 U | 2.4 | | | | 5 U | 5 U | 5 U | | | | | | | | | |
| 4/24/2008 | 5 U | 5 U | 1.5 J | 5 U | 5 U | 1.6 J | 0.64 J | 1 U | 15 | 5 U | 5 U | 5 U | | 2 U | 18.8 | 5.38 | 68 | 118 | 1 U | 0.05 U | 0.05 U |
| 10/29/2009 | 5 U | 5 U | 1.4 J | 5 U | 5 U | 2.7 J | 5 U | 5 U | 17 | 5 U | 5 U | 5 U | | 1.4 U | 21 J | 4.2 | 63.9 | 150 J | 0.16 U | 0.28 | 0.05 U |

| | |
|---|---|
| J | Indicates an estimated value. |
| U | Analyte was not detected above the reporting limit. |
| UJ | The analyte was not detected. The reporting limit is an approximate value. |
| J- | Indicates estimated value, biased low. |
| J+ | Indicates estimated value, biased high. |
| D | Result reported from a secondary dilution analysis. |
| R | The sample results are rejected. |

## MONITORING WELL GROUNDWATER ANALYTICAL RESULT SUMMARY
## HYDE PARK FACILITY
## NIAGARA, NEW YORK

**Well ID:** **MW-14B**

| Date | PCE (µg/L) | TCE (µg/L) | Cis-1,2-DCE (µg/L) | Trans-1,2-DCE (µg/L) | 1,1-DCE (µg/L) | Vinyl Chloride (µg/L) | Ethane (µg/L) | Ethene (µg/L) | Methane (µg/L) | 1,1,1-Trichloroethane (µg/L) | 1,1-Dichloroethane (µg/L) | Chloroethane (µg/L) | Dissolved Iron (mg/L) | BOD (mg/L) | COD (mg/L) | TOC (mg/L) | Chloride (mg/L) | Sulfate (mg/L) | Sulfide (mg/L) | Nitrate (mg/L) | Nitrite (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10/30/2007 | 5 U | 5 U | 56 | 0.42 J | 5 U | 49 | 2 U | 2 U | 110 | 5 U | 0.6 J | 5 U | | 2 U | 6.58 J | 4.07 | 119 | 263 | 1 U | | |
| 4/24/2008 | 5 U | 5 U | 120 | 0.81 J | 5 U | 90 | 1 U | 1.5 J | 170 | 5 U | 0.41 J | 5 U | | 2 U | 10.1 | 2.95 | 136 | 222 | 1 U | 0.05 U | 0.05 U |
| 10/29/2009 | 5 U | 5 U | 64 | 5 U | 5 U | 86 | 5 U | 2.2 J | 130 | 5 U | 5 U | 5 U | | 2.1 U | 23.3 J | 3.5 | 133 | 310 J | 0.5 | 0.1 U | 0.05 U |
| 5/13/2010 | 5 U | 5 U | 16 | 5 U | 5 U | 33 | 100 U | 170 | 3400 | 5 U | 5 U | 5 U | | 53.6 | 137 | 14.6 | 143 | 103 | 46.9 | 0.1 U | 0.05 U |
| 10/24/2011 | 5 U | 5 U | 4.1 J | 5 U | 5 U | 5.4 | 5 U | 66 | 690 | 5 U | 5 U | 5 U | 0.0264 J | 5.2 U | 36 J | 7 | 260 | 274 | 3 | 0.1 U | 0.05 U |
| 6/13/2012 | 5 U | 5 U | 1.5 J | 5 U | 5 U | 5.4 | 2.2 J | 91 | 9100 | 5 U | 5 U | 5 U | 0.027 J | 33 | 117 | 10.2 | 241 | 126 | 48.2 | 0.1 U | 0.05 U |
| 8/29/2013 | 5 U | 5 U | 5 U | 5 U | 5 U | 1.5 J | | | | 5 U | 5 U | 5 U | | | | | | | | | |
| 4/3/2014 | 1 U | 1 U | 0.67 J | 1 U | 1 U | 1.2 | | | | 1 UJ | 1 U | 1 U | | | | | | | | | |
| 11/18/2015 | 1 U | 1 U | 0.95 J | 1 U | 1 U | 1.5 | | | | 1 U | 0.53 J | 1 U | | | | | | | | | |
| 4/21/2016 | 1.0 U | 1.0 U | 0.94 J | 1.0 U | 1.0 U | 1.2 | | | | 1.0 U | 1.0 U | 1.0 U | | | | | | | | | |
| 9/14/2017 | 1.0 U | 1.0 U | 0.92 J | 1.0 U | 1.0 U | 2.9 | | | | 1.0 U | 0.43 J | 1.0 U | | | | | | | | | |
| 4/24/2018 | 1.0 U | 1.0 U | 0.72 J | 1.0 U | 1.0 U | 1.3 | | | | 1.0 U | 0.34 J | 1.0 U | | | | | | | | | |
| 12/5/2019 | 1.0 U | 1.0 U | 0.37 J | 1.0 U | 1.0 U | 0.7 J | | | | 1.0 U | 0.19 J | 1.0 U | | | | | | | | | |
| 3/18/2020 | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1 | | | | 1.0 U | 0.24 J | 1.0 U | | | | | | | | | |
| 12/7/2021 | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.9 | | | | 1.0 U | 1.0 U | 1.0 U | | | | | | | | | |
| 5/11/2022 | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.1 | | | | 1.0 U | 1.0 U | 1.0 U | | | | | | | | | |

| | |
|---|---|
| J | Indicates an estimated value. |
| U | Analyte was not detected above the reporting limit. |
| UJ | The analyte was not detected. The reporting limit is an approximate value. |
| J- | Indicates estimated value, biased low. |
| J+ | Indicates estimated value, biased high. |
| D | Result reported from a secondary dilution analysis. |
| R | The sample results are rejected. |

## MONITORING WELL GROUNDWATER ANALYTICAL RESULT SUMMARY
## HYDE PARK FACILITY
## NIAGARA, NEW YORK

**Well ID:** **MW-15**

| Date | PCE (µg/L) | TCE (µg/L) | Cis-1,2-DCE (µg/L) | Trans-1,2-DCE (µg/L) | 1,1-DCE (µg/L) | Vinyl Chloride (µg/L) | Ethane (µg/L) | Ethene (µg/L) | Methane (µg/L) | 1,1,1-Trichloroethane (µg/L) | 1,1-Dichloroethane (µg/L) | Chloro ethane (µg/L) | Dissolved Iron (mg/L) | BOD (mg/L) | COD (mg/L) | TOC (mg/L) | Chloride (mg/L) | Sulfate (mg/L) | Sulfide (mg/L) | Nitrate (mg/L) | Nitrite (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10/30/2007 | 5 U | 5 U | 170 | 1.7 J | 5 U | 86 | | | | 5 U | 0.66 J | 5 U | | | | | | | | | |
| 4/23/2008 | 5 U | 5 U | 190 | 1.5 J | 5 U | 93 | | | | 5 U | 0.58 J | 0.38 J | | | | | | | | | |
| 11/3/2009 | 5 U | 5 U | 56 | 1.1 J | 5 U | 82 | | | | 5 U | 2 J | 5 U | | | | | | | | | |
| 5/12/2010 | 5 U | 5 U | 5.9 | 5 U | 5 U | 17 | 1.1 J | 140 | 1300 | 5 U | 1.3 J | 5 U | | | | | | | | | |
| 10/21/2011 | 5 U | 5 U | 32 | 1.3 J | 5 U | 52 | | | | 5 U | 1.4 J | 5 U | | | | | | | | | |
| 6/14/2012 | 5 U | 5 U | 5 U | 5 U | 5 U | 1.8 J | | | | 5 U | 1.2 J | 5 U | | | | | | | | | |
| 8/29/2013 | 5 U | 5 U | 5 U | 5 U | 5 U | 2 J | | | | 5 U | 5 U | 5 U | | | | | | | | | |
| 6/14/2018 | 1.0 U | 1.0 UJ | 5.2 | 0.62 J | 1.0 U | 16 | | | | 1.0 U | 1.1 | 1.0 U | | | | | | | | | |

| | |
|---|---|
| J | Indicates an estimated value. |
| U | Analyte was not detected above the reporting limit. |
| UJ | The analyte was not detected. The reporting limit is an approximate value. |
| J- | Indicates estimated value, biased low. |
| J+ | Indicates estimated value, biased high. |
| D | Result reported from a secondary dilution analysis. |
| R | The sample results are rejected. |

## MONITORING WELL GROUNDWATER ANALYTICAL RESULT SUMMARY
## HYDE PARK FACILITY
## NIAGARA, NEW YORK

**Well ID:** **MW-16A**

| Date | PCE (µg/L) | TCE (µg/L) | Cis-1,2-DCE (µg/L) | Trans-1,2-DCE (µg/L) | 1,1-DCE (µg/L) | Vinyl Chloride (µg/L) | Ethane (µg/L) | Ethene (µg/L) | Methane (µg/L) | 1,1,1-Trichloroethane (µg/L) | 1,1-Dichloroethane (µg/L) | Chloroethane (µg/L) | Dissolved Iron (mg/L) | BOD (mg/L) | COD (mg/L) | TOC (mg/L) | Chloride (mg/L) | Sulfate (mg/L) | Sulfide (mg/L) | Nitrate (mg/L) | Nitrite (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10/31/2007 | 5 U | 0.39 J | 12 | 5 U | 5 U | 160 | 0.87 J | 15 | 18 | 5 U | 5 U | 5 U |  | 2 U | 23.2 J | 6.93 | 278 | 981 | 1.2 |  |  |
| 4/25/2008 | 5 U | 0.39 J | 9 | 5 U | 5 U | 53 | 1 U | 0.62 J | 4.5 | 5 U | 5 U | 5 U |  | 2 U | 20.4 | 6.5 | 209 | 1020 | 1 U | 0.05 U | 0.05 U |
| 10/27/2009 | 5 U | 5 U | 8.2 | 5 U | 5 U | 75 | 5 U | 4.7 J | 11 J | 5 U | 5 U | 5 U |  | 1.7 U | 41.6 J | 7.2 | 247 J | 1060 | 0.16 U | 0 R | 0.05 U |
| 5/11/2010 | 5 U | 5 U | 10 | 5 U | 5 U | 180 | 5 U | 20 | 20 | 5 U | 5 U | 5 U |  | 2 U | 40.7 J | 7 | 260 | 1040 | 0.16 U | 0.1 U | 0.05 U |
| 10/27/2011 | 5 U | 5 U | 11 | 5 U | 5 U | 340 | 5 U | 44 | 33 | 5 U | 5 U | 5 U | 0.0424 J |  | 31.5 J | 6.9 | 266 | 1130 | 0.16 U | 0.1 U | 0.05 UJ |
| 3/14/2012 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 3/15/2012 | 5 U | 5 U | 7.2 | 5 U | 5 U | 12 | 5 U | 1.3 J | 15 U | 5 U | 5 U | 5 U | 0.044 J |  |  | 8.1 | 245 | 1110 |  |  |  |
| 6/14/2012 | 5 U | 5 U | 8.4 | 5 U | 5 U | 110 | 5 U | 11 | 8.7 J | 5 U | 5 U | 5 U | 0.2 U | 5.4 | 26.5 J | 9.5 | 237 | 1100 |  |  |  |
| 11/29/2012 | 5 U | 5 U | 10 | 5 U | 5 U | 330 | 1.2 J | 79 | 40 | 5 U | 5 U | 5 U | 0.2 U |  |  | 7.7 | 255 | 1100 |  |  |  |
| 8/29/2013 | 5 U | 5 U | 8.5 | 5 U | 5 U | 300 | 1.1 J | 72 | 29 | 5 U | 5 U | 5 U |  | 3.8 U | 31.5 J | 8.2 | 252 | 1080 | 0.16 U | 0.1 U | 0.05 U |
| 1/15/2014 | 5 U | 5 U | 9 | 5 U | 5 U | 78 | 5 U | 6.4 | 5 U | 5 U | 5 U | 5 U | 0.4 U |  |  | 9.5 | 190 J+ | 812 J+ | 0.16 U |  |  |
| 4/2/2014 | 1 U | 1 U | 5.9 | 1 U | 1 U | 140 | 5 U | 20 | 5 U | 1 U | 1 U | 1 U | 0.4 U | 4.4 U | 24.1 J | 7.3 | 214 | 898 | 0.16 U | 0.1 U | 0.14 |
| 10/14/2014 | 1 U | 1 U | 8.6 | 1 U | 1 U | 350 | 5 U | 52 | 9.5 | 1 UJ | 1 U | 1 U | 0.491 |  |  | 9.1 | 221 | 958 | 0.16 U |  |  |
| 11/20/2015 | 1 U | 1 U | 9.1 | 1 U | 1 U | 250 | 1.2 J | 95 | 49 | 1 U | 1 U | 1 U | 0.4 U | 5.2 U | 33.6 J | 6.5 | 290 | 1080 | 0.16 U | 0.1 U | 0.05 U |
| 4/20/2016 | 1.0 U | 1.0 U | 6.5 | 1.0 U | 1.0 U | 18 | 5.0 U | 1.1 J | 5.0 U | 1.0 U | 1.0 U | 1.0 U | 0.400 U | 2.9 U | 33.6 J | 6.2 | 907 | 1140 | 0.10 U | 0.14 | 0.050 U |
| 9/12/2017 | 10 U | 10 U | 7.3 J | 10 U | 10 U | 190 | 0.47 J | 33 | 28 | 10 U | 10 U | 10 U | 0.100 U | 2.0 U | 28 | 6.4 | 250 | 1000 | 1.0 U | 0.50 U | 0.050 UJ |
| 4/26/2018 | 1.0 U | 1.0 U | 1.4 | 1.0 U | 1.0 U | 33 | 1.0 U | 13 | 12 | 1.0 U | 1.0 U | 1.0 U | 0.026 J | 2.0 U | 17 J | 5.8 | 48 | 190 | 1.0 U | 0.21 J | 0.050 U |
| 12/3/2019 | 4.0 U | 0.6 J | 3.6 J | 4.0 U | 4.0 U | 120 | 1 | 49 | 77 | 4.0 U | 4.0 U | 4.0 U | 0.20 U | 2.0 U | 18 | 6.1 | 170 | 810 | 1.0 U | 0.50 U |  |
| 3/20/2020 | 13 U | 13 U | 8.7 J | 13 U | 13 U | 560 | 3.1 | 270 | 290 | 13 U | 13 U | 13 U | 0.43 | 2.0 U | 17 | 6.7 | 210 | 1000 | 1.0 U | 1.0 U | 0.10 U |
| 12/7/2021 | 5.0 U | 5.0 U | 8.2 | 5.0 U | 5.0 U | 260 | 7.5 U | 77 | 160 | 5.0 U | 5.0 U | 5.0 U | 0.024 J | 2.0 U | 52 | 11 | 190 | 930 | 1.0 U | 0.42 | 0.050 U |
| 5/11/2022 | 1.0 U | 1.0 U | 8.1 | 1.0 U | 1.0 U | 290 D | 2.6 | 160 | 320 | 1.0 U | 1.0 U | 1.0 U | 0.2 U | 6.0 U | 18 | 6.4 | 160 | 850 | 1.0 U | 0.10 UJ | 0.050 UJ |

| | |
|---|---|
| J | Indicates an estimated value. |
| U | Analyte was not detected above the reporting limit. |
| UJ | The analyte was not detected. The reporting limit is an approximate value. |
| J- | Indicates estimated value, biased low. |
| J+ | Indicates estimated value, biased high. |
| D | Result reported from a secondary dilution analysis. |
| R | The sample results are rejected. |

# MONITORING WELL GROUNDWATER ANALYTICAL RESULT SUMMARY
# HYDE PARK FACILITY
# NIAGARA, NEW YORK

**Well ID:** **MW-16B**

| Date | PCE (µg/L) | TCE (µg/L) | Cis-1,2-DCE (µg/L) | Trans-1,2-DCE (µg/L) | 1,1-DCE (µg/L) | Vinyl Chloride (µg/L) | Ethane (µg/L) | Ethene (µg/L) | Methane (µg/L) | 1,1,1-Trichloroethane (µg/L) | 1,1-Dichloroethane (µg/L) | Chloroethane (µg/L) | Dissolved Iron (mg/L) | BOD (mg/L) | COD (mg/L) | TOC (mg/L) | Chloride (mg/L) | Sulfate (mg/L) | Sulfide (mg/L) | Nitrate (mg/L) | Nitrite (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10/31/2007 | 5 U | 5 U | 210 | 0.88 J | 5 U | 63 | 1 U | 3.7 | 190 | 5 U | 5 U | 5 U | | 2 U | 5 UJ | 3.7 | 114 | 269 | | | |
| 11/29/2007 | | | | | | | | | | | | | | | | | | | 1 U | | |
| 4/25/2008 | 5 U | 0.25 J | 280 | 1.4 J | 0.33 J | 86 | 0.7 J | 3.1 | 220 | 5 U | 0.22 J | 5 U | | 2 U | 10.1 | 3.81 | 106 | 264 | 1.1 | 0.05 U | 0.05 U |
| 10/27/2009 | 5 U | 5 U | 510 | 1.8 J | 5 U | 130 | 5 U | 3.2 J | 150 | 5 U | 5 U | 5 U | | 1.8 U | 18.8 J | 3.7 | 120 J | 286 | 0.22 | 0 R | 0.05 U |
| 5/11/2010 | 5 U | 5 U | 81 | 5 U | 5 U | 48 | 5 U | 2.3 J | 150 | 5 U | 5 U | 5 U | | 2.1 U | 15.6 J | 3.8 | 105 | 247 | 0.3 | 0.1 U | 0.05 U |
| 11/8/2010 | 5 U | 5 U | 320 | 1.4 J | 5 U | 110 | 5 U | 5 U | 120 | 5 U | 5 U | 5 U | | | | 3.7 | 114 | 264 | | | |
| 10/25/2011 | 5 U | 5 U | 27 | 5 U | 5 U | 43 | 5 U | 3.8 J | 140 | 5 U | 5 U | 5 U | 0.2 U | 2.6 U | 50 U | 3.5 | 134 J | 303 J | 0.38 | 0.1 U | 0.05 U |
| 3/15/2012 | 50 U | 45 J | 9000 | 36 J | 23 J | 830 | 3.1 J | 73 | 2400 | 50 U | 50 U | 50 U | 0.0585 J | | | 17.5 | 78.4 | 96.6 | | | |
| 6/13/2012 | 10 U | 74 | 4700 | 19 | 15 | 600 | 2.5 J | 74 | 2600 | 10 U | 4 J | 2.6 J | 0.2 U | 24.6 | 65.1 | 4.1 | 81.5 | 165 | 33.1 | 0.1 U | 0.05 U |
| 11/27/2012 | 50 U | 430 | 6800 | 24 J | 29 J | 820 | 5.6 | 190 | 3600 | 50 U | 50 U | 50 U | 0.0908 J | | | 3.5 | 82.8 | 191 | | | |
| 8/28/2013 | 5 U | 2.2 J | 600 | 5.2 | 2.4 J | 610 | 5 U | 75 | 670 | 5 U | 1 J | 5 U | | 5.1 U | 15.6 J | 3.8 | 90.1 J | 219 | 1.1 | 0.1 U | 0.05 U |
| 1/14/2014 | 25 U | 25 U | 8800 | 53 | 17 J | 5500 | 15 | 1500 | 18000 | 25 U | 15 J | 25 U | 0.214 J | | | 194 | 44.8 | 5 U | 50.9 | | |
| 4/3/2014 | 5 U | 5 U | 2300 | 16 | 5.5 | 2000 | 11 | 700 | 16000 | 5 U | 3.4 J | 5 U | 0.0956 J | 140 | 253 | 69.2 | 26.9 | 17.7 | 38.3 | 0.1 UJ | 0.05 U |
| 10/13/2014 | 1 U | 1 U | 17 | 8.8 | 1 U | 22 | 13 | 610 | 21000 | 1 U | 2.9 | 1 U | 0.372 J | | | 211 | 43.3 | 21.6 | 17.2 | | |
| 11/20/2015 | 1 U | 4.8 | 1100 | 22 | 2.2 | 780 | 40 | 920 | 24000 | 1 U | 6.6 | 1 U | 0.4 U | 105 | 215 | 47.3 | 70.6 | 4.2 | 36.5 | 0.1 U | 0.05 UJ |
| 4/20/2016 | 1.0 U | 1.0 U | 1.0 U | 6.8 | 1.0 U | 4.3 | 17 | 300 | 31000 D | 1.0 U | 2 | 1.0 U | 0.400 U | 62.4 | 201 | 26.5 | 73.8 | 8.2 | 50.5 | 0.10 U | 0.050 U |
| 9/12/2017 | 1.0 U | 1.0 U | 1.0 U | 0.44 J | 1.0 U | 2.6 | 15 | 34 | 8200 D | 1.0 U | 0.39 J | 1.0 U | 0.100 U | 39 | 99 | 6.8 | 120 | 120 | 29 | 0.25 U | 0.050 UJ |
| 4/26/2018 | 1.0 U | 1.0 U | 0.63 J | 1.0 U | 1.0 U | 4.6 | 1.0 U | 2.8 | 9900 D | 1.0 U | 1.0 U | 1.0 U | 0.200 U | 13 | 49 | 5.7 | 120 | 230 | 6.9 | 0.25 U | 0.050 U |
| 12/3/2019 | 1.0 U | 1.0 U | 1 | 1.0 U | 1.0 U | 6.7 | 4.2 | 17 | 9300 D | 1.0 U | 1.0 U | 1.0 U | 0.20 U | 14 | 25 | 4 | 110 | 220 | 9.5 | 0.25 U | |
| 3/20/2020 | 1.0 U | 1.0 U | 0.6 J | 1.0 U | 1.0 U | 2.9 | 1.5 | 1.1 | 14000 D | 1.0 U | 1.0 U | 1.0 U | 0.048 J | 17 | 32 | 3.4 | 120 | 250 | 13 | 0.50 U | 0.10 U |
| 12/7/2021 | 1.0 U | 1.0 U | 2.1 | 1.0 U | 1.0 U | 6.5 | 170 U | 150 U | 8000 | 1.0 U | 1.0 U | 1.0 U | 0.54 | 6.4 | 16 | 7.2 | 130 | 230 | 4.8 | 0.050 U | 0.050 U |
| 5/11/2022 | 1.0 U | 1.0 U | 13 | 1.0 U | 1.0 U | 23 | 5.9 | 24 | 11000 D | 1.0 U | 1.0 U | 1.0 U | 0.2 U | 16 | 36 | 4 | 130 | 250 | 7.3 | 0.10 UJ | 0.050 UJ |

| | |
|---|---|
| J | Indicates an estimated value. |
| U | Analyte was not detected above the reporting limit. |
| UJ | The analyte was not detected. The reporting limit is an approximate value. |
| J- | Indicates estimated value, biased low. |
| J+ | Indicates estimated value, biased high. |
| D | Result reported from a secondary dilution analysis. |
| R | The sample results are rejected. |

## MONITORING WELL GROUNDWATER ANALYTICAL RESULT SUMMARY
## HYDE PARK FACILITY
## NIAGARA, NEW YORK

**Well ID:** **MW-17A**

| Date | PCE (µg/L) | TCE (µg/L) | Cis-1,2-DCE (µg/L) | Trans-1,2-DCE (µg/L) | 1,1-DCE (µg/L) | Vinyl Chloride (µg/L) | Ethane (µg/L) | Ethene (µg/L) | Methane (µg/L) | 1,1,1-Trichloroethane (µg/L) | 1,1-Dichloroethane (µg/L) | Chloroethane (µg/L) | Dissolved Iron (mg/L) | BOD (mg/L) | COD (mg/L) | TOC (mg/L) | Chloride (mg/L) | Sulfate (mg/L) | Sulfide (mg/L) | Nitrate (mg/L) | Nitrite (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11/1/2007 | 5 U | 38 | 160 | 1.9 J | 10 | 12 | 1 U | 0.42 J | 60 | 5 U | 19 | 5 U | | 2 U | 11.4 J | 2.51 | 1400 | 134 | 1 U | | |
| 4/28/2008 | 5 U | 29 | 200 | 1.5 J | 9.1 | 28 | 1 U | 1.5 | 77 | 5 U | 20 | 5 U | | 2 U | 11 | 2.2 | 1120 | 153 | 1 U | 0.05 U | 0.05 U |
| 8/12/2008 | 5 U | 40 | 190 | 2.5 J | 11 | 24 | 5 U | 1.5 J | 120 | 5 U | 21 | | | | | 2.4 | 1250 | 168 | | | |
| 10/7/2008 | 5 U | 43 | 200 | 3.5 J | 13 | 23 | 5 U | 1.3 J | 120 J | 5 U | 23 | 5 U | | | | 2.2 | 1270 J | 165 | | | |
| 12/10/2008 | 5 U | 39 | 210 | 2.2 J | 12 | 27 | 5 U | 1.1 J | 65 | 5 U | 25 | 5 U | | | | 2.2 | 1070 | 161 | | | |
| 1/26/2009 | 5 U | 32 | 210 | 2.1 J | 11 | 29 | 5 U | 1.4 J | 88 | 5 U | 23 | 5 U | | | | | | | | | |
| 3/16/2009 | 5 U | 29 | 210 | 2.5 J | 12 | 28 | 5 U | 1.4 J | 78 | 5 U | 20 | 5 U | | | | 2.3 | 1220 | 170 | | | |
| 10/20/2009 | 5 U | 24 | 200 | 2.2 J | 14 | 24 | 5 U | 5 U | 120 | 5 U | 29 | 5 U | | | | 3.1 | 1080 J | 198 J | | | |
| 10/28/2009 | 5 U | 22 | 180 | 1.6 J | 14 | 25 | 5 U | 5 U | 97 | 5 U | 30 | 5 U | | 1.9 U | 59.9 J | 2.9 | 1130 J | 192 | 0.16 U | 0 R | 0.05 U |
| 12/11/2009 | 5 U | 11 | 200 | 1.4 J | 13 | 29 | 5 U | 5 U | 100 | 5 U | 28 | 5 U | | | | 3.1 | 1060 J | 217 J | | | |
| 2/9/2010 | 5 U | 14 | 210 | 1.3 J | 11 | 34 | 5 U | 5 U | 110 | 5 U | 24 | 5 U | | | | 3.7 J | 962 | 194 | | | |
| 3/30/2010 | 5 U | 11 | 180 | 1.7 J | 10 | 24 | | | | 5 U | 20 | 5 U | | | | | | | | | |
| 5/6/2010 | 5 U | 15 | 210 | 1.4 J | 11 | 27 | 5 U | 5 U | 15 U | 5 U | 20 | 5 U | | 3.6 U | 29.3 J | 2.9 | 729 J | 196 J | 0.16 U | 0.1 U | 0.05 U |
| 11/11/2010 | 5 U | 16 | 200 | 1.9 J | 13 | 28 | 1.5 J | 8.5 | 2100 | 5 U | 27 | 5 U | | | | 3.1 | 661 | 195 | | | |
| 10/24/2011 | 5 U | 11 | 160 | 1.2 J | 12 | 30 | 11 | 3.2 J | 4900 | 5 U | 26 | 5 U | 0.2 U | 5.1 | 33.8 J | 3.9 | 1010 | 189 | 0.16 U | 0.1 U | 0.05 U |
| 6/12/2012 | 5 U | 5.3 | 140 | 1.2 J | 8.1 | 25 | 12 | 3.1 J | 8500 | 5 U | 21 | 5 U | 0.2 U | 5.9 | 28.8 J | 4.4 | 484 | 172 | 0.16 U | 0.1 U | 0.05 U |
| 8/28/2013 | 5 U | 3.1 J | 180 | 5 U | 6.3 | 45 | 11 | 8.8 | 12000 | 5 U | 22 | 5 U | | 9.8 | 27 J | 3.8 | 318 J | 151 | 0.16 U | 0.1 U | 0.05 U |
| 4/3/2014 | 1 U | 0.62 J | 150 | 1 U | 3.6 | 49 | 14 | 17 | 18000 | 1 UJ | 16 | 1 U | 2.14 | 8.5 | 49.3 J | 5.1 | 277 | 145 | 0.16 U | 0.1 UJ | 0.05 U |
| 11/18/2015 | 1 U | 1 U | 160 | 1 U | 1 U | 86 | 12 | 11 | 15000 | 1 U | 18 | 1 U | 1.45 | 7.3 | 15.2 J | 3 | 167 | 114 | 0.16 U | 0.1 U | 0.05 U |
| 4/20/2016 | 1.0 U | 1.0 U | 110 | 1.0 U | 1.0 U | 89 | 7.4 | 11 | 15000 D | 1.0 U | 15 | 1.0 U | 0.955 | 7.8 | 26.7 J | 3.2 | 161 | 131 | 0.10 U | 0.10 U | 0.050 U |
| 9/12/2017 | 5.0 U | 5.0 U | 120 | 5.0 U | 5.0 U | 120 | 5.5 | 8.4 | 3700 D | 5.0 U | 17 | 5.0 U | 0.92 | 3.4 | 17 | 3 | 82 | 97 | 1.0 U | 0.25 U | 0.050 UJ |
| 4/25/2018 | 5.0 U | 5.0 U | 59 | 5.0 U | 5.0 U | 91 | 10 U | 10 U | 13000 | 5.0 U | 11 | 5.0 U | 1 | 4.8 J | 19 | 3.7 | 92 | 100 | 1.0 U | 0.25 U | 0.050 U |
| 12/5/2019 | 2.0 U | 2.0 U | 50 | 2.0 U | 2.0 U | 83 | 11 | 17 | 9400 D | 2.0 U | 13 | 2.0 U | 0.55 | 4.2 | 10 U | 2.8 | 57 | 67 | 1.0 U | 0.25 U | |
| 3/19/2020 | 2.0 U | 2.0 U | 38 | 2.0 U | 2.0 U | 78 | 17 | 21 | 17000 D | 2.0 U | 12 | 2.0 U | 0.7 | | 7.6 J | 2.7 | 53 | 70 | 1.0 U | 0.50 UJ | 0.10 UJ |
| 12/8/2021 | 4.0 U | 4.0 U | 48 | 4.0 U | 4.0 U | 110 | 9.4 | 14 | 12000 | 4.0 U | 13 | 4.0 U | 0.69 | 6.0 U | 52 | 4.1 | 32 | 55 | 1.0 U | 0.25 U | 0.25 U |
| 5/12/2022 | 1.0 U | 1.0 U | 36 | 1.0 U | 1.0 U | 83 D | 15 | 20 | 16000 D | 1.0 U | 11 | 1.0 U | 0.72 | 5.5 | 8.8 J | 2.4 | 31 | 56 | 1.0 U | 0.10 UJ | 0.050 UJ |

| | |
|---|---|
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| U | Analyte was not detected above the reporting limit. |
| UJ | The analyte was not detected. The reporting limit is an approximate value. |
| J- | Indicates estimated value, biased low. |
| J+ | Indicates estimated value, biased high. |
| D | Result reported from a secondary dilution analysis. |
| R | The sample results are rejected. |

## MONITORING WELL GROUNDWATER ANALYTICAL RESULT SUMMARY
## HYDE PARK FACILITY
## NIAGARA, NEW YORK

**Well ID:** **MW-17B**

| Date | PCE (µg/L) | TCE (µg/L) | Cis-1,2-DCE (µg/L) | Trans-1,2-DCE (µg/L) | 1,1-DCE (µg/L) | Vinyl Chloride (µg/L) | Ethane (µg/L) | Ethene (µg/L) | Methane (µg/L) | 1,1,1-Trichloroethane (µg/L) | 1,1-Dichloroethane (µg/L) | Chloroethane (µg/L) | Dissolved Iron (mg/L) | BOD (mg/L) | COD (mg/L) | TOC (mg/L) | Chloride (mg/L) | Sulfate (mg/L) | Sulfide (mg/L) | Nitrate (mg/L) | Nitrite (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11/1/2007 | 5 U | 4 J | 440 | 3.4 J | 3.4 J | 64 | 0.66 J | 2.8 | 180 | 5 U | 9.3 | 5 U | | 2 U | 9.7 J | 3.31 | 431 | 209 | 1 U | | |
| 4/28/2008 | 5 U | 4.6 J | 630 | 8.5 | 5.5 | 82 | 0.53 J | 4 | 160 | 5 U | 17 | 5 U | | 2 U | 10.4 | 3.06 | 475 | 211 | 1 U | 0.05 U | 0.05 U |
| 10/8/2008 | 5 U | 3.3 J | 600 | 5.9 | 4.4 J | 120 | 5 U | 6.6 | 170 J | 5 U | 22 | 5 U | | | | 55.7 | 561 J | 169 | | | |
| 12/10/2008 | 5 U | 2.6 J | 260 | 3.1 J | 2.9 J | 170 | 5 U | 33 | 120 | 5 U | 28 | 5 U | | | | 3 | 802 | 180 | | | |
| 1/26/2009 | 5 U | 2.1 J | 280 | 4.2 J | 3.1 J | 210 | 5 U | 61 | 130 | 5 U | 24 | 5 U | | | | | | | | | |
| 3/17/2009 | 5 U | 1.6 J | 270 | 3.6 J | 3.2 J | 180 | 5 U | 71 | 180 | 5 U | 22 | 5 U | | | | 3.5 | 631 | 275 | | | |
| 10/20/2009 | 5 U | 4.2 J | 280 J | 2.4 J | 4.5 J | 73 | 3 J | 22 | 120 | 5 U | 29 | 5 U | | | | 3 | 768 J | 204 J | | | |
| 10/28/2009 | 5 U | 3.1 J | 280 | 2.2 J | 3.1 J | 69 | 2 J | 14 | 89 | 5 U | 26 | 5 U | | 2.2 U | 53.1 J | 3.1 | 720 J | 195 | 0.1 J | 0 R | 0.05 U |
| 12/11/2009 | 5 U | 2.2 J | 170 | 2.4 J | 5 U | 160 | 2.4 J | 130 | 300 | 5 U | 8.4 | 5 U | | | | 264 | 171 J | 18.3 J | | | |
| 2/9/2010 | 5 U | 1.2 J | 31 | 1.8 J | 5 U | 52 | 4.2 J | 190 | 4400 | 5 U | 31 | 5 U | | | | 122 J | 727 | 32.2 | | | |
| 3/30/2010 | 5 U | 5 U | 5.9 | 1.7 J | 5 U | 10 | | | | 5 U | 37 | 5 U | | | | | | | | | |
| 5/6/2010 | 5 U | 5 U | 8.5 | 1.4 J | 5 U | 9.6 | 5 U | 5 U | 15 U | 5 U | 45 | 5 U | | 157 J | 219 | 12.7 | 883 J | 49.7 J | 14.3 | 0.1 U | 0.05 U |
| 11/10/2010 | 5 U | 5 U | 8.1 | 0.86 J | 5 U | 8.8 | 16 | 110 | 4200 | 5 U | 40 | 5 U | | | | 4.5 | 981 | 118 | | | |
| 10/26/2011 | 5 U | 5 U | 19 | 0.82 J | 5 U | 27 | 70 | 81 | 15000 | 5 U | 48 | 1.4 J | 0.102 J | 5.7 | 45.1 J | 3.2 | 966 | 154 J | 4.5 | 0.1 U | 0.05 U |
| 3/13/2012 | 5 U | 5 U | 14 | 1.1 J | 5 U | 15 | 44 | 83 | 18000 | 5 U | 46 | 1.3 J | 0.0442 J | | | 10.9 | 682 | 118 | | | |
| 6/12/2012 | 5 U | 5 U | 20 | 0.82 J | 5 U | 18 | 45 | 72 | 23000 | 5 U | 43 | 1.5 J | 0.19 J | 9.6 | 49.2 J | 3.8 | 739 | 116 | 11.6 | 0.1 U | 0.05 U |
| 11/27/2012 | 5 U | 5 U | 28 J | 5 U | 5 U | 31 | 41 | 79 | 19000 | 5 U | 35 J | 5 U | 0.172 J | | | 3.2 | 669 | 130 | | | |
| 8/28/2013 | 5 U | 5 U | 35 | 5 U | 5 U | 40 | 29 | 56 | 19000 | 5 U | 38 | 5 U | | 12.7 | 40.6 J | 3.6 | 521 J | 138 | 1.2 | 0.1 U | 0.05 U |
| 1/15/2014 | 5 U | 5 U | 1.8 J | 1.5 J | 5 U | 2.9 J | 7.2 | 52 | 19000 | 5 U | 7.9 | 11 | 54.8 | | | 454 | 351 J+ | 5 U | 6.3 | | |
| 4/1/2014 | 1 U | 1 U | 1.3 | 0.73 J | 1 U | 2.1 | 13 | 34 | 20000 | 1 U | 8.2 | 7.4 | 16.6 | 139 | 228 | 55.1 | 288 | 6.9 | 8.2 J- | 0.1 U | 0.016 J |
| 10/14/2014 | 1 U | 1 U | 0.52 J | 0.71 J | 1 U | 1.1 | 8.3 | 17 | 16000 | 1 UJ | 3.3 | 8.2 | 15.5 | | | 38.4 | 386 | 5 U | 4.1 | | |
| 11/18/2015 | 1 U | 1 U | 1 U | 1 U | 1 U | 0.8 J | 8.5 | 8.9 | 14000 | 1 U | 1.5 | 7.9 | 13.4 | 17.6 | 102 | 18.8 | 374 | 2.5 J | 1.4 | 0.1 U | 0.05 U |
| 4/21/2016 | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 0.88 J | 8 | 7 | 18000 D | 1.0 U | 1.7 | 6.7 | 17.3 | 20.4 | 103 | 25 | 327 | 7.2 | 1 | 0.10 U | 0.050 U |
| 9/12/2017 | 1.0 U | 0.68 J | 10 | 0.45 J | 1.0 U | 12 | 3.5 | 4.6 | 6800 | 1.0 U | 6.3 J | 7.6 | 5.3 | 6.2 | 78 | 17 | 210 | 47 | 0.73 J | 0.50 U | 0.050 UJ |
| 4/25/2018 | 1.0 U | 1.0 U | 4.9 | 0.39 J | 1.0 U | 7.9 | 19 | 27 | 22000 | 1.0 U | 4.5 | 3.7 | 4.7 | 6.8 | 89 | 20 | 170 | 45 | 2.1 | 0.25 U | 0.039 J |
| 12/5/2019 | 1.0 U | 1.0 U | 11 | 0.28 J | 1.0 U | 14 | 24 | 17 | 27000 D | 1.0 U | 4.3 | 6.6 | 3.1 | 9.7 J- | 19 | 5.9 | 140 | 67 | 2.3 | 0.25 U | |
| 3/19/2020 | 1.0 U | 1.0 U | 1.4 | 1.0 U | 1.0 U | 2.6 | 23 | 6.5 | 33000 D | 1.0 U | 4.5 | 8.9 | 4.1 | | 21 | 5.4 | 110 | 39 | 2.9 | 0.50 UJ | 0.10 UJ |
| 12/8/2021 | 4.0 U | 4.0 U | 31 | 4.0 U | 4.0 U | 20 | 170 U | 150 U | 26000 | 4.0 U | 7.3 | 2.9 J | 0.94 | 16 | 13 | 12 | 130 | 90 | 5.6 | 0.25 U | 0.25 U |
| 5/12/2022 | 1.0 U | 1.0 U | 28 | 1.0 U | 1.0 U | 23 | 31 | 21 | 29000 D | 1.0 U | 8.2 | 2.2 | 0.42 | 8.9 | 26 | 4.5 | 120 | 130 | 6.7 | 0.10 UJ | 0.050 U |

| | |
|---|---|
| J | Indicates an estimated value. |
| U | Analyte was not detected above the reporting limit. |
| UJ | The analyte was not detected. The reporting limit is an approximate value. |
| J- | Indicates estimated value, biased low. |
| J+ | Indicates estimated value, biased high. |
| D | Result reported from a secondary dilution analysis. |
| R | The sample results are rejected. |

## MONITORING WELL GROUNDWATER ANALYTICAL RESULT SUMMARY
## HYDE PARK FACILITY
## NIAGARA, NEW YORK

**Well ID:** **MW-18A**

| Date | PCE (µg/L) | TCE (µg/L) | Cis-1,2-DCE (µg/L) | Trans-1,2-DCE (µg/L) | 1,1-DCE (µg/L) | Vinyl Chloride (µg/L) | Ethane (µg/L) | Ethene (µg/L) | Methane (µg/L) | 1,1,1-Trichloroethane (µg/L) | 1,1-Dichloroethane (µg/L) | Chloroethane (µg/L) | Dissolved Iron (mg/L) | BOD (mg/L) | COD (mg/L) | TOC (mg/L) | Chloride (mg/L) | Sulfate (mg/L) | Sulfide (mg/L) | Nitrate (mg/L) | Nitrite (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11/1/2007 | 5 U | 22 | 25 | 0.46 J | 0.58 J | 6.7 | 0.38 J | 1 U | 17 | 5 U | 4.1 J | 5 U | | 2 U | 5 UJ | 1.79 | 74.2 | 125 | 1 U | | |
| 4/28/2008 | 5 U | 25 | 31 | 0.44 J | 0.8 J | 2.1 J | 1 U | 1 U | 16 | 5 U | 3.8 J | 5 U | | 2 U | 5 U | 1.56 | 79.6 | 133 | 1 U | 0.05 U | 0.05 U |
| 10/27/2009 | 5 U | 25 | 43 | 5 U | 0.93 J | 7 | 5 U | 5 U | 23 | 5 U | 4.7 J | 5 U | | 1.4 U | 14.2 J | 1.5 | 90.2 J | 130 | 0.16 U | 0 R | 0.05 U |
| 5/12/2010 | 5 U | 25 | 51 | 5 U | 1.1 J | 2.6 J | 5 U | 5 U | 13 J | 5 U | 4.2 J | 5 U | | 1.6 U | 50 U | 2.1 | 104 J | 132 | 0.16 U | 0.1 U | 0.05 U |
| 10/24/2011 | 5 U | 23 | 42 | 5 U | 0.9 J | 8.4 | 5 U | 5 U | 19 | 5 U | 4.7 J | 5 U | 0.0478 J | 2.1 U | 50 U | 1.8 | 293 | 156 | 0.16 U | 0.1 U | 0.05 U |
| 6/12/2012 | 5 U | 21 | 56 | 0.94 J | 1.1 J | 2.4 J | 5 U | 5 U | 11 J | 5 U | 4.2 J | 5 U | 0.2 U | 3.1 U | 50 U | 1 | 108 | 129 | 0.16 U | 0.1 U | 0.05 U |
| 8/27/2013 | 5 U | 25 | 58 | 0.87 J | 0.98 J | 3.4 J | 5 U | 5 U | 10 | 5 UJ | 4.9 J | 5 U | | 6.2 | 50 U | 2.1 | 118 | 138 | 0.16 U | 0.1 U | 0.05 U |
| 4/2/2014 | 1 U | 27 | 43 | 0.76 J | 0.9 J | 0.86 J | 5 U | 5 U | 3.4 J | 1 UJ | 3.6 | 1 U | 0.89 | 3.3 U | 50 U | 2.4 | 106 J- | 124 J+ | 0.16 U | 0.1 U | 0.05 U |
| 11/18/2015 | 1 U | 38 | 51 | 0.73 J | 1.1 | 2.3 | 5 U | 5 U | 11 J | 1 U | 4.5 | 1 U | 1.5 | 2.8 U | 50 U | 1.2 | 113 | 118 | 0.16 U | 0.1 U | 0.05 U |
| 4/20/2016 | 1.0 U | 37 | 51 | 0.83 J | 0.99 J | 0.62 J | 5.0 U | 5.0 U | 5.2 | 1.0 U | 4.3 | 1.0 U | 0.463 | 4.2 U | 19.8 J | 1.4 | 233 | 144 | 0.10 U | 0.10 U | 0.050 U |
| 9/13/2017 | 2.0 U | 29 | 58 | 0.8 J | 1 J | 1.8 J | 0.50 U | 0.50 U | 5.3 | 2.0 U | 5 | 2.0 U | 1.2 | 2.0 U | 12 | 1.3 | 86 | 120 | 1.0 U | 0.25 U | 0.050 U |
| 4/26/2018 | 1.0 U | 36 | 42 | 0.61 J | 0.88 J | 1.1 | 1.0 U | 1.0 U | 13 | 1.0 U | 3.7 | 1.0 U | 0.99 | 2.0 U | 12 | 1.5 | 81 | 130 | 1.0 U | 0.25 U | 0.050 U |
| 12/4/2019 | 2.0 U | 32 | 43 | 0.66 J | 0.93 J | 0.97 J | 0.36 J | 1.0 U | 9.2 | 2.0 U | 3.6 | 2.0 U | 0.9 | 2.0 U | 10 U | 1.3 | 67 | 130 | 1.0 U | 0.25 U | |
| 3/19/2020 | 2.0 U | 34 | 46 | 0.81 J | 0.87 J | 1.1 J | 1.0 U | 1.0 U | 17 | 2.0 U | 3.7 | 2.0 U | 0.99 | | 4.1 J | 1.3 | 65 | 130 | 1.0 U | 0.50 UJ | 0.10 UJ |
| 12/7/2021 | 1.0 UJ | 23 J- | 43 J- | 1.0 UJ | 0.49 J- | 2.3 J- | 7.5 U | 7.0 U | 4000 | 1.0 UJ | 3.3 J- | 1.0 UJ | 1.4 | 2.0 U | 45 | 2.2 | 53 | 120 | 1.0 U | 0.050 U | 0.050 U |
| 5/11/2022 | 1.0 U | 34 | 54 | 0.87 J | 1.2 | 5.7 | 1.5 | 1.4 | 5800 D | 1.0 U | 4.1 | 1.0 U | 1.9 | 2.4 | 6.8 J | 1.1 | 51 | 130 | 1.0 U | 0.10 UJ | 0.050 UJ |

| | |
|---|---|
| J | Indicates an estimated value. |
| U | Analyte was not detected above the reporting limit. |
| UJ | The analyte was not detected. The reporting limit is an approximate value. |
| J- | Indicates estimated value, biased low. |
| J+ | Indicates estimated value, biased high. |
| D | Result reported from a secondary dilution analysis. |
| R | The sample results are rejected. |

