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March 2021

# Five-Year Review Report (2016 to 2020), Former Carborundum Company, Hyde Park Facility
# Town of Niagara, Niagara County, NY
# NYSDEC Site No. 932036

*Submitted to:*

New York State Department of Environmental Conservation
Division of Hazardous Waste Remediation
270 Michigan Avenue
Buffalo, NY 14203

*On behalf of:*

Elm Holdings Inc.

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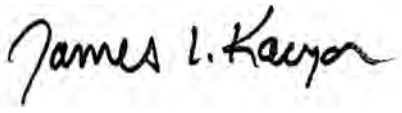

Reviewed By James L. Kaczor, P.G.

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# 1.0 Introduction

This Five-Year Review Report summarizes the groundwater monitoring and investigation activities completed at the Former Carborundum Company, Hyde Park Facility (Site) in the Town of Niagara, New York (see Figure 1 – Project Location Plan). This report provides a summary of the results from the annual groundwater monitoring events conducted from 2016 through 2020 with a comparison to previous results. The annual groundwater monitoring was conducted on an alternating spring (even years)/fall (odd years) schedule, and includes the collection of groundwater samples for the analysis of chlorinated volatile organic compounds (CVOCs) and natural attenuation parameters. This report also includes results from the 2016 membrane interface probe / hydraulic profiling tool (MIP/HPT) study as well as the 2018 emerging contaminants sampling event.

This work was completed in accordance with the groundwater monitoring work plan (DE&S 2000) for Operable Unit 2 (OU2), approved by the New York State Department of Environmental Conservation (NYSDEC), correspondence from NYSDEC dated September 28, 2005 (NYSDEC 2005) and April 8, 2014 (NYSDEC 2014), and letters to NYSDEC dated August 20, 2013 (Parsons 2013), April 3, 2014 (Parsons 2014), and September 24, 2018 (AECOM 2018b).

Figure 2 – Site Plan presents monitoring well locations, injection well locations, performance monitoring well locations, and site features.

## 1.1 Background

The following summary presents a brief description of Site history, previous investigation and remediation activities, Site Remedial Action Objectives (RAOs), and Site geology and hydrogeology.

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, 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 OU3, additional soil removal was conducted east of the property boundaries in 2002. 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 (COVCs) 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.

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 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). Based on the current CVOC concentrations observed in groundwater at the Site greater than Site SCGs, additional injections are being considered to further progress the Site to the remedial goals set forth in the ROD (i.e., meet Site SCGs and be protective of human health and the environment). If the remedial goals are met, the goal is to then have the Site delisted from a Class 4 Registry site and classified as a Class C non-registry site.

## 1.2 Site Geology/Hydrogeology

### 1.2.1 Overburden

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. Groundwater in the overburden is observed from approximately five to 20 feet below ground surface (bgs). Top of bedrock is typically occurs 20 to 27 feet bgs. 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.

### 1.2.2 Bedrock

Overburden at the Site is underlain by fractured Middle Silurian Dolostone (greater than 20 feet bgs) of the Lockport Group. The bedrock groundwater flow direction is west/southwesterly towards Hyde Park Boulevard and Rhode Island Avenue. Regionally, groundwater flow is affected by the Niagara River Gorge located approximately 1.5 miles west of the Site.

# 2.0 Groundwater Monitoring Program Summary

During the five-year period from 2016 through 2020, the annual groundwater rmonitoring events were conducted in April 2016 (AECOM 2016), September 2017 (AECOM 2017), April 2018 (AECOM 2018A), November 2019 (AECOM 2020a), and March 2020 (AECOM 2020b). The annual groundwater monitoring program included water level measurements, groundwater sampling at 17 to 23 well locations, and submission of groundwater samples for analysis of CVOCs and natural attenuation parameters. Quality assurance/quality control (QA/QC) samples, including field duplicate, matrix spike/matrix spike duplicate sample, and trip blanks were also collected and submitted for analysis. The scope of work for the groundwater monitoring events included:

- Collection of water level measurements from overburden and bedrock monitoring wells, injection wells, and performance monitoring wells;
- Purging of select overburden and bedrock monitoring wells and collection of field measurements of pH, temperature, specific conductivity, oxidation/reduction potential (ORP), dissolved oxygen (DO), and turbidity; and
- Collection of groundwater samples from monitoring wells for specific CVOC analyses.

The Spring 2020 sampling event included collection of groundwater samples from select overburden and bedrock monitoring wells for analysis of natural attenuation parameters to aid in remedial action optimization (RAO) evaluations. Table 1 presents a summary of groundwater sample locations and parameters for the annual groundwater monitoring program from 2016 through 2020.