## MONITORING WELL GROUNDWATER ANALYTICAL RESULT SUMMARY
## HYDE PARK FACILITY
## NIAGARA, NEW YORK

**Well ID:** **MW-18B**

| Date | PCE (µg/L) | TCE (µg/L) | Cis-1,2-DCE (µg/L) | Trans-1,2-DCE (µg/L) | 1,1-DCE (µg/L) | Vinyl Chloride (µg/L) | Ethane (µg/L) | Ethene (µg/L) | Methane (µg/L) | 1,1,1-Trichloroethane (µg/L) | 1,1-Dichloroethane (µg/L) | Chloroethane (µg/L) | Dissolved Iron (mg/L) | BOD (mg/L) | COD (mg/L) | TOC (mg/L) | Chloride (mg/L) | Sulfate (mg/L) | Sulfide (mg/L) | Nitrate (mg/L) | Nitrite (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11/1/2007 | 5 U | 5 U | 160 | 0.9 J | 5 U | 140 |  | 2.1 | 120 | 5 U | 5 U | 5 U |  | 2 U | 5 UJ | 4.09 | 80.9 | 261 |  |  |  |
| 11/29/2007 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1 U |  |  |
| 4/28/2008 | 5 U | 5 U | 120 | 0.73 J | 5 U | 180 | 0.74 J | 2.4 | 150 | 5 U | 5 U | 5 U |  | 2 U | 9.86 | 3.74 | 88.1 | 270 | 1 U | 0.05 U | 0.05 U |
| 10/27/2009 | 5 U | 5 U | 62 | 5 U | 5 U | 220 | 5 U | 2.3 J | 120 | 5 U | 5 U | 5 U |  | 1.7 U | 23.3 J | 4.1 | 93.8 J | 296 | 0.16 U | 0 R | 0.05 U |
| 5/12/2010 | 5 U | 5 U | 69 | 5 U | 5 U | 190 | 5 U | 2.4 J | 130 | 5 U | 5 U | 5 U |  |  |  |  |  |  |  |  |  |
| 10/25/2011 | 5 U | 5 U | 150 | 0.9 J | 5 U | 220 | 5 U | 4 J | 120 | 5 U | 5 U | 5 U | 0.0657 J | 2.4 U | 50 U | 3.9 | 114 J | 305 J | 0.16 U | 0.1 U | 0.05 U |
| 3/14/2012 | 5 U | 5 U | 59 | 5 U | 5 U | 170 | 5 U | 2.3 J | 96 | 5 U | 5 U | 5 U | 0.0423 J |  |  | 3.5 | 102 | 281 |  |  |  |
| 6/12/2012 | 5 U | 5 U | 110 | 5 U | 5 U | 140 | 5 U | 3.6 J | 110 | 5 U | 5 U | 5 U | 0.2 U | 3.5 U | 50 U | 4 | 102 | 268 | 0.16 U | 0.1 U | 0.05 U |
| 11/28/2012 | 5 U | 5 U | 89 | 5 U | 5 U | 180 | 5 U | 5.2 | 150 | 5 U | 5 U | 5 U | 0.2 U |  |  | 4.2 | 106 | 284 |  |  |  |
| 8/15/2013 | 0.96 J | 5 U | 120 | 5 U | 5 U | 190 |  |  |  | 5 U | 5 U | 5 U |  |  |  |  |  |  | 0.16 U |  |  |
| 8/27/2013 | 5 U | 5 U | 110 | 5 U | 5 U | 190 | 5 U | 5.3 | 170 | 5 UJ | 5 U | 5 U |  | 2.8 U | 17.9 J | 4.9 | 106 | 284 | 0.16 U | 0.1 U | 0.05 U |
| 1/17/2014 | 5 U | 5 U | 28 | 5 U | 5 U | 56 | 3.2 J | 41 | 5000 | 5 U | 5 U | 5 U | 5.97 |  |  | 941 | 91.1 | 55.1 | 17.3 |  |  |
| 1/21/2014 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 4/2/2014 | 1 U | 1 U | 43 | 1 U | 1 U | 71 | 3.8 J | 33 | 13000 | 1 UJ | 1 U | 1 U | 2.91 | 889 J | 1340 | 427 | 79.3 J- | 86.1 J+ | 7.7 | 0.1 U | 0.05 U |
| 10/13/2014 | 1 U | 1 U | 1.1 | 1 U | 1 U | 4.6 | 4 J | 11 | 18000 | 1 U | 1 U | 1 U | 8.37 |  |  | 166 | 34.9 | 3.8 J | 2.8 |  |  |
| 11/18/2015 | 1 U | 1 U | 35 | 1 U | 1 U | 40 | 3.5 J | 15 | 18000 | 1 U | 1 U | 1 U | 2.54 | 35.7 | 167 | 41.5 | 62.2 | 70.9 | 1.5 | 0.1 U | 0.05 U |
| 4/21/2016 | 1.0 U | 1.0 U | 90 | 1.0 U | 1.0 U | 120 | 2.8 J | 16 | 19000 D | 1.0 U | 1.0 U | 1.0 U | 0.893 | 22.1 | 88.7 | 21.7 | 122 | 189 | 4.8 | 0.10 U | 0.050 U |
| 9/13/2017 | 20 U | 20 U | 380 | 20 U | 20 U | 210 | 6.8 | 38 | 5000 D | 20 U | 20 UJ | 20 U | 0.52 | 23 | 99 | 11 | 110 | 140 | 7.3 | 0.50 U | 0.050 U |
| 4/26/2018 | 2.5 U | 2.5 U | 69 | 2.5 U | 2.5 U | 92 | 2 | 12 | 17000 D | 2.5 U | 2.5 U | 2.5 U | 0.41 | 17 | 71 | 12 | 97 | 130 | 10 | 0.25 U | 0.050 U |
| 12/4/2019 | 2.0 U | 2.0 U | 56 | 2.0 U | 2.0 U | 70 | 2.3 | 9.9 | 24000 D | 2.0 U | 2.0 U | 2.0 U | 0.35 | 35 J- | 49 | 8.8 | 96 | 130 | 13 | 0.25 U |  |
| 3/19/2020 | 2.0 U | 2.0 U | 32 | 2.0 U | 2.0 U | 51 | 2.5 | 29 | 24000 D | 2.0 U | 2.0 U | 2.0 U | 0.23 |  | 53 | 7.2 | 100 | 170 | 16 | 0.50 UJ | 0.10 UJ |
| 12/7/2021 | 2.0 U | 2.0 U | 47 | 2.0 U | 2.0 U | 80 | 170 U | 150 U | 13000 | 2.0 U | 2.0 U | 2.0 U | 0.32 | 14 | 39 | 6 | 98 | 190 | 8 | 0.050 U | 0.050 U |
| 5/11/2022 | 1.0 U | 1.0 U | 38 | 1.0 U | 1.0 U | 59 | 3.2 | 15 | 21000 D | 1.0 U | 1.0 U | 1.0 U | 0.17 J | 16 | 39 | 4.5 | 100 | 220 | 9.9 | 0.10 UJ | 0.050 UJ |

| | |
|---|---|
| J | Indicates an estimated value. |
| U | Analyte was not detected above the reporting limit. |
| UJ | The analyte was not detected. The reporting limit is an approximate value. |
| J- | Indicates estimated value, biased low. |
| J+ | Indicates estimated value, biased high. |
| D | Result reported from a secondary dilution analysis. |
| R | The sample results are rejected. |

# MONITORING WELL GROUNDWATER ANALYTICAL RESULT SUMMARY
## HYDE PARK FACILITY
## NIAGARA, NEW YORK

**Well ID:** **MW-19A**

| Date | PCE (µg/L) | TCE (µg/L) | Cis-1,2-DCE (µg/L) | Trans-1,2-DCE (µg/L) | 1,1-DCE (µg/L) | Vinyl Chloride (µg/L) | Ethane (µg/L) | Ethene (µg/L) | Methane (µg/L) | 1,1,1-Trichloroethane (µg/L) | 1,1-Dichloroethane (µg/L) | Chloroethane (µg/L) | Dissolved Iron (mg/L) | BOD (mg/L) | COD (mg/L) | TOC (mg/L) | Chloride (mg/L) | Sulfate (mg/L) | Sulfide (mg/L) | Nitrate (mg/L) | Nitrite (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10/31/2007 | 5 U | 5 U | 4.2 J | 5 U | 5 U | 4 | | | | 5 U | 5 U | 5 U | | | | | | | | | |
| 4/24/2008 | 5 U | 5 U | 3.2 J | 5 U | 5 U | 1.2 J | | | | 5 U | 5 U | 5 U | | | | | | | | | |
| 11/2/2009 | 5 U | 5 U | 3.7 J | 5 U | 5 U | 2.8 J | | | | 5 U | 5 U | 5 U | | | | | | | | | |

| | |
|---|---|
| J | Indicates an estimated value. |
| U | Analyte was not detected above the reporting limit. |
| UJ | The analyte was not detected. The reporting limit is an approximate value. |
| J- | Indicates estimated value, biased low. |
| J+ | Indicates estimated value, biased high. |
| D | Result reported from a secondary dilution analysis. |
| R | The sample results are rejected. |

## MONITORING WELL GROUNDWATER ANALYTICAL RESULT SUMMARY
## HYDE PARK FACILITY
## NIAGARA, NEW YORK

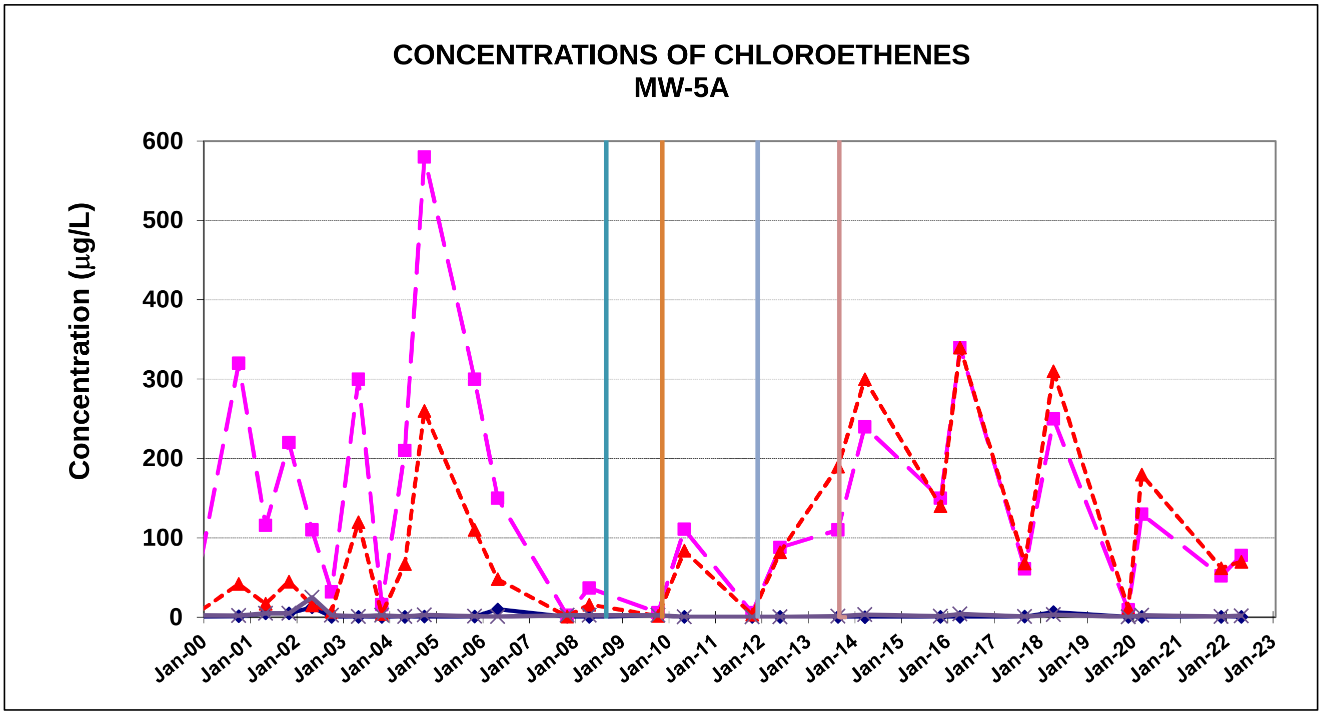
**Well ID:** **MW-19B**

| Date | PCE (µg/L) | TCE (µg/L) | Cis-1,2-DCE (µg/L) | Trans-1,2-DCE (µg/L) | 1,1-DCE (µg/L) | Vinyl Chloride (µg/L) | Ethane (µg/L) | Ethene (µg/L) | Methane (µg/L) | 1,1,1-Trichloroethane (µg/L) | 1,1-Dichloroethane (µg/L) | Chloroethane (µg/L) | Dissolved Iron (mg/L) | BOD (mg/L) | COD (mg/L) | TOC (mg/L) | Chloride (mg/L) | Sulfate (mg/L) | Sulfide (mg/L) | Nitrate (mg/L) | Nitrite (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10/31/2007 | 5 U | 5 U | 12 | 5 U | 5 U | 3.4 | | | | 5 U | 5 U | 5 U | | | | | | | | | |
| 4/24/2008 | 5 U | 5 U | 24 | 5 U | 5 U | 5.8 | | | | 5 U | 5 U | 5 U | | | | | | | | | |
| 11/2/2009 | 5 U | 5 U | 68 | 5 U | 5 U | 7.2 | | | | 5 U | 5 U | 5 U | | | | | | | | | |
| 5/12/2010 | 5 U | 5 U | 2.1 J | 5 U | 5 U | 2.1 J | 5 U | 5 U | 160 | 5 U | 5 U | 5 U | | | | | | | | | |
| 10/20/2011 | 5 U | 5 U | 8.7 | 5 U | 5 U | 3.3 J | | | | 5 U | 5 U | 5 U | | | | | | | | | |
| 6/12/2012 | 5 U | 5 U | 2.3 J | 5 U | 5 U | 1.6 J | | | | 5 U | 5 U | 5 U | | | | | | | | | |
| 8/28/2013 | 5 U | 5 U | 2.1 J | 5 U | 5 U | 1.2 J | | | | 5 U | 5 U | 5 U | | | | | | | | | |
| 4/2/2014 | 1 U | 1 U | 2.9 | 1 U | 1 U | 0.65 J | | | | 1 U | 1 U | 1 U | | | | | | | | | |
| 11/17/2015 | 1 U | 1 U | 1.8 | 1 U | 1 U | 1 | | | | 1 U | 1 U | 1 U | | | | | | | | | |
| 4/19/2016 | 1.0 U | 1.0 U | 1.1 | 1.0 U | 1.0 U | 1.1 | | | | 1.0 U | 1.0 U | 1.0 U | | | | | | | | | |
| 9/13/2017 | 1.0 U | 1.0 U | 1.6 | 1.0 U | 1.0 U | 1.5 | | | | 1.0 U | 1.0 UJ | 1.0 U | | | | | | | | | |
| 4/23/2018 | 1.0 U | 1.0 U | 24 | 1.0 U | 1.0 U | 5 | | | | 1.0 U | 1.0 U | 1.0 U | | | | | | | | | |
| 12/4/2019 | 1.0 U | 1.0 U | 1.4 | 1.0 U | 1.0 U | 1.2 | | | | 1.0 U | 1.0 U | 1.0 U | | | | | | | | | |
| 3/20/2020 | 1.0 U | 1.0 U | 11 | 1.0 U | 1.0 U | 2.3 | | | | 1.0 U | 1.0 U | 1.0 U | | | | | | | | | |
| 12/7/2021 | 1.0 U | 1.0 U | 1.8 | 1.0 U | 1.0 U | 1.5 | | | | 1.0 U | 1.0 U | 1.0 U | | | | | | | | | |
| 5/12/2022 | 1.0 U | 1.0 U | 1.5 | 1.0 U | 1.0 U | 1.1 | | | | 1.0 U | 1.0 U | 1.0 U | | | | | | | | | |

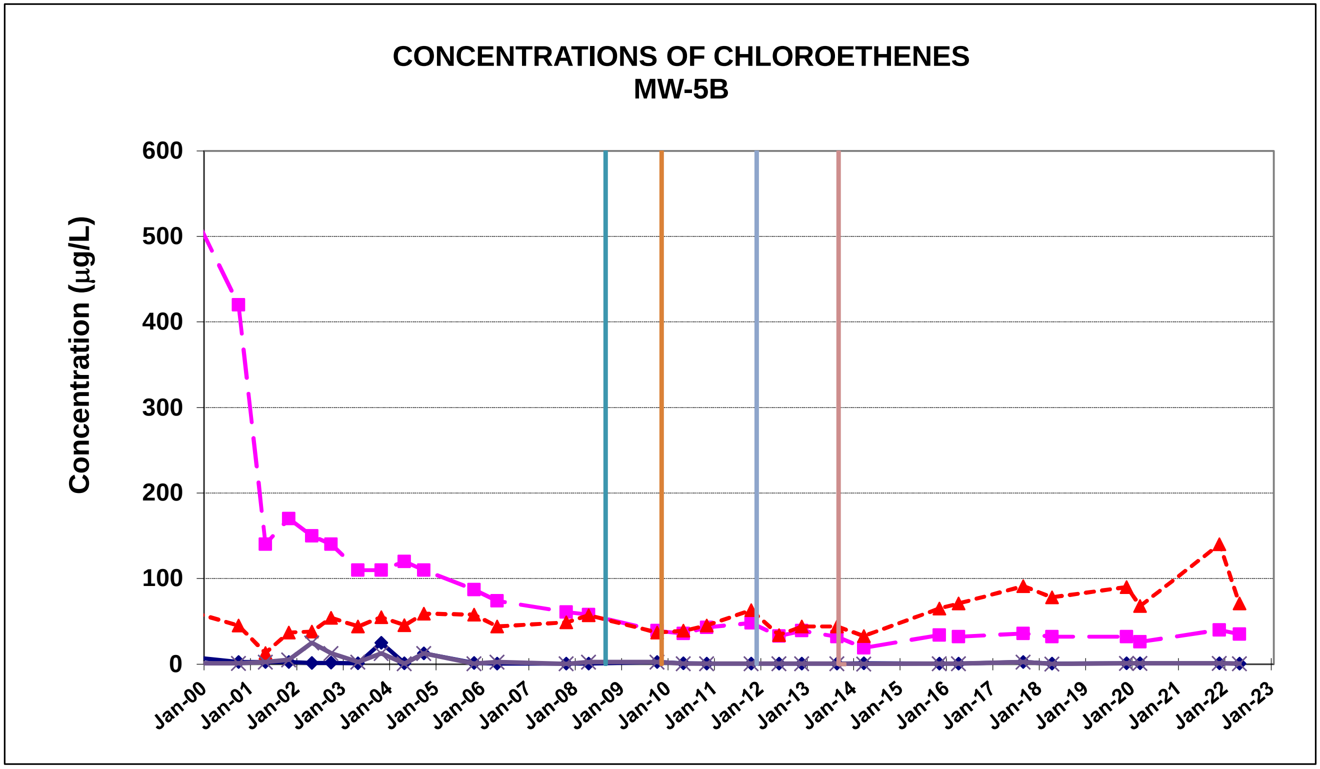
| | |
|---|---|
| J | Indicates an estimated value. |
| U | Analyte was not detected above the reporting limit. |
| UJ | The analyte was not detected. The reporting limit is an approximate value. |
| J- | Indicates estimated value, biased low. |
| J+ | Indicates estimated value, biased high. |
| D | Result reported from a secondary dilution analysis. |
| R | The sample results are rejected. |

# APPENDIX G

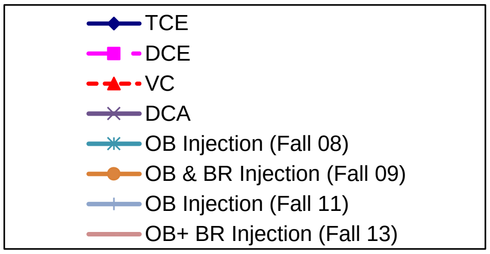
# LONG-TERM TRENDS OF CHLORINATED ETHENES IN WELLS 2000 - 2022



CONCENTRATIONS OF CHLOROETHENES
MW-5A



CONCENTRATIONS OF CHLOROETHENES
MW-5B

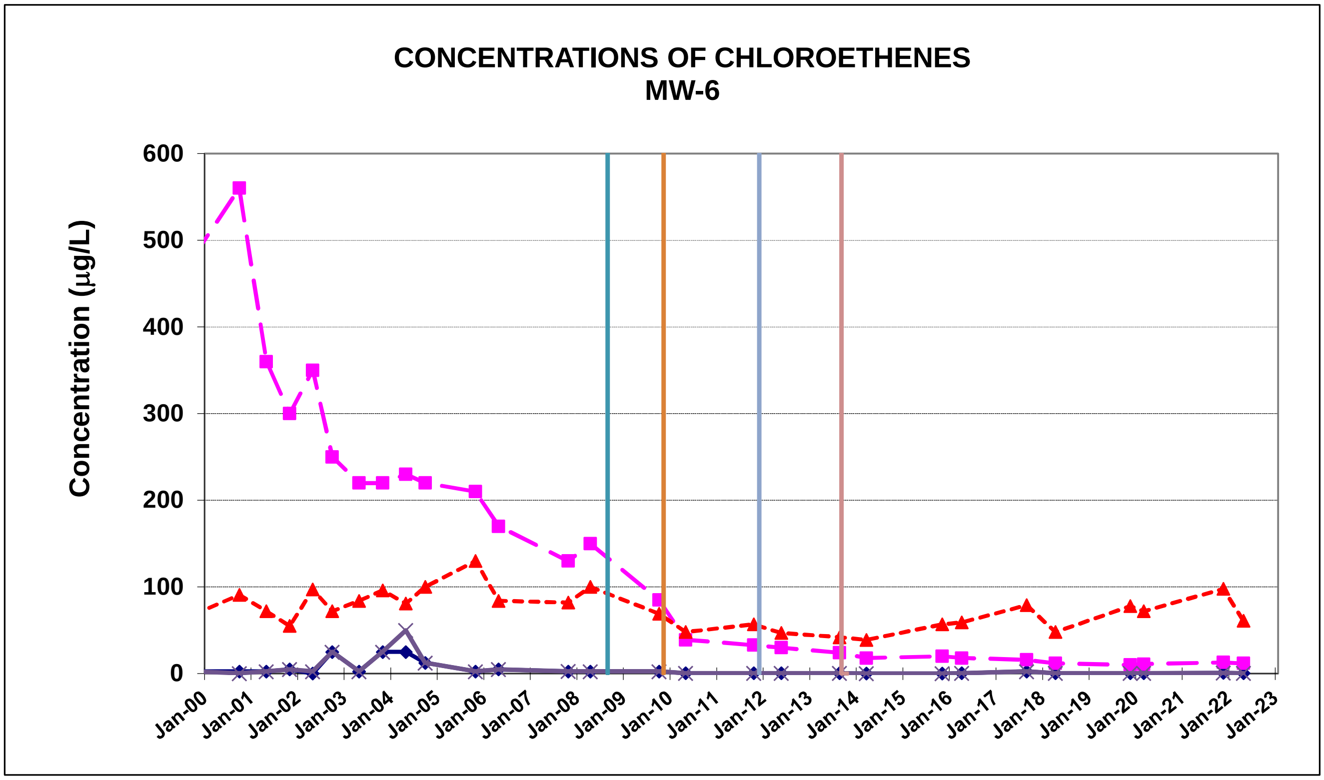


FORMER CARBORUNDUM COMPANY

LONG TERM TRENDS OF CHLORINATED
ETHENES IN WELLS MW-5A AND MW-5B

**AECOM**

1 John James Audubon Parkway, Amherst, NY 14228

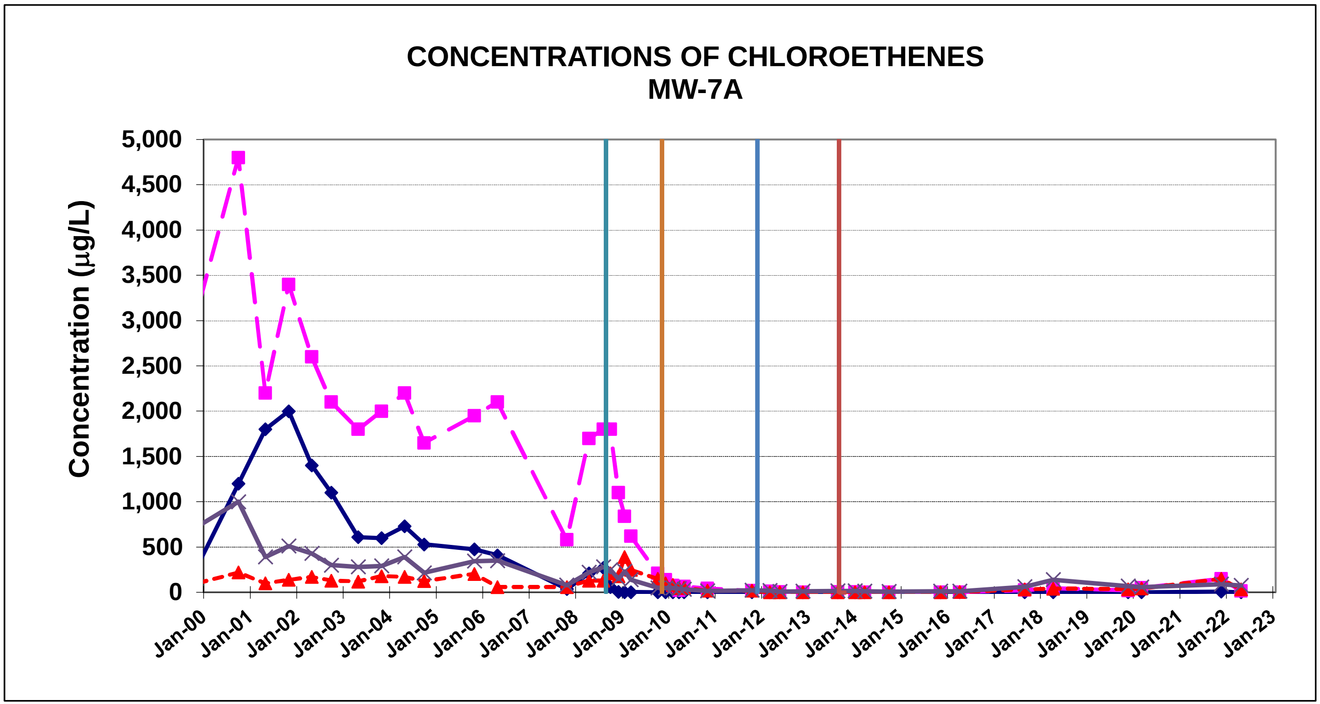


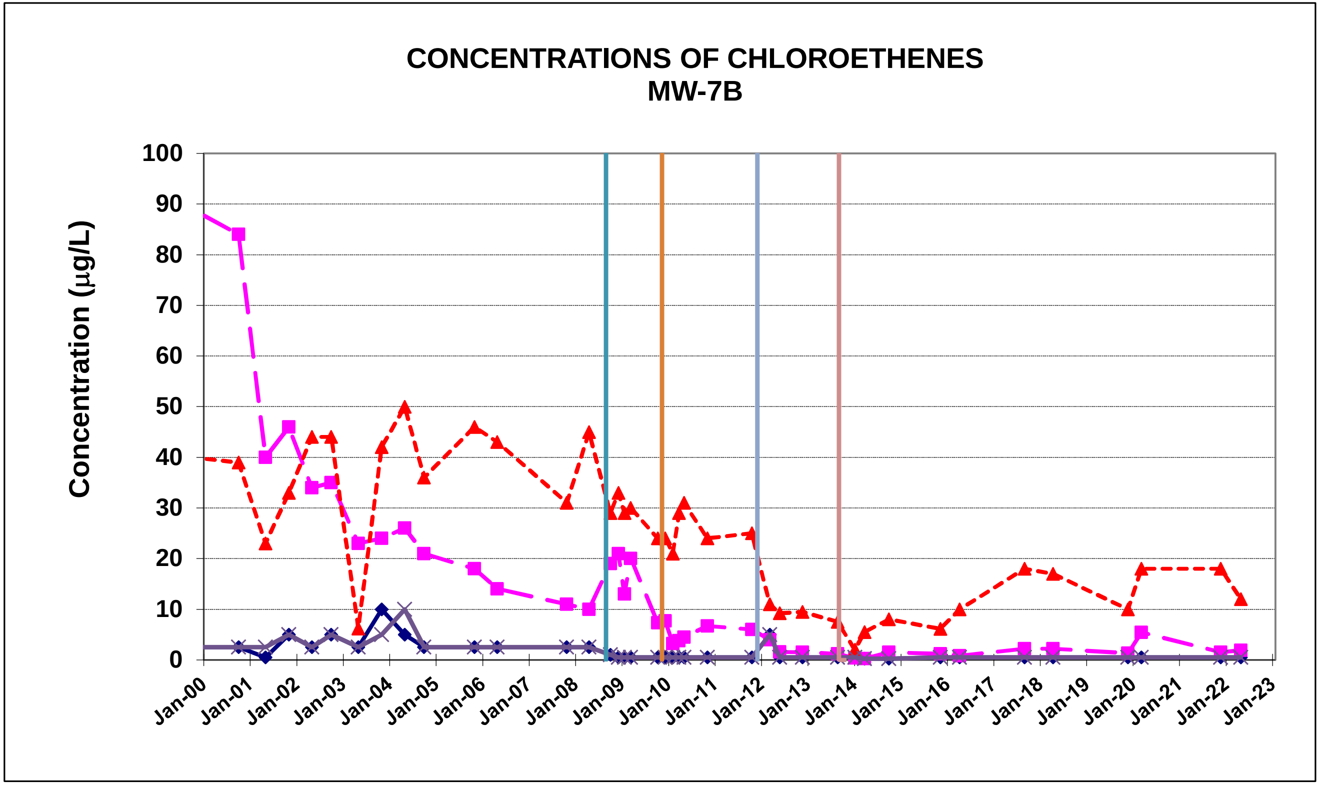
FORMER CARBORUNDUM COMPANY

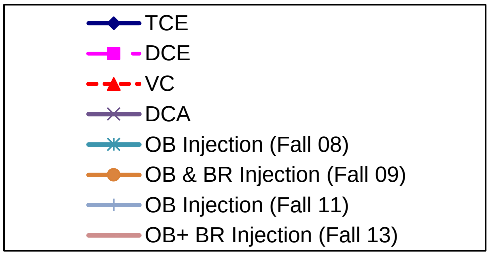
LONG TERM TRENDS OF CHLORINATED
ETHENES IN WELL MW-6

**AECOM**

1 John James Audubon Parkway, Amherst, NY 14228





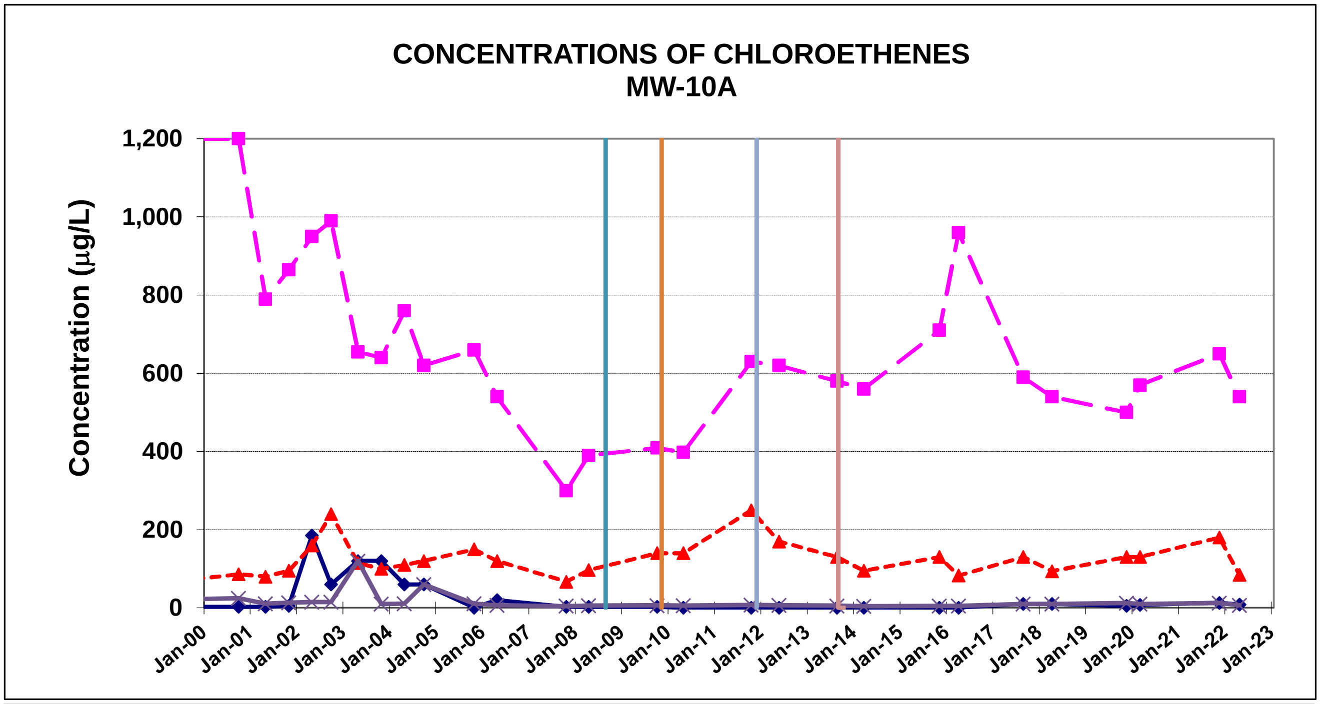


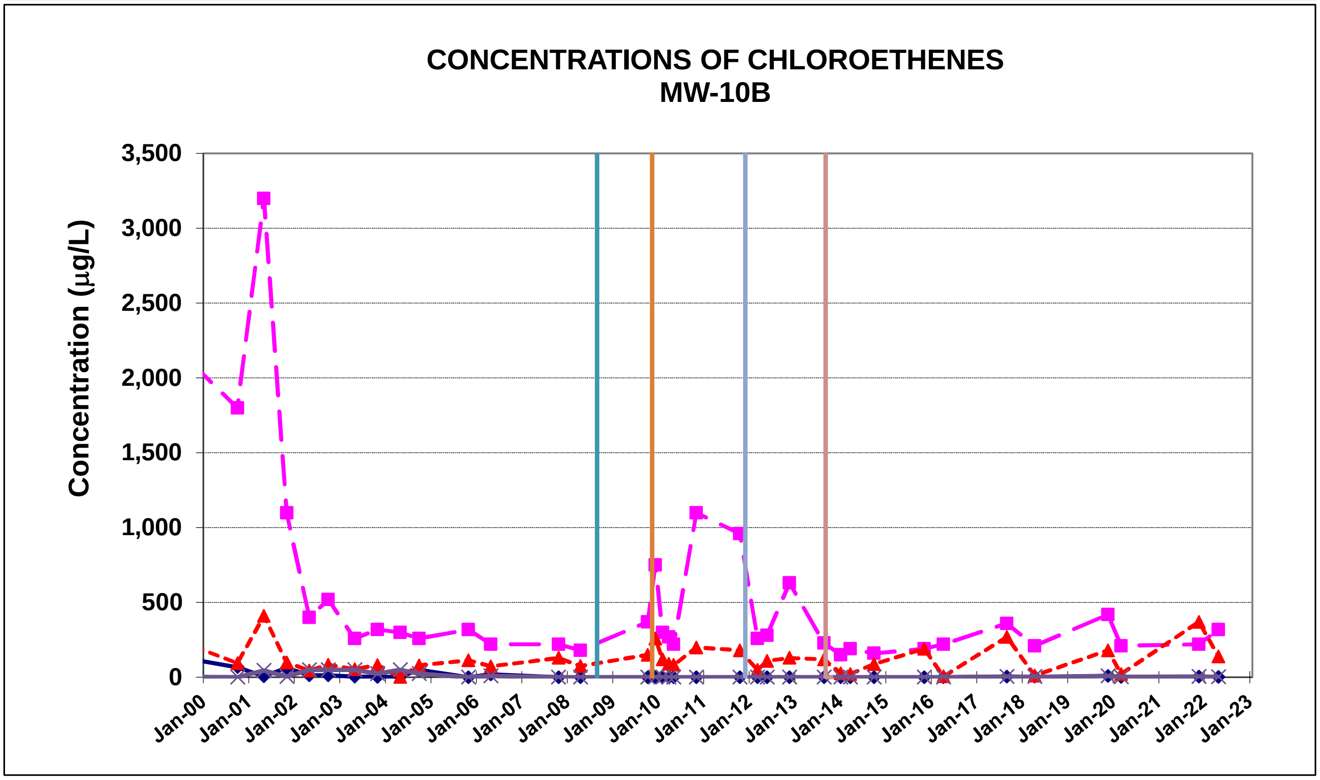
FORMER CARBORUNDUM COMPANY

LONG TERM TRENDS OF CHLORINATED ETHENES IN WELLS MW-7A AND MW-7B

**AECOM**

1 John James Audubon Parkway, Amherst, NY 14228



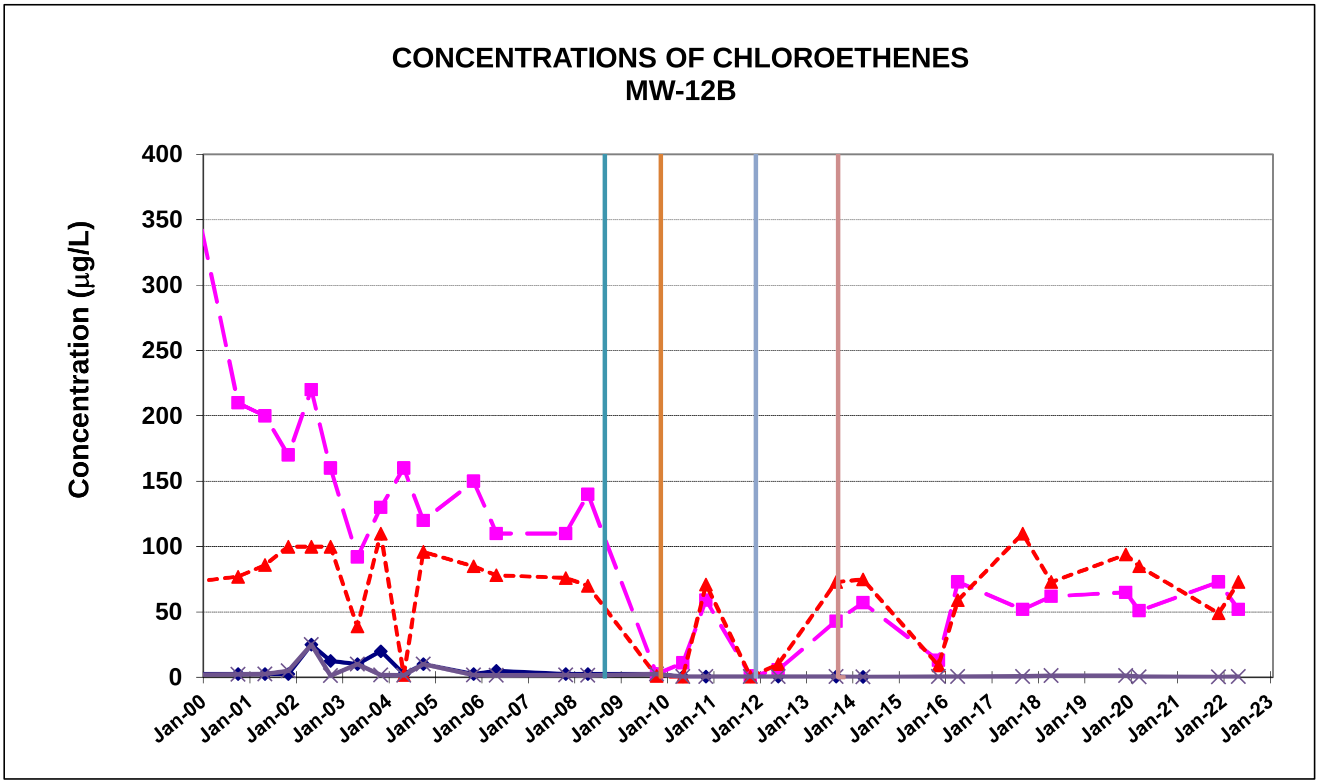


FORMER CARBORUNDUM COMPANY

LONG TERM TRENDS OF CHLORINATED ETHENES IN WELLS MW-10A AND MW-10B

**AECOM**

1 John James Audubon Parkway, Amherst, NY 14228

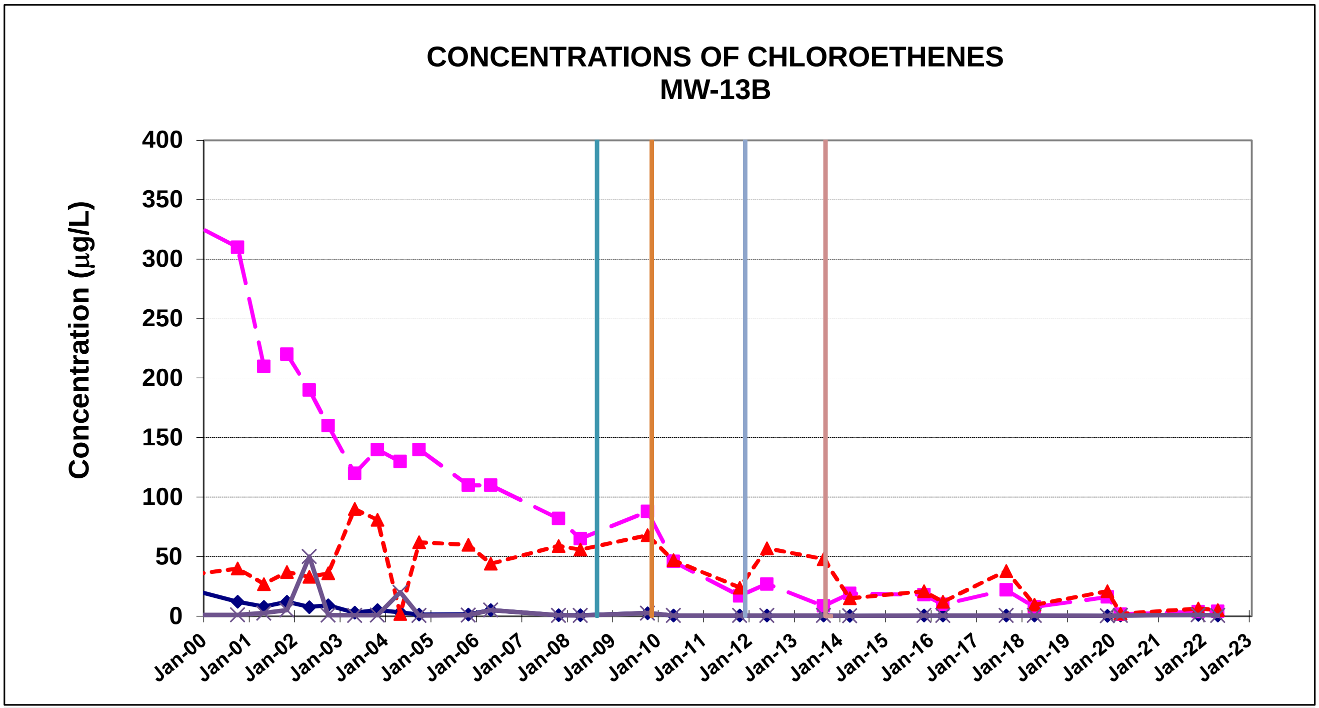


FORMER CARBORUNDUM COMPANY

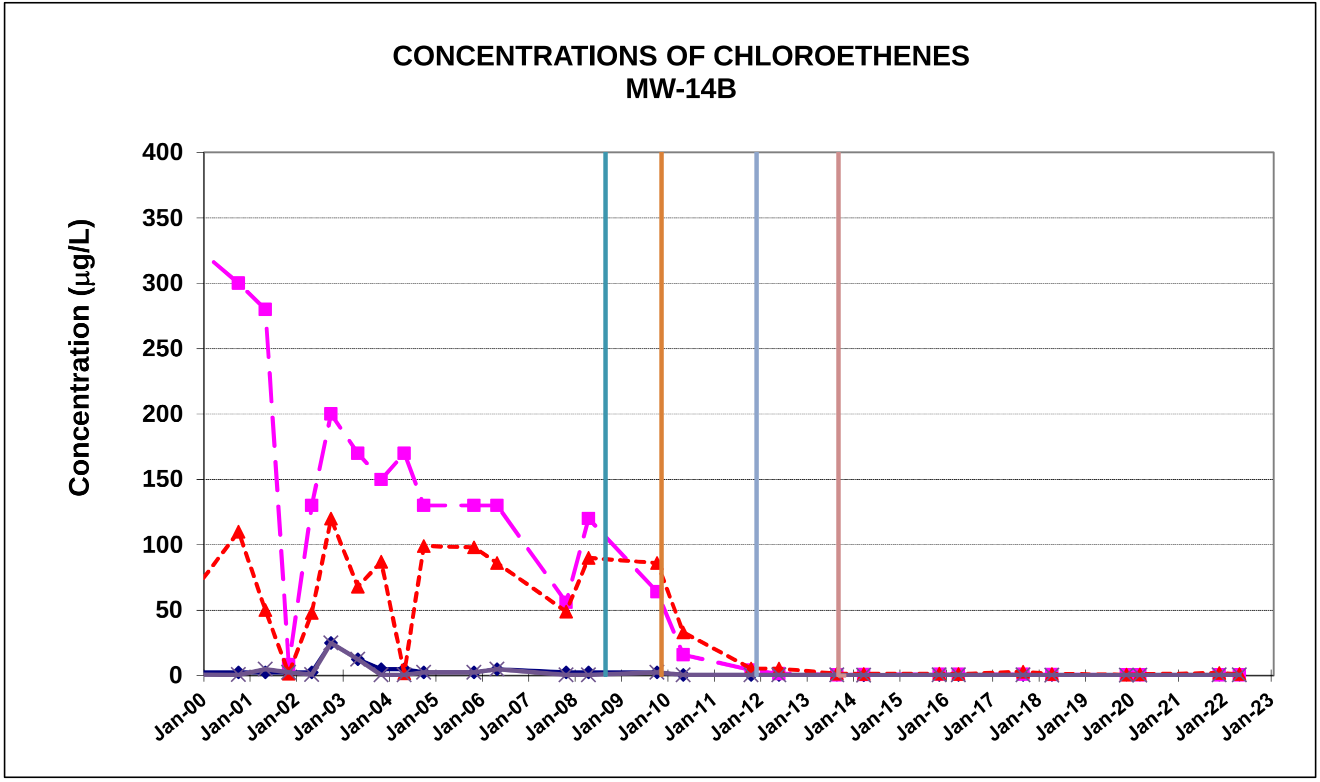
LONG TERM TRENDS OF CHLORINATED
ETHENES IN WELL MW-12B

**AECOM**

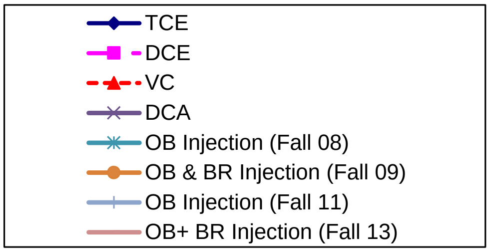
1 John James Audubon Parkway, Amherst, NY 14228



CONCENTRATIONS OF CHLOROETHENES
MW-13B



CONCENTRATIONS OF CHLOROETHENES
MW-14B

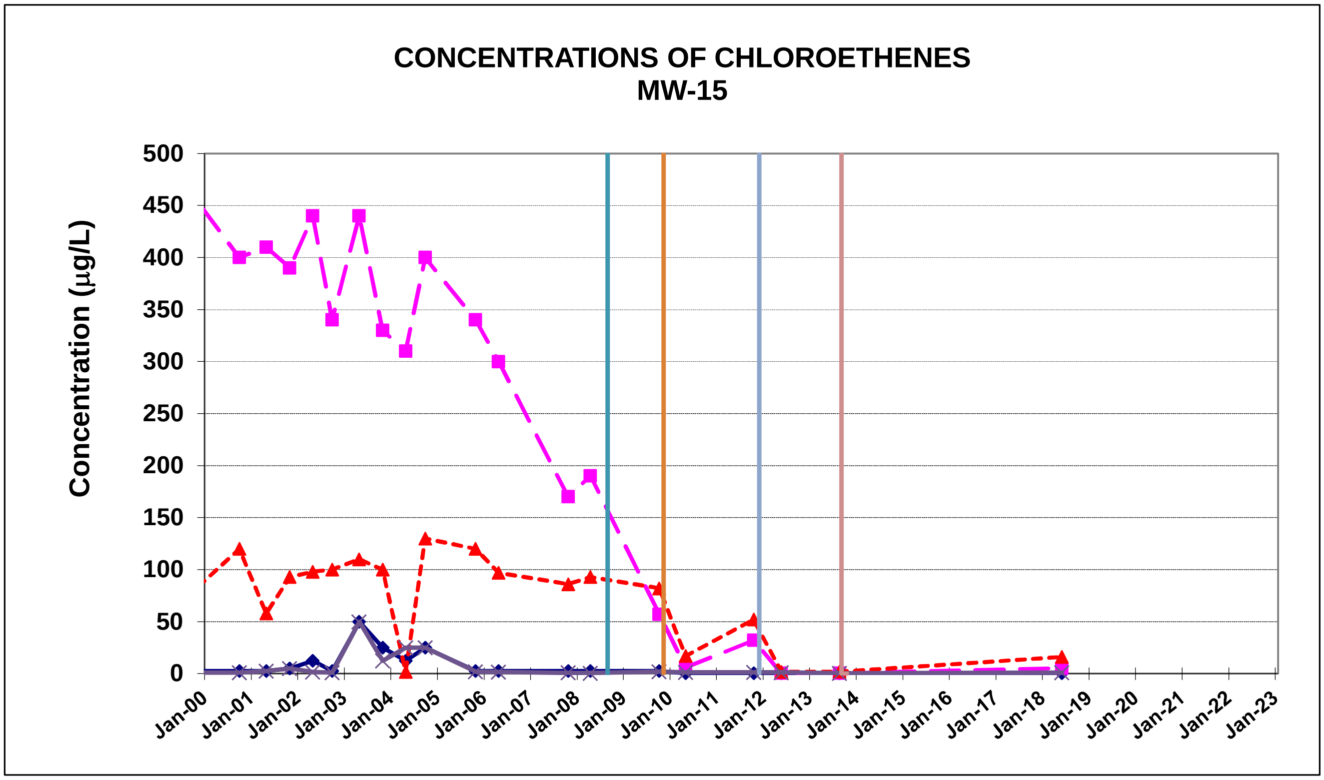


FORMER CARBORUNDUM COMPANY

LONG TERM TRENDS OF CHLORINATED
ETHENES IN WELLS MW-13B AND MW-14B

**AECOM**

1 John James Audubon Parkway, Amherst, NY 14228

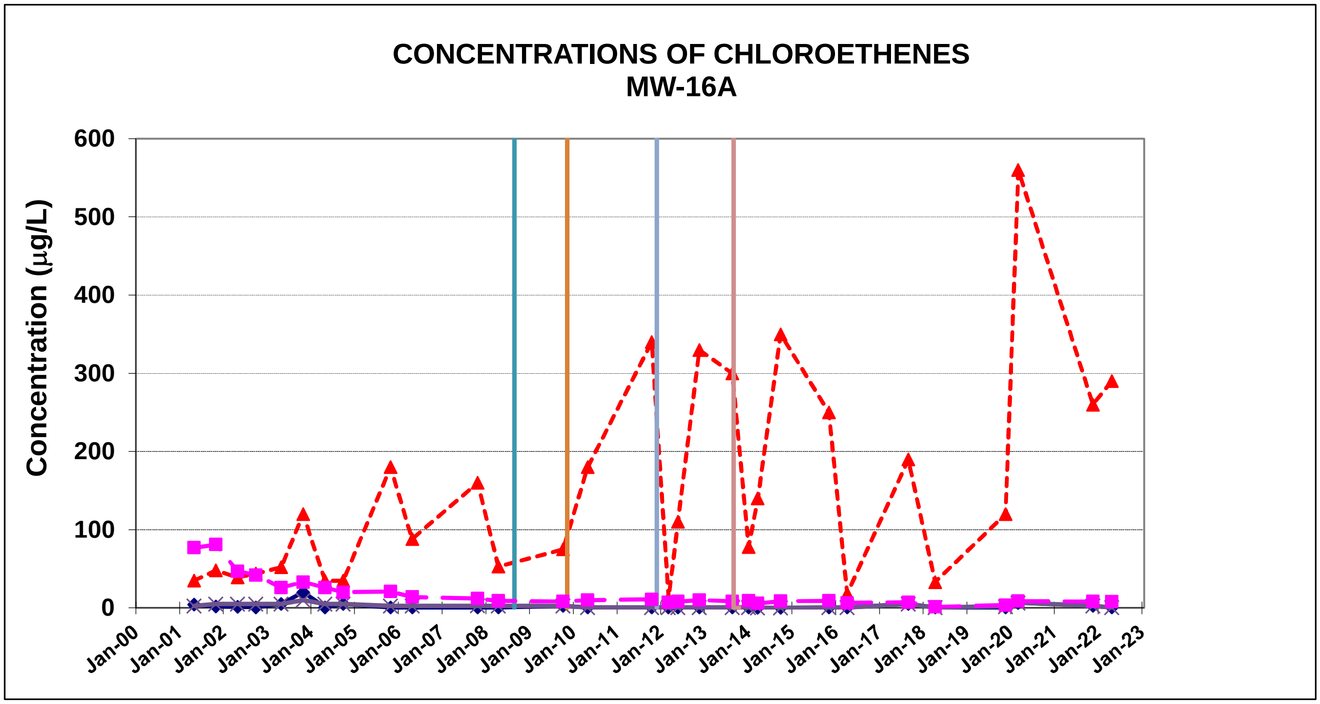


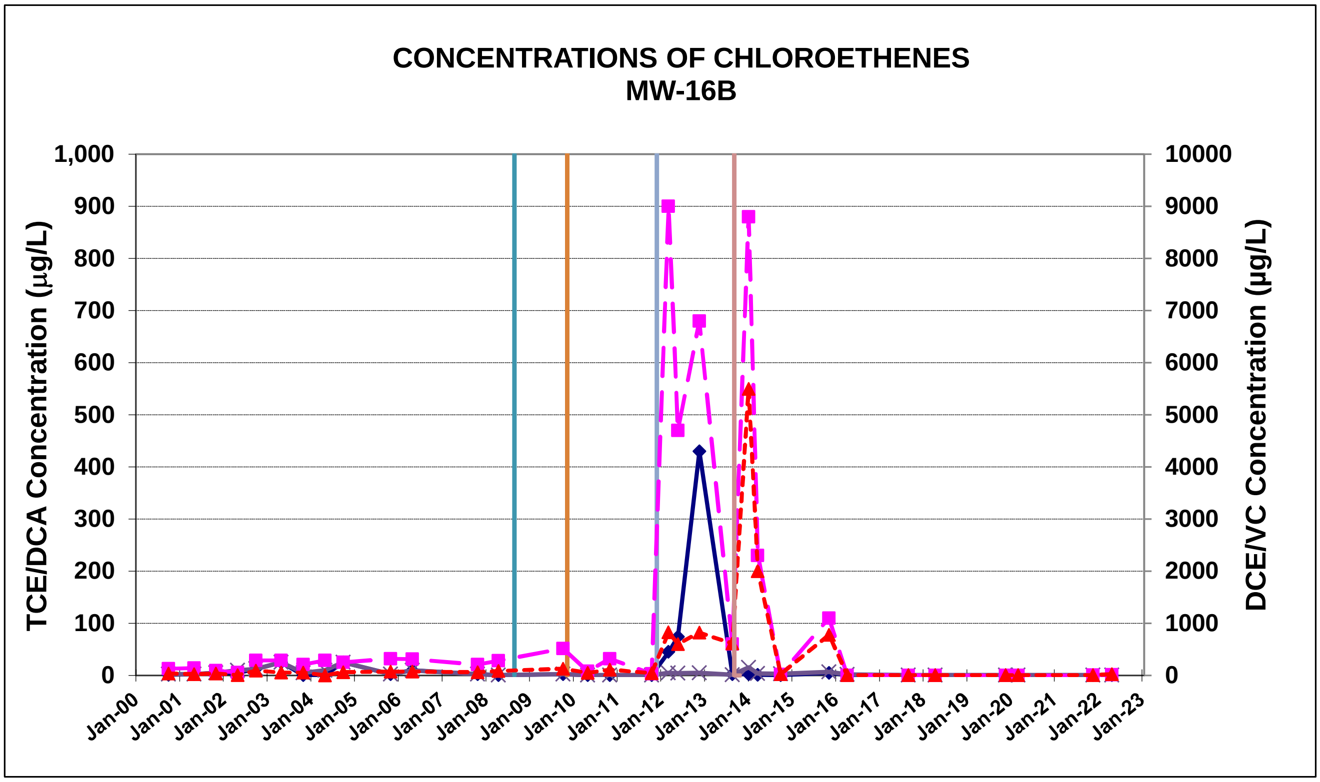
FORMER CARBORUNDUM COMPANY

LONG TERM TRENDS OF CHLORINATED
ETHENES IN WELL MW-15

**AECOM**

1 John James Audubon Parkway, Amherst, NY 14228



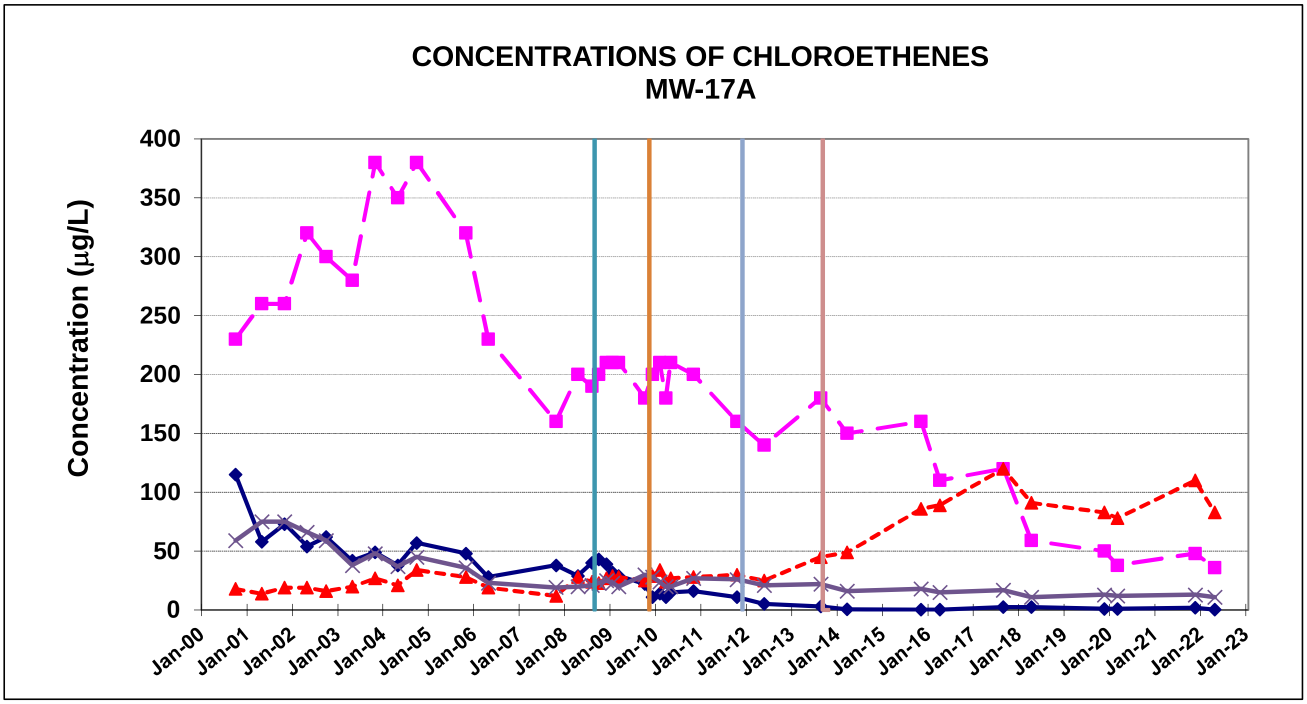


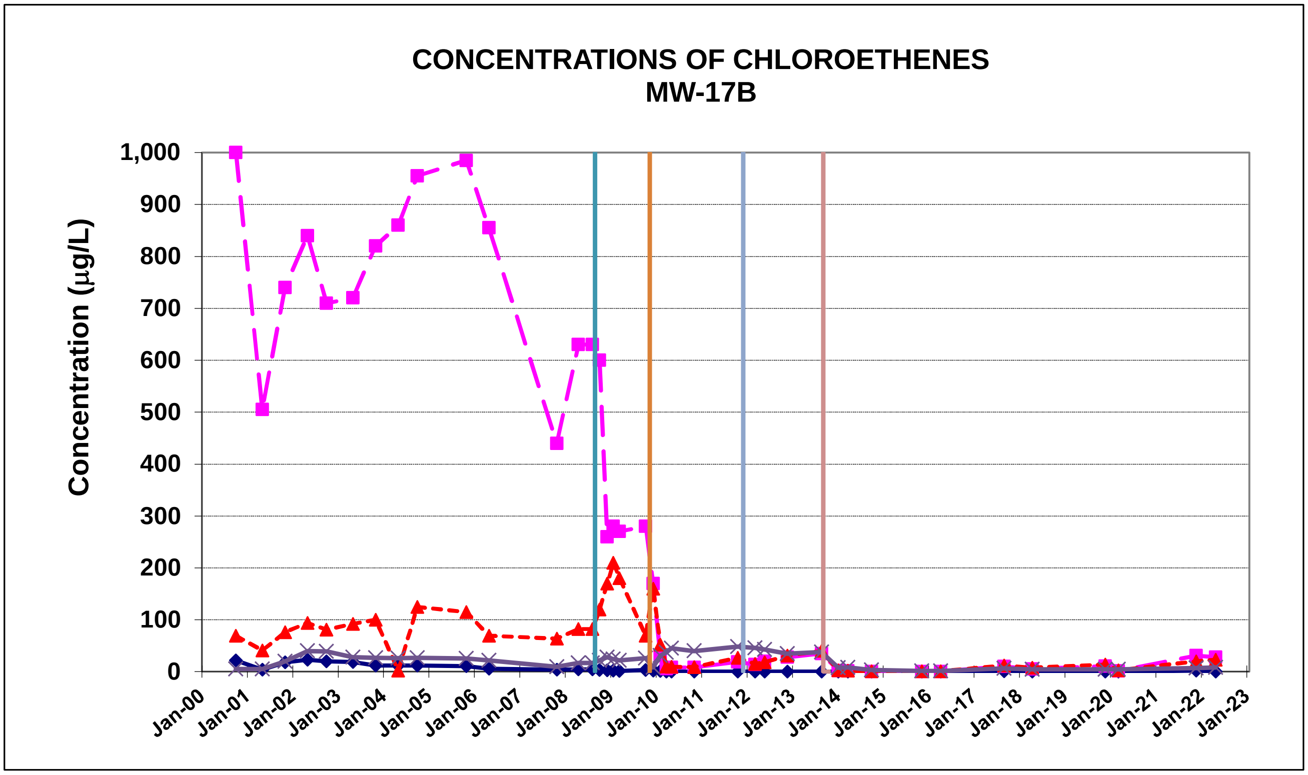
FORMER CARBORUNDUM COMPANY

LONG TERM TRENDS OF CHLORINATED ETHENES IN WELLS MW-16A AND MW-16B

**AECOM**

1 John James Audubon Parkway, Amherst, NY 14228





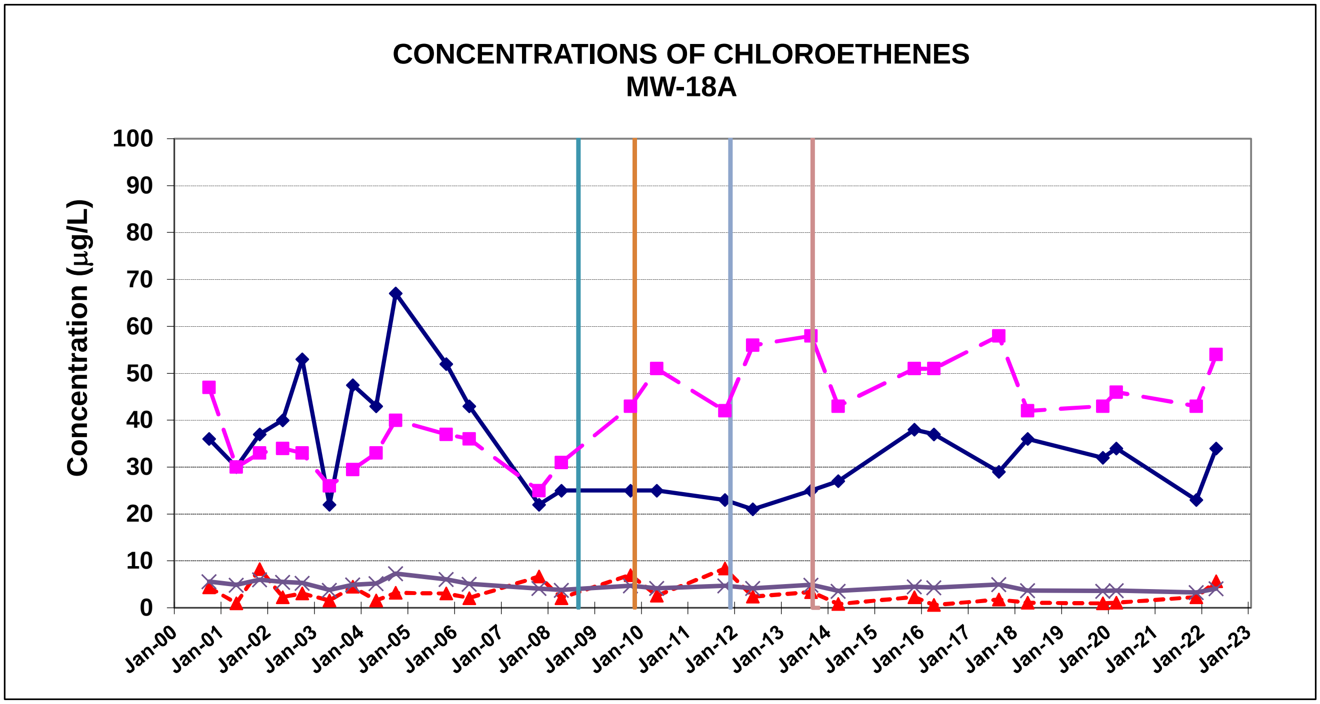
◆ TCE
■ DCE
▲ VC
× DCA
✳ OB Injection (Fall 08)
● OB & BR Injection (Fall 09)
+ OB Injection (Fall 11)
OB+ BR Injection (Fall 13)

FORMER CARBORUNDUM COMPANY

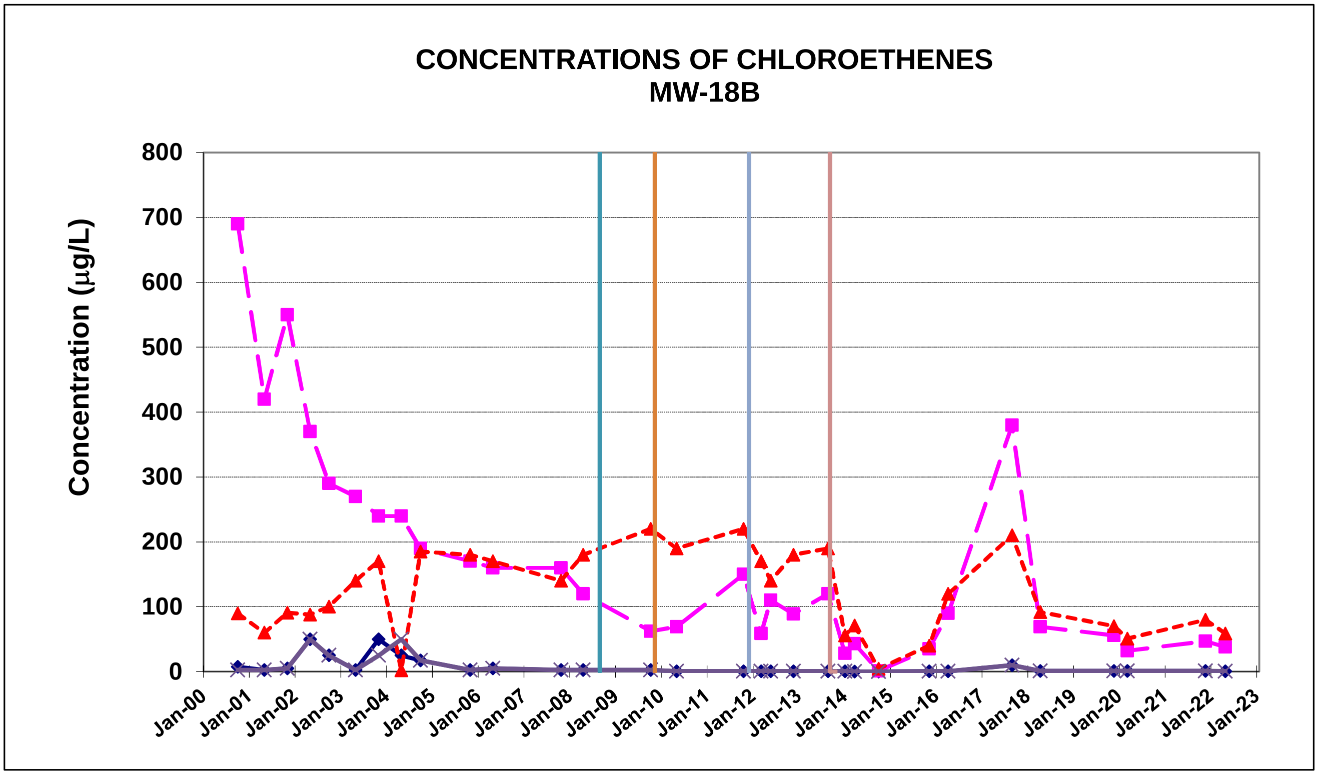
LONG TERM TRENDS OF CHLORINATED ETHENES IN WELLS MW-17A AND MW-17B

**AECOM**

1 John James Audubon Parkway, Amherst, NY 14228



CONCENTRATIONS OF CHLOROETHENES
MW-18A



CONCENTRATIONS OF CHLOROETHENES
MW-18B

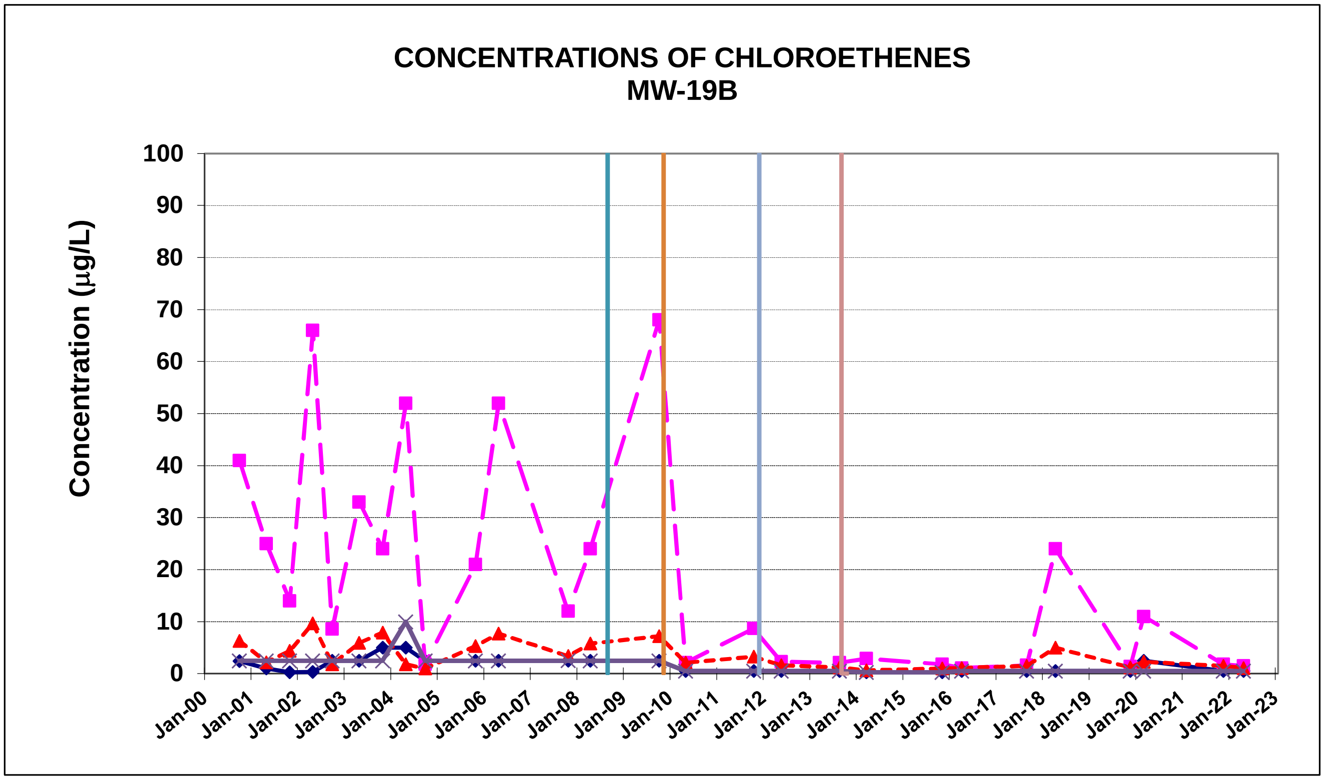
- TCE
- DCE
- VC
- DCA
- OB Injection (Fall 08)
- OB & BR Injection (Fall 09)
- OB Injection (Fall 11)
- OB+ BR Injection (Fall 13)

FORMER CARBORUNDUM COMPANY

LONG TERM TRENDS OF CHLORINATED
ETHENES IN WELLS MW-18A AND MW-18B

**AECOM**

1 John James Audubon Parkway, Amherst, NY 14228



- TCE
- DCE
- VC
- DCA
- OB Injection (Fall 08)
- OB & BR Injection (Fall 09)
- OB Injection (Fall 11)
- OB+ BR Injection (Fall 13)

FORMER CARBORUNDUM COMPANY

LONG TERM TRENDS OF CHLORINATED
ETHENES IN WELL MW-19B

**AECOM**

1 John James Audubon Parkway, Amherst, NY 14228

# APPENDIX H

# EXCAVATION WORK PLAN

# APPENDIX H – EXCAVATION WORK PLAN (EWP)

This Excavation Work Plan (EWP) is for the Former Carborundum Company Hyde Park Facility Site (New York State Department of Environmental Conservation [NYSDEC] Brownfield Cleanup Program Site No. 932036) located at 3425 Hyde Park Avenue in the Town of Niagara, New York (Figure 1 - Location Plan and Figure 2 - Site Layout Plan). No excavation is anticipated as a part of Site remedial measures, but excavation may occur during property redevelopment.

## H-1 NOTIFICATION

At least 15 days prior to the start of any activity that is anticipated to encounter remaining contamination or breach or alter the site's cover system, the site owner or their representative will notify the NYSDEC contacts listed in the table below. Table H-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 H-1: Notifications***

| | |
|---|---|
| Steven Moeller (NYSDEC Project Manager) | (716) 851-7220<br>steven.moeller@dec.ny.gov |
| [NYSDEC Project Manager's Supervisor] Stanley Radon | (716) 851-7220<br>stanley.radon@dec.ny.gov |
| Kelly Lewandowski | 518.402.9569<br>kelly.lewandowski@dec.ny.gov |
| | |
| | |

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

As applicable, this notification will include:

- A detailed description of the work to be performed, including information such as 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, any modifications of truck routes, 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 M of this SMP;
- Identification of disposal facilities for potential waste streams; and
- Identification of sources of any anticipated backfill, along with the required request to import form and all supporting documentation including, but not limited to, chemical testing results.

The NYSDEC project manager will review the notification and may impose additional requirements for the excavation that are not listed in this EWP.

## H-2 SOIL SCREENING METHODS

Visual, olfactory and instrument-based (e.g. photoionization detector) soil screening will be performed during all excavations into known or potentially contaminated material (remaining contamination) or a breach of the cover system. A qualified environmental professional (QEP) 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 will perform the screening. 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 Section 7 of this Appendix.

## H-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.

## H-4 MATERIALS EXCAVATION AND LOAD-OUT

A QEP 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 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 QEP. 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. A site utility stakeout will be completed for all utilities prior to any ground intrusive activities at 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 QEP 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 QEP 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. Material accumulated from the street cleaning and egress cleaning activities will be disposed off-site at a permitted landfill facility in accordance with all applicable local, State, and Federal regulations.

## H-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.

Prior to transport of materials, truck transport routes will be provided to NYSDEC. 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 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.

## H-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 off-site in a permitted facility in accordance with all local, State 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 project manager. Unregulated off-site management of materials from this site will not occur without formal NYSDEC project manager 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, (e.g., hazardous waste disposal facility, solid waste landfill, petroleum treatment facility, C&D debris recovery facility) Actual disposal quantities and associated documentation will be reported to the NYSDEC in the Periodic Review Report. This documentation will include, but will not be limited to: 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 consistent with 6 NYCRR Parts 360, 361, 362, 363, 364 and 365. Material that does not meet Unrestricted SCOs is prohibited from being taken to a New York State C&D debris recovery facility (6 NYCRR Subpart 360-15 registered or permitted facility).

## H-7 MATERIALS REUSE ON-SITE

The QEP as defined in 6 NYCRR part 375 will ensure that procedures defined for materials reuse in this SMP are followed and that unacceptable material (i.e., contaminated) 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.

Proposed materials for reuse on-site must be sampled for full suite analytical parameters including per- and polyfluoroalkyl substances (PFAS) and 1,4-dioxane. The sampling frequency will be in accordance with DER-10 Table 5.4(e)10 unless prior approval is obtained from the NYSDEC project manager for modification of the sampling frequency. The analytical results of soil/fill material testing must meet the site use criteria presented in NYSDEC DER-10 Appendix 5 – Allowable Constituent Levels for Imported Fill or Soil for all constituents listed, and the NYSDEC Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (January 2021) guidance values. Approvals for modifications to the analytical parameters must be obtained from the NYSDEC project manager prior to the sampling event.

Soil/fill material for reuse on-site will be segregated and staged as described in Sections H-2 and H-3 of this EWP. The anticipated size and location of stockpiles will be provided in the 15-day notification to the NYSDEC project manager. Stockpile locations will be based on the location of site excavation activities and proximity to nearby site features. Material reuse on-site will comply with requirements of NYSDEC DER-10 Section 5.4(e)4. Any modifications to the requirements of DER-10 Section 5.4(e)4 must be approved by the NYSDEC project manager.

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.

## H-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 off-site at a permitted facility 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.

## H-9 COVER SYSTEM RESTORATION

This section does not apply; there is no cover system at the Site.

## H-10 BACKFILL FROM OFF-SITE SOURCES

All materials proposed for import onto the site will be approved by the QEP, as defined in 6 NYCRR Part 375, 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. A copy of the form is presented in Appendix N.

Material from industrial sites, spill sites, 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 6 NYCRR 375-6.7(d) and DER-10 Appendix 5 for industrial use. 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 DER-10 Appendix 5 Commercial or Industrial Use Allowable Constituent Levels. Soils that meet 'general' fill requirements under 6 NYCRR Part 360.13, but do not meet backfill or cover soil objectives for this site, will not be imported onto the site without prior approval by NYSDEC project manager. Soil material will be sampled for the full suite of analytical parameters, including PFAS and 1, 4-dioxane. 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.

## H-11 STORMWATER POLLUTION PREVENTION

For large excavations, 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.

## H-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. The NYSDEC project manager will be promptly notified of the discovery.

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 (including 1,4-dioxane), TCL pesticides and PCBs, and PFAS], unless the site history and previous sampling results provide sufficient justification to limit the list of analytes. In this case, a reduced list of analytes will be proposed to the NYSDEC project manager for approval prior to sampling. Any tanks will be closed in accordance with NYSDEC regulations and guidance.

Identification of unknown or unexpected contaminated media identified by screening during invasive site work will be promptly communicated by phone within two hours 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.

## H-13 COMMUNITY AIR MONITORING PLAN

The Community Air Monitoring Plan (CAMP) will be consistent with the guidance provided in the New York State Department of Health (NYSDOH) Generic CAMP obtained in Appendix 1A of DER-10 (Attachment G of the site-specific Health and Safety Plan Appendix M of this SMP). The location of air sampling stations are based on generally prevailing wind conditions.  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.

## H-14 ODOR CONTROL PLAN

This odor control plan is capable of controlling emissions of nuisance odors off-site. Specific odor control methods to be used on a routine basis are discussed below. If nuisance odors are identified 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 relayed to NYSDEC.

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; and (d) backfilling the excavation immediately upon completion of work. 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.

## H-15 DUST CONTROL PLAN

Particulate monitoring must be conducted according to the Community Air Monitoring Plan (CAMP) provided in Section H-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 using 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.

## H-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 I

# FIELD SAMPLING PLAN

Environment

Prepared by:
AECOM
Buffalo, NY
60481767
April 2024

# Field Sampling Plan (FSP)

## Former Carborundum Company, Hyde Park Facility
## Town of Niagara, Niagara County, NY
## NYSDEC Site No. 932036

***Prepared for:***

New York State Department of Environmental Conservation
270 Michigan Avenue
Buffalo, New York 14203

***Prepared on behalf of:***

Elm Holdings., Inc.

# Contents

# List of Appendices

# 1.0 Introduction

This Field Sampling Plan (FSP) was prepared to provide guidance for personnel performing field activities at the Former Carborundum Company Facility in Hyde Park, New York (Site). It will serve as the field procedures manual for all personnel. Adherence to these procedures will ensure the quality and defensibility of the field data collected. In addition to the field procedures outlined in this document, all personnel performing field activities must do so in compliance with: (1) the Quality Assurance/ Quality Control (QA/QC) measures outlined in the Quality Assurance Project Plan (QAPP); (2) the appropriate Health and Safety guidelines found in the Health and Safety Plan (HASP); (3) the scope of work outlined in the associated NYSDEC-approved project-specific Work Plans.

## 1.1 Work Assignment Objectives

Field activities are planned and conducted in general accordance with NYSDEC DER-10, Technical Guidance for Site Investigation and Remediation (NYSDEC, 2010 and New York State Department of Health (NYSDOH) Guidance for Evaluating Soil Vapor Intrusion in the State of New York (NYSDOH, 2006). The FSP is intended to be a companion document to the site-specific Work Plan prepared for each work assignment.

## 1.2 Site Description and Background Information

Available site information is presented in the Site Management Plan (SMP). Information presented in the SMP includes the following:

- Site Description
- Site Location
- Site History
- Previous Investigations, Remedial Actions, and Reports
- Record of Decision
- Current Site Conditions
- Local and Regional Geology and Hydrogeology
- Other relevant information

# 2.0 General and Preparatory Field Activities

At the time of preparation of this FSP, the scope of work for the Hyde Park Site included annual groundwater monitoring. The scope of work could change in the future and may include a variety of field activities intended to obtain site-specific data pertaining to the extent of contamination and the extent to which releases s from the Site pose a threat to human health and the environment. Some possible additional activities include:

- Assess site geology;
- Assess site hydrogeology;
- Evaluate areal and vertical extent of contamination, including transport mechanisms;
- Assess the source(s) of contamination and determine if this source(s) has impacted off-site properties; and
- Collect additional data to support the design and implementation of remedial actions.

To accomplish these objectives, the field subtasks described in this FSP may be utilized. Additional methodology information will be provided in the QAPP. Unless otherwise noted, it is assumed that all field work will be completed at Level D personal protection in accordance with the HASP. Field activities will be monitored by a qualified AECOM representative(s).

## 2.1 Mobilization

Following authorization to proceed with the field activities from NYSDEC, AECOM and its subcontractors will mobilize necessary materials and equipment to the site. If the project involves intrusive work (e.g., monitoring well installation, soil borings, test pits), a call will be placed to DigSafely New York and will be the responsibility of the subcontractor performing the intrusive work. Utility clearance is detailed in Section 2.3.

The site-specific Work Plan will describe the provisions made for providing all necessary facilities and material, independent of the site owners/occupants. For small work assignments and those of short duration, it may be possible to mobilize and store the necessary materials in a vehicle (e.g., cargo van). For larger projects, mobilization may include establishing a site trailer, temporary sanitary facilities and the construction of a temporary decontamination pad that will remain in place during the field effort. If appropriate to the project, a drum storage area will be established for the temporary storage of investigation derived waste, including soil cuttings, monitoring well development water, decontamination fluids and purge water from groundwater sampling. Soil cuttings may be temporarily stored in drums or roll-off containers.

A project kick-off meeting will be held prior to initiating field work to orient field team members and subcontractors with the site and to familiarize all site workers with Site background, potential dangers, health and safety requirements and emergency contingencies and other field procedures.

## 2.2 Health and Safety

It is anticipated that the work to be completed at the Site will be performed in Level D personal protection with the potential to upgrade to Level C. Should health and safety monitoring during field activities indicate a threat to field personnel or warrant an upgrade beyond Level D protection, work will stop, and site conditions will be re-evaluated by NYSDEC and AECOM. An upgrade to Level C protection will require modification of the HASP and review by AECOM's regional safety manager.

The site-specific HASP is included in the SMP and will be updated annually.

## 2.3 Utility Clearance: Callout

Intrusive activities that may be conducted during a typical site investigation include soil borings, monitoring well installations, soil vapor sampling, and test pit excavations. Prior to the start of intrusive activities, a call will be placed to New York DIG SAFE CALL CENTER at Dig Safely New York (for all areas north of New York City) 811 (http://www.digsafelynewyork.com) or 1-800-962-7960; for New York City and Long Island, 811 or 1-800 272-4480 for utility markouts to minimize the risk of encountering subsurface utilities. Site personnel will be contacted to determine if detailed utility plans are available for the Site.

## 2.4 Geophysical Surveys

Geophysical surveys will be conducted to obtain information on subsurface conditions or features, in addition to locating utilities or obstructions, without intrusive work. The rationale, scope, and procedures for any geophysical surveys will be determined on a project-specific basis.

Seismic refraction, ground-penetrating radar and electromagnetic surveys are among the methods often utilized in site investigation. Descriptions of these survey methods are provided below.

Seismic Refraction

Seismic refraction techniques are used to determine the thickness and depth of geologic layers by measuring the travel time or velocity of seismic waves within the layers. Seismic waves are transmitted into the subsurface by a shock at the ground surface (i.e., a hydraulic hammer striking a metal plate). An array of geophones on the surface measures the travel time of the seismic waves from the source to the geophones at a number of pre-determined spacings. The time required for the wave to complete this path is measured, permitting a determination to be made of the subsurface features.

Ground-Penetrating Radar (GPR)

GPR utilizes high frequency radio waves to acquire subsurface information. From a small antenna, which is moved slowly across the ground surface, energy is radiated downward into the subsurface. This energy is then reflected back to the receiving antenna, where variations in the return signal are continuously recorded. This produces a continuous cross-section of the shallow subsurface conditions. Radar responds well to the different electrical properties between rock units, soils, groundwater, and most importantly for this application, buried pipes, utilities, and foundations.

## 2.5 Utility Clearance: Air Knife

Excavation with an air knife unit allows for excavation near subsurface utilities with reduced chance of impacting the utilities.

Procedure:

1. Excavate a two-foot square by approximately five-foot deep area manually using post-hole diggers, pry bars, soil knifes, and/or hand digging, along with the Vac-Tron® unit.
2. After the location is cleared for drilling, the hole will be backfilled flush with the sidewalk using the excavated spoils (small rocks and debris removed) and if necessary, temporarily patched with blacktop patch or concrete.
3. Excavated material not returned to the hole will be drummed along with the monitoring well boring spoils for proper disposal.

## 2.6 Community Air Monitoring

Community air monitoring will be performed as outlined in the NYSDOH Generic Community Air Monitoring Plan (CAMP), unless it is determined by NYSDEC that a site-specific air monitoring plan is required, or that some of the provisions of the CAMP are not appropriate for a specific work assignment. AECOM's approach to implementing the Generic CAMP is provided in Section 9.0 of this FAP.

## 2.7 Site Survey

Project surveying will provide data necessary to plot groundwater monitoring wells, piezometers, and soil-gas monitoring point locations on the existing base map. All surveying will be performed under the supervision of a New York State licensed land surveyor, following the requirements of the Scope of Work and HASP.

The horizontal positions will be tied into the North American Datum 1983 and UTM Zone 18N coordinate system. The vertical positions will be tied to the North American Vertical Datum 1988 (NAVD88). The measuring point associated with the existing monitoring wells or other Site reference features will be recorded to a vertical accuracy of 0.01 ft. The final survey will be supplied in a digital CAD format (i.e., .dwg or .dxf files in the cited coordinate systems).

## 2.8 Green and Sustainable Remediation

- The work to be completed will comply with NYSDEC guidance documents including DER-31: Green Remediation (2010b). To ensure compliance with DER-31, the work will be completed using the best management practices (BMPs) and techniques described below. Use renewable energy where possible or purchase Renewable Energy Credits (RECs);
- Use of remediation technologies with an intermittent energy supply (i.e., energy use during peak energy generation only);
- Incorporate green building design;
- Reuse existing buildings and infrastructure to reduce waste;
- Reuse and Recycle construction and demolition (C&D) debris and other materials (i.e., grind waste wood and other organics for on-site use);
- Design cover systems to be usable (i.e., habitat or recreation);
- Reduce vehicle idling;
- Use of Low Sulfur Diesel Fuel (LSDF) or alternate fuels (i.e., biodiesel or E85);
- Sequence work to minimize double-handling of materials; and
- Use energy efficient systems and office equipment in the job trailer.

Prior to initiating any field work, the Project Manager will identify applicable BMPs to be used for each work assignment. At a minimum, each BMP identified above will be included in the site-specific work plan with a discussion of how each practice or technique will be implemented or why a practice or technique is not appropriate to the work anticipated at the site.

### 2.8.1 Reporting

All Green and Sustainable BMPs employed during field activities will be discussed within the field logbooks described in Section 9.0 – Field Records and Documentation. Specifically, the field logbooks will acknowledge that the practices and techniques identified for the Site work were taken each day (if applicable). In addition, the following information will be recorded within the field logbooks at the close of each day:

- The estimated quantity of fuel consumed by onsite vehicles and equipment;
- The estimated distance traveled by trucks and equipment delivering goods or removing waste; and
- The estimated water use during onsite activities.

The information will be compiled and presented to NYSDEC in a form suitable to the project-specific work completed.

# 3.0 Drilling/ Coring Procedures

Drilling/ coring activities which may be typically conducted include hollow-stem auger (HSA) drilling, Rotosonic drilling, NX-rock coring, wash/mud rotary drilling and air rotary drilling. Procedures for these activities are described below.

## 3.1 Hollow-Stem Auger Drilling Procedures

A standard method of subsurface drilling which enables the recovery of representative subsurface samples for identification and laboratory testing. When sampling for per and polyfluoroalkyl substances (PFAS), see Appendix A (Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances [PFAS] Under NYSDEC's Part 375 Remedial Programs [NYSDEC, 2023]) for special field procedures.

Procedure:

1. HSAs, drill rods, and the drill rig will be thoroughly decontaminated prior to initial borehole installation and between each borehole at the centralized decontamination area. All decontamination liquids will be collected and placed in DOT-approved 55-gallon drums.

2. The drill rig will be inspected for oil leaks and any leaks reported prior to starting drilling operations.

3. Prior to drilling, all boring locations will be cleared with an air knife or hand auger to a depth of five feet below ground surface (ft bgs).

4. Advance the boring by rotating and advancing the HSAs to the desired depth. The borings will be advanced incrementally to permit continuous or intermittent subsurface soil sampling, as required.

5. Remove center plug from the HSAs and collect a split spoon sample per the method stipulated by the project geologist or hydrogeologist.

References: American Society for Testing and Materials (ASTM) D1452/D1452M-16.

## 3.2 Rotosonic Drilling Procedures

Rotosonic Drilling (also known as Sonic Drilling, Rotosonic, Rotary Sonic, Sonicore or Resonant Sonic Drilling) is a subsurface drilling method that employs the use of high frequency mechanical vibrations to take continuous core samples of overburden and most bedrock formations using a dual cased drill string. Rotosonic drilling is also used to advance casing in the ground for the installation of monitoring wells and other purposes. When sampling for PFAS, see Appendix A for special field procedures.

Procedure:

1. Core barrel and outer casing will be decontaminated prior to advancing boreholes.

The core barrel (core barrels are typically 5, 10 or 20 feet in length) is attached to the drill head. The boring is advanced by rotating the core barrel incrementally to the desired depth. The borings will be advanced incrementally to permit continuous subsurface soil sampling.

2. Once the core barrel is driven to its incremental depth (i.e., 5, 10 or 20 feet), the drill head is disconnected from the core barrel and connected to the outer casing. The outer casing is then driven down over the core barrel. Note: A small amount of water may be used during the driving of the outer casing to flush materials from the annular space between the core barrel and the outer casing.

3. The drill head is disconnected from the outer casing and reattached to the core barrel. The core barrel is brought to the surface and a clear polyethylene tube is attached to the end of the core barrel. The drive head is vibrated which extrudes the soil sample into the polyethylene tube.

4. The core barrel is reinserted into the outer casing and the boring is advanced to the desired depth by repeating Steps 2 through 4.

5. Split the sample lengthwise and screen the soil with a photoionization detector (PID) for volatile organic vapors

6. Document all properties and sample locations in the field notebook and Boring Log form (Appendix B).

Reference: ASTM D6914/D6914M-16.

## 3.3 NX-Rock Coring Procedures

NX-Coring is a standard method of subsurface drilling which enables the recovery of bedrock cores for identification. When sampling for PFAS, see Appendix A for special field procedures.

Procedure:

1. Advance the boring into the bedrock by core drilling using an NX-size, double-tube, swivel-type core barrel. Continue drilling until core blockage occurs or until the net length of the core barrel has been drilled.

2. Remove the core barrel from the hole and disassemble it as necessary to remove the core. Reassemble the core barrel and return it to the hole. Resume coring.

3. Place recovered core in the core box with the upper (surface) end of the core at the upper-left corner of the core box. Fit fractured, bedded, or jointed pieces of core together as they naturally occurred.

4. Label core box with borehole ID, date, time, and depth interval of core.

5. The following observations will be recorded from the rock core:

    a) Core recovery percent

b) Color
c) Rock classification
d) Rock hardness
e) Rock fractures, including descriptions of natural breaks
f) Rock Quality Designation (RQD)

$$\text{RQD} = \frac{\text{Sum of core lengths} > 4''}{\text{Total length of core run}} \times 100\%$$

Reference: ASTM D2113-14.

## 3.4 Wash/Mud Rotary Drilling Procedures

Wash/mud rotary drilling is a method of subsurface drilling wherein a drilling fluid (water or drill mud) is circulated through the drill string and drill bit, and up through HSAs or casing, if present, to flush cuttings out of the borehole and lubricate drilling tools. When sampling for PFAS, see Appendix A for special field procedures.

Procedure:

1. Connect drilling water supply pump to drill string.

2. Advance the boring by spinning the drill bit the desired distance into the subsurface.

3. Use a recirculating system to collect and separate cuttings rising out of the borehole.

4. Note rate of drilling and volume of water/mud lost down the borehole.

## 3.5 Air Rotary Drilling Procedures

Air rotary drilling is a method of subsurface drilling wherein compressed air is circulated through the drill string and drill bit, and up through HSAs or casing, if present, to flush cuttings out of the borehole and lubricate drilling tools. When sampling for PFAS, see Appendix A for special field procedures.

Procedure:

1. Connect air compressor discharge hose to drill string.

2. Advance the boring by spinning the drill bit the desired distance into the subsurface.

3. Use a cyclone system to collect and containerize cuttings rising out of the borehole.

4. Note rate of drilling down the borehole.

Reference: ASTM D5782-95.

# 4.0 Groundwater Investigation Tasks

Groundwater investigations are the primary component of field activities at the Hyde Park Site. Field activities which may be implemented as part of a groundwater investigation include (but are not limited to) the following:

- Existing Well Condition Survey
- Groundwater Elevation Survey
- Direct Push Groundwater Sampling
- Monitoring Well Installation
- Monitoring Well Development
- Groundwater Sampling from Monitoring Wells
- Aquifer Properties Testing (hydraulic conductivity “slug” testing)
- Aquifer Properties Testing (pumping test)

When sampling for PFAS, see Appendix A for special field procedures.

## 4.1 Monitoring Well Inspection and Maintenance

Since monitoring wells at the Site are sampled on an annual basis, an assessment of the condition and subsequent maintenance of existing monitoring wells may be necessary. Prior to initiating any sampling at the site, an initial well condition survey may be conducted if requested by NYSDEC; or if determined to be appropriate by AECOM and with NYSDEC concurrence. The following procedure should be employed whenever the monitoring wells are opened for gauging and sampling:

1. Use the Monitoring Well Inspection Form (Appendix B) to record the conditions of the various components of the monitoring well and protective casing including lock/hasp, hinge/lid, J-plug, gasket seal, and security bolts.

2. Coat security bolts with Never-Seez ™ to prevent seizure in the cast iron flush mount curb boxes.

3. In wells, record depth to water, depth to bottom, and depths to the top and bottom of any light non-aqueous phase liquid (LNAPL) and dense non-aqueous phase liquid (DNAPL) layers.

4. Record any maintenance performed on the well and stencil as needed.

5. All sections of the inspection form should be completed, and photographs taken before and after inspection and maintenance.

### 4.1.1 Road Box Replacement Procedures

Often during an inspection, it is determined that a monitoring well's road box is damaged and needs to be replaced. The following procedure should be employed whenever a road box is replaced:

1. Cut the pavement with a jackhammer and hand-excavate the surrounding soil to a depth of approximately 1 ft. below ground surface (bgs). If the surrounding surface is covered with asphalt instead of concrete, then hand cut the asphalt.

2. Any concrete (or asphalt) cuttings will be placed in a 1A2 open head 55-gallon steel drum.

3. Remove the damaged road box and install the new road box. The damaged road box will be placed in a 1A2 open head 55-gallon steel drum.

4. Backfill around the newly installed road box with the excavated soil, leaving enough room for a concrete pad/asphalt patch.

5. Construct a 2 ft. by 2 ft. square concrete pad/asphalt patch surrounding the new road box.

6. If using concrete in freezing temperatures, an anti-freeze agent will be added to the cement mixture and the concrete pad will be covered with a sheet of plastic to prevent the pad from freezing and cracking.

7. An orange cone will be placed near the monitoring well to prevent vehicles from driving over the newly repaired road box.

8. The drums will be addressed in accordance with the protocols outlined in Section 8.2.

## 4.2 Groundwater Elevation Survey

In order to better understand the hydrogeologic conditions, one or more rounds of synoptic water level readings may be collected by AECOM. A groundwater elevation survey may be taken as an initial task (e.g., concurrent with the existing well condition survey), or it may be performed at the conclusion of a well installation program, or both. Elevation surveys may be taken over several years, over several times of year to assess seasonal factors, or multiple times in a day to assess tidal or diurnal cycles which may influence groundwater elevations and flow directions.

Water levels in monitoring wells scheduled to be sampled during the field work will be measured using an electronic water level indicator. Initially, measurements will be taken following well development until the well has recovered to anticipated static conditions. Water levels will also be measured in the piezometers as specified in the Project Management Work Plan. Water level measurement procedures are presented below.

Procedure:

1. Clean the water level probe and the lower portion of cable following standard decontamination procedures (Section 8.1) and test water level meter to ensure that the batteries are charged.

2. Lower the probe slowly into the monitoring well until the audible alarm indicates water.

3. Read the depth to the nearest hundredth of a foot from the graduated cable using the V-notch on the riser pipe as a reference point.

4. Repeat the measurement for confirmation and record the water level.

5. Remove the probe from the well slowly, drying the cable and probe with a clean "Chem Wipe" or paper towel.

6. Replace the well cap and lock protective cap in place.

7. Decontaminate the water level meter (Section 8.0) if additional measurements are to be taken.

Reference: ASTM D4750-87(2001).

## 4.3 Direct Push Groundwater Sampling

A standard method of subsurface boring which enables the recovery of representative subsurface samples for groundwater screening. When sampling for PFAS, see Appendix A for special field procedures.

Procedure:

1. A Screen Point Sampler 15 (SP15) groundwater sampler, or an equivalent unit, will be utilized to collect groundwater samples in direct push borings that intercept the groundwater table.

2. To collect groundwater samples, a clean sampler will be threaded onto the leading end of the probe rod and lowered or driven to the desired sampling interval (approximately 1 foot below the top of the water table). While the sampler is driven to depth, O-ring seals at the drive head and expendable drive point will provide a watertight system.

3. Once at the desired sampling depth, chase rods will be sent down-hole until the leading rod contacts the bottom of the sampler screen. The tool string will then be retracted while the screen is held in place by the chase rods. As the tool string is retracted, the expendable point is released from the sampler sheath. An O-ring on the screen head maintains the seal at the top of the screen. As a result, any liquid entering the sampler during screen deployment must first pass through the screen.

4. The tool string and sheath may be retracted the full length of the screen or as little as a few inches if a small sampling interval is desired. The SP15 Sampler utilizes a screen with a standard slot size of 0.004 inches and an exposed length of 41 inches.

5. A minimum of 1 gallon of water will be purged from the sampler prior to sample collection with dedicated Teflon or polyethylene tubing of laboratory or food grade quality, and a check valve. The groundwater sample will be collected with dedicated Teflon or polyethylene tubing of laboratory or food grade quality, and a check valve.

6. Groundwater samples will be placed on ice and shipped to the laboratory under COC for analysis.

7. Upon the completion of the sampling, the sampler will be removed, and the borehole will be backfilled with bentonite pellets and the surface will be repaired with similar material (i.e., concrete, asphalt or topsoil); and marked with spray paint.

Reference: ASTM D6001-05(2012).

## 4.4 Monitoring Well Installation

At the time of preparation of this FSP, installation of additional monitoring wells was not anticipated. However, installation or replacement of monitoring wells may occur. The number and locations of proposed monitoring wells will be shown on a figure in the project-specific Work Plan. All monitoring wells will be installed by a New York-licensed well driller.

The default method for advancing overburden borings for monitoring well installation will be using 4¼-inch hollow stem augers (HSAs) with a center plug. The HSAs will be advanced to the target depth for well installation. If difficulties with running sands are encountered which hinder drilling, potable water may be introduced into the HSAs to maintain a positive hydrostatic head. For very difficult overburden drilling or for wells installed in bedrock, water rotary drilling methods will be employed.

Monitoring well borings will be advanced to the target depths listed in the project-specific Work Plan. Subsurface soil samples will be obtained in accordance with Section 5.2 and logged in accordance with Section 10.4. Soil cuttings will be screened for organic vapors using a PID.

### 4.4.1 Overburden Monitoring Well Construction Procedures

A method for construction of groundwater monitoring wells within unconsolidated material, which enables monitoring of groundwater elevation and acquisition of groundwater samples for laboratory testing. The groundwater monitoring wells and piezometers will be installed during this investigation using the procedures described below.

Procedure:

1. Advance subsurface boring to the desired depth by means of hollow-stem auger drilling.

2. While boring, collect split spoon samples on a continuous basis to geologically log the boring.

3. Remove center plug from augers and verify borehole depth using weighted measuring tape.

4. Add washed and graded medium sand as needed to base of borehole.

5. Insert the well screen and riser pipe into borehole through the hollow stem augers. Cap the riser to prevent well construction materials from entering the well.

6. Add sand to screen section of well while slowly removing augers. Sand pack should extend at least two feet above the top of the screen section. Measure with a tape.

7. Slowly add bentonite pellet seal to borehole as augers are slowly removed. The bentonite seal should extend at least two feet above the top of the sand pack section. Measure with tape.
8. Note: The rate of removal of the auger from the borehole should closely follow the rate that the sand pack and bentonite pellets fill the borehole.
9. If bentonite seal is placed above the groundwater level within the borehole, add water to the borehole to hydrate the bentonite pellets. Allow pellets to hydrate for at least 30 minutes.
10. Mix cement/bentonite grout per manufacturer's specifications.
11. Add grout to borehole through tremie pipe or hose from the top of the bentonite seal to the ground surface.
12. Remove remaining augers from the borehole.
13. Top off grout in borehole. Grout should extend to approximately two feet below ground surface.
14. Cut well-riser pipe to about three feet above the ground surface for stickup type wells. Flush-mount well risers should be cut off just below surface grade.
15. Backfill the remaining two feet of the borehole with concrete.
16. Install a protective casing over the well riser pipe and set it into the concrete backfill.
17. Lock the protective casing cover.
18. Document well construction in the field notebook and on a Well Construction Detail diagram (Appendix B).

Reference: ASTM D5092/D5092M-16.

### 4.4.2 Bedrock Monitoring Well Construction Procedures

A method for construction of monitoring wells within bedrock, which enables monitoring of groundwater elevation and acquisition of groundwater samples for laboratory testing, is described below.

Procedure:

1. Collect soil samples while advancing to the top of bedrock. Follow the procedures in Section 5.2 as applicable for field conditions.
2. Measure the depth to the top of bedrock from the ground surface using a weighted measuring tape.
3. At these boring locations collect a 3- to 5-foot NX- rock core sample from the top of rock.
4. Ream the core hole to approximately 8-inches in diameter.

5. Install a 6-inch carbon steel casing into the borehole and set it at least 3 feet into the bedrock. The casing should extend to the ground surface.

6. Remove the HSAs or casing and grout the annular space between the steel casing and borehole wall. Mix grout following procedures in Section 4.11. Allow grout to cure for at least 24 hours before continuing the boring.

7. Collect NX-rock core samples to desired depth in 5- or 10-foot increments. After coring, ream the core hole to approximately 6-inches in diameter.

8. Insert a riser cap (J-plug) into the well riser. Install an 8-inch curb box around the well casing by cementing the protective curb box around the well casing. Install lock on J-plug and seal the curb box.

9. Document well construction details in the field notebook and transfer the data onto the Bedrock Monitoring Well Construction Detail form (Appendix B).

Reference: ASTM D5092/D5092M-16.

## 4.5 Well Development

Following completion of groundwater monitoring well installation, each monitoring well will be developed by pumping until the discharged water is relatively sediment free and the indicator parameters (pH, temperature, and specific conductivity) have reached steady state. Developing the monitoring well not only removes any sediment but also may improve the hydraulic properties of the formation. The effectiveness of the development measures will be closely monitored in order to keep the volume of discharged water to the minimum necessary to obtain sediment-free samples. A portable turbidimeter will be used to monitor effectiveness of development. A turbidity reading of < 50 Nephelometric Turbidity Units (NTU) and steady-state pH, temperature, and specific conductivity readings will be used as a guide for discontinuing well development. When sampling for PFAS, see Appendix A for special field procedures.

Procedure:

1. An appropriate monitoring well development method should be selected, depending on water level depth, well productivity, and sediment content of water. Monitoring well development options include: (a) manual pumping; and (b) powered suction-lift or hydrolift pumping.

2. Equipment should be assembled, decontaminated (if necessary), and installed in the well. Care should be taken not to introduce contaminants to the equipment during installation.

3. Monitoring well development should proceed by repeated removal of water from the well until the discharged water is relatively sediment-free. All development waters will be containerized. Effectiveness of development should be monitored at regular intervals using a portable turbidimeter and water quality meter. Volume of water removed, and turbidity, pH, temperature, and conductivity measurements will be recorded on a Well Development/Purging Log form (Appendix B).

4. Monitoring well development will be discontinued when the turbidity of the discharged water is below 50 NTU and the other indicator parameters have stabilized.

Reference: ASTM D5092/D5092M-16.

## 4.6 Groundwater Sampling from Monitoring Wells

Groundwater sampling will be performed to evaluate the extent of groundwater contamination. The rationale, locations, wells, and analytical parameters are specified in the SMP.

### 4.6.1 Low-Flow Sampling Technique

Unless specified otherwise in the project-specific Work Plan and approved by NYSDEC, groundwater sampling will be done in accordance with *Groundwater Sampling Guidelines for Superfund and RCRA Project Managers* (USEPA OSWER 542-S-02-001). The default groundwater sampling method will be in accordance with EPA's low stress (often referred to as low flow) sampling technique (EPA, 1998).

Monitoring well purging will be completed using the low-flow purging technique as follows:

1. The well cover will be unlocked and carefully removed to avoid having any foreign material enter the well. The interior of the riser pipe will be monitored for organic vapors using PID. If a reading of greater than 5 ppm is recorded, the well will be vented until levels are below 5 ppm before purging begins.

2. Using an electronic interface probe/water level detector, the water level below top of casing will be measured. The depth of the well will be measured to determine the volume of water in the well. The bottom of the well will also be checked for DNAPL using the interface probe/water level indicator. The end of the probe will be decontaminated between wells.

3. Calibrate field instruments (e.g., pH, specific conductance, PID, turbidity).

4. Purge the required water volume (i.e., until stabilization of pH, temperature, specific conductivity, and turbidity) using a low-flow pump (e.g., Solinst or Geopump) and dedicated HDPE tubing. New dedicated tubing will be used for each well.

5. Purge the well until the water quality parameters have stabilized. The stabilization criteria are: specific conductivity - 3% full-scale range; pH - 0.10 pH unit; dissolved oxygen – 10%, Turbidity – 10% and oxidation/reduction (redox) potential - +/- 10 units.

6. Purging of three well volumes is not necessary if the indicator parameters are stable. However, at least one (1) well volume must be purged before sampling can begin. During purging, it is permissible to by-pass the flow cell until the groundwater has cleared.

7. Indicator parameters of pH, conductivity, dissolved oxygen, oxidation/reduction (redox) potential, turbidity, and temperature must be measured continuously using the flow cell.

8. Well purging data are to be recorded in the field notebook and on the Low Flow Purge Log (Appendix B).

### 4.6.2 Sample Collection Procedures

Procedure:

1. After well purging is completed, a sample will be collected into the appropriate containers.

2. Direct water flow toward the inside wall of the sample container to minimize volatilization. Fill volatile sample containers so no headspace (air bubbles) is present. If containers are pre-preserved, do not overfill sample containers. Note if effervescence is observed.

3. All sample bottles will be labeled in the field using a waterproof permanent marker (Section 10.4).

4. Samples will be collected into sample bottles (containing required preservatives) and placed on ice in coolers for processing (preservation and packing) prior to shipment to the analytical laboratory. A chain-of-custody record will be initiated. The analytical laboratory will certify that the sample bottles are analyte-free prior to shipping.

5. Remove pump and disconnect valves and tubing, as necessary. If a submersible pump was used, it must be decontaminated prior to and between each use. Clean pump by flushing 10 gallons of potable water through the pump. Rinse with deionized water after flushing the pump.

6. Well sampling data are to be recorded in the field notebook and on the Well Purging Log (Appendix B).

### 4.6.3 Field Analysis

Analysis for some parameters with short hold times may be performed in the field using commercially available test kits. After collection of samples for lab analysis, additional sample volume will be collected for analysis using field test kits (Hach® or similar). The sampler will follow the manufacturer instructions for each parameter to be tested. Instruction for field analysis of parameters to be analyzed in the field are presented in Appendix C.

## 4.7 Aquifer Property Testing

At some point, it may be appropriate to conduct aquifer tests to determine various hydrogeologic parameters (aquifer characteristics) such as permeability, transmissivity, and storativity. The two primary methods for determining aquifer characteristics are short-term permeability tests (often referred to as “slug” tests) or longer-term aquifer pumping tests.

### 4.7.1 Aquifer Tests

Available geologic and hydrogeologic data will be evaluated prior to conducting the aquifer test for the purpose of determining a suitable network of wells to complete the aquifer test. An existing well will be used for the aquifer test well, if available. If a suitable well is not available, a new aquifer test well will be installed. The number and location of water level observation wells and the frequency of measurement will be detailed in the project-specific Work Plan.

Pre-test (background), during test, and post-test (recovery) water levels will be collected from a select list of existing or new (as needed) monitoring wells. Water levels will be collected manually using an electronic water level indicator and electronically by transducers with data logging capacity. The wells requiring transducers will be selected after review of the available data from previous groundwater sampling and other appropriate sources.

The aquifer test well will be purged at the maximum practical pumping rate at a constant rate. If the maximum pumping rate is not confirmed, a step test will be performed to determine the maximum pumping capacity of the well. The planned pumping duration may vary as based upon the on-site review of the water level readings collected from the upgradient monitoring wells during the initial phase (first 12 to 24 hours) of the aquifer test. Water level measurements will be collected from select existing and new monitoring wells during the aquifer test at the locations and schedule presented in the project-specific work plan.

Water levels will be measured and recorded during the recovery period. The recovery period will be considered complete when the water level has returned to 90 percent of pre-test levels.

Discharge of large volumes of water generated from the aquifer test can be problematic. Management of this water will be established with NYSDEC and jurisdictional agencies and clearly established in the project-specific Work Plan.

Samples for chemical analysis may be collected from purge water from the test well or from other selected monitoring wells. The samples may be collected at the beginning of the aquifer test and at 12-hour intervals thereafter, including a sample when the test is terminated (or other intervals as specified in the project-specific Work Plan. These samples will be analyzed for parameters specified in the Work Plan.

## 4.8 Slug Tests

Hydraulic conductivity tests (slug tests) may be performed in newly installed wells. During any slug testing, gauging of fluid levels will be performed using a data logger/pressure transducer, and stainless-steel slugs. Since the water table is shallow, only rising head (slug-out) tests will be performed. This test will consist of inserting a ‘slug’ of known volume into the well/piezometer, allowing the water level in to return to a steady state, removing the slug allowing the water level to return to static conditions. The transducer/data logger will record changes in water level. These data will be analyzed using the methods of Bouwer and Rice (1976) and Bouwer (1989).

Slug testing is a rapid and inexpensive procedure for estimating the horizontal hydraulic conductivity of an aquifer material screened by a monitoring well. Equipment consists of dedicated/disposable nylon rope, decontaminated stainless steel slug and a data logger/pressure transducer, and a water level indicator.

Procedure:

1. Measure dimensions of the slug to be used to displace water in the monitor and predetermine the volume of water, which will be displaced, and corresponding initial water level change, which will occur by adding or removing the slug.

2. Record initial water level in the wells (static water level).

3. Lower the pre-cleaned data logger/pressure transducer into wells to the wells bottom. Pull transducer up one foot.

4. Insert slug into well, below water table, with nylon rope. Allow water level in well to return to static condition.

5. Simultaneously initiate data logger/pressure transducer and rapidly remove the slug from the wells.

6. Monitor water level recovery in well with data logger/pressure transducer until static water level has been regained.

7. Download data logger/pressure transducer and record data in field notebook. Review data to verify slug test was successful.

8. Remove equipment from well and decontaminate.

9. Analyze data in office using computer.

## 4.9 Monitoring Well Decommissioning

Monitoring well decommissioning will be performed in accordance with NYSDEC Policy CP-43, using the following steps:

1. Each well will be tremie grouted from the bottom of the well to within five feet of the ground surface to ensure a continuous grout column. Grout slurry composition should be the following:

    a. 1.5 to 3.0 percent by weight - Bentonite (Quick Gel)

    b. 40 to 60 percent by weight - Cement (Portland Type I)

    c. 40 to 60 percent by weight - Water

2. The well casing will be removed at a depth of five feet below grade (if possible) and the outer protective casing "stick-up" and/or flush-mount curb box will be removed only after the well has been properly filled with grout.

3. A metal marker (PK Survey Spike) will be embedded in the top of the grout to indicate the location of the former monitoring well.

4. The uppermost five feet of the borehole will be filled with approved/clean backfill or topsoil.

5. The surface of the borehole will be restored to the condition of the area surrounding the borehole (crushed stone, asphalt, etc.). If the surrounding surface is a concrete sidewalk flag, that flag will be replaced in accordance with applicable regulations/standards.

6. The solid waste should be handled is accordance with Section 8.2 of this plan.

7. Document well construction details in the field notebook and transfer the data onto the Well Decommissioning Record form (Appendix B).

Reference: ASTM D5299/D5299M-18

Reference: NYSDEC CP-43: *Groundwater Monitoring Well Decommissioning Policy*, November 3, 2009.

## 4.10 Plugging/Abandoning Borehole and Grout Mixing

Boreholes that are not completed as monitoring wells, will be sealed (plugged) prior to abandonment to prevent downhole contamination. In addition, the annular space in monitoring wells need to be sealed after the installation of the sand pack and bentonite seal to prevent any downward migration of surface water into the well. Sealing can be achieved by backfilling the borehole with bentonite below the water table (hole plug or pellets) and/or with a cement/bentonite grout above the water table. The backfill material will be introduced from bottom to top using either a tremie pipe or the drill rods. Shallow borings will be sealed with bentonite (hole plug or pellets) the entire length of the boring.

Procedure:

1. Determine most suitable seal materials. Grout specifications generally have mixture ratios as follows:

   Grout Slurry Composition (Percent Weight)

   1.5 to 3.0 percent - Bentonite (Quick Gel)

   40 to 60 percent - Cement (Portland Type I)

   40 to 60 percent - Water

2. Calculate the volume of the borehole based on the bit or auger head diameter plus 10 percent and determine the volume of grout to be emplaced. Generally, the total mixed volume is the borehole volume plus 20 percent.

3. Identify the equipment to be used for preparing and mixing of the grout. Ensure the volume of the tanks to be used for mixing has been measured adequately. Document these volumes.

4. Identify the source of the water to be used for the grout and determine its suitability for use. In particular, water with high sulfate or chloride levels, or heated water, should not be used. These types of waters can cause operational difficulties or modify the set-up for the grout.

5. Identify the equipment to be used for emplacing the grout. Ensure that the pump to be used has adequate pressure to enable complete return to surface.
6. Identify the volumes to be pumped at each stage or in total if only one stage is to be used.
7. Prepare the borehole plugging plan and discuss the plan and activities with the drilling contractor prior to beginning any mixing activities.
8. Begin mixing the grout to be emplaced.
9. Record the type and amount of materials used during the mixing operation. Ensure that the ratios are within specification tolerance.
10. Begin pumping the grout through the return line bypass system to confirm that all pump and surface fittings are secure.
11. Initiate downhole pumping. Record the times and volumes emplaced on the form.
12. Document the borehole is completely filled with grout.
13. Clear and clean the surface near the borehole. Level the ground to about the pre-existing grade. Add grout or cement as necessary to the area near the borehole.

Note: On occasion, there may be some settling of the grout, which takes place over several days. If this settling occurs, the natural soil from the immediate vicinity is used to put the level at grade. A follow-up check at each site should be made within one week to 10 days of completion. Document the visit and describe any action taken.

# 5.0 Soil Sampling Activities

Soil sampling activities which may be typically conducted include surface soil sampling, subsurface soil sampling, and test pit excavation. Procedures for these activities are described below.

## 5.1 Surface Soil Sampling

Surface soil samples (defined as soil samples from the first six inches or fewer of native soil) will be taken at locations identified in the project-specific Work Plan. Near-surface soil sampling by hand implements is also discussed in this section.

### 5.1.1 Surface Soil Sample Collection Procedure

1. Using a decontaminated stainless-steel trowel or by hand (protected by a chemically resistant glove), remove rocks, stone, grass, and debris to gain access to the surface soils.

2. Using a decontaminated stainless device (teaspoon, trowel, “scoopula,” or similar), transfer the exposed soils directly into the laboratory-provided sample containers. Sampling depth typically should not exceed six inches.

3. Complete the label on the sample container and transfer the sample container(s) to an iced cooler.

4. After collection of the sample, screen the hole with a photoionization detector for volatile organic vapors. Record the readings and any significant observations such as staining, oily sheen, or odors.

5. If the location is to be surveyed, place a stake in the center of the hole after backfilling the hole with the excavated material. Otherwise, measure the location from fixed (permanent) objects using a tape measure.

### 5.1.2 Near-Surface Soil Sampling (by Hand Auger)

1. Remove stones, vegetation, debris etc. from the ground surface in the sampling area.

2. Lay a section of plastic sheet adjacent to the soil sampling location.

3. Use a clean (decontaminated) bucket auger, required extension rods and “T” handle to collect a soil sample from the desired depth.

4. Monitor volatile organic compounds (VOCs) in the ambient air during soil collection.

5. Turn the auger in a clockwise direction with the “T” handle to remove soil until the desired soil sampling depth is reached. Place the excavated soil on the adjacent plastic. If possible, lay out the cuttings in stratigraphic order.

6. During auger advancement record observations made of the geologic features of the soil.

7. Stop advancing the auger when the top of the specified sampling depth has been reached. Decontaminate the auger.

8. Insert the auger into the borehole to the sample depth and collect the sample. Place sample on ice and ship overnight to the lab under COC custody.

9. Decontaminate the auger bucket and complete the preceding steps for sample collection from deeper depths.

10. When sampling is complete, place cuttings back in the borehole in the order in which they were removed if possible. Top off with hydrated bentonite pellets.

Reference: ASTM D6907-05(2016).

## 5.2 Subsurface Soil Sampling

Borings will be advanced at the locations as specified in the project-specific Work Plan or site-specific FSP. Borings are typically advanced either by direct push (geoprobe) methods or by HSA drilling. Soils will normally be logged during subsurface sampling, regardless of the method selected. Typical procedures for direct push sampling, sampling from HSA borings, and soil logging are presented below.

### 5.2.1 Subsurface Soil Sampling from Direct Push Borings

Soil samples will be collected at specific locations identified in the project-specific Work Plan, or based on field observations (e.g., if contamination is observed or if elevated PID readings are recorded). The soil samples will be analyzed for parameters as indicated in the project-specific Work Plan.

A standard method of subsurface boring using hydraulically powered (static force plus percussion) soil-probing equipment that enables the recovery of representative subsurface samples for identification and laboratory testing. When sampling for PFAS, see Appendix A for special field procedures.

Procedure:

1. Inspect the sampling equipment to ensure proper working condition.

2. Insert dedicated disposable acetate liner into the sampler and select additional components for the sampler as required (i.e., leaf spring core retainer for clays, or a sand trap for non-cohesive sands).

3. Lower the sampler to the ground surface, or bottom of the hole previously made by the sampler and check the depth against length of the rods and the sampler.

4. Attach the drive head assembly to the sample rods.

5. Push the sampler in increments up to 5 feet into the subsurface up to the desired depth with a hydraulic press.

6. Rotate the sampling rods clockwise and remove the sampler.

7. Split the sample lengthwise and screen the soil with a PID for volatile organic vapors.

8. Document all properties and sample locations in the field notebook, and on the Direct-Push Log form (Appendix B).

9. Abandon the direct-push boring by backfilling with bentonite pellets and hydrate with potable water or use concrete patch in impervious areas.

Reference: ASTM D6282/D6282M-14.

#### 5.2.1.1 Remote Direct-Push Soil Sampling

Standard equipment used for remote direct push sampling is the 420M Geoprobe® (or similar unit). This is a light weight and durable limited access machine designed to be deployed to hard-to-reach or limited access sampling locations. The machine is powered by a remote hydraulic source which is connected through auxiliary hydraulics. When sampling for PFAS, see Appendix A for special field procedures.

Procedure:

1. Read and understand all safety, maintenance and operations instructions regarding this machine before beginning operations.

2. Maneuver the probe unit to place the probe foot near the desired probing location.

3. Position the power source near the unit leaving sufficient distance so as not to be in the way of probing activities.

4. The probe unit is intended for operations on level surfaces. Do not use on slopes greater than 2 degrees due to decreased stability.

5. Connect hydraulic hoses to probe unit and power source.

6. Start the engine of the hydraulic power source to allow engine and hydraulics to warm sufficiently and ensure there is adequate ventilation for exhaust fumes.

7. Make sure everyone is clear of any moving parts before engaging the hydraulics of the probe unit. Check the emergency stop button for proper operation. If the emergency stop button doesn’t work, cease operations.

8. Anchor the probe derrick to floor or ground surface as needed based on conditions.

9. Insert dedicated disposable acetate liner into the sampler and select additional components for the sampler as required (i.e., leaf spring core retainer for clays, or a sand trap for non-cohesive sands).

10. Lower the sampler to the ground surface, or bottom of the hole previously made by the sampler and check the depth against length of the rods and the sampler.

11. Attach the drive head assembly to the sample rods.

12. Push the sampler in increments up to 5 feet into the subsurface up to the desired depth with a hydraulic press.

13. Rotate the sampling rods clockwise and remove the sampler. Split the sample lengthwise and screen the soil with a PID for volatile organic vapors.

14. Document all properties and sample locations in the field notebook, and on the Direct-Push Log form (Appendix B).

15. Abandon the direct-push boring by backfilling with bentonite pellets and hydrate with potable water or use concrete patch in impervious areas.

Reference: ASTM D6282/D6282M-14.

### 5.2.2 Split Spoon Sampling Procedures

Split-spoon sampling is a standard method of soil sampling to obtain representative samples for identification and laboratory testing as well as to serve as a measure of resistance of soil to sampler penetration. Split-spoon samples will be collected during boring advancement at continuous 2-foot intervals. When sampling for PFAS, see Appendix A for special field procedures.

Procedure:

1. Measure the sampling equipment lengths to ensure that they conform to specifications. Confirm the weight of the hammer (140 pounds.).

2. Clean out the HSAs to the bottom depth prior to sampling. Select additional components as required (i.e., leaf spring core retainer for clays or a sand trap for non-cohesive sands).

3. Lower the decontaminated 2-inch outside diameter (O.D.) split-spoon to the bottom of the HSAs and check the depth against length of the rods and the split-spoon.

4. Attach the drive head and hammer to the drill rods without the weight of the hammer resting on the rods.

5. Lower the weight and allow the split-spoon to settle up to 6 inches below the bottom of the HSAs. If it settles more, consider use of another type of sampler.

6. Mark four 6-inch intervals on the drill rods relative to a drive reference point on the rig. With the split-spoon resting on the bottom of the hole, drive the split-spoon with the 140-pound hammer falling freely over its 30-inch fall until 24 inches have been penetrated or 50 blows have applied in any 6-inch interval.

7. Record the number of blows required to drive the split-spoon 6 inches into the overburden. Determine the "N" value by adding the blows for the 6-to 12-inch and 12-to 18-inch interval of each sample attempt.

8. After penetration is complete, remove the split-spoon sampler.

9. Open the split-spoon to determine the percent recovery and describe the soil.

10. Split the sample lengthwise and screen the soil with a PID for volatile organic vapors.

11. Document all properties and sample locations in the field notebook, and on the Boring Log form (Appendix B).

Reference: ASTM D1586/ D1586M-18.

#### 5.2.2.1 Unified Soil Classification System

Soils are classified for engineering purposes according to the Unified Soil Classification System (USCS) adopted by the U.S. Army Corps of Engineers and U.S. Department of the Interior Bureau of Reclamation. Soil properties that form the basis for the USCS are:

- Percentage of gravel, sand, and fines;
- Shape of the grain-size distribution curve; and
- Plasticity and compressibility characteristics.

According to this system, all soils are divided into three major groups: coarse-grained, fine-grained, and highly-organic (peaty). The boundary between coarse-grained and fine-grained soils is taken to be the 200-mesh sieve (0.074 mm). In the field the distinction is based on whether the individual particles can be seen with the unaided eye. If more than 50% of the soil by weight is judged to consist of grains that can be distinguished separately, the soil is considered to be coarse-grained.

The coarse-grained soils are divided into gravelly (G) or sandy (S) soils, depending on whether more or less than 50% of the visible grains are larger than the No. 4 sieve (3/16 inch). They are each divided further into four groups:

W: Well graded; fairly clean (<5% finer than 0.074 mm)

P: Poorly graded (gap-graded); fairly clean (<5% finer than 0.074mm)

C: Clayey (>12% finer than 0.074mm); plastic (clayey) fines. Fine fraction above the A- line with plasticity index above 7.

M: Silty (>12% finer than 0.074 mm); non-plastic or silty fines. Fine fraction below the A- line and plasticity index below 4.

The soils are represented by symbols such as GW or SP. Borderline materials are represented by a double symbol, as GW-GC.

The fine-grained soils are divided into three groups: inorganic silts (M), inorganic clays (C), and organic silts and clays (O). The soils are further divided into those having liquid limits lower than 50% (L), or higher than 50% (H).

The distinction between the inorganic clays (C), the inorganic silts (M), and organic soils (O) is made on the basis of a modified plasticity chart. Soils CH and CL are represented by points above the A-line, whereas soils OH, OL, and MH correspond to positions below the A-line. Soils ML, except for a few clayey fine sands, are also represented by points below the A-line. The organic soils O are distinguished from the inorganic soils M and C by their characteristic odor and dark color.

Reference: ASTM D2487-17.

#### 5.2.2.2 Visual Identification

Soil samples collected during boring advancement will be visually identified. Soil properties required to define the USCS classification of a soil and other observed characteristics normally identified in describing a soil are defined below:

a. Color
b. Moisture conditions
c. Grain size
    i. Estimated maximum grain size
    ii. Estimated percent by weight of fines (material passing No. 200 sieve)
d. Gradation
e. Grain shape
f. Plasticity
g. Predominant soil type
h. Secondary components of soil
i. Classification symbol
j. Other features such as:
    - organic, chemical, or metallic content;
    - compactness;
    - consistency;
    - cohesiveness near plastic limit;
    - dry strength; and
    - source - residual, or transported (aeolian, water borne, glacial deposit, etc.)

Reference: ASTM D2488-17.

### 5.2.3 Shelby Tube Sampling Procedures

Shelby (thin-wall) tube sampling is commonly used in cohesive soils (where split-spoon sampling results in an "N" value less than 15) to obtain relatively undisturbed samples. The thin-walled tube accepts the least frictional resistance as the soil moves up into the sampler. The sampler is advanced in a continuous and rapid motion without twisting on impact.

Procedure:

1. Clean borehole to the required sampling depth, using care not to disturb the material to be sampled during the cleaning process.
2. Prepare the sampler for use, verifying that the tube is round, smooth, not dented or scratched, rust-free, and that the cutting edge has been honed to proper dimensions.
3. Record dimensions of the sampler. Note that the length and diameter of the sampler can be varied depending on soil conditions.
4. Lower the sampler on the drill rods to the bottom of the hole.
5. Make a reference point on the drilling rig and measure a length on the rods equivalent to the sample tube length, minus 10% (this allows for slough in the hole).
6. Raise the water level in the hole to ground surface or above, if practical (this step likely may be omitted).
7. Push the sampler the required distance into the soil with continuous motion of consistent weight.
8. If the sampler cannot be advanced by pushing, note the length advanced and stop sampling.
9. Rotate the rods three revolutions, using a wrench to shear the sample. Allow the sampler to sit undisturbed for five minutes.
10. Withdraw the sampler slowly and pull rods evenly to retrieve the sample. Measure sample length and calculate recovery.
11. Clean out the rod end of the tube and discard disturbed slough. Trim cutting edge of the sampler. Use the cuttings for onsite description and, if required, a moisture content sample.
12. If sample length is recessed from either end, insert plug and seal with wax. If the tube is full, seal ends with caps and/or wax the ends, including the caps if possible.
13. Label the sample container and prepare sample for shipping and/or storage.
14. Store and transport sample(s) in an upright position.

Reference: ASTM D1587/D1587M-15.

## 5.3 Test Pit Excavation

Test pits (test trenches) may be excavated for observational purposes (e.g., to determine the subsurface features causing anomalies detected in geophysical investigations) or to collect subsurface soil samples, or both. General guidelines for test pit excavation are presented below; however, a site-specific test pit excavation plan must be developed and documented in the project-specific Work Plan. In addition, test pit excavation must be addressed in the site-specific HASP. When sampling for PFAS, see Appendix A for special field procedures.

Procedure:

1. Decontaminate backhoe bucket prior to excavation.

2. Maneuver backhoe into position.

3. Remove subsurface materials in 1-foot lifts. Conduct continuous air monitoring with appropriate air monitoring equipment as indicated in the HASP. Screen soil with photoionization detector (PID) and place excavated soil on plastic sheeting adjacent to test pit.

4. Upon completion of test pit, visually inspect the soil horizons for discoloration, perched water zones or staining and photo document the test pit.

5. Record the following information in the field book for each test pit:

    - The total length and width of the excavation
    - The depth and thickness of distinct soil or lithologic units
    - A lithologic description of each unit
    - A description of any man-made materials or apparent impacted soil encountered.
    - A Test Pit Log sheet will be completed for each test pit (Appendix B).

6. Collect necessary soil samples. The excavator will collect a sample from a specific horizon and bring the sample to the ground surface. No personnel will enter the excavation to collect samples. The sampler will remove approximately 2 inches of soil from the outside of the soil sample prior to collecting the sample to prevent cross contamination of the sample.

7. Soil samples will be placed on ice and shipped overnight to the laboratory under COC control.

8. The test pit will be backfilled with excavated material immediately after the required information has been recorded and the samples collected. The first soils out should be the last soils in when filling the test pit. Soils will be compacted in 1-foot lifts using the excavator bucket. No test pits will be left open overnight.

9. Decontaminate sampling equipment and excavator bucket.

# 6.0 Surface Water and Sediment Sampling Activities

Surface water and sediment samples are typically taken concurrently and at the same location; but one may be collected without the other, depending on the goals of the sampling.

## 6.1 Surface Water Sampling

No surface water is present on Site or in the immediate vicinity of the Site. However, in the interest of completeness, methodologies for surface water sampling are included in this FSP. Surface water samples will be collected as specified in the project-specific Work Plan.  Two typical methods (hand held bottles, and dipper and pond samplers) are described below; other methods may be appropriate depending on the investigative objectives and site characteristics.

Regardless of the sampling method, the following *in situ* readings are typically obtained after samples are collected at each surface water sampling location:

- pH;
- DO;
- Specific conductance;
- ORP;
- Temperature; and
- Turbidity.

### 6.1.1 Hand-Held Bottle Method

In shallow streams, surface water samples may be collected by dipping laboratory supplied clean glassware into the stream and then transferring the water directly into the sample jars.  Latex or nitrile gloves will be worn during sample collection.  Jars will be filled upstream of where the sampling personnel are standing in the stream.

Collection of surface water samples using the hand-held bottle method may be used for easily accessible locations.  The sample will be collected by submerging the appropriate sample container with the cap in place into the body of water.  The container will then be slowly and continuously filled using the cap to regulate the rate of sample entry into the container.  The sample container should be filled such that a minimum of bubbling (and volatilization) occurs.

### 6.1.2 Dipper and Pond Sampler Method

Dipper and pond samplers may be used to collect surface water samples. The dipper and pond sampler perform similar functions and vary only in the length of the handle attached to the sampling vessel (usually a beaker or a laboratory-supplied sample bottle). Before beginning sampling, a handle of appropriate length is attached to the dipper or pond sampler. Collection of surface water samples using the dipper or pond sampler method will then be accomplished by slowly submerging the device into the water so that the open end of the device is facing upstream. The sampler device will be retrieved from the water body with minimal disturbance to the sample, which will then be transferred into appropriate sample containers.

### 6.1.3 Sampling from Vessels

More complex studies or larger water bodies may require sampling from a boat. Studies of this nature must be planned on a project-specific basis and are beyond the scope of this FSP.

## 6.2 Sediment Sampling

Sediment samples may be either grab samples of surface sediments; or sediment cores may be obtained for profiling. Objectives and site characteristics vary too much to provide definitive protocols for sediment sampling in this FSP; however, basic information and guidance is presented below.

### 6.2.1 Surface Sediment Sampling

Surface sediment samples may be collected by a variety of methods. Two typical methods are described below.

#### 6.2.1.1 Ponar (Sediment)

The Ponar sampler may be used to collect sediment samples from locations specified in the project-specific Work Plan. The Ponar sampler is a clamshell-type scoop activated by a counter-level system. The shell is opened, latched in place, and slowly lowered to the bottom. When tension is released on the lowering cable, the latch releases and the lifting action of the cable on the lever system closes the clamshell. The Ponar is then slowly raised to the surface and free liquids are allowed to drain, being careful not to lose fine sediments. The Ponar is placed into a stainless-steel tray or bowl and opened. This process is repeated until sufficient sample volume is obtained. Sediment then will be homogenized in a stainless-steel bowl.

The Ponar sampler will be decontaminated between sample locations.

#### 6.2.1.2 Scoop/Trowel (Sediment)

The scoop/trowel method will be used for collection of easily accessible dry sediment samples and sediment samples located underwater where the water depth is less than six inches. This collection method will be accomplished using a stainless-steel trowel or spoon used to manually dig into the subsurface material to the required depth designated for the sampling location. Sampled material then will be transferred to a stainless-steel bowl for homogenization.

The trowel and bowl will be decontaminated between sample locations.

### 6.2.2 Sediment Coring (Subsurface Sediment Sampling)

Collection of subsurface sediments and obtaining vertical profiles is typically done using coring techniques. A new Lexan core is typically advanced through the sediment to the desired depth by manually pushing (if the sediments are sufficiently soft), or by other techniques, such as vibracoring.

Obtaining sediment core samples will usually require sampling from a boat. Studies of this nature must be planned on a project-specific basis and are beyond the scope of this FSP.

## 6.3 Leachate Sampling

Leachate (leachate seep) samples are typically collected at pre-determined locations, based on visual observations of the presence of a seep, directly into laboratory-supplied glassware. To keep the sample bottles submitted to the laboratory clean, a ‘sacrificial’ bottle may be used to collect the water from the seep; the water collected in this bottle may transferred (poured) into the appropriate bottles for the necessary analytical parameters.

Collection usually consists of placing the bottle in the sample is to be collected at the seep location and allowing the bottle to fill. The side or base of the bottle may be used to create a slight depression in order to allow the bottle to fill more readily; or a decontaminated trowel or other clean device may be used for this purpose.

# 7.0 Soil Vapor Intrusion Studies

Work at the Former Carborundum Hyde Park facility may include a Soil Vapor Intrusion (SVI) study to evaluate the sub-slab soil vapor, indoor air, and outdoor air at the project site, if the Site building is redeveloped.

Soil vapor samples are collected from locations which are not beneath the foundation or slab of a building. Sub-slab soil vapor samples are collected from immediately beneath the slabs of the selected buildings. The indoor air samples will be collected from the basement and/or first floor of the selected buildings. The outdoor air samples are collected to characterize site-specific background (ambient) outdoor air conditions (i.e., from upwind of the structures at a breathing zone height).

Details of the typical field activities associated with SVI studies are presented in this section of the FSP.

## 7.1 SVI Study Objectives

The objective of the Soil Vapor Intrusion study is to evaluate whether vapor intrusion of compounds related to the site or suspected source is occurring in the structures within the Study Area and whether vapor hazards as a result of the soil or groundwater contamination may exist for receptors associated the existing structures in the Study Area. The SVI study results may be used to identify the structures within the study area that require further investigation or mitigation/remediation.

The following tasks will typically be performed:

- Task 1 – Procurement of Access Agreements
- Task 2 – Location Mark-Out and Utility Clearance Activity
- Task 3 – Building Survey and Product Inventory in accordance with NYSDOH Guidelines
- Task 4 – Sample Collection and Analysis
- Task 5 – Data Evaluation and Report Preparation

## 7.2 SVI Study Field Sampling Plan

This section outlines the procedures that will be used in the collection of sub-slab soil vapor samples, indoor air samples and outdoor air samples.

### 7.2.1 Access Agreements

A representative from the NYSDEC will contact the owner and tenants of each of the proposed sampling location sites within the Study Area to obtain permission to perform the work. AECOM will explain the scope of work and the proposed work schedule to the owner/tenant of each site within the Study Area.

### 7.2.2 Location Markout and Utility Clearance Activity

Prior to commencement of the sub-slab soil vapor sampling, AECOM's drilling subcontractor will notify the New York State One Call Utility for utility clearance. However, utility clearance from One Call Utility does not cover private property. Therefore, AECOM will engage a geophysical subcontractor (see Section 2.4) who will delineate potential subsurface utilities at the structures using electromagnetic utility locating instruments. Utility markouts by the local One-Call center and any information provided by the building occupants will be considered when locating the soil vapor and sub-slab soil vapor locations in the field.

### 7.2.3 Building Survey and Product Inventory

As required by the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (SVI Guidance; NYSDOH, 2006), a building survey will be performed to identify and minimize conditions that may interfere with the proposed testing prior to collecting samples at each structure. The building survey will evaluate the type of building structure, floor layout, air-flow patterns (e.g., using smoke tubes), and the physical condition of the buildings being studied. Information obtained during the building survey, including information on sources of potential indoor air contamination, will be identified on the NYSDOH Indoor Air Quality Questionnaire and Building Inventory Form (NYSDOH, 2006; Appendix B). As shown in NYSDOH Appendix B, specific information to be evaluated and noted during the building survey includes the following:

1. Occupant name(s) and address;
2. Owner or landlord information;
3. Building characteristics (e.g., commercial/industrial, number of units/tenants, number of floors, building age, etc.);
4. Construction characteristics, including foundation cracks and utility penetrations, ceiling construction and firewall separations, or other openings that may serve as preferential pathways for vapor intrusion;
5. Heating, ventilation, and air conditioning systems, including the type of heating system(s), type of fuel used, presence of a boiler/furnace, presence of aboveground or underground storage tanks, type(s) of air conditioning, and the presence of air distribution ducts;
6. Occupancy and the general use of each floor;
7. Factors that may influence indoor air quality, including attached garages, separate heating units in the garage, petroleum-powered machines stored in the garage, workshop or craft area, smoking in the building, exhaust fans in the kitchen or bathrooms, new carpets, fresh paints, etc.; and,
8. Type of water supply and sewage disposal.

A product inventory will also be conducted throughout each floor and the basement of each structure to identify chemicals and products that may bias sampling results. Product names and chemical ingredients listed on container labels will be recorded. If the ingredients are not listed on the label, the product's exact and full name, and manufacturer information, will be recorded. Chemicals or products that are noted as being stored in a questionable manner (e.g., in an open container), that emit odor, or yield positive field screening results, will need to be controlled during the indoor air quality sampling to reduce potential interferences. Control options will be discussed with the building occupant and will include removal of the container (preferred option) or tightly sealing the containers.

The presence and description of odors and portable vapor monitoring equipment readings (e.g., PID readings) will be noted. Photographs will also be taken as appropriate during the building survey. Floor plans will be sketched to indicate sub-slab soil vapor and indoor air sampling locations, possible indoor air pollution sources, and PID meter readings. The PID meter will have a detection limit of 1 part per million (ppm).

The building superintendent/facility manager will also be questioned to provide information regarding the location of any potential utilities in the locations that are to be sampled.

The project-specific Work Plan will indicate the general approach and locations of sample locations for the SVI; however, the exact location of the sub-slab soil vapor, indoor air, and outdoor air samples will be determined during the implementation of the study.

## 7.3 Soil Vapor Implant Installation

A method for construction of soil vapor implants within unconsolidated material enables acquisition of soil vapor samples for laboratory testing. The soil vapor implants will be installed using the procedures described below.

Procedure:

1. Implants shall be 6 inches in length (e. g., Geoprobe® AT86 series) and are to be constructed of double woven stainless-steel wire screen. Implants shall have a pore diameter of 0.0057 inch, which is equivalent to a 0.007 slot well screen. The bottom of the implants must have a post run tubing (PRT) style thread; the same fitting style used with Geoprobe® PRT vapor sampling tools. The top connection with the Teflon or polyethylene tubing shall be stainless steel Swagelok® or clamp fitting to prevent leakage during sample collection. The connection to the sampling Summa® canister shall be made through the use of a 1/8th inch ID Teflon or polyethylene tubing.

2. Once the rods have been advanced to the desired depth, attach appropriate tubing to the implant to be installed. Allow at least 48 inches of tubing length longer than the required depth of the implant. Cover or plug the end of the tubing.

3. Remove the pull cap from the rods and lower the implant and tubing down inside the diameter of the rods until the implant hits the top of the Anchor/Drive Point. Note the length of the tubing to ensure proper depth has been reached.

4. Rotate tubing counterclockwise while exerting a gentle downward force to engage the PRT threads. Pull up on the tubing lightly to test the connection. DO NOT cut excess tubing.

5. Position a probe rod pull plate or manual probe rod jack on the top of the probe rod. Exert downward pressure on the tubing while pulling the probe rods up. Pull up about 12 inches.

6. Thread excess tubing through the bottom of a funnel and position funnel over top of probe rod. The funnel will be used to facilitate installation of sand into the borehole around the screened portion of the implant.

7. Pour sand into the funnel and down the inside diameter of the probe rods around the outside of the tubing and around the screen of the implant. Use tubing to “stir” sand into place. [NOTE: sand and bentonite can only be installed in the vadose zone (unsaturated zone above the water table)].

8. Lift up an additional 18 to 24 inches and insert a bentonite slurry above beads or sand.

9. Pull remaining rods out of the hole and complete with bentonite slurry.

10. Cut any excess tubing to allow approximately 8 to 12 inches to extend above the ground surface. Plug the tubing with a cap or plug.

11. Install a protective casing (road box) over the tubing and set it into concrete.

12. Document well construction in the field notebook and on a Soil Vapor Implant Construction Detail diagram (Appendix B).

## 7.4 Soil Vapor and Air Sample Collection and Analysis

Procedures for collection of soil vapor, sub-slab soil vapor, and indoor and outdoor air samples are provided below.

### 7.4.1 Soil Vapor Implant Inspection and Maintenance

Periodic inspection and maintenance of soil vapor implant protective casings are required to keep the implants in good condition. The following procedure should be employed whenever the soil vapor implants are opened for sampling.

Procedure:

1. Use the Soil Vapor Implant Inspection Form (Appendix B) to record the conditions of the various components of the soil vapor implant and protective casing including lock/hasp, hinge/lid, gasket seal, and security bolts.

2. Coat security bolts with never seize to prevent seizure in the cast iron flush mount curb boxes.

3. Record any maintenance performed on the implant and stencil as needed.

4. All sections of the inspection form should be completed, and photographs taken before and after inspection and maintenance.

#### 7.4.1.1 Road Box Replacement Procedures

Summary: Often during an inspection, it is determined that a soil vapor implant's road box is damaged and needs to be replaced. The following procedure should be employed whenever a road box is replaced.

Procedure:

1. Cut the pavement with a jackhammer and hand-excavate the surrounding soil to a depth of approximately 1 ft. bgs. If the surrounding surface is covered with asphalt instead of concrete, then hand cut the asphalt.
2. Any concrete (or asphalt) cuttings will be placed in a 1A2 open head 55-gallon steel drum.
3. Remove the damaged road box and install the new road box. The damaged road box will be placed in a 1A2 open head 55-gallon steel drum.
4. Backfill around the newly installed road box with the excavated soil, leaving enough room for a concrete pad/asphalt patch.
5. Construct a 2 ft. by 2 ft. square concrete pad/asphalt patch surrounding the new road box.
6. If using concrete in freezing temperatures, an anti-freeze agent will be added to the cement mixture and the concrete pad will be covered with a sheet of plastic to prevent the pad from freezing and cracking.
7. An orange cone will be placed near the soil vapor implant to prevent vehicles from driving over the newly repaired road box.
8. The drums will be addressed in accordance with the protocols outlined in Section 8.2.

### 7.4.2 Soil Vapor Sampling

Soil vapor probe installations may be permanent, semi-permanent or temporary. In general, permanent or semi-permanent installations are preferred for data consistency reasons and to ensure outdoor air infiltration does not occur. Temporary probes should only be used if measures are taken to ensure that an adequate surface seal is created to prevent outdoor air infiltration and if tracer gas is used at every sampling location. Soil vapor implants or probes should be constructed in the same manner at all sampling locations to minimize possible discrepancies. The following procedures should be included in any permanent construction protocol:

1. Implants should be installed using an appropriate method based on site conditions (e.g., direct push, manually driven, auger if necessary, to attain the desired depth);

2. At a depth comparable to the depth of foundation footings (determined on a building-specific or site-specific basis) or at least 1 ft above the water table in areas where the groundwater table is less than 6 ft below grade;
3. Porous, inert backfill material (e.g., glass beads, washed #1 crushed stone, etc.) should be used to create a 1 to 2 ft long sampling zone;
4. Implants should be fitted with inert tubing (e.g., polyethylene, stainless steel, nylon, Teflon, etc.) of the appropriate size (typically 1/8 inch to 1/4-inch diameter) and of laboratory or food grade quality to the surface;
5. Soil vapor probes should be sealed above the sampling zone with a bentonite slurry for a minimum distance of 3 ft to prevent outdoor air infiltration and the remainder of the borehole backfilled with clean material;
6. For multiple probe depths, the borehole should be grouted with bentonite between probes to create discrete sampling zones or separate nested probes should be installed; and
7. Steps should be taken to minimize infiltration of water or outdoor air and to prevent accidental damage (e.g., setting a protective casing around the top of the probe tubing and grouting in place to the top of bentonite, sloping the ground surface to direct water away from the borehole like a groundwater monitoring well).

To obtain representative samples and to minimize possible discrepancies, soil vapor samples should be collected in the following manner at all locations:

1. At least 24 hours after the installation of permanent probes and shortly after the installation of temporary probes, one to three implant volumes (i.e., the volume of the sample probe and tube) should be purged prior to collecting the samples;
2. Flow rates for both purging and collecting should not exceed 200 mL/min to minimize outdoor air infiltration during sampling;
3. Samples should be collected, using conventional sampling methods, in an appropriate container, one which
   - Meets the objectives of the sampling (e.g., investigation of areas where low or high concentrations of volatile chemicals are expected; to minimize losses of volatile chemicals that are susceptible to photodegradation),
   - Is consistent with the sampling and analytical methods (e.g., low flow rate; Summa® canisters if analyzing by using EPA Method TO-15), and
   - Is certified clean by the laboratory;
4. Sample size depends upon the volume of that will achieve minimum reporting limits; and
5. A tracer gas (e.g., helium) should be used when collecting soil vapor samples to verify that adequate sampling techniques are being implemented (i.e., to verify infiltration of outdoor air is not occurring).

In some cases, weather conditions may present certain limitations on soil vapor sampling. For example, condensation in the sample tubing may be encountered during winter sampling due to low outdoor air temperatures. Devices, such as tube warmers, may be used to address these conditions. AECOM will discuss anticipated limitations to the sampling with NYSDEC prior to the sampling event so appropriate measures to address these difficulties are established in the project-specific Work Plan. When soil vapor samples are collected, the following actions should be taken to document local conditions during sampling that may influence interpretation of the results:

- If sampling near a commercial or industrial building, uses of volatile chemicals during normal operations of the facility should be identified;
- Outdoor plot sketches should be drawn that include the site, area streets, neighboring commercial or industrial facilities (with estimated distance to the site), outdoor air sampling locations (if applicable), and compass orientation (north);
- Weather conditions (e.g., precipitation and outdoor temperature) should be noted for the past 24 to 48 hours; and
- Any pertinent observations should be recorded, such as odors and readings from field instrumentation.

Additional information that could be gathered to assist in the interpretation of the results includes barometric pressure, wind speed and wind direction. The field sampling team should maintain a sample log sheet summarizing the following:

- sample identification,
- date and time of sample collection,
- sampling depth,
- identity of samplers,
- sampling methods and devices,
- purge volumes,
- volume of soil vapor extracted,
- if Summa® canisters are used, note the vacuum before and after samples were collected,
    - The February 2008 update to the 2005 NYSDEC ASP (NYSDEC, 2008) specifies allowable pressures (vacuum) for canisters. The initial canister vacuum must be 28 inches Hg ± 2-inch Hg. The final canister pressure vacuum should be 5 inches Hg ± 1-inch Hg. If final canister pressures are not within this range, contact the NYSDEC project manager before instructing the laboratory to analyze the canisters.
- apparent moisture content (dry, moist, saturated, etc.) of the sampling zone, and;

- Chain of custody protocols and records used to track samples from sampling point to analysis.

### 7.4.3 Sub-Slab Soil Vapor Sampling

Sub-slab soil gas samples will be collected from the buildings or other locations as described in the site-specific Work Plan.

In accordance with NYSDOH SVI Guidance (October 2006), a temporary sample point will be advanced to collect sub-slab soil gas sample at pre-selected locations. If possible, the heating/cooling system at each of the structures will be operated continuously to maintain a normal temperature (i.e., 65º to 75º F) for at least 24 hours prior to and during the scheduled sampling time. The samples will be collected from a depth of approximately 2 to 6 inches below the floor slab.

The following steps will be taken to collect samples:

1. Select and prepare the sub-slab sample collection point by observing the condition of the building floor slab for apparent penetrations such as concrete floor cracks, floor drains, or sump holes. The floor conditions will be noted, and a potential location of a subsurface probe will be selected. The location will ideally be central to the building, and away from the foundation walls, apparent penetrations and buried pipes. Review all locations with the Homeowner prior to drilling any hole! Photograph and document all sample locations.

2. In locations where bare concrete is available, drill a 5/8-inch diameter hole about one-inch (1”) into the concrete using an electric hammer drill. Extend the hole through the remaining thickness of the slab using a ½ -inch drill bit. Lengthen the hole about three inches (3”) beyond the sub-slab using the drill bit.

3. Remove the concrete dust within the 5/8-inch drilled hole and around the hole using wire brushes and a brush and dust pan, then dabbing the surface with Sculpey brand clay (see below).

4. Insert a 5/8-inch outside diameter (OD) by ¼-inch inside diameter (ID) rubber stopper onto and three-inches beyond the end of a 1/4-inch OD by 1/8-inch ID Teflon tube. Insert the Teflon tube into the 5/8-inch hole so the stopper is seated into the top of the ½-inch drilled hole.

5. Seal the annular space between the 5/8-inch hole and the Teflon tubing with white Sculpey Brand modeling clay (or equivalent). Bring the clay above the floor’s surface and around the tubing in a volcano-like shape.

6. In locations where only linoleum tile is available, AND THE OWNER AGREES, drill a small (1/4-inch best) hole through the tile and slab. Place the sample tubing into the hole and seal to the floor with clay.

7. Purge the sampling tube by connecting the Teflon tubing to the inlet of an air-sampling pump (GilAir 300 or 500) with 3/8-inch OD silicone tubing and connecting a 1-liter (L) Tedlar bag to the outlet of the pump with silicone tubing. Purge approximately one liter (1L) of gas from the subsurface probe into the Tedlar bag, using the air-sampling pump. Analyze the 1L Tedlar bag containing the sub-slab purged air with a gas detector that records the concentrations of CH4,

CO2 and O2. Record the purge times (start and stop) and the gas concentrations on a Summa Canister Sampling Field Data Sheet (Appendix B). Purging flow rates must not exceed 0.2 L/min.

8. Assign sample identification to the Summa® canister identification tag and record on chain of custody (COC), and the Summa Canister Sampling Field Data Sheet. Also record the Summa® canister's serial number on the Summa Canister Sampling Field Data Sheet.

9. Remove brass plug from canister fitting.

10. Attach a pre-calibrated/certified 24-hour flow controller, and particulate filter to the Summa® canister. Record the regulator serial number on the Summa Canister Sampling Field Data Sheet.

11. Attach the sample tube to the Summa® canister using a ¼-inch Swagelok® nut with appropriate ferrules, via the flow controller/particulate filter assembly.

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

13. After 24 hours, record sample end time and canister pressure on the Summa Canister Sampling Field Data Sheet, and close valve.

14. Disconnect the Teflon tubing and remove flow controller/particulate filter assembly from canister. Seal canister with brass plug.

15. Seal the hole in the basement slab with hydraulic cement patch.

16. Ship samples with COCs, overnight, to a NYSDOH approved laboratory, for analysis.

<u>Using Helium Tracer Gas to Test Floor Seals.</u>

1. Drill the concrete floor and attach and seal the Teflon sample tubing to the floor as described above.

2. Place a 2-quart (or similar size) bucket over the floor seal after threading the Teflon sample tube through a hole in the top of the bucket. Seal the tube to the bucket with clay.

3. The bucket should also have a hole in the top for the injection of helium gas. An additional hole should be present in the side, near the bottom, to measure the concentration of helium gas in the bucket.

4. Connect helium (99.999%) cylinder tubing to the top port of bucket enclosure and seal with clay or other sealing material. Insert a helium detector probe to the bottom port of the bucket.

5. Release enough helium to displace any ambient air in the bucket until the concentration of helium reaches a minimum of 90%. Maintain this minimum concentration by testing with a helium detector. The helium cylinder should be open during the purge time to cause a slight positive pressure within the enclosure.

6. Connect the sample tubing to a GilAir vacuum pump or equivalent using 3/8-inch O.D. silicone tubing. Connect a 1-liter Tedlar bag to the outlet of the pump using silicone tubing and collect a 1-liter sample. Analyze the Tedlar bag for helium using a helium detector and record the results on the Summa Canister Sampling Field Data Sheet. Also analyze the Tedlar bag for the presence of methane, H2S, CO2 and O2 and record the result on the Summa Canister Sampling Field Data Sheet. A concentration of helium 10% or greater indicates a poor seal of the sample tubing to the basement floor. The tubing must be resealed to the floor and another helium test conducted.

7. Purging flow rates must not exceed 0.2 L/min.

8. After purging, remove the bucket enclosure and assign sample identification to the Summa® canister identification tag and record on the COC, and the Summa Canister Sampling Field Data Sheet. Also record the Summa® canister's serial number on the Summa Canister Sampling Field Data Sheet.

9. Connect the 1/4-inch Teflon OD sample tubing to the Summa® canister regulator inlet using a ¼-inch Swagelok® nut with appropriate ferrules. Open the canister valve to initiate sample collection and record the start time and date and beginning vacuum on the canister identification tag and on the Summa Canister Sampling Field Data Sheet. If the canister does not show sufficient vacuum (generally less than 25" Hg), do not use.

10. After 24 hours, record sample end time and final vacuum on the Summa Canister Sampling Field Data Sheet and close the valve.

11. Disconnect the Teflon tubing from the Summa® canister and remove the flow controller/particulate-filter assembly from canister. Seal canister with brass plug.

12. Thread the Teflon sample tubing through the bucket enclosure and conduct a helium tracer gas test as described above. After purging, test the concentration of helium in the 1-liter Tedlar bag and record on the Summa Canister Sampling Field Data Sheet.

13. Remove the sample tubing, stopper and clay from the hole in the basement slab and seal with hydraulic cement patch.

14. Ship the samples, with COCs, overnight to a selected lab, for analysis.

During the sampling, the initial and final vacuum readings of each canister will be noted in a Field Form. In addition, smoke tubes will be used during the sub-slab sampling to confirm pressure relationships and airflow patterns, especially between floor levels and sub-slab. Upon completion of the sample collection and screening steps, each penetration hole advanced through the slab will be patched with cement or will be repaired to restore pre-sampling conditions.

### 7.4.4 Indoor and Outdoor Air Sampling

Indoor air samples are proposed to be collected within the basements, if present, and the first floors of each of the structures. In addition, an outdoor ambient air sample will be collected concurrently with the indoor air samples to determine the extent to which outdoor sources may be influencing indoor air quality within the sampling area.

As specified in the SVI Guidance (NYSDOH, 2006), to reduce the potential for interference and dilution effects, the occupants of the buildings to be sampled will be requested to refrain from the activities listed below for the 24-hour period prior to and during the ambient air sampling collection:

- Opening any windows, fireplace dampers, openings or vents;
- Operating any ventilation fans unless special arrangements are made;
- Smoking in the building;
- Painting;
- Using a wood stove, fireplace, or other auxiliary heating equipment (e.g., kerosene heater);
- Operating or storing an automobile in the building or an attached garage;
- Allowing containers of gasoline or oil to remain within the building or garage area, except for fuel oil tanks;
- Cleaning, waxing or polishing furniture, floors or other woodwork with petroleum or oil-based products;
- Using air fresheners, scented candles or odor eliminators;
- Engaging in any hobbies that use materials containing volatile chemicals;
- Using cosmetics including hairspray, nail polish, nail polish removers, perfume/cologne, etc.;
- Lawn mowing, paving with asphalt, or snow blowing;
- Applying pesticides; and,
- Using building repair or maintenance products, such as caulk or roofing tar.

Indoor air and outdoor air samples will be collected concurrently with the sub-slab soil vapor sampling.

Sampling procedures for the indoor samples and outdoor air sample are summarized below:

1. Place the basement and first floor Summa® canisters at breathing height in a high traffic location. The breathing height is defined as three to six feet above the floor. Place the outdoor air sample at least 2 to three feet above the ground.

2. Record the canister's serial number on the Summa Canister Sampling Field Data Sheet.

3. Assign sample identification to the canister identification tag (see Section 10.3.1 below) and record on the COC and the Summa Canister Sampling Field Data Sheet.

4. Remove brass plug from canister fitting.

5. Attach a pre-calibrated/certified 24-hour flow controller and particulate filter to the Summa® canister, open valve completely to initiate sampling, and record the sample start time and date, and beginning vacuum reading on the canister identification tag and the Summa Canister Sampling Field Data Sheet. Also record the regulator serial number on the Summa Canister

Sampling Field Data Sheet. If the canister does not show sufficient vacuum (generally less than 25" Hg), do not use.

6. Take a digital photograph of canister setup and surrounding area. Include a dry erase board or similar display which presents sample ID and date.
7. After 24 hours, record end time and pressure on the Summa Canister Sampling Field Data Sheet, and close valve.
8. Disconnect flow controller/particulate filter assembly from canister.
9. Seal canister with brass plug.
10. Ship canister standard overnight, with COC, to a NYSDOH approved laboratory, for analysis.

### 7.4.5 Site Restoration

If necessary, upon completion of soil vapor or sub-slab soil vapor sampling, an AECOM subcontractor will repair the carpet/floor tile to restore the work area to its previous conditions. The nature and extent of site restoration that will be required upon completion of the VI sampling will be determined on a case-by-case basis.

### 7.4.6 Soil Vapor Sample Analytical Requirements

AECOM will use a NYSDOH Wadsworth Environmental Laboratory Accreditation Program (ELAP) laboratory certified for the air and emissions category. The Summa® canisters will be certified clean (batch certification) by the laboratory. Air samples are typically analyzed for VOCs by USEPA Method TO-15.

For indoor air samples and outdoor air samples, the required detection limit for trichloroethene (TCE), carbon tetrachloride, and vinyl chloride (the three “Matrix 1” compounds) is 0.25 micrograms per cubic meter ($\mu g/m^3$). For the remaining compounds, the reporting limit will be 1.0 $\mu g/m^3$ (sub-slab soil vapor, indoor air and outdoor air samples). The laboratory-specific detection limits and quantitation limits for TO-15 analytes will included in as an attachment to the site-specific Work Plan or in the site-specific QAPP.

### 7.4.7 Decontamination Procedures

Only dedicated equipment (canisters, tubing, etc.) will be used during sampling. All non-dedicated equipment (i.e. flow meters, etc.) will be purged with air prior to sampling. As such, no field decontamination is necessary for air sampling. Summa canisters will be decontaminated by the analytical laboratory and certification of cleanliness will be included in the analytical data report.

# 8.0 Decontamination and Management of Investigation Derived Waste

## 8.1 Equipment Decontamination

To avoid cross contamination, sampling equipment (defined as any piece of equipment which may contact a sample) will be decontaminated according to the following procedures specified in the project-specific Work Plan; the procedures discussed here are general and may be superseded by project-specific requirements (as documented in the project-specific Work Plan. Field equipment rinsate blanks are generated and analyzed to monitor the effective of field decontamination procedures.

Cross contamination is minimized by the use of vendor-decontaminated, dedicated, disposable equipment to the extent practical.

When sampling for PFAS, see Appendix A for special field procedures.

### 8.1.1 Decontamination Procedures

For larger projects, and as indicated in the project-specific Work Plan, a decontamination pad may be constructed on the site. The pad will be sized to be large enough to handle the equipment used on site (e.g., drill rig). Additionally, the pad will be used for small equipment decontamination as well as personnel decontamination.

### 8.1.2 Small Equipment Decontamination

Small equipment decontamination for non-disposable equipment such as Geoprobe® HydroPunch® samplers, transducer probes and cables, will be accomplished using the following procedures:

- Alconox (or equivalent) and potable water wash;
- Potable water rinse;
- Distilled/deionized water rinse;

Solvents will not be used in the field decontamination of such equipment. Decontamination will include scrubbing/washing with a laboratory grade detergent (e.g. Alconox) to remove visible contamination, followed by potable (tap) water and analyte-free water rinses. Tap water may be used from any treated municipal water system; the use of an untreated potable water supply is not an acceptable substitute.

Equipment should be allowed to dry prior to use. Steam cleaning or high-pressure hot water cleaning may be used in the initial removal of gross, visible contamination.

Electric submersible pumps (such as a Grundfos Redi-Flow II) will be decontaminated using the above steps followed by running a large volume (several gallons) of potable water through the pump, followed by an analyte-free water rinse. Tubing will not be re-used (new tubing will be used for each well). Submersible pumps and supporting lines and cables will be placed in a plastic bucket filled with Liquinox and potable water and then run for several minutes (to decontaminate both exterior and interior parts). The process will be repeated with potable water. Submersible pumps will also be given a final analyte-free water rinse of both interior and exterior parts.

If bladder pumps are used, the pump will be disassembled and cleaned after each used. A new bladder will be used for each sample. Small parts, such as screens and gaskets will be replaced after each use. Dedicated airline tubing and Teflon sample tubing will be used at each monitoring well. The pump will be cleaned using the following steps:

- Alconox (or equivalent) and potable water wash;
- Potable water rinse;
- Distilled/deionized water rinse;
- Solvent (reagent or pesticide grade) rinse if samples are collected for organic analysis;
- Dilute (10%) nitric acid rinse if samples are collected for metals analysis; and
- Distilled/deionized rinse, air dry.

### 8.1.3 Heavy Equipment Decontamination

Drilling equipment will be decontaminated before the first use, between boreholes and prior to demobilization using high-pressure steam. Decontamination will be conducted at a dedicated decontamination pad constructed for the project or at an alternate location as indicated in the project-specific Work Plan. Decontamination fluids will be containerized (drummed) for subsequent characterization or disposal, unless other arrangements are made on a project-specific basis and as indicated in the project-specific Work Plan.

### 8.1.4 Personnel Decontamination

Wash buckets and potable water will be set up at the decontamination pad or alternate location as indicated in the project-specific Work Plan or HASP. This includes washing hands and a boot wash. Details of the personnel decontamination procedures will be provided in the HASP.

## 8.2 Management of Investigation Derived Waste

Investigation-derived waste (IDW) management will be in accordance with section 3.3(3e) of DER-10 (NYSDEC, 2010). The sampling methods and equipment will be selected to limit both the need for decontamination and the volume of IDW.

IDW generated during field activities include, but is not limited to, the following:

- Purge water;
- Poly sheeting;
- Spent macrocore liners;
- PPE; and
- Drill cutting and soil boring spoils.

IDW will be placed in appropriate containers pending NYSDEC-approved discharge or shipment off site for disposal.

Procedure:

*Segregation*

Drummed IDW is to be divided into the following categories:

- Drill cuttings and soil boring spoils (see Section 3.0);
- Purgewater from monitoring well development/sampling and DNAPL/LNAPL product; and,
- Solid waste other than drill cuttings and boring spoils (i.e., spent poly tubing, PPE, etc.).

*Generator ID*

Any IDW generated is assigned USEPA Generator ID Number NYD000513366.

*Hazardous/Non-Hazardous Classification*

AECOM will collect characterization samples to classify the IDW as either hazardous or non-hazardous. Based on previous characterization and contaminant levels, all IDW is anticipated to be non-hazardous.

*Shipment/Disposal*

Drummed IDW must be staged at its point of origin until it is shipped off site on the same day it's generated or staged in a designated and secured area until it can be shipped off site at a later date.

All IDW must be shipped off site by a permitted contractor to a permitted facility and may be disposed of at a facility licensed to accept hazardous waste, if necessary.

*Manifests*

Waste manifests must accompany the IDW during shipment off site for disposal. For non-hazardous waste, a non-hazardous waste manifest must be completed. For hazardous waste, a Uniform Hazardous Waste Manifest (USEPA Form 8700-22) must be completed, along with a Land Disposal

Restriction Notification Form 1. IDW manifests can be signed by qualified AECOM personnel as attorneys-in-fact for the generator (Elm Holdings, Inc.).

# 9.0 Community Air Monitoring Program

A Community Air Monitoring Plan (CAMP) is used 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 protocols cited below are based on the NYSDOH Generic CAMP (May, 2010; Appendix 1A to DER-10 [NYSDEC, 2010]) which is typically utilized by NYSDEC as guidance for work conducted at Inactive Hazardous Waste Disposal sites.

## 9.1 Monitoring

Real-time air monitoring for volatile organic compounds (VOCs) and/or particulate levels at the perimeter and surrounding community of the work area may be necessary. Monitoring activities will consist of a combination of continuous and periodic monitoring, which will be performed dependent upon the type of activity being conducted at the site, as discussed below.

The specific types of monitoring necessary and appropriate for any particular project will be determined by NYSDEC and AECOM and specified in the project-specific Work Plan.

### 9.1.1 Continuous Air Monitoring

Continuous monitoring for VOCs and particulates may be required for ground intrusive activities associated with the site, including, but not limited to, the installation of soil borings and groundwater monitoring wells and test pit excavation.

VOC monitoring will be conducted at the downwind perimeter of the immediate work area on a continuous basis. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions. VOC monitoring will be performed using a MiniRAE 2000 or equivalent, which is appropriate to detect a wide range of contaminants typically encountered. The MiniRAE 2000 will be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The MiniRAE 2000 is capable of calculating 15-minute running average concentrations, which will be compared to the action levels specified below.

Particulate concentrations will be monitored continuously at the upwind and downwind perimeters of the work area at temporary particulate monitoring stations. The particulate monitoring will be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) such as a Thermo MIE pDR-4000 DataRam or equivalent. The

Thermo MIE pDR-4000 DataRam is a real-time monitoring equipment capable of measuring particulate matter less than 10 microns (µm) in size [PM-10] and capable of integrating over a period of 15 minutes for comparison to the airborne particulate action level. The Thermo MIE pDR is equipped with an audible alarm to indicate exceedance of the action level. In addition to using the Thermo MIE pDR-4000 DataRam, fugitive dust migration will be visually assessed during work activities. If particulate concentrations at the upwind station are higher or equivalent to concentrations at or downwind of work areas, then continuous air monitoring may be discontinued, as approved by NYSDEC.

### 9.1.2 Periodic (As-Needed) Air Monitoring

Periodic or as-needed air monitoring for VOCs may be required during non-intrusive activities associated with the project-specific Work Plan. Non-intrusive activities may include the collection of soil and sediment samples, the collection of groundwater samples from existing monitoring wells, and the collection of indoor air and soil vapor samples. Periodic air monitoring during sample collection will consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well bailing/purging, and taking a reading prior to leaving a sample location.

## 9.2 Action Levels and Response

This subsection identifies the action levels and corresponding responses for concentrations of VOCs and particulates detected during the field activities associated with the Site.

### 9.2.1 Volatile Organic Compounds

If the ambient air concentration of total organic vapors at the downwind perimeter of the work area exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities will be temporarily halted, and monitoring will continue. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities will 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 will be stopped, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities will resume provided that the total organic vapor level 200 ft downwind of the work zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less (but in no case less than 20 ft), 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, field activities will be shut down.

All 15-minute readings will be recorded and be available for NYSDEC and NYSDOH personnel to review. Instantaneous readings (if any) used for decision purposes will also be recorded.

### 9.2.2 Particulates

If the downwind PM-10 particulate level is 100 µg/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 will be employed. Work will continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 µg/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, the downwind PM-10 particulate levels are greater than 150 µg/m$^3$ above the upwind level, work will be stopped, and a re-evaluation of activities initiated. Work will resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 µg/m$^3$ of the upwind level and in preventing visible dust migration.

Similar to the VOC readings, particulate readings will be recorded and be available for state (NYSDEC and NYSDOH) and county health personnel to review.

# 10.0 Field Records and Documentation

The objective of this subsection is to provide consistent procedures and formats by which field records will be kept and activities documented, and a methodology by which field records will be managed. Field records and documentation to be used during field activities include Field Logbooks and Standard Forms. Standard Forms are provided in Appendix B.

## 10.1 Field Logbooks

Field logbooks will be prepared and maintained throughout the course of the investigation**. With the exception of PFAS sampling events (Appendix A)**, only bound, weatherproof field logbooks will be used by field personnel. The logbooks will be turned in for copying/filing/tracking when complete. **If performing PFAS sampling, then loose leaf notebook paper shall be used in lieu of a field logbook**.

Logbook entries will be recorded in indelible, waterproof ink. If errors are made in any field logbook, field record (form), Chain-of-Custody Record, or any other field record document, corrections will be made by crossing a single line through the error, entering the correct information, and initialing and dating the correction.

Standard Forms have been adopted in this FSP to facilitate the collection of consistent data (see Appendix B). This will preclude detailed documentation of, for example, lithologic descriptions in the field logbook. A reference, however, to use of each specific form must be made in the logbook.

The date will be placed at the top of every page in the left-hand corner of the right page. The time of entry recordings will be in columnar form down the left-hand side of the right page. If an entry is made in a non-dedicated logbook, then the date, project name, and project number will be entered left to right, respectively, along the top of the right page. Entries should be dated, and time of entry recorded. At the beginning of each day, the first two entries will be “Personnel/Contractors On Site” and “Weather.” At the end of each day's entry or particular event, if appropriate, the person entering the field notes should draw a diagonal line originating from the bottom left corner of the page to the conclusion of the entry and sign along the line indicating the conclusion of the entry or the day's activity.

Entries in field logbooks will be legible (printing is preferable) and will contain accurate and inclusive documentation of project activities (investigation, monitoring remediation, closure, maintenance, etc.). Information pertaining to health and safety aspects, personnel on site, visitor’s names, association, and time of arrival/departure, etc., should also be recorded. Language should be objective, factual, and free of personal feelings or other terminology that might prove inappropriate, since field records are the basis for later written reports. Once completed, these field logbooks become accountable documents and must be maintained as part of the project files.

Sample collection and handling activities, as well as visual observations, will be documented in the field logbooks. The sample collection equipment (where appropriate), field analytical equipment, and equipment used to make physical measurements will be identified in the field logbooks. Calculations, results, and calibration data for field sampling, field analytical, and field physical measurement equipment will also be recorded in the field logbooks, except where these are referenced as being recorded on approved field forms. Field analyses and measurements must be traceable to the specific piece of field equipment utilized and to the field investigator collecting the sample, making the measurement, or conducting analyses. Logbooks will be updated as field work progresses.

On a periodic basis (i.e., daily, weekly, etc.), or at the end of each field event, the pages of the field logbook that were filled out during that time will be scanned into PDF format. The resulting PDF files will then be uploaded to the project folder located on the office server.

When an individual logbook is full, the logbook will be submitted to the AECOM project manager for final cataloging and filing. The logbooks will be stored in the Project File. Copies of specific sections will be made available to personnel upon request.

## 10.2 Standard Forms

All non-bound field records (e.g., drilling logs, well construction forms, sampling logs, etc.) will be completed the day the associated activity occurs. Field data collected using electronic data loggers or computer entry forms, will be uploaded as soon as practical to office servers. If possible, the person collecting the data will download electronic data on a daily basis. This person will be responsible for verifying that the data collected are adequately represented in electronic media and in the file. Examples of forms typically used are provided in Appendix B of this FSP.

On a periodic basis (i.e., daily, weekly, etc.), or at the end of each field event, the field forms that were completed during that time will be scanned into PDF format. The resulting PDF files will then be uploaded to the project folder located on the office server.

## 10.3 Sample Identification

During this project, a unique sample identifier will designate each sample collected. The following system may be used to assign unique sample identification numbers; however, modifications should be made as needed to clearly and appropriate identify samples for each site or project. Each sample will be identified by an alphanumeric character identifier, as described below.

The following codes will be used for identifying other sample types:

| CODE | Sample Type |
|---|---|
| MW | Monitoring well |
| SB | Soil boring |
| SW | Surface water |
| SD | Sediment |
| IA | Indoor air |
| OA (or AA) | Outdoor (or ambient) air |
| SV | Soil vapor |
| FB | Field (Rinsate) Blank |
| N + 50 | Field Duplicate (e.g., field duplicate of MW-3S will be MW-53S) |
| TB | Trip Blank |
| MS/MSD | Matrix Spike/ Matrix Spike Duplicate |

Field blanks and tip blanks will be labeled for the day of collection. For MS/MSD samples, the MS/MSD will be added to the sample ID and included on the COC as a note.

An example of the sample numbering system is provided below.

| Sample Identifier | Description |
|---|---|
| MW-10A | Shallow well MW-10A |
| MW-10B | Deep monitoring well MW-10B |
| SB-02-0406 | Soil sample from 4 to 6 ft interval from boring SB-02. |
| SS-01 | Surface soil sample from location SS-01. |
| FBW110502 | Field blank associated with water samples collected on 5/2/11 |
| TB110503 | Trip blank associated with samples shipped 5/3/11. |

### 10.3.1 Vapor Intrusion Samples Procedure

Each indoor air sample will have the following information placed on the laboratory supplied sample label:

- Site name
- Sample identification – see below
- Date/time
- Sampler's initials

- Analysis required – (i.e. **TO-15)**

The serial number of the canister and regulator used during sampling will also be noted on the Summa® canister identification tag and on the COC.

The following terminology shall be used for the structure sample identification (using site 932036 as an example):

- Structure Air Samples
- 932036-SS-xx (for sub-slab locations)
- 932036-BA-xx (for basement indoor ambient air)
- 932036-FF-xx (for first floor indoor air)
- 932036-OA-xx (for outdoor ambient air)

Where xx is the NYSDEC assigned structure identification number. Note: If multiple sub-slab samples in a single residence, they are identified as SSA, SSB, SSC, etc.

Field duplicate samples will be assigned a unique identification alphanumeric code that specifies the date of collection, the letters FD (for field duplicate) and an ascending number that records the number of duplicate samples collected that day. For example, the first field duplicate collected on January 22, 2018 would be assigned the following sample number using the code shown below:

YYYYMMDD-FD-1 = 20180122-FD-1

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

## 10.4 Sample Labeling

A non-removable label will be affixed to each sample container. Labels will be marked with permanent marker pens. The following information will be contained on each label:

Project name;

Sample identifier;

Company (AECOM);

Sample date and time;

Sampler’s initials;

Sample preservation; and

Analysis required.

## 10.5 Sample Shipping

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

The procedures should follow the chain-of-custody guidelines outlined in NEIC Policies and Procedures, prepared by the National Enforcement Investigations Center (NEIC) of the U.S. Environmental Protection Agency Office of Enforcement.

Procedure:

1. The chain-of-custody (COC) record (Appendix B) should be completely filled out, with all relevant information.

2. The original COC goes with the samples. It should be placed in a Ziploc bag and taped inside the sample cooler. The sampler should retain a copy of the COC.

3. Place inert cushioning material such as vermiculite or bubble-wrap in the bottom of the cooler.

4. Place the bottles in the cooler in such a way that they do not touch (use cardboard dividers or bubble-wrap).

5. Wrap VOA vials securely in bubble-wrap and tape. Place them in the center of the cooler.

6. With the exception of Summa® canisters, pack the cooler with ice in doubled Ziploc plastic bags.

7. Pack the cooler with cushioning material.

8. Tape the drain shut.

9. Wrap the cooler completely with strapping tape at two locations securing the lid. Do not cover any labels.

10. Place the lab address on top of cooler. For out-of-town laboratory, add the following: Put "This side up" labels on all four sides and "Fragile" labels on at least two sides. Affix numbered custody seals on front right and left of cooler. Cover seals with wide, clear tape.

11. Summa® canisters are shipped in the same boxes the laboratory used for shipping.

12. Ship samples via overnight carrier the same day that they are collected. Samples (except Summa® canisters) must be maintained at 4 degrees Celsius (C) ± 2ºC throughout the shipping duration.

# 11.0 References

American Society for Testing and Materials (ASTM) D1452/D1452M-16, *Standard Practice for Soil Exploration and Sampling by Auger Borings*

ASTM D1586/ D1586M-18. *Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils*.

ASTM D1587/D1587M-15. *Standard Practice for Thin-Walled Tube Sampling of Fine-Grained Soils for Geotechnical Purposes*.

ASTM D2113-14. *Standard Practice for Rock Core Drilling and Sampling of Rock for Site Exploration*.

ASTM D2487-17. *Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)*.

ASTM D2488-17. *Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)*.

ASTM D4750-87(2001). *Standard Test Method for Determining Subsurface Liquid Levels in a Borehole or Monitoring Well (Observation Well)*.

ASTM D5092/D5092M-16. *Standard Practice for Design and Installation of Groundwater Monitoring Wells*.

ASTM D5299/D5299M-18. *Standard Guide for Decommissioning of Groundwater Wells, Vadose Zone Monitoring Devices, Boreholes, and Other Devices for Environmental Activities*.

ASTM D5782-95. *Standard Guide for Use of Direct Air-Rotary Drilling for Geoenvironmental Exploration and the Installation of Subsurface Water-Quality Monitoring Devices*.

ASTM D5783-18. *Standard Guide for Use of Direct Rotary Drilling with Water-Based Drilling Fluid for Geoenvironmental Exploration and the Installation of Subsurface Water-Quality Monitoring Devices*.

ASTM D6001-05(2012). *Standard Guide for Direct-Push Groundwater Sampling for Environmental Site Characterization*.

ASTM D6282/D6282M-14. *Standard Guide for Direct Push Soil Sampling for Environmental Site Characterizations*.

ASTM D6907-05(2016). *Standard Practice for Sampling Soils and Contaminated Media with Hand-Operated Bucket Auger*s.

ASTM D6914/D6914M-16. *Standard Practice for Sonic Drilling for Site Characterization and the Installation of Subsurface Monitoring Devices*.

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

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United States Environmental Protection Agency (USEPA), 1988. Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, Interim Final. USEPA Office of Emergency and Remedial Response. EPA/540/G-89/004. October.

USEPA, 1998. Region II Sampling SOP - Ground Water Sampling Procedure Low Stress (Low Flow) Purging and Sampling. March 16, 1998.

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# Appendix A

# NYSDEC PFAS Sampling and Analysis Guidance

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

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

## Under NYSDEC's Part 375 Remedial Programs

April 2023

www.dec.ny.gov

# Table of Contents

April 2023

# ERRATA SHEET for

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

| Citation and Page Number | Current Text | Corrected Text | Date |
|---|---|---|---|
| Title of Appendix I, page 32 | Appendix H | Appendix I | 2/25/2020 |
| Document Cover, page 1 | Guidelines for Sampling and Analysis of PFAS | Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs | 9/15/2020 |
| Data Assessment and Application to Site Cleanup Page 3 | Until such time as Ambient Water Quality Standards (AWQS) and Soil Cleanup Objectives (SCOs) for PFOA and PFOS are published | Until such time as Soil Cleanup Objectives (SCOs) for PFOA and PFOS are published | 3/28/2023 |
| Water Sample Results Page 3 | PFOA and PFOS should be further assessed and considered as potential contaminants of concern in groundwater or surface water if PFOA or PFOS is detected in any water sample at or above 10 ng/L (ppt) and is determined to be attributable to the site, either by a comparison of upgradient and downgradient levels, or the presence of soil source areas, as defined below. | NYSDEC has adopted ambient water quality guidance values for PFOA and PFOS. Groundwater samples should be compared to the human health criteria of 6.7 ng/l (ppt) for PFOA and 2.7 ng/l (ppt) for PFOS. These guidance values also include criteria for surface water for PFOS applicable for aquatic life, which may be applicable at some sites. Drinking water sample results should be compared to the NYS maximum contaminant level (MCL) of 10 ng/l (ppt).Analysis to determine if PFOA and PFOS concentrations are attributable to the site should include a comparison between upgradient and downgradient levels, and the presence of soil source areas, as defined below. | 3/28/2023 |
| Soil Sample Results Page 3 | Soil cleanup objectives for PFOA and PFOS have been proposed in an upcoming revision to 6 NYCRR Part 375-6. Until SCOs are in effect, the following are to be used as guidance values: | NYSDEC will delay adding soil cleanup objectives for PFOA and PFOS to 6 NYCRR Part 375-6 until the PFAS rural soil background study has been completed. Until SCOs are in effect, the following are to be used as guidance values: | 3/28/2023 |
| Protection of Groundwater Page 3 | PFOA (ppb) 1.1<br>PFOS (ppb) 3.7 | PFOA (ppb) 0.8<br>PFOS (ppb) 1.0 | 3/28/2023 |

| Citation and Page Number | Current Text | Corrected Text | Date |
|---|---|---|---|
| Footnote 2<br>Page 3 | The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the guidance value for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf). | The Protection of Groundwater values are based on the above referenced ambient groundwater guidance values. Details on that calculation are available in the following document, prepared for the February 2022 proposed changes to Part 375 (https://www.dec.ny.gov/docs/remediation_hudson_pdf/part375techsupport.pdf). The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the guidance value for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf). | 3/28/2023 |
| Testing for Imported Soil<br>Page 4 | If the concentrations of PFOA and PFOS in leachate are at or above 10 ppt (the Maximum Contaminant Levels established for drinking water by the New York State Department of Health), then the soil is not acceptable. | If the concentrations of PFOA and PFOS in leachate are at or above the ambient water quality guidance values for groundwater, then the soil is not acceptable. | 3/28/2023 |
| Routine Analysis,<br>page 9 | “However, laboratories analyzing environmental samples…PFOA and PFOS in drinking water by EPA Method 537, 537.1 or ISO 25101.” | “However, laboratories analyzing environmental samples…PFOA and PFOS in drinking water by EPA Method 537, 537.1, ISO 25101, or Method 533.” | 9/15/2020 |
| Additional Analysis, page 9, new paragraph regarding soil parameters | None | “In cases where site-specific cleanup objectives for PFOA and PFOS are to be assessed, soil parameters, such as Total Organic Carbon (EPA Method 9060), soil pH (EPA Method 9045), clay content (percent), and cation exchange capacity (EPA Method 9081), should be included in the analysis to help evaluate factors affecting the leachability of PFAS in site soils.” | 9/15/2020 |

| Citation and Page Number | Current Text | Corrected Text | Date |
|---|---|---|---|
| Data Assessment and Application to Site Cleanup Page 10 | Until such time as Ambient Water Quality Standards (AWQS) and Soil Cleanup Objectives (SCOs) for PFAS are published, the extent of contaminated media potentially subject to remediation should be determined on a case-by-case basis using the procedures discussed below and the criteria in DER-10. Target levels for cleanup of PFAS in other media, including biota and sediment, have not yet been established by the DEC. | Until such time as Ambient Water Quality Standards (AWQS) and Soil Cleanup Objectives (SCOs) for PFOA and PFOS are published, the extent of contaminated media potentially subject to remediation should be determined on a case-by-case basis using the procedures discussed below and the criteria in DER-10. Preliminary target levels for cleanup of PFOA and PFOS in other media, including biota and sediment, have not yet been established by the DEC. | 9/15/2020 |
| Water Sample Results Page 10 | PFAS should be further assessed and considered as a potential contaminant of concern in groundwater or surface water (…)<br>If PFAS are identified as a contaminant of concern for a site, they should be assessed as part of the remedy selection process in accordance with Part 375 and DER-10. | PFOA and PFOS should be further assessed and considered as potential contaminants of concern in groundwater or surface water (…)<br>If PFOA and/or PFOS are identified as contaminants of concern for a site, they should be assessed as part of the remedy selection process in accordance with Part 375 and DER-10. | 9/15/2020 |

| Citation and Page Number | Current Text | Corrected Text | Date |
|---|---|---|---|
| Soil Sample Results, page 10 | "The extent of soil contamination for purposes of delineation and remedy selection should be determined by having certain soil samples tested by Synthetic Precipitation Leaching Procedure (SPLP) and the leachate analyzed for PFAS. Soil exhibiting SPLP results above 70 ppt for either PFOA or PFOS (individually or combined) are to be evaluated during the cleanup phase." | "Soil cleanup objectives for PFOA and PFOS will be proposed in an upcoming revision to 6 NYCRR Part 375-6. Until SCOs are in effect, the following are to be used as guidance values. "<br><br>[Interim SCO Table]<br>"PFOA and PFOS results for soil are to be compared against the guidance values listed above. These guidance values are to be used in determining whether PFOA and PFOS are contaminants of concern for the site and for determining remedial action objectives and cleanup requirements. Site-specific remedial objectives for protection of groundwater can also be presented for evaluation by DEC. Development of site-specific remedial objectives for protection of groundwater will require analysis of additional soil parameters relating to leachability. These additional analyses can include any or all the parameters listed above (soil pH, cation exchange capacity, etc.) and/or use of SPLP.<br><br>As the understanding of PFAS transport improves, DEC welcomes proposals for site-specific remedial objectives for protection of groundwater. DEC will expect that those may be dependent on additional factors including soil pH, aqueous pH, % organic carbon, % Sand/Silt/Clay, soil cations: K, Ca, Mg, Na, Fe, Al, cation exchange capacity, and anion exchange capacity. Site-specific remedial objectives should also consider the dilution attenuation factor (DAF). The NJDEP publication on DAF can be used as a reference: https://www.nj.gov/dep/srp/guidance/rs/daf.pdf. " | 9/15/2020 |

| Citation and Page Number | Current Text | Corrected Text | Date |
|---|---|---|---|
| Testing for Imported Soil Page 11 | Soil imported to a site for use in a soil cap, soil cover, or as backfill is to be tested for PFAS in general conformance with DER-10, Section 5.4(e) for the PFAS Analyte List (Appendix F) using the analytical procedures discussed below and the criteria in DER-10 associated with SVOCs.<br>If PFOA or PFOS is detected in any sample at or above 1 µg/kg, then soil should be tested by SPLP and the leachate analyzed for PFAS. If the SPLP results exceed 10 ppt for either PFOA or PFOS (individually) then the source of backfill should be rejected, unless a site-specific exemption is provided by DER. SPLP leachate criteria is based on the Maximum Contaminant Levels proposed for drinking water by New York State's Department of Health, this value may be updated based on future Federal or State promulgated regulatory standards. Remedial parties have the option of analyzing samples concurrently for both PFAS in soil and in the SPLP leachate to minimize project delays. Category B deliverables should be submitted for backfill samples, though a DUSR is not required. | Testing for PFAS should be included any time a full TAL/TCL analyte list is required. Results for PFOA and PFOS should be compared to the applicable guidance values. If PFOA or PFOS is detected in any sample at or above the guidance values then the source of backfill should be rejected, unless a site-specific exemption is provided by DER based on SPLP testing, for example. If the concentrations of PFOA and PFOS in leachate are at or above 10 ppt (the Maximum Contaminant Levels established for drinking water by the New York State Department of Health), then the soil is not acceptable.<br><br>PFOA, PFOS and 1,4-dioxane are all considered semi-volatile compounds, so composite samples are appropriate for these compounds when sampling in accordance with DER-10, Table 5.4(e)10. Category B deliverables should be submitted for backfill samples, though a DUSR is not required. | 9/15/2020 |

| Citation and Page Number | Current Text | Corrected Text | Date |
|---|---|---|---|
| Footnotes | None | [1] TOP Assay analysis of highly contaminated samples, such as those from an AFFF (aqueous film-forming foam) site, can result in incomplete oxidation of the samples and an underestimation of the total perfluoroalkyl substances.<br>[2] The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the soil cleanup objective for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf). | 9/15/2020 |
| Additional Analysis, page 9 | In cases… soil parameters, such as Total Organic Carbon (EPA Method 9060), soil… | In cases… soil parameters, such as Total Organic Carbon (Lloyd Kahn), soil… | 1/8/2021 |
| Appendix A, General Guidelines, fourth bullet | List the ELAP-approved lab(s) to be used for analysis of samples | List the ELAP- certified lab(s) to be used for analysis of samples | 1/8/2021 |
| Appendix E, Laboratory Analysis and Containers | Drinking water samples collected using this protocol are intended to be analyzed for PFAS by ISO Method 25101. | Drinking water samples collected using this protocol are intended to be analyzed for PFAS by EPA Method 537, 537.1, 533, or ISO Method 25101 | 1/8/2021 |
| Water Sample Results Page 9 | "In addition, further assessment of water may be warranted if either of the following screening levels are met:<br>a. any other individual PFAS (not PFOA or PFOS) is detected in water at or above 100 ng/L; or<br>b. total concentration of PFAS (including PFOA and PFOS) is detected in water at or above 500 ng/L" | Deleted | 6/15/2021 |

| Citation and Page Number | Current Text | Corrected Text | Date |
|---|---|---|---|
| Routine Analysis, Page XX | Currently, New York State Department of Health's Environmental Laboratory Approval Program (ELAP)… criteria set forth in the DER's laboratory guidelines for PFAS in non-potable water and solids (Appendix H - Laboratory Guidelines for Analysis of PFAS in Non-Potable Water and Solids). | Deleted | 5/31/2022 |
| Analysis and Reporting, Page XX | As of October 2020, the United States Environmental Protection Agency (EPA) does not have a validated method for analysis of PFAS for media commonly analyzed under DER remedial programs (non-potable waters, solids). DER has developed the following guidelines to ensure consistency in analysis and reporting of PFAS. | Deleted | 5/31/2022 |
| Routine Analysis, Page XX | LC-MS/MS analysis for PFAS using methodologies based on EPA Method 537.1 is the procedure to use for environmental samples. Isotope dilution techniques should be utilized for the analysis of PFAS in all media. | EPA Method 1633 is the procedure to use for environmental samples. | |
| Soil Sample Results, Page XX | Soil cleanup objectives for PFOA and PFOS will be proposed in an upcoming revision to 6 NYCRR Part 375-6 | Soil cleanup objectives for PFOA and PFOS have been proposed in an upcoming revision to 6 NYCRR Part 375-6 | |
| Appendix A | "Include in the text… LC-MS/MS for PFAS using methodologies based on EPA Method 537.1" | "Include in the text ….EPA Method 1633" | |
| Appendix A | "Laboratory should have ELAP certification for PFOA and PFOS in drinking water by EPA Method 537, 537.1, EPA Method 533, or ISO 25101" | Deleted | |
| Appendix B | "Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1" | "Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633" | |

| Citation and Page Number | Current Text | Corrected Text | Date |
|---|---|---|---|
| Appendix C | "Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1" | "Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633" | |
| Appendix D | "Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1" | "Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633" | |
| Appendix G | | Updated to include all forty PFAS analytes in EPA Method 533 | |
| Appendix H | | Deleted | |
| Appendix I | Appendix I | Appendix H | |
| Appendix H | "These guidelines are intended to be used for the validation of PFAS analytical results for projects within the Division of Environmental Remediation (DER) as well as aid in the preparation of a data usability summary report." | "These guidelines are intended to be used for the validation of PFAS using EPA Method 1633 for projects within the Division of Environmental Remediation (DER)." | |
| Appendix H | "The holding time is 14 days…" | "The holding time is 28 days…" | |
| Appendix H, Initial Calibration | "The initial calibration should contain a minimum of five standards for linear fit…" | "The initial calibration should contain a minimum of six standards for linear fit…" | |
| Appendix H, Initial Calibration | Linear fit calibration curves should have an $R^2$ value greater than 0.990. | Deleted | |
| Appendix H, Initial Calibration Verification | Initial Calibration Verification Section | Deleted | |
| Appendix H | secondary Ion Monitoring Section | Deleted | |
| Appendix H | Branched and Linear Isomers Section | Deleted | |

April 2023

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

## Objective

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

## Applicability

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

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

## Field Sampling Procedures

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

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

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

# Analysis and Reporting

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

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

## Routine Analysis

EPA Method 1633 is the procedure to use for environmental samples. Reporting limits for PFOA and PFOS in aqueous samples should not exceed 2 ng/L. Reporting limits for PFOA and PFOS in solid samples should not exceed 0.5 µg/kg. Reporting limits for all other PFAS in aqueous and solid media should be as close to these limits as possible. If laboratories indicate that they are not able to achieve these reporting limits for the entire *PFAS Analyte List*, site-specific decisions regarding acceptance of elevated reporting limits for specific PFAS can be made by the DER project manager in consultation with the DER chemist. Data review guidelines were developed by DER to ensure data comparability and usability (Appendix H - Data Review Guidelines for Analysis of PFAS in Non-Potable Water and Solids).

## Additional Analysis

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

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

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

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

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

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

## Data Assessment and Application to Site Cleanup

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

### Water Sample Results

NYSDEC has adopted ambient water quality guidance values for PFOA and PFOS. Groundwater samples should be compared to the human health criteria of 6.7 ng/l (ppt) for PFOA and 2.7 ng/l (ppt) for PFOS. These human health criteria should also be applied to surface water that is used as a water supply. This guidance also includes criteria for surface water for PFOS applicable for aquatic life, which may be applicable at some sites. Drinking water sample results should be compared to the NYS maximum contaminant level (MCL) of 10 ng/l (ppt). Analysis to determine if PFOA and PFOS concentrations are attributable to the site should include a comparison between upgradient and downgradient levels, and the presence of soil source areas, as defined below.

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

### Soil Sample Results

NYSDEC will delay adding soil cleanup objectives for PFOA and PFOS to 6 NYCRR Part 375-6 until the PFAS rural soil background study has been completed. Until SCOs are in effect, the following are to be used as guidance values:

| Guidance Values for Anticipated Site Use | PFOA (ppb) | PFOS (ppb) |
|---|---:|---:|
| Unrestricted | 0.66 | 0.88 |
| Residential | 6.6 | 8.8 |
| Restricted Residential | 33 | 44 |
| Commercial | 500 | 440 |
| Industrial | 600 | 440 |
| Protection of Groundwater[2] | 0.8 | 1.0 |

PFOA and PFOS results for soil are to be compared against the guidance values listed above. These guidance values are to be used in determining whether PFOA and PFOS are contaminants of concern for the site and for determining remedial action objectives and cleanup requirements. Site-specific remedial objectives for protection of groundwater can also be presented for evaluation by DEC. Development of site-specific remedial objectives for protection of groundwater will require analysis of additional soil parameters relating to leachability. These

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[2] The Protection of Groundwater values are based on the above referenced ambient groundwater guidance values. Details on that calculation are available in the following document, prepared for the February 2022 proposed changes to Part 375 (https://www.dec.ny.gov/docs/remediation_hudson_pdf/part375techsupport.pdf). The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the guidance value for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf).

additional analyses can include any or all the parameters listed above (soil pH, cation exchange capacity, etc.) and/or use of SPLP.

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

## Testing for Imported Soil

Testing for PFAS should be included any time a full TAL/TCL analyte list is required. Results for PFOA and PFOS should be compared to the applicable guidance values. If PFOA or PFOS is detected in any sample at or above the guidance values then the source of backfill should be rejected, unless a site-specific exemption is provided by DER based on SPLP testing, for example. If the concentrations of PFOA and PFOS in leachate are at or above the ambient water quality guidance values for groundwater, then the soil is not acceptable.

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

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

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

## General Guidelines in Accordance with DER-10

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

## Specific Guidelines for PFAS

- Include in the text that sampling for PFAS will take place
- Include in the text that PFAS will be analyzed by EPA Method 1633
- Include the list of PFAS compounds to be analyzed (*PFAS Analyte List*)
- Include the laboratory SOP for PFAS analysis
- List the minimum method-achievable Reporting Limits for PFAS
    - Reporting Limits should be less than or equal to:
        - Aqueous – 2 ng/L (ppt)
        - Solids – 0.5 µg/kg (ppb)
- Include the laboratory Method Detection Limits for the PFAS compounds to be analyzed
- 
- Include detailed sampling procedures
    - Precautions to be taken
    - Pump and equipment types
    - Decontamination procedures
    - Approved materials only to be used
- Specify that regular ice only will be used for sample shipment
- Specify that equipment blanks should be collected at a minimum frequency of 1 per day per site for each matrix

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

## General

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

## Laboratory Analysis and Containers

Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633.

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

## Equipment

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

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

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

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

## Equipment Decontamination

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

## Sampling Techniques

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

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

## Sample Identification and Logging

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

## Quality Assurance/Quality Control

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

## Documentation

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

## Personal Protection Equipment (PPE)

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

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

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

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

# Appendix C - Sampling Protocols for PFAS in Monitoring Wells

## General

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

## Laboratory Analysis and Container

Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633.

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

## Equipment

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

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

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

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

## Equipment Decontamination

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

## Sampling Techniques

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

## Sample Identification and Logging

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

## Quality Assurance/Quality Control

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

## Documentation

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

## Personal Protection Equipment (PPE)

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

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

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

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

# Appendix D - Sampling Protocols for PFAS in Surface Water

## General

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

## Laboratory Analysis and Container

Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633.

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

## Equipment

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

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

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

- stainless steel cup

## Equipment Decontamination

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

## Sampling Techniques

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

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

## Sample Identification and Logging

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

## Quality Assurance/Quality Control

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

## Documentation

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

## Personal Protection Equipment (PPE)

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

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

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

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

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

## General

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

## Laboratory Analysis and Container

Drinking water samples collected using this protocol are intended to be analyzed for PFAS by EPA Method 537, 537.1, 533, or ISO Method 25101. The preferred material for containers is high density polyethylene (HDPE). Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory.

## Equipment

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

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

## Equipment Decontamination

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

## Sampling Techniques

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

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

## Sample Identification and Logging

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

## Quality Assurance/Quality Control

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

## Documentation

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

## Personal Protection Equipment (PPE)

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

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

# Appendix F - Sampling Protocols for PFAS in Fish

This appendix contains a copy of the current SOP developed by the Division of Fish and Wildlife (DFW) entitled "General Fish Handling Procedures for Contaminant Analysis" (Ver. 8). This SOP should be followed when collecting fish for contaminant analysis. Note, however, that the Bureau of Ecosystem Health will not be supplying bags or tags. All supplies are the responsibility of the collector

**Procedure Name:** General Fish Handling Procedures for Contaminant Analysis

**Number:** FW-005

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

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

**Version:** 8

**Previous Version Date:** 21 March 2018

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

**Originator or Revised by:** Wayne Richter, Jesse Becker

**Date:** 26 April 2019

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

## NEW YORK STATE
## DEPARTMENT OF ENVIRONMENTAL CONSERVATION

## GENERAL FISH HANDLING PROCEDURES FOR CONTAMINANT ANALYSES

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

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

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

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

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

   1. Project and Site Name.

   2. DEC Region.

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

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

   5. Preservation Method.

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

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

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

   3. Date collected.

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

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

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

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

D. General data collection recommendations:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

page ______ of ______

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

Project and Site Name ______________________________________________ DEC Region ____________

Collections made by (include all crew) ______________________________________________

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

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

| FOR LAB USE ONLY- LAB ENTRY NO. | COLLECTION OR TAG NO. | SPECIES | DATE TAKEN | LOCATION | AGE | SEX &/OR REPROD. CONDIT | LENGTH ( ) | WEIGHT ( ) | REMARKS |
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richter: revised 2011, 5/7/15, 10/4/16, 3/20/17; becker: 3/23/17, 4/26/19

# NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
# CHAIN OF CUSTODY

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

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

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

Town of _______________________________________, in __________________________________ County.

Item(s) ____________________________________________________________________________

____________________________________________________________________________________________

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

________________________________________________ ____________________________
Signature Date

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

________________________________________ ____________________
Signature Date

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

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

## NOTICE OF WARRANTY

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

## HANDLING INSTRUCTIONS

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

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

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

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

EQUIPMENT LIST

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

Fish measuring board.

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

Individually numbered metal tags for fish.

Manila tags to label bags.

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

Knife for removing scales.

Chain of custody and fish collection forms.

Clipboard.

Pens or markers.

Paper towels.

Dish soap and brush.

Bucket.

Cooler.

Ice.

Duct tape.

# Appendix G – PFAS Analyte List

| Group | Chemical Name | Abbreviation | CAS Number |
|---|---|---|---|
| Perfluoroalkyl sulfonic acids | Perfluorobutanesulfonic acid | PFBS | 375-73-5 |
| | Perfluoropentanesulfonic acid | PFPeS | 2706-91-4 |
| | Perfluorohexanesulfonic acid | PFHxS | 355-46-4 |
| | Perfluoroheptanesulfonic acid | PFHpS | 375-92-8 |
| | Perfluorooctanesulfonic acid | PFOS | 1763-23-1 |
| | Perfluorononanesulfonic acid | PFNS | 68259-12-1 |
| | Perfluorodecanesulfonic acid | PFDS | 335-77-3 |
| | Perfluorododecanesulfonic acid | PFDoS | 79780-39-5 |
| Perfluoroalkyl carboxylic acids | Perfluorobutanoic acid | PFBA | 375-22-4 |
| | Perfluoropentanoic acid | PFPeA | 2706-90-3 |
| | Perfluorohexanoic acid | PFHxA | 307-24-4 |
| | Perfluoroheptanoic acid | PFHpA | 375-85-9 |
| | Perfluorooctanoic acid | PFOA | 335-67-1 |
| | Perfluorononanoic acid | PFNA | 375-95-1 |
| | Perfluorodecanoic acid | PFDA | 335-76-2 |
| | Perfluoroundecanoic acid | PFUnA | 2058-94-8 |
| | Perfluorododecanoic acid | PFDoA | 307-55-1 |
| | Perfluorotridecanoic acid | PFTrDA | 72629-94-8 |
| | Perfluorotetradecanoic acid | PFTeDA | 376-06-7 |
| Per- and Polyfluoroether carboxylic acids | Hexafluoropropylene oxide dimer acid | HFPO-DA | 13252-13-6 |
| | 4,8-Dioxa-3H-perfluorononanoic acid | ADONA | 919005-14-4 |
| | Perfluoro-3-methoxypropanoic acid | PFMPA | 377-73-1 |
| | Perfluoro-4-methoxybutanoic acid | PFMBA | 863090-89-5 |
| | Nonafluoro-3,6-dioxaheptanoic acid | NFDHA | 151772-58-6 |
| Fluorotelomer sulfonic acids | 4:2 Fluorotelomer sulfonic acid | 4:2-FTS | 757124-72-4 |
| | 6:2 Fluorotelomer sulfonic acid | 6:2-FTS | 27619-97-2 |
| | 8:2 Fluorotelomer sulfonic acid | 8:2-FTS | 39108-34-4 |
| Fluorotelomer carboxylic acids | 3:3 Fluorotelomer carboxylic acid | 3:3 FTCA | 356-02-5 |
| | 5:3 Fluorotelomer carboxylic acid | 5:3 FTCA | 914637-49-3 |
| | 7:3 Fluorotelomer carboxylic acid | 7:3 FTCA | 812-70-4 |
| Perfluorooctane sulfonamides | Perfluorooctane sulfonamide | PFOSA | 754-91-6 |
| | N-methylperfluorooctane sulfonamide | NMeFOSA | 31506-32-8 |
| | N-ethylperfluorooctane sulfonamide | NEtFOSA | 4151-50-2 |
| Perfluorooctane sulfonamidoacetic acids | N-methylperfluorooctane sulfonamidoacetic acid | N-MeFOSAA | 2355-31-9 |
| | N-ethylperfluorooctane sulfonamidoacetic acid | N-EtFOSAA | 2991-50-6 |
| Perfluorooctane sulfonamide ethanols | N-methylperfluorooctane sulfonamidoethanol | MeFOSE | 24448-09-7 |
| | N-ethylperfluorooctane sulfonamidoethanol | EtFOSE | 1691-99-2 |

| Group | Chemical Name | Abbreviation | CAS Number |
|---|---|---|---|
| Ether sulfonic acids | 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (F-53B Major) | 9Cl-PF3ONS | 756426-58-1 |
| | 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (F-53B Minor) | 11Cl-PF3OUdS | 763051-92-9 |
| | Perfluoro(2-ethoxyethane) sulfonic acid | PFEESA | 113507-82-7 |

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

## General

These guidelines are intended to be used for the validation of PFAS using EPA Method 1633 for projects within the Division of Environmental Remediation (DER). Data reviewers should understand the methodology and techniques utilized in the analysis. Consultation with the end user of the data may be necessary to assist in determining data usability based on the data quality objectives in the Quality Assurance Project Plan. A familiarity with the laboratory's Standard Operating Procedure may also be needed to fully evaluate the data. If you have any questions, please contact DER's Quality Assurance Officer, Dana Barbarossa, at dana.barbarossa@dec.ny.gov.

## Preservation and Holding Time

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

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

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

## Initial Calibration

The initial calibration should contain a minimum of six standards for linear fit and six standards for a quadratic fit. The relative standard deviation (RSD) for a quadratic fit calibration should be less than 20%.

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

| | |
|---|---|
| %RSD >20% | J flag detects and UJ non detects |

## Continuing Calibration Verification

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

| | |
|---|---|
| CCV recovery <70 or >130% | J flag results |

## Blanks

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

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

## Field Duplicates

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

| | |
|---|---|
| RPD >30% | Apply J qualifier to parent sample |

## Lab Control Spike

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

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

## Matrix Spike/Matrix Spike Duplicate

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

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

## Extracted Internal Standards (Isotope Dilution Analytes)

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

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

## Signal to Noise Ratio

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

## Reporting Limits

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

## Peak Integrations

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

# Appendix B

# Field Activity Forms

**AECOM**

# GROUNDWATER SAMPLING LOG

Page __1__ of __1__

## Low Flow Sampling Record

**Site Name:** IP-BP Hyde Park

**Well ID:** ______________

**Well Diameter:**

**Samplers:**

**Weather:**

**Water Volume Calculation**

| | |
|---|---|
| 1 inch= 0.041 | 6 inch= 1.4 |
| 1.5 inch= 0.092 | 8 inch= 2.5 |
| 2 inch= 0.163 | 10 inch= 4 |
| 4 inch= 0.64 | |

= (Total Depth of Well - Depth to Water) × Casing volume per foot

**Acceptance Criteria:**

| | |
|---|---|
| Temp | 3% |
| pH | + 0.1 unit |
| Sp. Cond. | 3% |
| ORP | + 10mV |
| DO | 10% |
| Turbidity | <50 NTU |
| Drawdown | <0.3' |

**Purging Data:**

Method: **Low Flow**

**Date:**

**Time:** (hhmm)

**feet below top of PVC**

**Initial Depth to Water**

**Depth to Bottom**

| **Time**<br>hhmm | **DTW**<br>(ft) | **Pump Rate**<br>(ml/min) | **Volume**<br>(gal.) | **Temp**<br>(C˚) | **Sp. Cond**<br>(ms/cm) | **DO**<br>(mg/L) | **pH** | **ORP**<br>(mV) | **Turb**<br>(NTU) | **Comments:** |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
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| | | | | | | | | | | |

**Sample Collection Method:** **Peristaltic Pump**

**Date:**

**Time:**

**Total Volume of Water Purged:**

### Hach Test Kits

| | |
|---|---|
| **Alkalinity (mg/L)** | |
| **Carbon Dioxide (mg/L)** | |
| **Ferrous Iron (mg/L)** | |
| **Hydrogen Sulfide (mg/L)** | |
| **DTW** | |

### Sample Set

| **Parameter** | | **Bottle** | **Pres.** | **Method** |
|---|---|---|---|---|
| VOCs | ☐ | 3-40 mL glass vial | HCL | EPA 8260C |
| Dissolved Iron | ☐ | 1-250 mL plastic (field filtered) | HNO3 | 6010C |
| TOC | ☐ | 2-40mL glass vial | H2SO4 | 5310C |
| M.E.E.P. | ☐ | 3-40 mL glass vial | HCL | RSK-175 mod |
| Nitrate/Nitrite/ Chloride/Sulfate | ☐ | 1-500mL plastic | unpreserved | 300, 353.2<br>300.0_28D |
| BOD | ☐ | 1-1000 mL plastic | unpreserved | 5210B |
| COD | ☐ | 1-250 mL plastic | H2SO4 | 410.4 |
| Sulfide | ☐ | 1-500mL plastic | NaOH/Zn Acetate | 4500-S2-F |

**SITE NAME:** ____________________

SITE ID.: ____________
INSPECTOR: ____________

# MONITORING WELL FIELD INSPECTION LOG

DATE/TIME: ____________
WELL ID.: ____________

---

| | YES | NO |
|---|---|---|
| WELL VISIBLE? (If not, provide directions below) | | |

WELL COORDINATES? NYTM X ______________ NYTM Y ______________ See Report

| | YES | NO |
|---|---|---|
| WELL I.D. VISIBLE? | | |
| WELL LOCATION MATCH SITE MAP? (if not, sketch actual location on back) | | |

WELL I.D. AS IT APPEARS ON PROTECTIVE CASING OR WELL: ............................................

| | YES | NO |
|---|---|---|
| SURFACE SEAL PRESENT? | | |
| SURFACE SEAL COMPETENT? (If cracked, heaved etc., describe below) | | |
| PROTECTIVE CASING IN GOOD CONDITION? (If damaged, describe below) | | |

HEADSPACE READING (ppm) AND INSTRUMENT USED ............ ________
TYPE OF PROTECTIVE CASING AND HEIGHT OF STICKUP IN FEET (If applicable) ............ ________
PROTECTIVE CASING MATERIAL TYPE: ............ ________
MEASURE PROTECTIVE CASING INSIDE DIAMETER (Inches): ............ ________

| | YES | NO |
|---|---|---|
| LOCK PRESENT? | | |
| LOCK FUNCTIONAL? | | |
| DID YOU REPLACE THE LOCK? | | |
| IS THERE EVIDENCE THAT THE WELL IS DOUBLE CASED? (If yes,describe below) | | |
| WELL MEASURING POINT VISIBLE? | | |

MEASURE WELL DEPTH FROM MEASURING POINT (Feet): ............ ________
MEASURE DEPTH TO WATER FROM MEASURING POINT (Feet): ............ ________
MEASURE WELL DIAMETER (Inches): ............ ________
WELL CASING MATERIAL: ............ ________
PHYSICAL CONDITION OF VISIBLE WELL CASING: ............ ________
ATTACH ID MARKER (if well ID is confirmed) and IDENTIFY MARKER TYPE ............ ________
PROXIMITY TO UNDERGROUND OR OVERHEAD UTILITIES ............ ________

DESCRIBE ACCESS TO WELL: (Include accessibility to truck mounted rig, natural obstructions, overhead power lines, proximity to permanent structures, etc.).

DESCRIBE WELL SETTING (For example, located in a field, in a playground, on pavement, in a garden, etc.) AND ASSESS THE TYPE OF RESTORATION REQUIRED.

IDENTIFY ANY NEARBY POTENTIAL SOURCES OF CONTAMINATION, IF PRESENT (e.g. Gas station, salt pile, etc.):

REMARKS:

# DRUM LOG

AECOM

SITE NAME: ______________________ PROJECT NUMBER: ______________________

SITE ADDRESS: ______________________

______________________ CLIENT: ______________________

______________________ ______________________

| DRUM ID NUMBER | DATE STARTED/ CLOSED | BORING / WELL LOCATION | MATRIX | CONTENTS / COMMENTS | SOLID WASTE (Y/N) | RCRA WASTE (Y/N) |
|---|---|---|---|---|---|---|
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |
| 5 | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

______________________ ONSITE REPRESENTATIVE (PRINT)

______________________ (SIGN)

# DRILLING SUMMARY

**Geologist:**

**Drilling Company:**

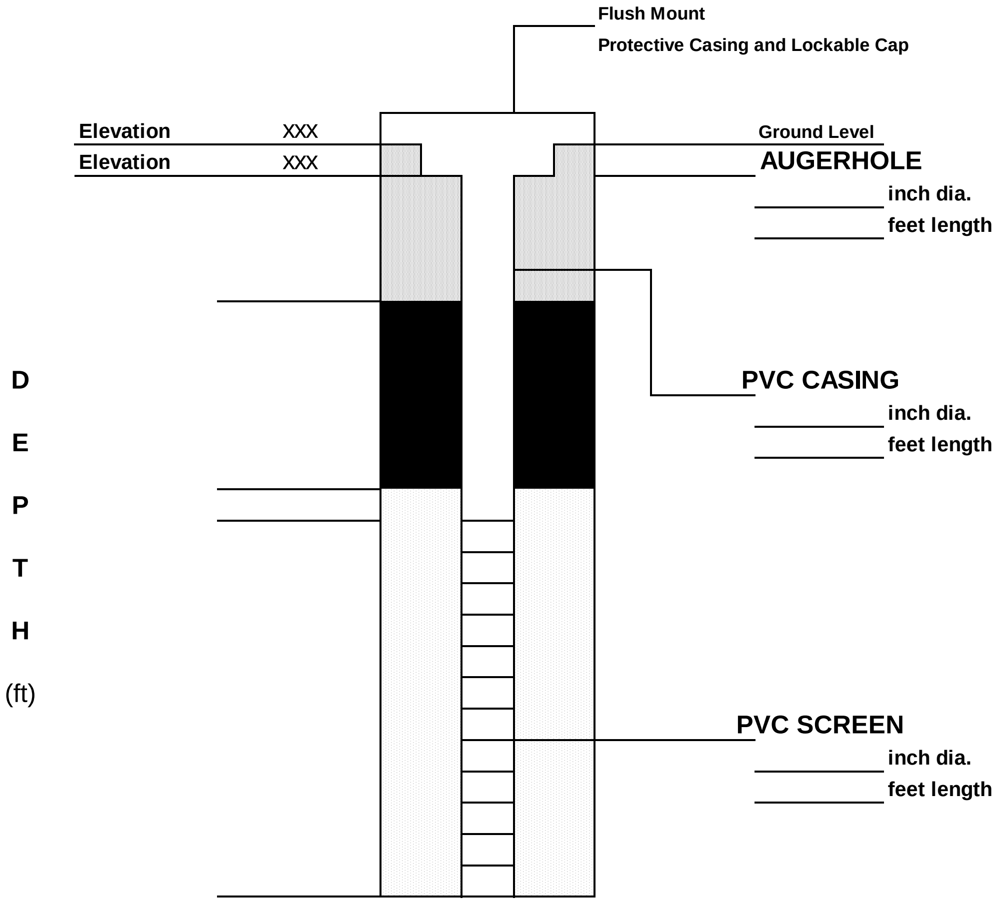
**Driller:**

**Rig Make/Model:**

**Date:**

## GEOLOGIC LOG

| Depth(ft.) | Description |
|---|---|
| | See boring log for lithologic description. |



## WELL DESIGN

| CASING MATERIAL | | SCREEN MATERIAL | | FILTER MATERIAL | | | |
|---|---|---|---|---|---|---|---|
| **Surface:** | Steel grade box | **Type:** | 2" SCH 40 PVC | **Type:** | Sand | **Setting:** | |
| | | | | **SEAL MATERIAL** | | | |
| **Monitor:** | 2" SCH 40 PVC | **Slot Size:** | .010" | **Type:** | | **Setting:** | |

***COMMENTS:***

***LEGEND***

| | |
|---|---|
| ▨ | Bagged Gravel (Quikrete #1151) |
| ■ | Bentonite Seal |
| ░ | Silica Sandpack |

**Client:**

**Location:**

**Project No.:**

***AECOM***

**MONITORING WELL CONSTRUCTION DETAILS**

**Well Number:**

# WELL DEVELOPMENT LOG

**AECOM**

PROJECT TITLE: IP-BP Hyde Park WELL NO.: ______

PROJECT NO.: 60481767

STAFF: ______

DATE(S): ______

1. TOTAL CASING AND SCREEN LENGTH (FT.) = ______
2. WATER LEVEL BELOW TOP OF CASING (FT.) = ______
3. NUMBER OF FEET STANDING WATER (#1 - #2) = ______
4. VOLUME OF WATER/FOOT OF CASING (GAL.) = ______
5. VOLUME OF WATER IN CASING (GAL.)(#3 x #4) = ______
6. VOLUME OF WATER TO REMOVE (GAL.)(#5 x ___ ) = ______
7. VOLUME OF WATER ACTUALLY REMOVED (GAL.) = ______

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

OR

V=0.0408 x (CASING DIAMETER)²

| | ACCUMULATED VOLUME PURGED (GALLONS) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| PARAMETERS | | | | | | | | | | | |
| pH | | | | | | | | | | | |
| SPEC. COND. (umhos) | | | | | | | | | | | |
| APPEARANCE | | | | | | | | | | | |
| TEMPERATURE (°C) | | | | | | | | | | | |
| TURBIDITY (NTU) | | | | | | | | | | | |
| | | | | | | | | | | | |

COMMENTS:

Project Name:__BP- Globar Hyde Park Facility__

Project Number:__60481767_______________

# Instrument Calibration Record

Date_________________________________

| Parameter | Instrument | | Standard | | Standard Value @ __C | Ambient Temp. C | Pre Calibration Value | Post Calibration Value | Initials & Time | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | Manf/Model | Serial No. | Manf/Model | SN/Exp. Date | | | | | | |
| pH 4.00 | YSI | | | | 4.00 @ 25C | | | | | |
| pH 7.00 | | | | | 7.00 @ 25C | | | | | |
| pH 10.00 | | | - | - | 10.00 @ 25C | NA | NA | NA | NA | 2 point Calibration |
| Specific Cond. | | | | | ______uS/cm @ 25C | | | | | |
| Cond. (check only) | | | | | | | | | | |
| ORP | | | - | - | _____mV @ _____C | | | | | |
| DO | | | H2O Saturated Air | | 100% @ _____C | | | | | BP = |
| DO | | | H2O Saturated Air | | _____mg/L @ ____C<br>for BP ____ mmHg | | | | | Diff = |
| Temperature (check only) | | | | | N/A | | | ---------- | | |
| Turbidity | LaMotte 2020 | | | | 0.00 NTU | N/A | | | | |
| | | | | | 1 NTU | N/A | | | | |
| OVM/PID | | | | | | N/A | | | | |

| CALIBRATION REQUIREMENTS | | | | |
|---|---|---|---|---|
| Parameter | Units | Standard | Reqmnt. | Action |
| DO | mg/L | O2 Soluability | ±0.2 | change DO membrane |
| DO | mg/L | 0 | ≤0.50 | change DO membrane |
| pH | S.U. | 7 | ±0.05 | recalibrate |
| ORP | mV | ORP solution | ±10.0 | recalibrate |
| Sp. Cond. | us/$^{c}$cm | specific standard | ±5% | recalibrate |

# Hyde Park DTW & 4-gas/PID meter readings

Date: __/__/__

Personnel:

| Well ID | Time | DTW (ft btpvc) | CO (ppm) IN OUT | H2S (ppm) IN OUT | Oxygen (%) IN OUT | LEL (%) IN OUT | VOCs (ppb) |
|---|---|---|---|---|---|---|---|
| INJ-1 | | | | | | | |
| INJ-2 | | | | | | | |
| INJ-3 | | | | | | | |
| INJ-4 | | | | | | | |
| INJ-5L | | | | | | | |
| INJ-5U | | | | | | | |
| INJ-6L | | | | | | | |
| INJ-6U | | | | | | | |
| INJ-07 | | | | | | | |
| INJ-08 | | | | | | | |
| INJ-09 | | | | | | | |
| INJ-10 | | | | | | | |
| MW-1A | | | | | | | |
| MW-1B | | | | | | | |
| MW-2A | | | | | | | |
| MW-2B | | | | | | | |
| MW-3A | | | | | | | |
| MW-3B | | | | | | | |
| MW-4A | | | | | | | |
| MW-4B | | | | | | | |
| MW-5A | | | | | | | |
| MW-5B | | | | | | | |
| MW-6 | | | | | | | |
| MW-7A | | | | | | | |
| MW-7B | | | | | | | |
| MW-8 | | | | | | | |

# Hyde Park DTW & 4-gas/PID meter readings

Date: __/__/__

Personnel:

| Well ID | Time | DTW (ft btpvc) | CO (ppm) | | H2S (ppm) | | Oxygen (%) | | LEL (%) | | VOCs (ppb) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | IN | OUT | IN | OUT | IN | OUT | IN | OUT | |
| MW-10A | | | | | | | | | | | |
| MW-10B | | | | | | | | | | | |
| MW-11A | | | | | | | | | | | |
| MW-11B | | | | | | | | | | | |
| MW-12B | | | | | | | | | | | |
| MW-13A | | | | | | | | | | | |
| MW-13B | | | | | | | | | | | |
| MW-14A | | | | | | | | | | | |
| MW-14B | | | | | | | | | | | |
| MW-15 | | | | | | | | | | | |
| MW-16A | | | | | | | | | | | |
| MW-16B | | | | | | | | | | | |
| MW-17A | | | | | | | | | | | |
| MW-17B | | | | | | | | | | | |
| MW-18A | | | | | | | | | | | |
| MW-18B | | | | | | | | | | | |
| MW-19A | | | | | | | | | | | |
| MW-19B | | | | | | | | | | | |
| PMW-1 | | | | | | | | | | | |
| PMW-2 | | | | | | | | | | | |
| PMW-3 | | | | | | | | | | | |
| PMW-4 | | | | | | | | | | | |
| PMW-5 | | | | | | | | | | | |
| PMW-6 | | | | | | | | | | | |
| PMW-7 | | | | | | | | | | | |
| PMW-8 | | | | | | | | | | | |
| PMW-9 | | | | | | | | | | | |

*MW-15B sampled every 5 yrs.

# Appendix C

# Field Analysis Instruction Manuals

# Iron, Ferrous

DOC316.53.01049

## 1,10-Phenanthroline Method[1]

## Method 8146

## 0.02 to 3.00 mg/L $Fe^{2+}$

## Powder Pillows

**Scope and application:** For water, wastewater, seawater, brine solutions, produced waters and hydraulic fracturing waters.

[1] Adapted from Standard Methods for the Examination of Water and Wastewater, 15th ed. 201 (1980).

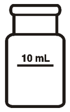
## Test preparation

### Instrument-specific information

Table 1 shows all of the instruments that have the program for this test. The table also shows sample cell and orientation requirements for reagent addition tests, such as powder pillow or bulk reagent tests.

To use the table, select an instrument, then read across to find the applicable information for this test.

**Table 1 Instrument-specific information**

| Instrument | Sample cell orientation | Sample cell |
|---|---|---|
| DR6000<br>DR3800<br>DR2800<br>DR2700<br>DR1900 | The fill line is to the right. | 2495402<br> |
| DR5000<br>DR3900 | The fill line is toward the user. | |
| DR900 | The orientation mark is toward the user. | 2401906<br> |

### Before starting

| |
|---|
| Samples must be analyzed immediately after collection and cannot be preserved for later analysis. |
| Install the instrument cap on the DR900 cell holder before ZERO or READ is pushed. |
| For the best results, measure the reagent blank value for each new lot of reagent. Replace the sample with deionized water in the test procedure to determine the reagent blank value. Subtract the reagent blank value from the sample results automatically with the reagent blank adjust option. |
| Review the Safety Data Sheets (MSDS/SDS) for the chemicals that are used. Use the recommended personal protective equipment. |
| Dispose of reacted solutions according to local, state and federal regulations. Refer to the Safety Data Sheets for disposal information for unused reagents. Refer to the environmental, health and safety staff for your facility and/or local regulatory agencies for further disposal information. |

## Items to collect

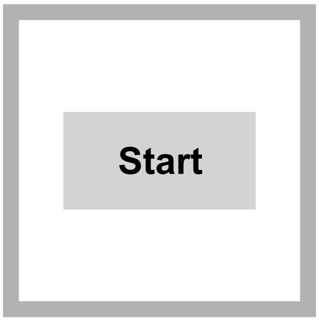
| Description | Quantity |
|---|---|
| Ferrous Iron Reagent Powder Pillows, 25 mL | 1 |
| Sample cells. (For information about sample cells, adapters or light shields, refer to Instrument-specific information on page 1.) | 2 |

Refer to Consumables and replacement items on page 4 for order information.

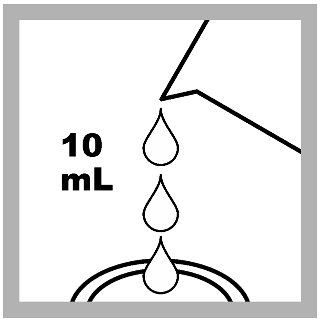
## Sample collection

- Analyze the samples immediately. The samples cannot be preserved for later analysis.
- Collect samples in clean glass or plastic bottles with tight-fitting caps. Completely fill the bottle and immediately tighten the cap.
- Prevent agitation of the sample and exposure to air.

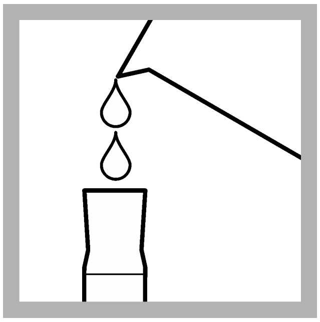
## Test procedure



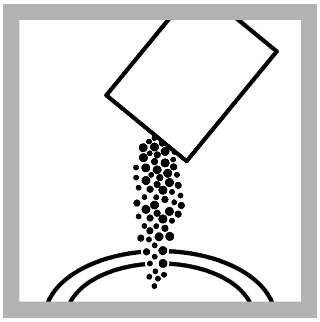
**1.** Start program **255 Iron, Ferrous**. For information about sample cells, adapters or light shields, refer to Instrument-specific information on page 1.



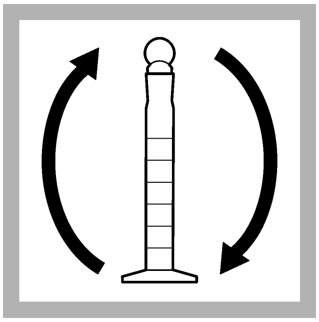
**2. Prepare the blank:** Fill the sample cell with 10 mL of sample.



**3. Prepare the sample:** Fill a mixing cylinder to the 25-mL line with sample.

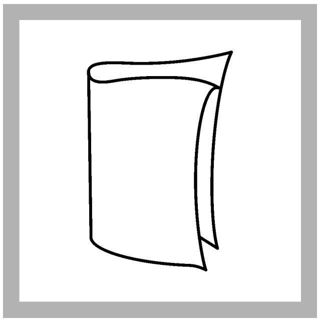


**4.** Add the contents of one Ferrous Iron Reagent Powder Pillow to the mixing cylinder.
An orange color shows if ferrous iron is present in the sample.

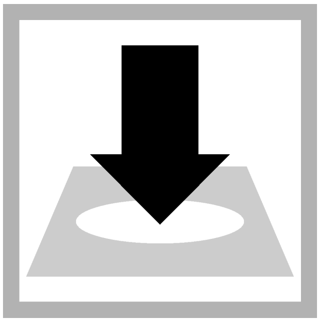


**5.** Put the stopper on the mixing cylinder. Invert the mixing cylinder several times to mix.
Undissolved powder does not affect accuracy.

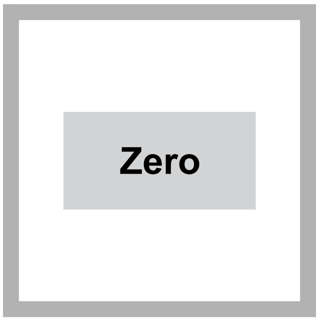
**6.** Start the instrument timer. A 3-minute reaction time starts.



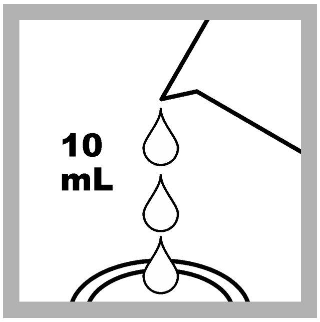
**7.** When the timer expires, clean the blank sample cell.



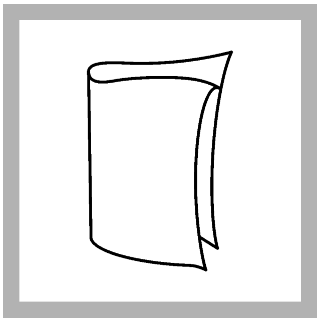
**8.** Insert the blank into the cell holder.



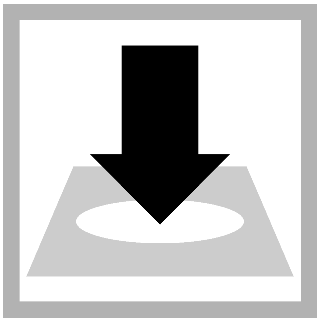
**9.** Push **ZERO**. The display shows 0.00 mg/L $Fe^{2+}$.



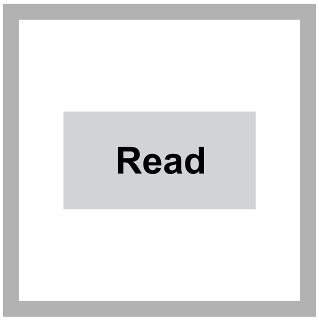
**10.** Fill a second sample cell with 10 mL of the reacted prepared sample.



**11.** Clean the prepared sample cell.



**12.** Insert the prepared sample into the cell holder.



**13.** Push **READ**. Results show in mg/L $Fe^{2+}$.

## Accuracy check

### Standard solution method

Use the standard solution method to validate the test procedure, the reagents and the instrument.

Items to collect:

- Ferrous Ammonium Sulfate, hexahydrate
- 1-L volumetric flask, Class A
- 100-mL volumetric flask, Class A
- 2-mL volumetric pipet, Class A and pipet filler
- Deionized water

1. Prepare a 100-mg/L $Fe^{2+}$ ferrous iron stock solution as follows:
    - **a.** Add 0.7022 g of ferrous ammonium sulfate, hexahydrate into a 1-L volumetric flask.
    - **b.** Dilute to the mark with deionized water. Mix well.
2. Prepare a 2-mg/L ferrous iron standard solution as follows:
    - **a.** Use a pipet to add 2.00 mL of the 100-mg/L $Fe^{2+}$ ferrous iron stock solution into a 100-mL volumetric flask.
    - **b.** Dilute to the mark with deionized water. Mix well. Prepare the standard solution immediately before use.
3. Use the test procedure to measure the concentration of the prepared standard solution.
4. Compare the expected result to the actual result.

    ***Note:*** *The factory calibration can be adjusted slightly with the standard calibration adjust option so that the instrument shows the expected value of the standard solution. The adjusted calibration is then used for all test results. This adjustment can increase the test accuracy when there are small variations in the reagents or instruments.*

## Method performance

The method performance data that follows was derived from laboratory tests that were measured on a spectrophotometer during ideal test conditions. Users can get different results under different test conditions.

| Program | Standard | Precision (95% confidence interval) | Sensitivity Concentration change per 0.010 Abs change |
|---|---|---|---|
| 255 | 2.00 mg/L $Fe^{2+}$ | 1.99–2.01 mg/L $Fe^{2+}$ | 0.021 mg/L $Fe^{2+}$ |

## Summary of method

The 1,10-phenanthroline indicator in the Ferrous Iron Reagent reacts with ferrous iron ($Fe^{2+}$) in the sample to form an orange color in proportion to the iron concentration. Ferric iron ($Fe^{3+}$) does not react. The ferric iron concentration can be determined by subtracting the ferrous iron concentration from the results of a total iron test. The measurement wavelength is 510 nm for spectrophotometers or 520 nm for colorimeters.

## Consumables and replacement items

### Required reagents

| Description | Quantity/test | Unit | Item no. |
|---|---|---|---|
| Ferrous Iron Reagent Powder Pillow, 25 mL | 1 | 100/pkg | 103769 |

### Recommended standards and apparatus

| Description | Unit | Item no. |
|---|---|---|
| Balance, analytical, 80 g x 0.1 mg 100–240 VAC | each | 2936701 |
| Ferrous Ammonium Sulfate, hexahydrate, ACS | 113 g | 1125614 |
| Flask, volumetric, Class A, 1000 mL glass | each | 1457453 |
| Pipet filler, safety bulb | each | 1465100 |
| Pipet, volumetric, Class A, 1.00 mL | each | 1451535 |
| Water, deionized | 4 L | 27256 |
| Wipes, disposable | 280/pkg | 2097000 |

08/2019, Edition 11

# Alkalinity Test Kit

## AL-AP MG/L (2444301)

DOC326.97.00105

## Test preparation

***CAUTION:*** ⚠ ***Review the Safety Data Sheets (MSDS/SDS) for the chemicals that are used. Use the recommended personal protective equipment.***

- Hold the dropper vertically above the sample. Do not let the dropper touch the bottle during the titration.
- Rinse the tubes and bottles with sample before the test. Rinse the tubes and bottles with deionized water after the test.
- Alkalinity is the capacity of water to neutralize acids. Carbonates, bicarbonates and hydroxides are the primary sources of alkalinity in water. A high total alkalinity value makes water more resistant to pH changes.
- To verify the test accuracy, use a standard solution as the sample.
- To record the test result as gpg (grains per gallon), multiply the LR test result by 0.3 and the HR test result by 1.2

## Replacement items

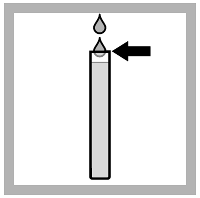
***NOTE: Product and Article numbers may vary for some selling regions. Contact the appropriate distributor or refer to the company website for contact information.***

| Description | Unit | Item no. |
|---|---|---|
| Alkalinity Reagent Set, drop count titration, 0–400 mg/L as $CaCO_3$ (Includes: one each 94299, 94399, 2349732) | 100 tests | 2437401 |
| Bromcresol Green-Methyl Red Indicator Powder Pillows | 100/pkg | 94399 |
| Phenolphthalein Indicator Powder Pillows | 100/pkg | 94299 |
| Sulfuric acid standard solution, 0.035 N | 100 mL MDB | 2349732 |
| Bottle, square, 29 mL, with 10, 15, 20 and 23-mL marks | 6/pkg | 232706 |
| Measuring tube, plastic, 5.83 mL | each | 43800 |

## Optional items

| Description | Unit | Item no. |
|---|---|---|
| Alkalinity standard solution, 500 mg/L as $CaCO_3$ | 1 L | 2826253 |
| Water, deionized | 500 mL | 27249 |

## Test procedure—Alkalinity (0–400 mg/L $CaCO_3$)

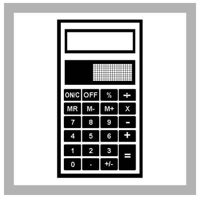


**1.** Fill the measuring tube with sample.

**2.** Pour the sample into the mixing bottle.

**3.** Add one Phenolphthalein Indicator Powder Pillow. Swirl to mix.
If the solution is colorless, the Phenolphthalein (P) alkalinity is zero. Go to step 6.

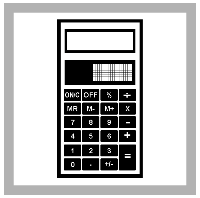
**4.** Add the 0.035 N Sulfuric Acid Standard Solution by drops. Mix after each drop. Count the drops until the color changes from pink to colorless.



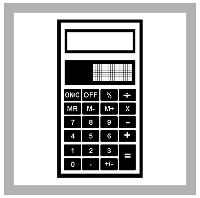
**5.** Multiply the number of drops by 20 to get the phenolphthalein alkalinity result as $CaCO_3$.

**6.** Add one Bromcresol Green-Methyl Red Powder Pillow. Swirl to mix.

**7.** Add the 0.035 N Sulfuric Acid Standard Solution by drops. Mix after each drop. Count the drops until the color changes from green to pink.

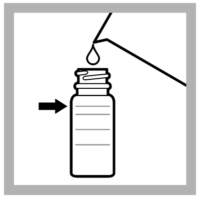


**8.** Calculate the total number of drops from step 4 and step 7.



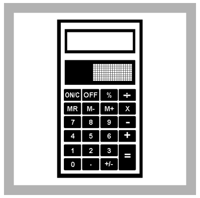
**9.** Multiply the total number of drops by 20 to get the total (methyl orange) alkalinity result as $CaCO_3$.

## Test procedure—Alkalinity (0–100 mg/L $CaCO_3$)


**1.** Fill the bottle to the 23-mL mark with sample.

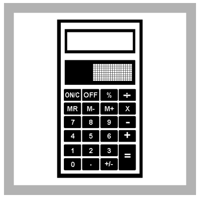

**2.** Add one Phenolphthalein Indicator Powder Pillow. Swirl to mix.
If the solution is colorless, the Phenolphthalein (P) alkalinity is zero. Go to step 5.

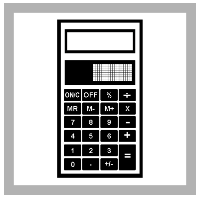

**3.** Add the 0.035 N Sulfuric Acid Standard Solution by drops. Mix after each drop. Count the drops until the color changes from pink to colorless.


**4.** Multiply the number of drops by 5 to get the phenolphthalein alkalinity result as $CaCO_3$.


**5.** Add one Bromcresol Green-Methyl Red Powder Pillow. Swirl to mix.


**6.** Add the 0.035 N Sulfuric Acid Standard Solution by drops. Mix after each drop. Count the drops until the color changes from green to pink.


**7.** Calculate the total number of drops from step 3 and step 6.


**8.** Multiply the total number of drops by 5 to get the total (methyl orange) alkalinity result as $CaCO_3$.

02/2019, Edition 1

# Alkalinity Test Kit

## AL-TA (2314500)

DOC326.97.00107

## Test preparation

***CAUTION:*** ⚠ ***Review the Safety Data Sheets (MSDS/SDS) for the chemicals that are used. Use the recommended personal protective equipment.***

- Hold the dropper vertically above the sample. Do not let the dropper touch the bottle during the titration.
- Rinse the tubes and bottles with sample before the test. Rinse the tubes and bottles with deionized water after the test.
- Alkalinity is the capacity of water to neutralize acids. Carbonates, bicarbonates and hydroxides are the primary sources of alkalinity in water. A high total alkalinity value makes water more resistant to pH changes.

## Alkalinity concentration in gpg and mg/L

Find in Table 1 the total number of drops used in the test procedure, then read across to find the concentration in gpg (grains per gallon) and mg/L. As an alternative, multiply the total number of drops by 22.5 for gpg or by 385 for mg/L. For proprietary solutions, multiply the number of drops by the factor supplied by the vendor.

**Table 1 Alkalinity concentration in gpg and mg/L**

| Number of drops | Total Alkalinity as $CaCO_3$ (gpg) | Total Alkalinity as $CaCO_3$ (mg/L) |
|---|---|---|
| 1 | 23 | 385 |
| 2 | 45 | 770 |
| 3 | 68 | 1155 |
| 4 | 90 | 1540 |
| 5 | 113 | 1925 |
| 6 | 135 | 2310 |
| 7 | 158 | 2695 |
| 8 | 180 | 3080 |
| 9 | 203 | 3465 |
| 10 | 225 | 3850 |
| 11 | 250 | 4235 |
| 12 | 270 | 4620 |
| 13 | 293 | 5005 |
| 14 | 315 | 5390 |
| 15 | 338 | 5775 |
| 16 | 360 | 6160 |
| 17 | 383 | 6545 |
| 18 | 405 | 6930 |
| 19 | 428 | 7315 |
| 20 | 450 | 7700 |
| 21 | 473 | 8085 |
| 22 | 495 | 8470 |

## Replacement items

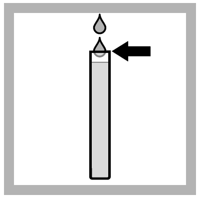
***NOTE: Product and Article numbers may vary for some selling regions. Contact the appropriate distributor or refer to the company website for contact information.***

| Description | Unit | Item no. |
|---|---|---|
| Bromcresol Green-Methyl Red Indicator Powder Pillows | 100/pkg | 94399 |
| Sulfuric Acid Standard Solution, 0.500 N | 100 mL MDB | 212132 |
| Bottle, square, 29 mL, with 10, 15, 20 and 23-mL marks | 6/pkg | 232706 |
| Measuring tube, plastic, 5.83 mL | each | 43800 |

## Optional items

| Description | Unit | Item no. |
|---|---|---|
| Water, deionized | 500 mL | 27249 |

## Test procedure—Alkalinity, Total (0–495 gpg, 0–8470 mg/L as $CaCO_3$)

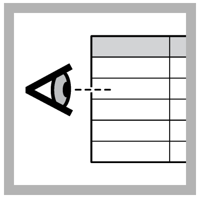


**1.** Fill the measuring tube with sample.

**2.** Pour the sample into the mixing bottle.

**3.** Add one Bromcresol Green-Methyl Red Powder Pillow. Swirl to mix.

**4.** Add the Sulfuric Acid Standard Solution by drops. Mix after each drop. Count the drops until the color changes from green to pink.



**5.** Refer to Table 1 on page 1 to get the total (methyl orange) alkalinity result.

02/2019, Edition 1

# Carbon Dioxide Test Kit

## 1.25 to 25 mg/L, 2 to 40 mg/L, 5 to 100 mg/L $CO_2$

## For test kit 143601 (CA-23)

DOC326.98.00004

**Additional copies available on www.hach.com**

### Test preparation

- Rinse labware with deionized water between tests.
- When titrating, count each drop of titrant. Hold the dropper vertically. Swirl after each drop is added.

***CAUTION: Handle chemical standards and reagents carefully. Review Material Safety Data Sheets for safe handling, storage and disposal information.***

### Required items

| Description | Unit | Catalog no. |
|---|---|---|
| Measuring Tube | each | 43800 |
| Mixing Bottle | 6/pkg | 232706 |
| Phenolphthalein Indicator Solution | 15 mL (½ oz) SCDB[1] | 189736 |
| Sodium Hydroxide Solution, 0.01 N | 100 mL MDB[2] | 67132 |

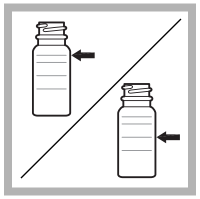
[1] Self-contained dropping bottle

[2] Marked dropping bottle

### Optional items

| Description | Unit | Catalog no. |
|---|---|---|
| Deionized Water | 500 mL | 27249 |

### Low range (1.25 to 25 mg/L) and medium range (2 to 40 mg/L) test procedure

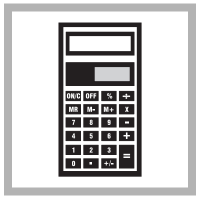


**1. Low Range**: Fill the bottle to the 23-mL mark with sample.

**Medium Range**: Fill the bottle to the 15-mL mark with sample.

**2.** Add one drop of Phenolphthalein Indicator Solution.

**3.** Add Sodium Hydroxide Solution by drops. Count the drops until the color changes to light pink and persists for 30 seconds. Swirl to mix after each drop.



**4. Low Range**: Calculate the result. Each drop of Sodium Hydroxide Solution used in step 3 equals 1.25 mg/L carbon dioxide ($CO_2$).

**Medium Range**: Calculate the result. Each drop of Sodium Hydroxide Solution used in step 3 equals 2 mg/L carbon dioxide ($CO_2$).

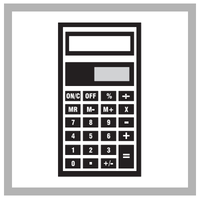
### High range (5 to 100 mg/L) test procedure

**1.** Fill the plastic tube to the top with sample.

Pour the sample into the bottle.

**2.** Add one drop of Phenolphthalein Indicator Solution.

**3.** Add Sodium Hydroxide Solution by drops. Count the drops until the color changes to light pink and persists for 30 seconds. Swirl to mix after each drop.



**4.** Calculate the result. Each drop of Sodium Hydroxide Solution used in step 3 equals 5 mg/L carbon dioxide ($CO_2$).

Edition 1, August 2006

# 二氧化碳测试工具包

**1.25 至 25 mg/L， 2 至 40 mg/L， 5 至 100 mg/L $CO_2$**

**适用于测试工具包 143601 (CA-23)** DOC326.98.00004

**www.hach.com 上提供的其他副本**

## 测试准备

- 在进行新的测试之前使用去离子水清洗实验室器具。
- 滴定时，对每一滴滴定剂都要计数。垂直握住滴管。每加一滴都要摇匀。

***警告：处理化学标准溶液和试剂时要小心。有关安全处理、存储和处置的信息，请查阅材料安全数据表。***

## 必需项目

| 说明 | 单位 | 货号 |
|---|---|---|
| 量筒 | 个 | 43800 |
| 混合瓶 | 6/pkg | 232706 |
| 酚酞指示剂溶液 | 15 mL (½ oz) SCDB[1] | 189736 |
| 0.01 N 的氢氧化钠溶液 | 100 mL MDB[2] | 67132 |

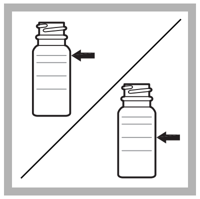
[1] 独立点滴瓶

[2] 有标记的点滴瓶

## 可选项目

| 说明 | 单位 | 货号 |
|---|---|---|
| 去离子水 | 500 mL | 27249 |

## 低量程 （1.25 至 25 mg/L）和中量程 （2 至 40 mg/L）测试步骤



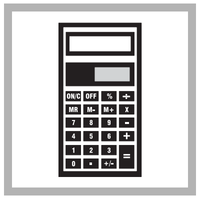
**1. 低量程：**将取样倒入瓶中至 23-mL 标记处。

**中量程：**

将取样倒入瓶中至
15-mL 标记处。

**2.** 加入一滴酚酞指示剂溶液。

**3.** 逐滴滴加氢氧化钠溶液。数一下颜色变为淡粉色并持续 30 秒时滴入的滴数。每加一滴都要摇匀。



**4. 低量程：**计算结果。在步骤 3 中使用的每一滴氢氧化钠溶液相当于 1.25 mg/L 的二氧化碳 ($CO_2$)。

**中量程：**计算结果。在步骤 3 中使用的每一滴氢氧化钠溶液相当于 2 mg/L 的二氧化碳 ($CO_2$)。

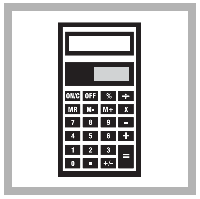
## 高量程 （5 至 100 mg/L）测试步骤

**1.** 将取样加入塑料试管中至顶部。

将取样倒入瓶中。

**2.** 加入一滴酚酞指示剂溶液。

**3.** 逐滴滴加氢氧化钠溶液。数一下颜色变为淡粉色并持续 30 秒时滴入的滴数。每加一滴都要摇匀。



**4.**计算结果。在步骤 3 中使用的每一滴氢氧化钠溶液相当于 5 mg/L 二氧化碳 ($CO_2$)。

若要获取技术帮助或订购信息，请访问 www.hach.com，致电 800-227-4224 或发送电子邮件至 techhelp@hach.com

2006 年 8 月第 1 版

# Hydrogen Sulfide Test

**0 to 5 mg/L $H_2S$**

**For test kit 2537800 (Model HS-C)** DOC326.98.00022

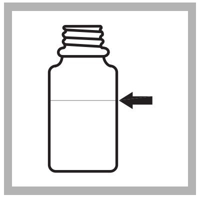
**Additional copies available on www.hach.com**

## Test preparation

- Rinse bottle with the sample water before testing. Rinse bottle with deionized water after testing.
- Wash all labware between tests. Contamination may alter test results. Clean with a non-abrasive detergent or a solvent such as isopropyl alcohol. Rinse with deionized water. Wipe and dry with a soft cloth.
- **Perform this test immediately after sampling.** Water that is aerated or allowed to stand will lose most of the hydrogen sulfide through aeration and oxidation.
- Test paper circles should be pale blue. Slight variations in the color of the test paper will not affect test results.
- Use only Alka-Seltzer tablets that do not contain aspirin. All other formulations of Alka-Seltzer will generate excess pressure and cause inaccurate test results.

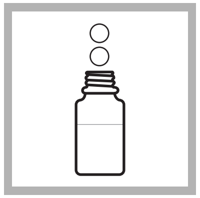
***CAUTION: Handle chemical standards and reagents carefully. Review Material Safety Data Sheets for safe handling, storage and disposal information.***

## Test procedure



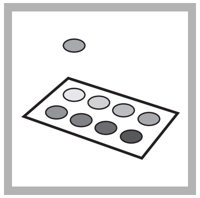
**1.** Fill the bottle to the 100-mL mark with sample.

**2.** Put a circle of Hydrogen Sulfide Test Paper inside the sample bottle cap. Do not get the paper wet.



**3.** Add two Alka-Seltzer tablets to the sample bottle. Cap the bottle immediately.

**4.** Wait two minutes for the tablets to dissolve and the effervescence to subside.



**5.** Remove the test paper from the cap. Compare the color of the test paper to the color on the color chart.

## Replacement items

| Description | Unit | Catalog no. |
|---|---|---|
| Alka-Seltzer® Tablets, without aspirin[1] | 36 | 1453300 |
| Hydrogen Sulfide Bottle, with cap | each | 2532800 |
| Hydrogen Sulfide Test Chart | each | 2537900 |
| Hydrogen Sulfide Test Papers | 100/pkg | 2537733 |

[1] Alka-Seltzer is a registered trademark of Miles Laboratories, Inc.

## Optional items

| Description | Unit | Catalog no. |
|---|---|---|
| Deionized Water | 500 mL | 27249 |

# APPENDIX J

# QUALITY ASSURANCE PROJECT PLAN

AECOM

# QUALITY ASSURANCE PROJECT PLAN (QAPP)

## Site Management
## Former Carborundum Company,
## Hyde Park Facility
## Town of Niagara, Niagara County, NY
## NYSDEC Site No. 932036

***Prepared for:***

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**March 2022**

AECOM

# QUALITY ASSURANCE PROJECT PLAN (QAPP)

## Site Management
## Former Carborundum Company,
## Hyde Park Facility
## Town of Niagara, Niagara County, NY
## NYSDEC Site No. 932036

**March 2022**

# Contents

# List of Tables

# List of Attachments

# 1.0 INTRODUCTION

## 1.1 PURPOSE AND OBJECTIVE

The purpose of this Quality Assurance Project Plan (QAPP) is to document site management activities and establish the criteria for performing these activities at a predetermined quantity for the work conducted by AECOM for the Hyde Park site (No. 932036) located in the Town of Niagara, New York.

## 1.2 PROJECT MANAGEMENT AND ORGANIZATION

### 1.2.1 Personnel

The general responsibilities of key AECOM project personnel are listed below.

Operations Manager – Dave Espy, BP IPO Program Lead, will have responsibility for overall program management.

Task Manager – James Kaczor, PG, of AECOM's Buffalo, NY office, will have responsibility for overall project management and coordination with the client and NYSDEC, and will coordinate the initiation and implementation of the Site activities as well as coordinate subcontractors

Field Team Leader – Emily Au, of AECOM's Buffalo, NY office, will be responsible for coordinating field activities including soil boring and monitoring well installations, monitoring well sampling, soil sampling, and any aquifer properties or soil vapor testing.

Quality Assurance Officer – George Kisluk, of AECOM's Buffalo, NY office, will serve as the Project Quality Assurance Officer (QAO) for this project. The QAO will be responsible for oversight of the data validation and laboratory subcontractors, as well as data usability reports. The QAO will work with the database manager to assure that electronic deliverables provided by the laboratory are accurate and are formatted consistent with AECOM and NYSDEC submittal requirements.

Health & Safety (H&S) Officer – Timothy Gilles, BP IPO Program Safety, Health and Environment Manager will be responsible for oversight of the preparation of the project Health and Safety plan (HASP), approving it, and tracking of its implementation.

Database Manager – Max Reis, of AECOM's Buffalo, NY office, will serve as database manager. The database manager is responsible for verifying that laboratory deliverables meet AECOM and NYSDEC electronic deliverable specifications, and for preparing the final EQuIS deliverable for submission to NYSDEC.

Data Validation – Ann Marie Kropovitch, of AECOM's Buffalo, NY office, a certified validator, will be assigned for data quality review and data usability summary report (DUSR).

### 1.2.2 Specific Tasks and Services

AECOM will obtain the following subcontractor specialists for services relating to laboratory analytical services:

**Laboratory Analysis** – Eurofins TestAmerica Laboratories, Inc. (Eurofins TestAmerica), Amherst, New York laboratory has been assigned for the project. Eurofins TestAmerica is certified by the New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) for aqueous and non-aqueous matrices. Eurofins TestAmerica may subcontract some analyses to other Eurofins facilities that have the appropriate parameter certification.

## 1.3 SITE DESCRIPTION AND LOCATION

Detailed background data on the site, including the site description and location, site history, previous investigations, and current conditions, are summarized in the in the site-specific Site Management Plan.

The Site property is a 5-acre inactive, vacated manufacturing plant located in the Town of Niagara at the intersection of Hyde Park Boulevard and Rhode Island Street. The Carborundum Company purchased the property from the Globar Company in 1936. BP America subsequently purchased the Carborundum Company. The Globar facility was subsequently sold in 1993 to CESIWID, Inc. and CESIWID, Inc. sold the facility to Kanthal-Globar. Kanthal-Globar then sold the property in 2008 to 3425 Hyde Park Boulevard, LLC, the current owner; however, BP America retained the responsibility for certain pre-existing conditions when they sold the facility to CESIWID, Inc.

In 1985, the Carborundum Company collected samples to assess soil and groundwater contamination. In 1987, the United States Environmental Protection Agency completed a preliminary assessment and referred the Site to the State of New York. In 1990, NYSDEC completed a Preliminary Site Assessment (PSA). As a result of the completed investigations, the Site remained on the Registry as a Class 2a site. Subsequently, the Carborundum Company completed a PSA in 1993, which found contamination (hazardous waste) in Site soils and groundwater resulting from past spills and leaks from bulk chemical storage. As a result, the Site was upgraded to a Class 2 Registry site. Since 1993, a series of investigations were completed to define the extent of soil and groundwater contamination.

This contamination is being addressed under the direction of NYSDEC under the 1995 Order on Consent and associated modifications. The Order on Consent required a Remedial Investigation/Feasibility Study (RI/FS). The RI Report was issued in January 1997. A supplemental investigation was completed, and the Phase II RI Report was issued in May 1998. The results of these investigations lead to a soil removal interim remedial measure (IRM), which was completed in 1999, to remove on-site soils with residual volatile organic compounds (VOCs).

The FS was completed in January 2000. Later in 2000, the NYSDEC issued a Record of Decision (ROD) which segmented the Site into three Operable Units (OUs):

- OU1 – On-site soil,
- OU2 – Groundwater beneath the Site, and
- OU3 – Off-site soil east of the Site.

Following the issuance of the ROD for OU1 & OU2, additional soil investigation and removal was conducted east of the property boundaries in 2002. The ROD for OU3 was issued in August 2004. Since that time, OU1 and OU3 have been closed.

For OU2, NYSDEC selected No Further Action with groundwater monitoring. Semi-annual groundwater sampling began in 2000. In 2005, NYSDEC requested that groundwater monitoring be continued but annually on an alternating spring/fall schedule. Since this request from NYSDEC in 2005, annual groundwater monitoring has been conducted and includes the collection of groundwater samples for chemical analysis of chlorinated VOCs (CVOCs) and natural attenuation parameters. Key CVOCs present at select locations in the groundwater at the Site are trichloroethene (TCE), 1,1-dichloroethene (DCE), 1,1-dichloroethane (DCA), and vinyl chloride (VC).

As stated in the ROD, the remedial goals for the Site are dependent on natural attenuation. In 2005, after review of the first Five Year Review Report (INTERA, 2005), NYSDEC suggested that, although natural attenuation was occurring, progress towards remediation was slow. Therefore, remedial alternatives were evaluated and in the 2006 Remedial Alternatives Report (Parsons 2006) that was submitted to NYSDEC, application of enhanced in situ bioremediation was chosen as the preferred alternative for pilot testing.

A Soil Vapor Intrusion Assessment at the Site post-dated the remedial action and RODs for OU1 to OU3 and took place in 2007 (Parsons, 2007a, & 2007b). The results of the study did not indicate a potential for soil vapor intrusion from the Site to impact nearby residences, additional studies will be conducted should the building use change.

Bioremediation injections using emulsified vegetable oil (EVO) and microorganisms were completed in 2008 (overburden), 2009 (overburden and bedrock), 2011 (overburden) and 2013 (overburden and bedrock). Terra Systems, Inc. (TSI) SRS®-SD was used for all overburden injections, SRS®-FR was used for all bedrock injections, and TSI-DC® bioaugmentation culture was used for microorganism bioaugmentation. The remedial objective of enhancing the natural attenuation process in groundwater was achieved through the bioremediation/bioaugmentation injections conducted between 2008 and 2013.

In March 2013 the NYSDEC reclassified the Site from Class 2 to Class 4 on the Registry. The Class 4 classification is assigned to a site that has been properly closed but requires continued site management. Class 4 sites have not necessarily been brought into compliance with standards, criteria, or guidance (SCGs).

# 2.0 SAMPLE HANDLING

## 2.1 SAMPLE IDENTIFICATION AND LABELING

During this project, a unique sample identifier will designate each sample collected. The following system may be used to assign unique sample identification numbers; however, modifications should be made as needed to clearly and appropriate identify samples for each site or project. Each sample will be identified by an alphanumeric character identifier, as described below.

The following codes will be used for identifying other sample types:

| CODE | Sample Type |
|---|---|
| MW | Monitoring well |
| SB | Soil boring |
| IA | Indoor air |
| OA (or AA) | Outdoor (or ambient) air |
| SV | Soil vapor |
| FB | Field (Rinsate) Blank |
| DUP | Field Duplicate |
| TB | Trip Blank |
| MS/MSD | Matrix Spike/ Matrix Spike Duplicate |

Field blanks and tip blanks will be labeled for the day of collection. For MS/MSD samples, the MS/MSD will be added to the sample ID and included on the COC as a note.

An example of the sample numbering system is provided below.

| Sample Identifier | Description |
|---|---|
| MW-10A | Shallow well MW-10A |
| MW-10B | Deep monitoring well MW-10B |
| SB-02-0406 | Soil sample from 4 to 6 ft interval from boring SB-02. |
| SS-01 | Surface soil sample from location SS-01. |
| FBW110502 | Field blank associated with water samples collected on 5/2/11 |
| TB110503 | Trip blank associated with samples shipped 5/3/11. |

QC field duplicate samples will be submitted blind to the laboratory; a fictitious sample ID will be created using FD followed by the date followed by the matrix and a numerical identifier in sequence for each duplicate sample collected for that day (e.g., DUP060320 would be a groundwater field-duplicate taken on 06/03/2020). The sample identifications (of the original sample and its field duplicate) will be marked in the field book and on the copy of the chain-of-custody kept by the sampler and copied to the project manager. As the field duplicates are blind to the laboratory, the NYSDEC Valid Value for a field duplicate (FD) along with the identification of the parent sample will be done by AECOM after the EQuIS deliverable is received from the laboratory.

Affixed to each sampling container will be a non-removable label on which the following information will be recorded with permanent water-proof ink:

- Site name, location, and job number;
- Sample identifier;
- Company (AECOM)
- Date and time;
- Sampler's initials;
- Preservative;
- Type of sample (e.g., water, soil, sludge, sediment, air); and,
- Requested analyses.

## 2.2 SAMPLE BOTTLES, PRESERVATION, AND HOLDING TIME

Table 1 identifies the sample preparation and analytical method, matrix, holding time, containers, and preservatives for the typical analyses to be performed on this project. Sample bottle requirements, preservation, and holding times are discussed further below.

### 2.2.1 Sample Containers

The selection of sample containers used to collect samples is based on the criteria of sample matrix, analytical method, potential contaminants of concern, reactivity of container material with the sample, QA/QC requirements, and any regulatory protocol requirements.

Sample bottles will be provided by the analytical laboratory and will conform to the requirements of the USEPA Specifications and Guidance for Contaminant-Free Sample Containers. Aqueous samples for volatile organic compound (VOC) analysis will be collected in 40-mL vials with Teflon septa.

### 2.2.2 Sample Preservation

Samples will be preserved as summarized on Table 1.

Chemical preservatives will be added to the sample bottles (prior to sample collection) by the analytical laboratory. Sample preservation is checked upon sample receipt by the laboratory; this information is reported to the AECOM QAO. If it appears that the level of chemical preservation added is not adequate, laboratory preservative preparation and addition will be modified or additional preservative will be added in the field by the sampling team.

### 2.2.3 Holding Times

Contractual holding times (see Table 1) are calculated from the validated time of sample receipt (VTSR) by the laboratory; samples will be shipped from the field to arrive at the lab no later than 48 hours from the time of sample collection. Holding time requirements will be those specified in the NYSDEC Analytical Services Protocol (ASP) 2005 with 2008 update.

Although trip blanks are prepared in the analytical laboratory and shipped to the site prior to the collection of environmental samples, for the purposes of determining holding time conformance, trip blanks will be considered to have been generated on the same day as the environmental samples with which they are shipped and delivered. Procurement of bottles and blanks will be scheduled to prevent trip blanks from being stored for excessive periods prior to their return to the laboratory; the goal is that trip blanks should be held for no longer than one week prior to use.

## 2.3 CHAIN OF CUSTODY AND SHIPPING

A chain-of-custody (COC) form will trace the path of sample containers from the project site to the laboratory. COC forms are typically provided by the analytical laboratory.

Sample bottle tracking sheets or the COC will be used to track the containers from the laboratory to the containers' destination. The Project Manager will notify the laboratory of upcoming field sampling events and the subsequent transfer of samples. This notification will include information concerning the number and type of samples, and the anticipated date of arrival. Insulated sample shipping containers (typically coolers) will be provided by the laboratory for shipping samples. Sample bottles within each shipping container will be individually labeled with an adhesive identification label provided by the laboratory. Project personnel receiving the sample containers from the laboratory will check each cooler for the condition and integrity of the bottles prior to field work.

Once the sample containers are filled, they will be immediately placed in the cooler with ice (in Ziploc plastic bags to prevent leaking) or synthetic ice packs to maintain the samples at 4º C. The field sampler will indicate the sample designation/location number in the space provided on the chain-of-custody form for each sample. The chain of custody forms will be signed and placed in a sealed plastic Ziploc bag in the cooler. The completed shipping container will be closed for transport with nylon strapping, or a similar shipping tape, and two paper seals will be affixed to the lid. The seals must be broken to open the cooler and will indicate tampering if the seals are broken before receipt at the laboratory. A label may be affixed identifying the cooler as containing “Environmental Samples” and the cooler will be shipped by an overnight delivery service to the laboratory. When the laboratory receives the coolers, the custody seals will be checked and lab personnel will sign the chain-of-custody form.

## 2.4 LABORATORY SAMPLE RECEIPT

Upon receipt at the laboratory, a laboratory representative inspects the samples for integrity and checks the shipment against the chain-of-custody/analytical task order form. Discrepancies are addressed at this point and documented on the chain-of-custody form and the cooler checklist. Discrepancies are reported to the Laboratory Project Manager who contacts the AECOM Project Manager or QAO for resolution.

When the shipment and the chain-of-custody are in agreement, the custodian enters the samples into the Laboratory Information Management System and assigns each sample a unique laboratory number. This number is affixed to each sample bottle. The custodian then enters the sample and analysis information into the laboratory computer system.

### 2.4.1 Laboratory Sample Custody

The laboratory must satisfy the sample chain-of-custody requirements by implementing the following procedures for laboratory/sample security:

- Samples are stored in a secure area;
- Access to the laboratory is through a monitored area;
- Visitors sign a visitor's log and are escorted while in the laboratory;
- Only the designated sample custodians have keys to sample storage area(s); and
- Transfers of samples in and out of storage are documented.

### 2.4.2 Sample Storage, Security, and Disposal

While in the laboratory, the samples and aliquots that require storage at 4° C ± 2°C are maintained in a locked refrigerator unless they are being used for analysis. The laboratory is responsible for sample storage and security so that:

- Samples and extracts are stored for 60 days after the final analytical data report has been submitted to AECOM. The samples, extracts, and digestates are then disposed by the laboratory in accordance with laboratory SOPs and applicable regulations.
- Samples are not stored with standards or sample extracts.

# 3.0 DATA QUALITY REQUIREMENTS

## 3.1 ANALYTICAL METHODS

Soil and water sample analyses will utilize USEPA SW-846 methods as listed below.

Analytical and extraction/sample preparation methods typically used are shown on Table 1 and summarized below.

- Chlorinated VOCs – SW-846 Method 5030C/8260C
- Dissolve Iron – SW-846 Method 3005A/6010C
- Methane, Ethane, Ethane – RSK SOP-175 MOD
- BOD5 – SM 5210B
- COD – MCAWW 410.4
- TOC – SM 52310C
- Sulfide – SM 4500 S2F
- Chloride, Sulfate, Nitrate, and Nitrite - MCAWW 300.0
- Nitrate-Nitrite - MCAWW 353.2

Analytical methods are presented in the following documents:

> SW-846: Test Methods for Evaluating Solid Waste, Physical/Chemical Methods. USEPA SW-846. Complete through Update IV, March 2009.
>
> RSK: Sample Prep And Calculations For Dissolved Gas Analysis In Water Samples Using A GC Headspace Equilibration Technique, RSKSOP-175
>
> SM: ‘Standard Methods For The Examination Of Water And Wastewater”
>
> MCAWW: "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

AECOM has selected Eurofins TestAmerica to provide laboratory analytical services for this project. The proposed laboratory is certified by the NYSDOH Environmental Laboratory Approval Program. The laboratory is in good standing for the applicable parameter groups.

## 3.2 QUALITY ASSURANCE OBJECTIVES

Data quality objectives (DQO) for measurement data in terms of sensitivity and the PARCC parameters (precision, accuracy, representativeness, comparability, and completeness) are established so that the data collected are sufficient and of adequate quality for their intended uses. Data collected and analyzed in conformance with the DQO process described in this QAPP will be used in assessing the uncertainty associated with decisions related to this site.

### 3.2.1 Sensitivity

The sensitivity or detection limit desired for each analysis or compound is based on the DQOs established for the project. The method detection limit is determined in accordance with the procedure in ASP Exhibit A, section 4.9.2.12, which is consistent with the procedure in 40 CFR Part 136 Appendix B.

The reporting limit (RL) for non-detected analytes will be the lowest calibration standard associated with the analysis. Reporting limits will be equal to or lower than those presented in Exhibit C of ASP 2005 for the applicable method. Analytes detected at concentrations below the RL but above the MDL will be flagged "J" (estimated) by the laboratory. Typical RLs are summarized on Table 2.

The reporting limits and MDLs of the assigned laboratory will be reviewed by AECOM's QAO for each project to verify that the laboratory sensitivity is sufficient to meet the project objectives. These will typically include meeting the applicable standards, criteria, and guidance (SCGs) including groundwater and surface water criteria (compiled in TOGS 1.1.1), and indoor air screening levels (NYSDOH, 2006, 2007).

### 3.2.2 Precision

The laboratory objective for precision is to equal or exceed the precision demonstrated for the applied analytical methods on similar samples. Precision is evaluated by the analyses of laboratory and field duplicates. Matrix spike duplicate analyses will be performed once for every 20 samples for VOCs.

Relative Percent Difference (RPD) criteria determined from laboratory performance data are used to evaluate precision between duplicates. A matrix spike duplicate will be performed once for every twenty samples for volatile organics.

Precision measures the reproducibility of measurements under a given set of conditions. Specifically, it is a quantitative measure of the variability of a group of measurements compared to their average value. Precision is usually stated in terms of standard deviation but other estimates such as the coefficient of variation, relative standard deviation, range (maximum value minus minimum value), and relative range are common, and may be used pending review of the data.

The overall precision of measurement data is a mixture of sampling and analytical factors. Analytical precision is easier to control and quantify than sampling precision; there are more historical data related to individual method performance and the "universe" is not limited to the samples received in the laboratory. In contrast, sampling precision is unique to each site or project.

Overall system (sampling plus analytical) precision will be determined by analysis of field duplicate samples. Analytical results from laboratory duplicate samples will provide data on measurement (analytical) precision.

Precision will be determined from field duplicates, as well as laboratory matrix duplicate samples for metals analyses, and matrix spikes and matrix spike duplicates for organic analyses; it will be expressed as the relative percent difference (RPD):

$$\text{RPD} = 100 \times 2(|X_1 - X_2|) / (X_1 + X_2)$$

where:

> $X_1$ and $X_2$ are reported concentrations for each duplicate sample and subtracted differences represent absolute values.

Criteria for evaluation of laboratory duplicates are specified in the applicable methods. The objective for field duplicate precision is ≤ 50% RPD for all matrices for analytes detected at concentrations at least 2 times the reporting limit. Where one or both analytes are detected at less than 2 times the RL, the criterion is the absolute difference "D" ($X_1 - X_2$), and D should be less than the RL for the analyte.

### 3.2.3 Accuracy

The laboratory objective for accuracy is to equal or exceed the accuracy demonstrated for the applied analytical method on similar samples. Percent method recovery criteria and those determined from laboratory performance data, are used to evaluate accuracy in matrix (sample) spike and blank spike quality control samples. A matrix spike and blank spike or laboratory control will be performed once for every analytical batch or as specified in the method or ASP. Other method-specific laboratory QC samples (such as continuing calibration standards) may also be used in the assessment of analytical accuracy. Sample (matrix) spike recovery is calculated as:

$$\% \text{ Recovery} = 100 \times (SSR\text{-}SR)/SA$$

Where:

SSR = Spiked sample Result;

SR = Sample Result; and

SA = Spike Added.

Accuracy measures the bias in a measurement system. It is difficult to measure accuracy for the entire data collection activity. Accuracy will be assessed through use of known QC samples. Accuracy values can be presented in a variety of ways. For projects under this contract, accuracy will be normally presented as percent recovery.

Routine organic analytical protocol requires a surrogate spike in each sample. Surrogate recovery will be defined as:

$$\% \text{ Recovery} = (R/S) \text{ x } 100$$

Where:

S = surrogate spike concentration; and
R = reported surrogate compound concentration.

Recovery criteria for laboratory spikes and other laboratory QC samples through which accuracy may be evaluated are established in the applicable analytical method.

### 3.2.4 Representativeness

The representativeness of data is only as good as the representativeness of the samples collected. Sampling and handling procedures, and laboratory practices are designed to provide a standard set of performance-driven criteria to provide data of the same quality as other analyses of similar matrices using the same methods under similar conditions. Representativeness will be determined by a comparison of the quality controls for these samples against data from similar samples analyzed at the same time.

### 3.2.5 Comparability

Comparability of analytical data among laboratories becomes more accurate and reliable when all labs follow the same procedure and share information for program enhancement. Some of these procedures include:

- Instrument standards traceable to National Institute of Standards and Technology (NIST), the US Environmental Protection Agency (USEPA), or the New York State Departments of Health or Environmental Conservation;
- Using standard methodologies;

- Reporting results for similar matrices in consistent units;
- Applying appropriate levels of quality control within the context of the laboratory quality assurance program; and
- Participation in inter-laboratory studies to document laboratory performance.

By using traceable standards and standard methods, the analytical results can be compared to other labs operating similarly. The QA Program documents internal performance. Periodic laboratory proficiency studies are instituted as a means of monitoring intra-laboratory performance.

Comparability within any specific project is also assessed by comparison of the project data to data generated previously; and, if available, comparison of the data for multiple sampling events conducted for the project. Comparability (consistency) of sampling techniques is also assessed, to some extent, by analysis of field duplicates; although it should be noted that large differences between field duplicates may result from a wide variety of causes, not just inconsistent sampling.

### 3.2.6 Completeness

The goal of completeness is to generate the maximum amount possible of valid data for all planned samples. Completeness of 100 percent indicates that all planned samples were collected; and the resultant data were fully valid and acceptable. As completeness is a function of both field activities and laboratory activities, separate completeness goals are established for each.

The default goal for sampling completeness is 95 percent, as is calculated as:

$$\text{Sampling Completeness (\%)} = (Sc/Sp) \times 100$$

Where:

Sc = Samples collected (submitted) for analysis (documented from field records or COC); and

Sp = Samples planned (as documented in the SMP or QAPP).

The default goal for analytical completeness is also set at 95 percent. Analytical completeness may be less than 100 percent either due to systemic failures that result in the rejection or loss of data for an entire sample; or compound-specific rejection (e.g., 2-hexanone) within an otherwise valid analysis.

For typical work assignments, the default overall completeness goal is 90 percent useable data. The impact of rejected or unusable data will be made on a case-by-case basis. If the goals of the project can be achieved without the missing datum or data, or if data from a different sampling event can be used to fill the data gap, no further action would be necessary. However, loss of critical data may require resampling or reanalysis.

## 3.3 FIELD QUALITY ASSURANCE

Blank water generated for use during this project must be “demonstrated analyte-free.” The criteria for analyte-free water are based on the USEPA-assigned values for the Contract Required Quantitation Limits (CRQLs) for Contract Laboratory Program (CLP) analyses, or the RL for SW-846 or other methods.

However, specifically for the common laboratory contaminants (acetone and 2-butanone), the allowable limits are five times the CRQL (or RL). For methylene chloride, the limit is 2.5 times the CRQL. For common SVOC contaminants (phthalate esters such as bis(2-ethylhexyl) phthalate), the limit is 5 times the CRQL.

The analytical testing required for the water to be demonstrated as analyte-free must be performed prior to the start of sample collection; thus, blank water will be supplied by the laboratory.

Table 2 of this QAPP shows QA/QC samples and reporting limits. QA/QC samples are discussed below.

### 3.3.1 Field Equipment (Rinseate) Blanks

Equipment blanks consist of demonstrated, analyte-free water that show if sampling equipment has the potential for contaminant carryover to give a false impression of contamination in an environmental sample. When blank water is used to rinse a piece of sampling equipment (before it is used to sample), the rinseate is collected and analyzed to see if sampling could be biased by contamination from the equipment.

Rinseate blanks are not required when samples are collected directly into laboratory-provided sample containers (e.g., if specified as such in the SMP for matrices such as surface water).

### 3.3.2 Field Duplicate Samples

Field duplicate samples are used to assess the variability of a matrix at a specific sampling point and to assess the reproducibility of the sampling method.

Aqueous field duplicate samples are second samples collected from the same location, at the same time, in the same manner as the first, and placed into a separate container (technically, these are co-located samples). Each duplicate sample will be analyzed for the same parameters as the original sample collected that day.

The default field duplicate precision (RPD) objective is ≤50% percent RPD for all matrices where the sample concentration is at least two times the reporting limit. Where the analyte is detected in both samples but the concentration is less than 2 times the reporting limit, precision is assessed by the absolute difference, which should be less than the reporting limit. The RPD is not calculable when the analyte is not detected in one or both analyses. A more detailed discussion of the calculation is provided in Section 4.2.2 (Precision), above.

Field duplicates will be collected at a frequency of one per 20 environmental samples for aqueous and non-aqueous samples.

### 3.3.3 Trip Blanks

The purpose of a VOC trip blank (using demonstrated analyte-free water) is to place a mechanism of control on sample bottle preparation and blank water quality, and sample handling. The trip blank travels from the lab to the site with the empty sample bottles and back from the site with the collected samples. There will be a minimum of one trip blank per shipment containing aqueous samples for VOC analysis.

Trip blanks will be collected only when aqueous volatile organics are being sampled and shipped; except that a trip blank is not required when the only aqueous samples in a shipment are QC samples (rinseate blanks).

### 3.3.4 Temperature Blanks

The laboratory will use either an infrared instrument to measure the temperature of liquid samples, or a temperature blank will be used to measure the temperature of liquid samples. If used, temperature blanks will be supplied by the analytical laboratory. If multiple coolers are necessary to store and transport aqueous samples, then each cooler will contain an individual temperature blank (if used).

## 3.4 FIELD TESTING QC

Field testing of groundwater will be performed during purging of wells prior to sampling for laboratory samples. Field QC checks of control limits for pH, specific conductance (conductivity), and turbidity are detailed below. The calibration frequencies discussed below are the minimum. Field personnel can and should check calibration more frequently in adverse conditions, if anomalous readings are obtained, or subjective observations of instrument performance suggest the possibility of erroneous readings. Calibration logs for the instruments discussed below will be provided in the SMP.

### 3.4.1 pH Meter

The pH meter is calibrated daily, using two standards bracketing the range of interest (generally 4.0 and 7.0). If the pH QC control sample (a pH buffer, which may be the same or different than those used to initially calibrate the instrument) exceeds 0.1 pH units from the true value, the source of the error will be determined and the instrument recalibrated. If a continuing calibration check with pH 7.0 buffer is off by more than 0.1 pH units, the instrument will be recalibrated. Expired buffer solutions will not be used.

Note that gel-type probes take longer to equilibrate (up to 15 minutes at near-freezing temperatures); this must be taken into account in calibrating the instrument and reading samples and standards.

### 3.4.2 Specific Conductivity

A vendor-provided conductivity standard will be used to check the calibration of the conductivity meter daily. Specific conductance QC samples will be on the order of 0.01 or 0.1 molar potassium chloride (KCl) solutions in accordance with manufacturer's recommendations.

### 3.4.3 Turbidity

The turbidity meter should be calibrated using a standard as close as possible to 50 NTU (the critical value for determining effectiveness of well development and evacuation). The turbidimeter will be checked daily. The turbidity QC sample will be a commercially prepared polymer standard (Advanced Polymer System, Inc., or similar).

### 3.4.4 Temperature

Temperature probes associated with instruments (such as the YSI SCT-33 conductivity and temperature meter) are not subject to field calibration, but the calibration should be checked to monitor instrument performance. It is recommended that the instrument temperature reading be checked against a NIST-traceable thermometer concurrently with checking the conductivity calibration. The instrument manual will be referenced for corrective actions if accurate readings cannot be obtained.

## 3.5 LABORATORY QUALITY ASSURANCE

### 3.5.1 Method Blanks

A method blank is laboratory water on which every step of the method is performed and analyzed along with the samples. Method blanks are used to assess the background variability of the method and to assess the introduction of contamination to the samples by the method, technique, or instruments as the sample is prepared and analyzed in the laboratory. Method blanks will be analyzed at a frequency of one for every twenty samples analyzed or as otherwise specified in the analytical protocol.

### 3.5.2 Laboratory Duplicates

Laboratory duplicates are sub-samples taken from a single aliquot of sample after the sample has been thoroughly mixed or homogenized (with the exception of volatile organics), to assess the precision or reproducibility of the analytical method on a sample of a particular matrix. Laboratory duplicates will be performed on spiked samples as a matrix spike and a matrix spike duplicate (MS/MSD) for volatile organics.

### 3.5.3 Spiked Samples

Two types of spiked samples will be prepared and analyzed as quality controls: matrix spikes and matrix spike duplicates (MS/MSD), which are analyzed to evaluate instrument and method performance and performance on samples of similar matrix. MS/MSD samples will be analyzed at a frequency of one (pair) for every 20 samples. In addition, matrix spike blanks (MSBs) will also be prepared and analyzed by the laboratory as required by NYSDEC ASP.

### 3.5.4 Laboratory Control Sample

A fortified clean matrix (laboratory control sample, or LCS) is analyzed with each analysis. In some cases, a "Laboratory-Fortified Blank" (LFB) may serve as the LCS. These samples generally consist of a standard aqueous or solid matrix fortified with the analytes of interest for single-analyte methods and selected analytes for multi-analyte methods according to the appropriate analytical method. The LCS may be analyzed in duplicate for some methods (LCSD). The analyte recovery from each analysis (LCS and LCSD) is used to monitor analytical accuracy; analytical precision can be assessed from evaluation of the LCS/LCSD in the same manner as the MS/MSD.

# 4.0 FIELD DATA DOCUMENTATION

Field reporting documentation will be performed, including field notes and field data reporting forms. Bound, weatherproof field logbooks or pre-printed sampling logs will be used by personnel. The field sampling information will be turned in for copying/filing/tracking when complete.

Field logbooks will be prepared and maintained throughout the course of the project**.** With the exception of PFAS sampling events, only bound, weatherproof field logbooks will be used by field personnel. The logbooks will be turned in for copying/filing/tracking when complete. If performing PFAS sampling, then loose leaf notebook paper shall be used in lieu of a field logbook.

Entries will be recorded in indelible, waterproof ink. If errors are made in any field logbook, field record (form), COC, or any other field record document, corrections will be made by crossing a single line through the error, entering the correct information, and initialing and dating the correction.

Entries in field logbooks will be legible (printing is preferable) and will contain accurate and inclusive documentation of project activities (investigation, monitoring remediation, closure, maintenance, etc.). Information pertaining to health and safety aspects, personnel on site, visitor's names, association, and time of arrival/departure, etc., should also be recorded. Language should be objective, factual, and free of personal feelings or other terminology that might prove inappropriate, since field records are the basis for later written reports. Once completed, these field log books become accountable documents and must be maintained as part of the project files.

Sample collection and handling activities, as well as visual observations, will be documented in the field log books. The sample collection equipment (where appropriate), field analytical equipment, and equipment used to make physical measurements will be identified in the field log books. Calculations, results, and calibration data for field sampling, field analytical, and field physical measurement equipment will also be recorded in the field log books, except where these are referenced as being recorded on approved field forms. Field analyses and measurements must be traceable to the specific piece of field equipment utilized and to the field investigator collecting the sample, making the measurement, or conducting analyses. Log books will be updated as field work progresses.

When an individual log book is full, the log book will be submitted to the AECOM project manager for final cataloging and filing. The log books will be stored in the Project File. Copies of specific sections will be made available to personnel upon request.

All non-bound field records (e.g., drilling logs, well construction forms, sampling records, COCs, aquifer testing forms) will be completed the day the associated activity occurs. Field data collected using electronic data loggers or computer entry forms, will be downloaded as soon as practical and copied/uploaded to office servers. If possible, the person collecting the data will download electronic data on a daily basis. This person will be responsible for verifying that the data collected are adequately represented in electronic media and in the file. A hard copy of the data, and any graphical representation produced by logging software, will also be printed out and duplicated.

# 5.0 EQUIPMENT CALIBRATION AND MAINTENANCE

Quality assurance for instrumentation and equipment used for a project is controlled by a formal calibration program, which verifies that equipment is of the proper type, range, accuracy, and precision to provide data compatible with specified requirements. Instruments and equipment that measure a quantity, or whose performance is expected at a stated level, are subject to calibration. Calibration is performed using reference standards or externally by calibration agencies or equipment manufacturers.

## 5.1 STANDARD WATER AND AIR QUALITY FIELD EQUIPMENT

Field equipment used during the collection of environmental samples typically includes a turbidimeter (turbidity per EPA Method 180.1), pH meter (pH per EPA Method 150.1), conductivity meter (specific conductance per EPA Method 120.1), thermometer, and photoionization detector. Ferrous iron will be field-analyzed using a HACH DR-900 colorimeter or other equivalent field-testing device. Other field analyses include alkalinity, carbon dioxide, and hydrogen sulfide. These analyses will be collected using HACH field kits. During water levels, headspace upon opening each well will be scanned with a 4-gas meter and PID.

The photoionization detector (MiniRAE or equivalent) and 4-gas meter used for soil screening and health and safety air monitoring will be calibrated following the manufacturer's instructions, at the beginning of the day, whenever the instrument is shut off for more than two hours, and at the field technician's discretion.

## 5.2 LABORATORY EQUIPMENT CALIBRATION

Laboratory equipment will be calibrated according to the method-specific requirements of the 2005 NYSDEC ASP**,** Exhibit E, Parts II and III, and maintained following professional judgment and the manufacturer's specifications, and additional requirements as specified in the ELAP certification manual.

### 5.2.1 Calibration Procedure

Written procedures are used for all instruments and equipment subject to calibration. For chemical analyses typically performed for these contracts, the calibration procedures are specified in the methods as compiled in the ASP. If established procedures are not available, a procedure is developed considering the type of equipment, stability characteristics of the equipment, required accuracy, and the effect of operational error on the quantities measured.

### 5.2.2 Calibration Frequency

Calibration frequency is based on the type of equipment, inherent stability, manufacturer's recommendations, values provided in recognized standards, intended data use, specified analytical methods, effect of error upon the measurement process, and prior experience.

### 5.2.3 Calibration Reference Standards

Two types of reference standards will be used by the analytical laboratory for calibration:

Physical standards, such as weights for calibrating balances and certified thermometers for calibrating working thermometers, refrigerators and ovens, are generally used for periodic calibration.

Chemical standards, such as Standard Reference Materials (SRMs) provided by the National Institute of Standards and Technology (NIST) or USEPA, may also include vendor-certified materials traceable to NIST or USEPA SRMs. These are primarily used for operational calibration.

### 5.2.4 Calibration Failure

Equipment that cannot be calibrated or becomes inoperable is removed from service. Such equipment must be repaired and satisfactorily recalibrated before re-use. For laboratory equipment that fails calibration, analysis cannot proceed until appropriate corrective action is taken and the analyst achieves an acceptable calibration.

Laboratory managers are responsible for development and implementation of a contingency plan for major equipment failure. The plan includes guidelines on waiting for repairs, use of other instrumentation, subcontracting analyses, and evaluating scheduled priorities.

### 5.2.5 Calibration Records

Records are prepared and maintained for each piece of equipment subject to calibration. Records demonstrating accuracy of preparation, stability, and proof of continuity of reference standards are also maintained. Copies of the raw calibration data are kept with the analytical sample data.

## 5.3 OPERATIONAL CALIBRATION

Operational calibration is generally performed as part of the analytical procedure and refers to those operations in which instrument response (in its broadest interpretation) is related to analyte concentration. Included are the preparation of a standard response (calibration) curve and often the analysis of blanks.

Preparation of a standard calibration curve is accomplished by the analysis of calibration standards, which are prepared by adding the analyte(s) of interest to the solvent that is introduced into the instrument. The concentrations of the calibration standards are chosen to cover the working range of the instrument or method. For most methods, five calibration standards are used, with the concentration of the lowest calibration standard being the reporting or quantitation limit for that analysis. Sample measurements are made and reported within this working range; apparent concentrations which exceed the high end of the calibrated range (“E”-flagged data for organic analyses) are diluted (or a smaller sample is used) and re-analyzed. The calibration curve is prepared by plotting or performing a linear regression of the instrument responses against the analyte concentration.

# 6.0 DATA REDUCTION, VALIDATION, AND REPORTING

The guidance followed to perform quality data validation, and the methods and procedures outlined herein and elsewhere in the SMP, pertain to initiating and performing data validation, as well as reviewing data validation performed by others (if applicable). An outline of the data validation process is presented here, followed by a description of data validation review summaries.

## 6.1 LABORATORY DATA REPORTING AND REDUCTION

Data reduction is the process by which raw analytical data generated from laboratory instrument systems is converted into usable concentrations. The raw data, which may take the form of area counts, instrument responses, or observations, are processed by the laboratory and converted into concentrations expressed in the parts per million (milligram per kilogram [mg/kg] or milligram per liter [mg/L]) or parts per billion (µg/kg or µg/L) range. Raw data from these systems include compound identifications, concentrations, retention times, and data system print-outs. Raw data are usually reported in graphic form, bar graph form, or tabular form. The laboratory will follow standard operating procedures consistent with the data handling requirements of the applicable methods.

The laboratory will meet the applicable documentation, data reduction, and reporting protocols as specified in the 2005 revision of the NYSDEC ASP. ASP Deliverables are either Category B (full deliverables; similar to USEPA CLP requirements) or Category A (a reduced deliverable level). For this contract, Category B deliverables are the default and will be provided for all deliverables generated under the contract unless explicitly indicated otherwise on a site-specific basis. Laboratory data reports will conform to NYSDEC Category B deliverable requirements.

Copies of the laboratory's generic Quality Assurance Management Plan (QAMP, as defined in ASP 2005 Exhibit E, Part I) will be maintained at AECOM's principal contact office (Buffalo, NY). The laboratory's QAMP will indicate the standard methods and practices for obtaining and assessing data, and how data are reduced from the analytical instruments to a finished report, indicating levels of review along the way.

To meet NYSDEC electronic data deliverable (EDD) requirements, subcontract laboratories will be required to submit electronic deliverables in an EQuIS 4-file format consistent with AECOM standards (see Attachment 1). AECOM's database manager will be responsible for verifying that the file submitted meets these specifications including verifying that current NYSDEC Valid Values were used for sample coding; providing an Excel (or Access) file to the data validator; uploading the validated data into the database; overseeing the uploading of any other data (field data, boring log information, etc.), and submitting a final EQuIS deliverable to NYSDEC that meets NYSDEC EDD requirements.

In addition to the hard copy of the data report, the laboratory will be asked to provide the sample data in spreadsheet form (submitted electronically or on computer diskette). The data spreadsheet will be generated to the extent possible directly from the laboratory's electronic files or information management system to minimize possible transcription errors resulting from the manual transcription of data.

## 6.2 DATA VALIDATION

Data generated for this RI will be validated by a qualified data validator. The validator, Ann Marie Kropovitch, will follow guidelines established in the USEPA Region 2 SOPs applicable to the analytical method(s) being reviewed. These SOPs are checklists which are designed to formally and rigorously assess the quality and completeness of the analysis data packages. The use of these USEPA SOPs will be adapted to conform to the specific requirements of the NYSDEC ASP (e.g., NYSDEC/ASP holding times; matrix spike blank requirements).

Validation reports and DUSRs will consist of text results of the review and marked up copies of Form I (results with qualifiers applied by the validator). Validation will consist of target and non-target compounds with corresponding method blank data, spike and surrogate recoveries, sample data, and a final note of validation decision or qualification, along with any pertinent footnote references. Qualifiers applied to the data will be documented in the report text. Where QC failures caused the laboratory to perform a re-analysis, the data validator will make a recommendation as to which of the two analyses should be used. Data review will also include an assessment of sensitivity (i.e., are reporting limits appropriate to determine if contaminants are present at or above action levels or other applicable threshold values).

There may be some analyses for which there is no established USEPA or NYSDEC data validation protocol. In such cases, validation will be based on the Region 2 SOPs, as well as the laboratory's adherence to the technical requirements of the method, and the professional judgment of the validator. The degree of rigor in such validation will correspond to the nature of the data and the significance of the data and its intended use.

## 6.3 DATA USABILITY

AECOM’s QA staff will prepare a DUSR which to be provided as part of the RI Report, encompassing both quantitative and qualitative aspects, although the qualitative element is the most significant.

The quantitative aspect is a summary of the data quality as expressed by qualifiers applied to the data; the percent rejected, qualified (i.e., estimated), missing, and fully acceptable data are reported. As appropriate, this quantitative summary is broken down by matrix, laboratory, or analytical fraction or method.

The qualitative element of the data usability summary is the QA officer’s translation and summary of the validation reports into a discussion useful to data users. The qualitative aspect will discuss the significance of the qualifications applied to the data, especially in terms of those most relevant to the intended use of the data. The usability report will also indicate whether there is a suspected bias (high or low) in qualified data, and will also provide a subjective overall assessment of the data quality. If similar analyses are performed by more than one method, a discussion of the extent of agreement among the various methods will be included, as well as discussion of any discrepancies among the data sets.

The QAO will also indicate if there is a technical basis for selecting one data type over another for multiple measurements which are not in agreement.

Data which has not been validated and field data used for the project will be discussed in the data usability summary, including any limitations on the use of such data.

## 6.4 FIELD DATA VERIFICATION

Field personnel will record all field data in bound field logbooks and on standard forms. After checking the validity of the data in the field notes, the Project Manager or his/her designee will reduce the data to tabular form, when possible, by entering the data into data files. Where appropriate, the data files will be set up for direct input into the project database. Subjective data will be filed as hard copies for later review by the Project Manager and incorporation into technical reports, as appropriate.

Verification of field data will be performed at two different levels. The first level of data verification will be performed at the time of collection by following standard procedures and QC checks. The second level of review consists of the Project Manager, Task Manager, or other competent personnel, reviewing the data to confirm that the correct codes and units have been included. After data reduction into tables and arrays is complete, the Site Manager will review data sets for anomalous values. The Project Manager, who will review field reports for reasonableness and completeness, will validate subjective field and technical data.

# 7.0 PERFORMANCE AND SYSTEM AUDITS

Audits are systematic checks to determine the quality of operation of some activity or function in the field or laboratory. Field audits are conducted to verify adherence to proper field and sampling procedures. Audits are of two types, as described below.

- Performance audits are independent safety and health, procedure, and/or sample checks made by a supervisor or auditor to arrive at a quantitative measure of the quality of the data produced by one section or the entire measurement process.
- System audits are onsite qualitative inspections and reviews of the QA system used by some part of or the entire measurement system. The audits are performed against the QAPP. A checklist is typically generated from the requirements and becomes the basis for the audit. The results of any deficiencies noted during the audit are summarized in an audit report.

Laboratory performance and system audits are performed by the laboratory's QA staff to assess the effectiveness of the quality system. These internal audits are performed on a routine basis. Audits are also performed by certifying agencies. Audit reports and corrective actions are available to NYSDEC for review.

## 7.1 RESPONSIBILITY, AUTHORITY, AND TIMING

QA audits to be conducted for the project may include system, performance, and data audits. The Project QAO will keep a tentative schedule on record that details the number and types of audits.

## 7.2 FIELD AUDITS

Field performance audits, if specified, will be conducted during the project as field data are generated, reduced, and analyzed. Numerical manipulations, including manual calculations, will be documented. Records of numerical analyses will be legible, of reproduction quality, and sufficiently complete to permit logical reconstruction by a qualified individual other than the originator.

Indicators of the level of field performance include the analytical results of the blank and replicate samples. Each blank analysis will be considered an indirect audit of the effectiveness of measures taken in the field to maintain sample integrity (e.g., field decontamination procedures).

The results of the field replicate analyses are an indirect audit of the ability of each field team to collect representative sample portions of each matrix type.

System audits of site activities will be accomplished by an inspection of all field site activities. During this audit, the auditor(s) will compare current field practices with standard procedures. The following elements will be evaluated during a field system audit:

- Field activities conducted in substantial compliance with the SMP;
- Procedures and analyses conducted according to procedures outlined in the QAPP and Addendum;
- Sample documentation;
- Working order of instruments and equipment;
- Level of QA conducted by field personnel;
- Contingency plans in case of equipment failure or other event preventing the planned activity from proceeding;

- Decontamination procedures;
- Level of efficiency with which each team conducts planned activities at one site and proceeds to the next; and
- Sample packaging and shipment.

After completion of the audit, any deficiencies will be discussed with the field staff and corrections identified. If any of these deficiencies could affect the integrity of the samples being collected, the auditor(s) will inform the field staff and corrections will be implemented immediately. The audit will be performed by the Project QA/QC Coordinator or the Site Manager.

## 7.3 LABORATORY PERFORMANCE AND SYSTEM AUDITS

The laboratory assigned to this project will been verified to be certified by the NYSDOH Environmental Laboratory Approval Program for the matrices and analytical protocols to be used. Therefore, no project-specific audit of the laboratory(s) will be performed unless warranted by a problem(s) that cannot be resolved by any other means, or at the discretion of AECOM.

## 7.4 AUDIT PROCEDURES

Prior to an audit, the designated lead auditor prepares an audit checklist. During an audit and upon its completion, the auditor(s) will discuss the findings with the individuals audited and discuss and agree on corrective actions to be initiated. The auditor will then prepare and submit an audit report to the manager of the audited group and the project manager.

The manager of the audited group will then prepare and submit, to the Project QAO and the Project Manager, a plan for implementing the corrective action to be taken on non-conformances indicated in the audit report, the date by which such corrective action will be completed, and actions taken to prevent reoccurrence. If the corrective action has been completed, supporting documentation should be attached to the reply. The auditor will ascertain (by re-audit or other means) if appropriate and timely corrective action has been implemented.

Records of audits will be maintained in the project files.

## 7.5 AUDIT DOCUMENTATION

A checklist will be completed during each audit so that the previously defined scope of the individual audits is accomplished and that the audits follow established procedures. The checklist will detail the activities to be executed as part of the auditing plan. Audit checklists will be prepared in advance and will be available for review. Following each system, performance, and data audit, the auditor or QAO will prepare a report to document the findings of the specific audit.

# 8.0 CORRECTIVE ACTIONS

If instrument performance or data fall outside acceptable limits, then corrective actions will be taken. These actions may include recalibration or standardization of instruments, acquiring new standards, replacing equipment, repairing equipment, and reanalyzing samples or redoing sections of work.

Subcontractors providing analytical services should perform their own internal laboratory audits and calibration procedures with data review conducted at a frequency so that errors and problems are detected early, thus avoiding the prospect of redoing large segments of work.

Situations related to this project requiring corrective action will be documented and made part of the project file. For each measurement system identified requiring corrective action, the responsible individual for initiating the corrective action and also the individual responsible for approving the corrective action, if necessary, will be identified.

As part of its quality management system (QMS) program, AECOM provides relevant excerpts and conclusions from data validation reports to the analytical laboratories. The laboratories are therefore made aware of non-critical items and areas where improvement may be made in subsequent NYSDEC ASP work.

The objectives of the corrective action procedures presented below are to ensure that recognized errors in performance of sample and data acquisition lead to effective remedial measures and that those steps are documented to provide assurance that any data quality deficiencies are recognized in later interpretation and are not recurrent.

## 8.1 RATIONALE

Many times corrective measures are undertaken in a timely and effective fashion but go undocumented. In other cases, corrective actions are of a complex nature and may require scheduled interactions between departmental groups. In either case, documentation in a formal or informal sense can reinforce the effectiveness and duration of the corrective measures taken.

## 8.2 CORRECTIVE ACTION METHODS

### 8.2.1 Immediate Corrective Actions

Immediate corrective actions are of a minor or routine nature such as correcting malfunctioning equipment, correction of data transcription errors, and other such activities routinely made in the field, laboratory, or office by technicians, analysts, and other project staff.

### 8.2.2 Long-Term Corrective Actions

Long-term corrective action will be used to identify and eliminate causes of non-conformances which are of a complex nature and that are formally reported between management groups.

### 8.2.3 Corrective Action Steps

For long-term corrective actions, steps comprising closed-loop corrective action system are as follows:

- Define the problem;
- Assign responsibility for investigating the problem;
- Investigate and determine the cause of the problem;

- Determine a corrective action to eliminate the problem;
- Assign and accept responsibility for implementing the corrective action; and
- Verify that the corrective action has eliminated the problem.

Non-conformance events associated with analytical work are documented by the laboratories' Non-Conformance Records, which are reviewed and approved by the laboratory's Quality Assurance Manager.

### 8.2.4 Audit-Based Non-Conformances

Following audits, corrective action is initiated by documenting the audit finding and recommended corrective action on an Audit Finding Report.

## 8.3 CORRECTIVE ACTION REPORT REVIEW AND FILING

Immediate and long-term corrective actions require review to assure that, during the time of non-conformance, erroneous data were not generated or that, if possible, correct data were acquired instead. Such confirmation and review is the responsibility of the supervisor of the staff implementing the corrective action. Confirmation will be acknowledged by notation and dated signature on the affected data record or appropriate form or by memorandum to AECOM project management.

# 9.0 QUALITY ASSURANCE REPORTS TO MANAGEMENT

Fundamental to the success of this QA/QC is the active participation of the Project Manager and the Project QA Officer. The Program QA Officer will be advised of project activities and will participate in development, review, and operation of the project. Project management will be informed of QA activities through the receipt, review, and/or approval of:

- Project-specific QA project plans;
- Corporate and project-specific QA/QC plans and procedures;
- Corrective action notices; and
- Non-conformance records.

Periodic assessment of field and laboratory QA/QC activities and data accuracy, precision, and completeness will be conducted and reported by the laboratory. Items to be included in the QA reports are the summary of results for the performance or the system audit and, where applicable:

- Assessment of adherence to work scope and schedule for the audited task;
- Assessment of the precision, accuracy, and completeness of sample batches and subsequent status of data processing and analyses;
- Significant QC problems and the status of any ongoing corrective actions;
- Changes to the SMP; and
- Status of implementation of the SMP.

Project status reporting will include aspects of quality control that were pertinent during the month's activities. Problems revealed during review of the month's activities will be documented and addressed. These reports will include a description of completed and on-going activities, and an indication how each task is progressing relative to the project schedule.

The project manager, through task managers, will be responsible for verifying that records and files related to the work assignment are stored appropriately and are retrievable.

The laboratory will submit any memoranda or correspondence related to quality control of this project's samples as part of its deliverables package.

# 10.0 REFERENCES

New York State Department of Environmental Conservation (NYSDEC), 2005. *Analytical Services Protocol (ASP) Manual*. July.

NYSDEC, 2010. *Technical Guidance for Site Investigation and Remediation. DER-10*. Division of Environmental Remediation. May.

New York State Department of Health (NYSDOH) Wadsworth Laboratory Environmental Laboratory Approval Program Certification Manual. Accessed online at https://www.wadsworth.org/regulatory/elap/requirements-for-laboratory-certification-certification. Revisions through February 2019.

NYSDOH ELAP Web site. https://www.wadsworth.org/regulatory/elap/certified-labs

USEPA Region 2, Standard Operating Procedures for Data Review. Available at https://www.epa.gov/quality/region-2-quality-assurance-guidance-and-standard-operating-procedures.

USEPA Region 2, 1998. *Ground Water Sampling Procedure – Low Stress (Low Flow) Purging and Sampling*. Final. March 16.

# Tables

## Table 1

## Sample Bottle, Volume, Preservation, and Holding Time Summary
## Hyde Park Site Quality Assurance Project Plan
## Niagara County, NY

| MATRIX/ANALYSIS | Sample Prep Method (1) | Analytical Method (2) | Sample Bottles (3) | | | | Minimum Vol Rqd | Preservation (4) | Holding Time (4,5) | | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mat'l | Size | Qty | Source | | | Extraction | Analysis | |
| Aqueous Samples | | | | | | | | | | | |
| Chlorinated Volatile Organics | SW 846 5030C | SW 846 8260C | Glass | 40 ml | 3 | Lab | 40 mL | HCl to pH ≤ 2 | NA | 14 days | 7 days if not preserved. |
| Dissolved Iron | SW 846 3005A | SW 846 6010C | Plastic | 250 ml | 1 | Lab | 50 ml | $HNO_3$ to pH≤ 2 | NA | 180 days | field filtered |
| Methane, Ethane, Ethane, Propane | RSK SOP-175 Modified | RSK SOP-175 MOD | Glass | 40 ml | 2 | Lab | 40 ml | HCl to pH ≤ 2 | NA | 14 days | |
| BOD | SM 5210B | SM 5210B | Plastic | 500 ml | 1 | Lab | 500 ml | | NA | 28 days | |
| COD | MCAWW 410.4 | MCAWW 410.4 | Glass | 100 ml | 1 | Lab | 100 ,l | $H_2SO_4$ to pH ≤ 2 | NA | 28 days | |
| TOC | SM 5310C | SM 5310C | Glass | 40 mL | 2 | Lab | 40 ml | HCl or $H_2SO4$ to pH ≤ 2 | NA | 28 days | |
| Chloride | MCAWW 300.0 | MCAWW 300.0 | Plastic | 50 ml | 1 | Lab | 50 ml | | NA | 28 days | |
| Sulfate | MCAWW 300.0 | MCAWW 300.0 | Plastic | 50 ml | 1 | Lab | 50 ml | | NA | 28 days | |
| Sulfide | SM 4500 S2F | SM 4500 S2F | Plastic | 500 ml | 1 | Lab | 500 ml | Zinc acetate/NaOH pH > 9 | NA | 7 days | |
| Nitrate | MCAWW 300.0 | MCAWW 300.0 | Plastic | 50 ml | 1 | Lab | 50 ml | | NA | 48 hrs. | |
| Nitrite | MCAWW 300.0 | MCAWW 300.0 | Plastic | 50 ml | 1 | Lab | 50 ml | | NA | 48 hrs. | |
| Nitrate-Nitrite | MCAWW 353.2 | MCAWW 353.2 | Plastic | 50 ml | 1 | Lab | 50 ml | $H_2SO_4$ to pH ≤ 2 | NA | 28 days | |

Notes

(1) Laboratory may propose alternate extraction/preparation methods, subject to AECOM approval.
(2) More recent versions of SW-846 methods may be used subject to AECOM approval.
(3) Bottles typical. Note the laboratory may group analytes with similar preservation requirements together and provide a larger sampling container.
(4) All samples for chemical analysis should be held at 4 degrees C in addition to any chemical preservation required.
(5) Holding time calculated from day of collection, unless noted as being from time of extraction. Laboratory holding times (ASP 2005, Exhibit I) are two days shorter to allow for field handling and shipping.

ml - milliliter hrs. - hours NA - not applicable
SW-846 = Test Methods for Evaluating Solid Waste, Physical/Chemical Methods. USEPA SW-846. Complete through Update IV, March 2009.
RSK = Sample Prep And Calculations For Dissolved Gas Analysis In Water Samples Using A GC Headspace Equilibration Technique, RSKSOP-175
SM = "Standard Methods For The Examination Of Water And Wastewater"
MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

## Table 2

## Reporting Limits and QA/QC Sample Quantity Summary
Hyde Park Site Quality Assurance Project Plan
Niagara County, NY

| MATRIX/ANALYSIS | Analytical Method | Laboratory | Reporting Limit -Typical (units as specified) (1) | Field Sample Quantity | Field Duplicate (2) | Matrix Spike (MS) or LCS (2) | MS Duplicate or Matrix Duplicate (2) | Equipment Blank | Trip Blank | Total Analyses |
|---|---|---|---|---|---|---|---|---|---|---|
| Aqueous Samples Groundwater | | | | | | | | | | |
| Chlorinated Volatile Organics | SW 846 8260C | Eurofins Test America | 1.0 µg/L | 17 | 1 | 1 | 1 | 0 | 3 | 23 |
| Dissolved Iron | SW 846 6010C | Eurofins Test America | 0.05 mg/L | 17 | 1 | 1 | 1 | 0 | - | 20 |
| Methane, Ethane, Ethene, Propane | RSK SOP-175 Modified | Eurofins Test America | Analyte-specific | 17 | 1 | 1 | 1 | 0 | - | 20 |
| BOD | SM 5210B | Eurofins Test America | 2.0 mg/L | 17 | 1 | 1 | 1 | 0 | - | 20 |
| COD | MCAWW 410.4 | Eurofins Test America | 10 mg/L | 17 | 1 | 1 | 1 | 0 | - | 20 |
| TOC | SM 5310C | Eurofins Test America | 1.0 mg/L | 17 | 1 | 1 | 1 | 0 | - | 20 |
| Chloride | MCAWW 300.0 | Eurofins Test America | 0.50 mg/L | 17 | 1 | 1 | 1 | 0 | - | 20 |
| Sulfate | MCAWW 300.0 | Eurofins Test America | 2.0 mg/L | 17 | 1 | 1 | 1 | 0 | - | 20 |
| Sulfide | SM 4500 S2F | Eurofins Test America | 1.0 mg/L | 17 | 1 | 1 | 1 | 0 | - | 20 |
| Nitrate | MCAWW 300.0 | Eurofins Test America | 0.05 mg/L | 17 | 1 | 1 | 1 | 0 | - | 20 |
| Nitrite | MCAWW 300.0 | Eurofins Test America | 0.05 mg/L | 17 | 1 | 1 | 1 | 0 | - | 20 |
| Nitrate-Nitrite | MCAWW 353.2 | Eurofins Test America | 0.05 mg/L | 17 | 1 | 1 | 1 | 0 | - | 20 |

Notes

(1) Detections above the MDL but less than reporting limits will be reported and flagged estimated (J).

(2) Duplicates, Matrix Spike, and Matrix Spike Duplicate samples will be collected at a rate of 1 per 20 samples.

mg/L - milligrams/liter

SW-846 = Test Methods for Evaluating Solid Waste, Physical/Chemical Methods. USEPA SW-846. Complete through Update IV, March 2009.

RSK = Sample Prep And Calculations For Dissolved Gas Analysis In Water Samples Using A GC Headspace Equilibration Technique, RSKSOP-175

# Attachment 1

# ATTACHMENT 1
# AECOM Electronic Data Deliverable Specification

Documentation of the structure and contents of the EDD is now provided directly by the EQuIS Data Processor (EDP). Click the **EDD Description** button in the **Tools** section of the **Home** ribbon section of EDP. The AECOM format file and EDP software (for data providers that do not have it already) are available from http://www.earthsoft.com/products/edp/edp-format-for-aecom/. The format will have to be "registered" when first launched in EDP.

Each EDD will comprise 4 files, to describe samples, tests, results, and batches. The format file has two different sections for samples, Field and Lab, only one of which can be included in the EDD. Which sample section to use will be communicated by the AECOM data manager at project setup.

## Submittal

The EDD file can be in one of the following formats:

- ZIP archive of tab-delimited text files (.txt)
- spreadsheet (.xls or .xlsx)
- database (.mdb)

Regardless of the method of EDD Submittal, EDD Packages must be named using a specific naming convention.
EDD File Name:
<Unique ID>.<Facility Code>.AECOM.{zip | xls | xlsx | mdb}

ZIP archive text file EDD section names:
<Unique ID>.<EDD Section Name>.txt

XLS worksheet MDB table EDD section names:
<EDD Section Name>

*Where*:
<Unique ID> = A unique identifier which will be the Sample Delivery Group name unless other arrangements have been made.
<Facility Code> = The facility code for the facility to which this EDD will be loaded, will be communicated by the AECOM data manager at project setup.
<EDD Section Name> = The name of the section within the EDD (i.e. AECOMLabSMP or AECOMFSample, AECOMLabTST, AECOMLabRES, AECOMLabBCH) as it appears in EDP.
Between each of the name elements is a "." (period). It is very important that it is a period and not a "-" (dash), "_" (underscore), or any other character.

## Resubmittal

EDD packages may be resubmitted. However, in order to resubmit corrected EDDs, the files must each be renamed, regardless of the reason(s) for resubmittal.
Example: A lab originally submits an EDD Package (.zip) file named "20100129.MySite.AECOM.zip" which contains EDDs named "20100129.AECOMFSample.txt," etc. If the lab later makes a change to one of the EDDs, it would have to submit a new EDD Package named "20100129R.MySite.AECOM.zip" with EDDs named "20100129R.AECOMFSample.txt," etc.

## Reference Values

A Reference Values file should be delivered from the AECOM data manager to the data provider at project setup. No EDDs will be accepted that do not strictly adhere to the project-specific reference values. If new values need to be used, they must be identified and explained to the AECOM data manager who will provide approval or alternate codes to use before any EDD should be submitted.

For the NYSDEC projects, the reference values can be accessed at
http://www.earthsoft.com/products/edp/edp-format-for-nysdec/

# APPENDIX K

# SITE MANAGEMENT FORMS

# INSPECTION FORM
# FORMER CARBORUNDUM COMPNANY, HYDE PARK FACILITY
# NIAGARA, NEW YORK

**Date of Inspection:** **Time:**

**Inspector(s) Name/Title:**

| Inspection of | Action Required? | | Comments/Location | Correction Date |
|---|---|---|---|---|
| | Yes | No | | |
| 1. Site Institutional Controls | | | | |
| A. Any site groundwater use? | | | | |
| B. Any site excavation work? | | | | |
| C. Any change of use or re-occupancy of site buildings, or construction of new buildings? | | | | |
| D. The property is utilized only for industrial use? | | | | |
| 2. Site Engineering Controls | | | | |
| A. Site Groundwater Wells are in good condition? | | | | |
| 3. Site Management Activities | | | | |
| A. Annual groundwater sampling being completed? | | | | |
| B. Site Health and Safety inspections being completed? | | | | |
| 4. Site Records | | | | |
| A. Site records up to date? (ie- field notebook, field forms, etc.) | | | | |
| 5. General Site Conditions | | | | |
| A. Fences/Gates | | | | |
| B. Other Site conditions | | | | |

AECOM

# GROUNDWATER SAMPLING LOG

Page __1__ of __1___

## Low Flow Sampling Record

bp

**Site Name:** IP-BP Hyde Park

**Well ID:** _______________

**Well Diameter:**

**Samplers:**

**Weather:**

**Water Volume Calculation**

| | |
|---|---|
| 1 inch= 0.041 | 6 inch= 1.4 |
| 1.5 inch= 0.092 | 8 inch= 2.5 |
| 2 inch= 0.163 | 10 inch= 4 |
| 4 inch= 0.64 | |

= (Total Depth of Well - Depth to Water) × Casing volume per foot

**Acceptance Criteria:**

| | |
|---|---|
| Temp | 3% |
| pH | ± 0.1 unit |
| Sp. Cond. | 3% |
| ORP | ± 10mV |
| DO | 10% |
| Turbidity | <50 NTU |
| Drawdown | <0.3' |

**Purging Data:**

Method: Low Flow

**Date:**

**Time:** (hhmm)

**feet below top of PVC**

**Initial Depth to Water**

**Depth to Bottom**

| **Time**<br>hhmm | **DTW**<br>(ft) | **Pump Rate**<br>(ml/min) | **Volume**<br>(gal.) | **Temp**<br>(C˚) | **Sp. Cond**<br>(ms/cm) | **DO**<br>(mg/L) | **pH** | **ORP**<br>(mV) | **Turb**<br>(NTU) | **Comments:** |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
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**Sample Collection Method:** Peristaltic Pump

**Date:**

**Time:**

**Total Volume of Water Purged:**

**Hach Test Kits**

| | |
|---|---|
| **Alkalinity (mg/L)** | |
| **Carbon Dioxide (mg/L)** | |
| **Ferrous Iron (mg/L)** | |
| **Hydrogen Sulfide (mg/L)** | |
| **DTW** | |

**Sample Set**

| **Parameter** | | **Bottle** | **Pres.** | **Method** |
|---|---|---|---|---|
| VOCs | ☐ | 3-40 mL glass vial | HCL | EPA 8260C |
| Dissolved Iron | ☐ | 1-250 mL plastic (field filtered) | HNO3 | 6010C |
| TOC | ☐ | 2-40mL glass vial | H2SO4 | 5310C |
| M.E.E.P. | ☐ | 3-40 mL glass vial | HCL | RSK-175 mod |
| Nitrate/Nitrite/ Chloride/Sulfate | ☐ | 1-500mL plastic | unpreserved | 300, 353.2<br>300.0_28D |
| BOD | ☐ | 1-1000 mL plastic | unpreserved | 5210B |
| COD | ☐ | 1-250 mL plastic | H2SO4 | 410.4 |
| Sulfide | ☐ | 1-500mL plastic | NaOH/Zn Acetate | 4500-S2-F |

# Hyde Park DTW & 4-gas/PID meter readings

Date: __/__/__

Personnel:

|  |  | DTW | CO (ppm) |  | H2S (ppm) |  | Oxygen (%) |  | LEL (%) |  | VOCs |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Well ID | Time | (ft btpvc) | IN | OUT | IN | OUT | IN | OUT | IN | OUT | (ppb) |
| INJ-1 |  |  |  |  |  |  |  |  |  |  |  |
| INJ-2 |  |  |  |  |  |  |  |  |  |  |  |
| INJ-3 |  |  |  |  |  |  |  |  |  |  |  |
| INJ-4 |  |  |  |  |  |  |  |  |  |  |  |
| INJ-5L |  |  |  |  |  |  |  |  |  |  |  |
| INJ-5U |  |  |  |  |  |  |  |  |  |  |  |
| INJ-6L |  |  |  |  |  |  |  |  |  |  |  |
| INJ-6U |  |  |  |  |  |  |  |  |  |  |  |
| INJ-07 |  |  |  |  |  |  |  |  |  |  |  |
| INJ-08 |  |  |  |  |  |  |  |  |  |  |  |
| INJ-09 |  |  |  |  |  |  |  |  |  |  |  |
| INJ-10 |  |  |  |  |  |  |  |  |  |  |  |
| MW-1A |  |  |  |  |  |  |  |  |  |  |  |
| MW-1B |  |  |  |  |  |  |  |  |  |  |  |
| MW-2A |  |  |  |  |  |  |  |  |  |  |  |
| MW-2B |  |  |  |  |  |  |  |  |  |  |  |
| MW-3A |  |  |  |  |  |  |  |  |  |  |  |
| MW-3B |  |  |  |  |  |  |  |  |  |  |  |
| MW-4A |  |  |  |  |  |  |  |  |  |  |  |
| MW-4B |  |  |  |  |  |  |  |  |  |  |  |
| MW-5A |  |  |  |  |  |  |  |  |  |  |  |
| MW-5B |  |  |  |  |  |  |  |  |  |  |  |
| MW-6 |  |  |  |  |  |  |  |  |  |  |  |
| MW-7A |  |  |  |  |  |  |  |  |  |  |  |
| MW-7B |  |  |  |  |  |  |  |  |  |  |  |
| MW-8 |  |  |  |  |  |  |  |  |  |  |  |

# Hyde Park DTW & 4-gas/PID meter readings

Date: __/__/__ Personnel:

| Well ID | Time | DTW (ft btpvc) | CO (ppm) | | H2S (ppm) | | Oxygen (%) | | LEL (%) | | VOCs (ppb) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | IN | OUT | IN | OUT | IN | OUT | IN | OUT | |
| MW-10A | | | | | | | | | | | |
| MW-10B | | | | | | | | | | | |
| MW-11A | | | | | | | | | | | |
| MW-11B | | | | | | | | | | | |
| MW-12B | | | | | | | | | | | |
| MW-13A | | | | | | | | | | | |
| MW-13B | | | | | | | | | | | |
| MW-14A | | | | | | | | | | | |
| MW-14B | | | | | | | | | | | |
| MW-15 | | | | | | | | | | | |
| MW-16A | | | | | | | | | | | |
| MW-16B | | | | | | | | | | | |
| MW-17A | | | | | | | | | | | |
| MW-17B | | | | | | | | | | | |
| MW-18A | | | | | | | | | | | |
| MW-18B | | | | | | | | | | | |
| MW-19A | | | | | | | | | | | |
| MW-19B | | | | | | | | | | | |
| PMW-1 | | | | | | | | | | | |
| PMW-2 | | | | | | | | | | | |
| PMW-3 | | | | | | | | | | | |
| PMW-4 | | | | | | | | | | | |
| PMW-5 | | | | | | | | | | | |
| PMW-6 | | | | | | | | | | | |
| PMW-7 | | | | | | | | | | | |
| PMW-8 | | | | | | | | | | | |
| PMW-9 | | | | | | | | | | | |

*MW-15B sampled every 5 yrs.

**SITE NAME:** ______________________________

SITE ID.: ____________

INSPECTOR: ____________

# MONITORING WELL FIELD INSPECTION LOG

DATE/TIME: ____________

WELL ID.: ____________

---

| | YES | NO |
|---|---|---|
| WELL VISIBLE? (If not, provide directions below) ........................................ | | |

WELL COORDINATES? NYTM X ______________ NYTM Y ______________ See Report

| | YES | NO |
|---|---|---|
| WELL I.D. VISIBLE? ........................................ | | |
| WELL LOCATION MATCH SITE MAP? (if not, sketch actual location on back) ............ | | |

WELL I.D. AS IT APPEARS ON PROTECTIVE CASING OR WELL: ..............................

| | YES | NO |
|---|---|---|
| SURFACE SEAL PRESENT? ........................................ | | |
| SURFACE SEAL COMPETENT? (If cracked, heaved etc., describe below) .................. | | |
| PROTECTIVE CASING IN GOOD CONDITION? (If damaged, describe below) ............ | | |

HEADSPACE READING (ppm) AND INSTRUMENT USED .............................. ________

TYPE OF PROTECTIVE CASING AND HEIGHT OF STICKUP IN FEET (If applicable) ............ ________

PROTECTIVE CASING MATERIAL TYPE: .............................. ________

MEASURE PROTECTIVE CASING INSIDE DIAMETER (Inches): .............................. ________

| | YES | NO |
|---|---|---|
| LOCK PRESENT? ........................................ | | |
| LOCK FUNCTIONAL? ........................................ | | |
| DID YOU REPLACE THE LOCK? ........................................ | | |
| IS THERE EVIDENCE THAT THE WELL IS DOUBLE CASED? (If yes,describe below) ............ | | |
| WELL MEASURING POINT VISIBLE? ........................................ | | |

MEASURE WELL DEPTH FROM MEASURING POINT (Feet): .............................. ________

MEASURE DEPTH TO WATER FROM MEASURING POINT (Feet): .............................. ________

MEASURE WELL DIAMETER (Inches): .............................. ________

WELL CASING MATERIAL: .............................. ________

PHYSICAL CONDITION OF VISIBLE WELL CASING: .............................. ________

ATTACH ID MARKER (if well ID is confirmed) and IDENTIFY MARKER TYPE ............ ________

PROXIMITY TO UNDERGROUND OR OVERHEAD UTILITIES .............................. ________

DESCRIBE ACCESS TO WELL: (Include accessibility to truck mounted rig, natural obstructions, overhead power lines, proximity to permanent structures, etc.).

______________________________________________

______________________________________________

______________________________________________

DESCRIBE WELL SETTING (For example, located in a field, in a playground, on pavement, in a garden, etc.) AND ASSESS THE TYPE OF RESTORATION REQUIRED.

______________________________________________

______________________________________________

______________________________________________

IDENTIFY ANY NEARBY POTENTIAL SOURCES OF CONTAMINATION, IF PRESENT (e.g. Gas station, salt pile, etc.):

______________________________________________

______________________________________________

______________________________________________

REMARKS:

______________________________________________

______________________________________________

# Structure Sampling Questionnaire and Building Inventory

New York State Department of Environmental Conservation

## PRODUCT INVENTORY

Building Name: ______________________ Bldg Code: ______________ Date: ______________

Bldg Address: ______________________________________ Apt/Suite No: ______________

Bldg City/State/Zip: ______________________________________

Make and Model of PID: ______________________ Date of Calibration: ______________

| Location | Product Name/Description | Size (oz) | Condition * | Chemical Ingredients | PID Reading | COC Y/N? |
|---|---|---|---|---|---|---|
| | | | | | | ☐ |
| | | | | | | ☐ |
| | | | | | | ☐ |
| | | | | | | ☐ |
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| | | | | | | ☐ |
| | | | | | | ☐ |
| | | | | | | ☐ |
| | | | | | | ☐ |

* Describe the condition of the product containers as **Unopened (UO)**, **Used (U)**, or **Deteriorated (D)**

** Photographs of the **front and back** of product containers can replace the handwritten list of chemical ingredients. However, the photographs must be of good quality and ingredient labels must be legible.

Product Inventory Complete? ☐ Were there any elevated PID readings taken on site? ☐ ☐ Products with COC?

AECOM

*Client:*

*Project Number:*

*Boring Location:*

*Drilling Method:*

*Weather:*

***BORING ID:***

*Sheet:* 1 of 1

*Date/Time Started:*

*Date/Time Finished:*

*Logged By:*

*Drilled By:*

| Depth (ft) | Sample Number | Sample Type | Recovery (ft) | PID reading* | MVA reading | U.S.C.S | **Lithologic Description** | Lab Sample ID |
|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | |
| 2 | | | | | | | | |
| 3 | | | | | | | | |
| 4 | | | | | | | | |
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| 16 | | | | | | | | |
| 17 | | | | | | | | |
| 18 | | | | | | | | |
| 19 | | | | | | | | |
| 20 | | | | | | | | |

END OF BORING @

**NOTES:**

* units relative to isobutylene span gas in parts per million (ppm)
f - fine; m - medium; c - coarse
NA - not applicable
SAA - Same as above

Checked by:______________ Date:__________________

## DRILLING SUMMARY

**Geologist:**

**Drilling Company:**

**Driller:**

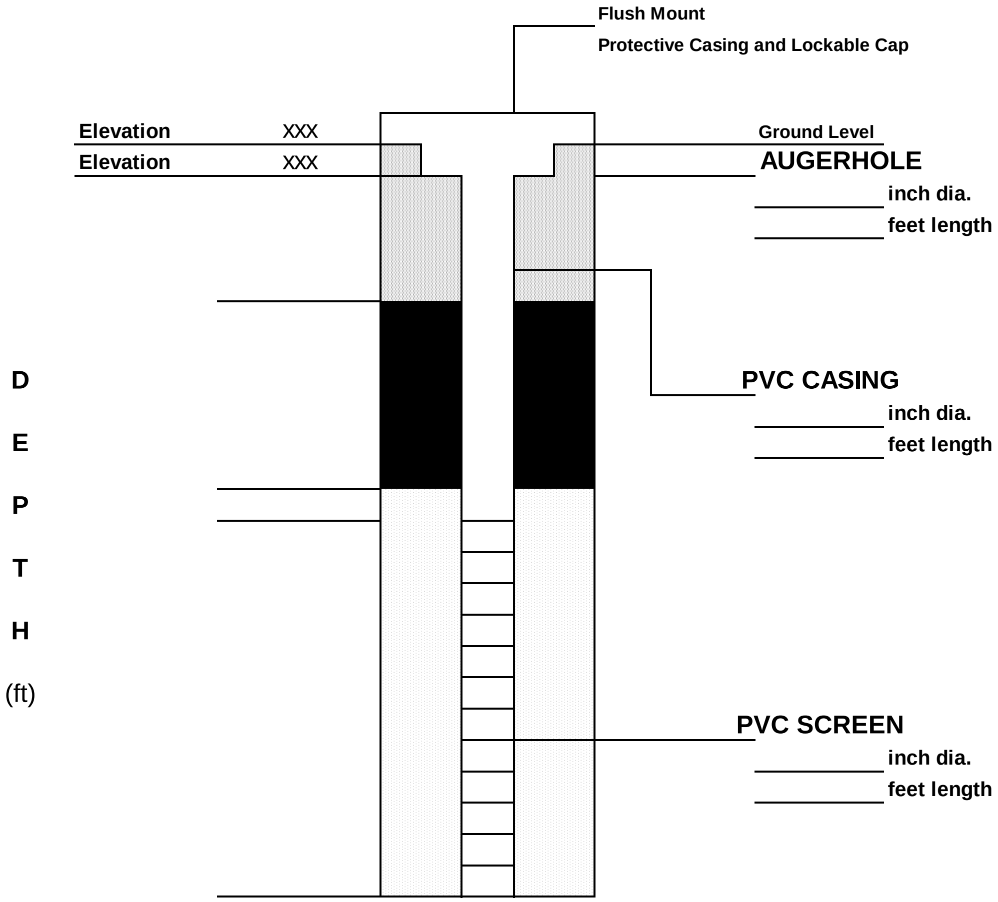
**Rig Make/Model:**

**Date:**

## GEOLOGIC LOG

| Depth(ft.) | Description |
|---|---|
| | See boring log for lithologic description. |

## WELL DESIGN



### *CASING MATERIAL*

**Surface:** Steel grade box

**Monitor:** 2" SCH 40 PVC

### *SCREEN MATERIAL*

**Type:** 2" SCH 40 PVC

**Slot Size:** .010"

### *FILTER MATERIAL*

**Type:** Sand **Setting:**

### *SEAL MATERIAL*

**Type:** **Setting:**

### *COMMENTS:*

### *LEGEND*

▒ Bagged Gravel (Quikrete #1151)

■ Bentonite Seal

░ Silica Sandpack

**Client:**

**Location:**

**Project No.:**

***AECOM***

**MONITORING WELL CONSTRUCTION DETAILS**

**Well Number:**

# Structure Sampling Questionnaire and Building Inventory

New York State Department of Environmental Conservation

Site Name: Site Code: Operable Unit:
Building Code: Building Name:
Address: Apt/Suite No:
City: State: Zip: County:

## Contact Information

Preparer's Name: Phone No:
Preparer's Affiliation: Company Code:
Purpose of Investigation: Date of Inspection:
Contact Name: Affiliation:
Phone No: Alt. Phone No: Email:
Number of Occupants (total): Number of Children:
☐ Occupant Interviewed? ☐ Owner Occupied? ☐ Owner Interviewed?
Owner Name (if different): Owner Phone:
Owner Mailing Address:

## Building Details

Bldg Type (Res/Com/Ind/Mixed): Bldg Size (S/M/L):
If Commercial or Industrial Facility, Select Operations:
If Residential Select Structure Type:
Number of Floors: Approx. Year Construction: ☐ Building Insulated? ☐ Attached Garage?
Describe Overall Building 'Tightness' and Airflows(e.g., results of smoke tests):

## Foundation Description

Foundation Type: Foundation Depth (bgs): Unit: FEET
Foundation Floor Material: Foundation Floor Thickness:
Foundation Wall Material: Foundation Wall Thickness: Unit: INCHES
☐ Floor penetrations? Describe Floor Penetrations:
☐ Wall penetrations? Describe Wall Penetrations:
Basement is: Basement is: ☐ Sumps/Drains? Water In Sump?:
Describe Foundation Condition (cracks, seepage, etc.) :
☐ Radon Mitigation System Installed? ☐ VOC Mitigation System Installed? ☐ Mitigation System On?

## Heating / Cooling / Ventilation Systems

Heating System: Heat Fuel Type: ☐ Central A/C Present?

## Vented Appliances

Water Heater Fuel Type: Clothes Dryer Fuel Type:
Water Htr Vent Location: Dryer Vent Location:

# Structure Sampling Questionnaire and Building Inventory

New York State Department of Environmental Conservation

Site Name: ______ Site Code: ______ Operable Unit: ______

Building Code: ______ Building Name: ______

Address: ______ Apt/Suite No: ______

City: ______ State: ______ Zip: ______ County: ______

## Factors Affecting Indoor Air Quailty

Frequency Basement/Lowest Level is Occupied?: ☐ Floor Material: ☐

☐ Inhabited? ☐ HVAC System On? ☐ Bathroom Exhaust Fan? ☐ Kitchen Exhaust Fan?

Alternate Heat Source: ☐ ☐ Is there smoking in the building?

☐ Air Fresheners? Description/Location of Air Freshener: ______

☐ Cleaning Products Used Recently?: Description of Cleaning Products: ______

☐ Cosmetic Products Used Recently?: Description of Cosmetic Products: ______

☐ New Carpet or Furniture? Location of New Carpet/Furniture: ______

☐ Recent Dry Cleaning? Location of Recently Dry Cleaned Fabrics: ______

☐ Recent Painting/Staining? Location of New Painting: ______

☐ Solvent or Chemical Odors? Describe Odors (if any): ______

☐ Do Any Occupants Use Solvents At Work? If So, List Solvents Used: ______

☐ Recent Pesticide/Rodenticide? Description of Last Use: ______

Describe Any Household Activities (chemical use,/storage, unvented appliances, hobbies, etc.) That May Affect Indoor Air Quality:

☐ Any Prior Testing For Radon? If So, When?: ______

☐ Any Prior Testing For VOCs? If So, When?: ______

## Sampling Conditions

Weather Conditions: ☐ Outdoor Temperature: ☐ °F

Current Building Use: ☐ Barometric Pressure: ☐ in(hg)

Product Inventory Complete? ☐ ☐ Building Questionnaire Completed?

# Structure Sampling Questionnaire and Building Inventory

New York State Department of Environmental Conservation

Building Code: Address:

## Sampling Information

Sampler Name(s): Sampler Company Code:

Sample Collection Date: Date Samples Sent To Lab:

Sample Chain of Custody Number: Outdoor Air Sample Location ID:

## SUMMA Canister Information

| | | | | | |
|---|---|---|---|---|---|
| Sample ID: | | | | | |
| Location Code: | | | | | |
| Location Type: | | | | | |
| Canister ID: | | | | | |
| Regulator ID: | | | | | |
| Matrix: | | | | | |
| Sampling Method: | | | | | |

## Sampling Area Info

| | | | | | |
|---|---|---|---|---|---|
| Slab Thickness (inches): | | | | | |
| Sub-Slab Material: | | | | | |
| Sub-Slab Moisture: | | | | | |
| Seal Type: | | | | | |
| Seal Adequate?: | ☐ | ☐ | ☐ | ☐ | ☐ |

## Sample Times and Vacuum Readings

| | | | | | |
|---|---|---|---|---|---|
| Sample Start Date/Time: | | | | | |
| Vacuum Gauge Start: | | | | | |
| Sample End Date/Time: | | | | | |
| Vacuum Gauge End: | | | | | |
| Sample Duration (hrs): | | | | | |
| Vacuum Gauge Unit: | | | | | |

## Sample QA / QC Readings

| | | | | | |
|---|---|---|---|---|---|
| Vapor Port Purge: | ☐ | ☐ | ☐ | ☐ | ☐ |
| Purge PID Reading: | | | | | |
| Purge PID Unit: | | | | | |
| Tracer Test Pass: | ☐ | ☐ | ☐ | ☐ | ☐ |

Sample start and end times should be entered using the following format: MM/DD/YYYY HH:MM

# Structure Sampling Questionnaire and Building Inventory

New York State Department of Environmental Conservation

## LOWEST BUILDING LEVEL LAYOUT SKETCH

Please click the box with the blue border below to upload a sketch of the lowest building level .
The sketch should be in a standard image format (.jpg, .png, .tiff)

Clear Image

Design Sketch

### Design Sketch Guidelines and Recommended Symbology

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

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

# Structure Sampling Questionnaire and Building Inventory

New York State Department of Environmental Conservation

## FIRST FLOOR BUILDING LAYOUT SKETCH

Please click the box with the blue border below to upload a sketch of the first floor of the building.
The sketch should be in a standard image format (.jpg, .png, .tiff)

Clear Image

Design Sketch

### Design Sketch Guidelines and Recommended Symbology

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

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

# Structure Sampling Questionnaire and Building Inventory

New York State Department of Environmental Conservation

## OUTDOOR PLOT LAYOUT SKETCH

Please click the box with the blue border below to upload a sketch of the outdoor plot of the building as well as the surrounding area. The sketch should be in a standard image format (.jpg, .png, .tiff)

Clear Image

Design Sketch

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# Hyde Park DTW & 4-gas/PID meter readings

Date: __/__/__ Personnel:

| Well ID | Time | DTW (ft btpvc) | CO (ppm) | | H2S (ppm) | | Oxygen (%) | | LEL (%) | | VOCs (ppb) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | IN | OUT | IN | OUT | IN | OUT | IN | OUT | |
| INJ-1 | | | | | | | | | | | |
| INJ-2 | | | | | | | | | | | |
| INJ-3 | | | | | | | | | | | |
| INJ-4 | | | | | | | | | | | |
| INJ-5L | | | | | | | | | | | |
| INJ-5U | | | | | | | | | | | |
| INJ-6L | | | | | | | | | | | |
| INJ-6U | | | | | | | | | | | |
| INJ-07 | | | | | | | | | | | |
| INJ-08 | | | | | | | | | | | |
| INJ-09 | | | | | | | | | | | |
| INJ-10 | | | | | | | | | | | |
| MW-1A | | | | | | | | | | | |
| MW-1B | | | | | | | | | | | |
| MW-2A | | | | | | | | | | | |
| MW-2B | | | | | | | | | | | |
| MW-3A | | | | | | | | | | | |
| MW-3B | | | | | | | | | | | |
| MW-4A | | | | | | | | | | | |
| MW-4B | | | | | | | | | | | |
| MW-5A | | | | | | | | | | | |
| MW-5B | | | | | | | | | | | |
| MW-6 | | | | | | | | | | | |
| MW-7A | | | | | | | | | | | |
| MW-7B | | | | | | | | | | | |
| MW-8 | | | | | | | | | | | |

# Hyde Park DTW & 4-gas/PID meter readings

Date: __/__/__

Personnel:

| Well ID | Time | DTW (ft btpvc) | CO (ppm) | | H2S (ppm) | | Oxygen (%) | | LEL (%) | | VOCs (ppb) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | IN | OUT | IN | OUT | IN | OUT | IN | OUT | |
| MW-10A | | | | | | | | | | | |
| MW-10B | | | | | | | | | | | |
| MW-11A | | | | | | | | | | | |
| MW-11B | | | | | | | | | | | |
| MW-12B | | | | | | | | | | | |
| MW-13A | | | | | | | | | | | |
| MW-13B | | | | | | | | | | | |
| MW-14A | | | | | | | | | | | |
| MW-14B | | | | | | | | | | | |
| MW-15 | | | | | | | | | | | |
| MW-16A | | | | | | | | | | | |
| MW-16B | | | | | | | | | | | |
| MW-17A | | | | | | | | | | | |
| MW-17B | | | | | | | | | | | |
| MW-18A | | | | | | | | | | | |
| MW-18B | | | | | | | | | | | |
| MW-19A | | | | | | | | | | | |
| MW-19B | | | | | | | | | | | |
| PMW-1 | | | | | | | | | | | |
| PMW-2 | | | | | | | | | | | |
| PMW-3 | | | | | | | | | | | |
| PMW-4 | | | | | | | | | | | |
| PMW-5 | | | | | | | | | | | |
| PMW-6 | | | | | | | | | | | |
| PMW-7 | | | | | | | | | | | |
| PMW-8 | | | | | | | | | | | |
| PMW-9 | | | | | | | | | | | |

*MW-15B sampled every 5 yrs.

# APPENDIX L

# REMEDIAL SYSTEM OPTIMIZATION TABLE OF CONTENTS

# REMEDIAL SYSTEM OPTIMIZATION
# FORMER CARBORUNDUM COMPANY – HYDE PARK SITE

TABLE OF CONTENTS

# APPENDIX O

# RESPONSIBILITIES of OWNER and REMEDIAL PARTY

## Responsibilities

The responsibilities for implementing the Site Management Plan ("SMP") for the Former Carborundum Company, Hyde Park Facility site (the "site"), number 932036, are divided between the site owner(s) and a Remedial Party, as defined below. The owner(s) is/are currently listed as:
3425 Hyde Park Boulevard, LLC
(716) 940-1435
emery@simonconstructionco.com
(the "owner").

**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:
Elm Holdings Inc., 201 Helios Way, Floor 6, Houston, TX 77079.

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

## 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 a(n) Environmental Notice 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 Notice and shall submit, upon request by the NYSDEC, a written certification that the Environmental Notice 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. If 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) If 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 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 375 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 1.3 of the SMP. A change of use includes, but is not limited to, any activity that may increase direct human or environmental exposure (e.g., day care, school or park). 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.

## 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) Prior to a change in use that impacts the requirements and/or responsibilities for implementing the SMP, the RP shall submit to the NYSDEC for approval an amended SMP.

7) 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 NYSDEC project manager 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.