## 2.1 Groundwater Elevation Measurements

During the annual groundwater sampling events, water levels were measured in the monitoring wells, injection wells, and performance monitoring wells relative to the top of the inner well casing using an electronic water level tape accurate to 0.01 foot (ft). The depth to water was measured in each well from a surveyed point on the casing. The water levels were then converted to elevations presented as feet above mean sea level (ft AMSL, NAVD 88 datum). The groundwater elevations were used to construct groundwater elevation contour maps in both the overburden and bedrock zones. Table 2 provides a summary of the groundwater level measurements and calculated groundwater elevations from the five-year period summarized herein. Figures 3 through 7 present overburden groundwater potentiometric surface contours and Figures 8 through 12 present bedrock groundwater potentiometric contours. Section 4.1 presents a discussion of groundwater elevations and flow directions.

## 2.2 Groundwater Sampling

The locations of the monitoring wells sampled are shown in Figure 2. Wells were sampled following the methodology outlined in the groundwater monitoring work plan and approved revisions per subsequent correspondence with NYSDEC. A list of wells and analytical parameters for the 2016 through 2020 annual sampling events is provided in Table 1. As described in the Site Management (SM) Periodic Review Report (PRR) Response letter from the NYSDEC dated October 6, 2018, four locations (MW-2B, MW-4A, MW-8, and MW-11B) were not required to be sampled as part of the annual groundwater monitoring program after 2018. MW-12A was found to be destroyed during the

Fall 2019 sampling event and therefore was not sampled in 2019 or 2020. MW-15 is sampled every five years and is scheduled to be sampled next in 2023.

During purging, groundwater was monitored for temperature, specific conductivity, pH, dissolved oxygen (DO), oxidation-reduction potential (ORP), and turbidity. An aliquot of the groundwater sample was tested in the field for alkalinity, carbon dioxide, ferrous iron, and hydrogen sulfide using Hach™ test kits.

During each sampling event, the monitoring wells were purged following low-flow procedures with dedicated tubing and a peristaltic pump. All samples for chemical analyses were hand-delivered to Eurofins TestAmerica Laboratories, Inc., (ETAL) in Amherst, New York under secure chain-of-custody (COC). ETAL Amherst transferred the samples to ETAL, Canton, Ohio which performed the analyses. Both ETAL locations are New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) certified laboratories.

Samples from each well were analyzed for select CVOCs, including tetrachloroethene (PCE), TCE, cis-1,2-DCE, trans-1,2-DCE, 1,1-DCE, DCA, 1,1,1-trichloroethane (TCA), VC, and chloroethane. In addition, samples from selected wells were analyzed for natural attenuation evaluation parameters, consisting of:

- dissolved iron;
- methane, ethane, ethene, and propane;
- total chloride, sulfate, and sulfide; and,
- total organic carbon (TOC), biological oxygen demand (BOD), chemical oxygen demand (COD), nitrate, and nitrite.

The six well pairs chosen for these additional analyses are located within, upgradient, downgradient, and side gradient of the source area, and consist of 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 well pair, MW-12A and MW-12B, has historically also been sampled; but, in Fall 2019 MW-12A was found destroyed and only MW-12B was able to be sampled in Fall 2019 and Spring 2020.

Purge water and decontamination water were contained and staged in a secure area onsite in a either a holding tank or new steel 55-gallon drum for subsequent characterization and proper disposal.

## 2.3 Membrane Interface Probe/Hydraulic Profiling Tool Study

In November 2016, AECOM 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 data will provide for improved long-term groundwater monitoring data interpretation and assessment of remedy enhancement.

In accordance with the Work Plan submitted to NYSDEC on November 21, 2016, the MIP/HPT study was performed on November 29 and 30, 2016 by Parratt-Wolff, Inc. (East Syracuse, NY) under the supervision of a qualified AECOM geologist.

The MIP/HPT study focused on three areas of monitoring wells: MW-10A/MW-5A, MW-17A, and MW-18A. A total of nine investigation points were completed, as follows:

- MW-10/MW-5A area - MIP-1 through MIP-4;

- MW-17A area - MIP-5 through MIP-7; and,
- MW-18A area - MIP-8 and MIP-9.

The MIP/HPT logs present direct-reading, continuous screening using the following sensors:

- PID – Photoionization Detector (detects general VOCs);
- FID – Flame Ionization Detector (detects general VOCs; greater ionization potential than PID);
- XSD – Halogen Specific Detector (detects chlorinated VOCs);
- EC – Electrical Conductivity Detector – Conductivity of soils to help determine soil composition (cohesive materials show higher response; granular materials show lesser response); and,
- HPT – Flow and pressure measurements are produced to estimate hydraulic conductivity values and to help confirm soil composition.

A map of MIP/HPT boring locations, logs and cross-sections are presented in Appendix A.

## 2.4 Emerging Contaminants 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. On September 24, 2018, AECOM submitted an Emerging Contaminants Groundwater Sampling Work Plan (AECOM 2018b). In this work plan, AECOM proposed to 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. A peristaltic pump and dedicated-disposable high-density polyethylene tubing were used to complete the sampling by low-flow sampling techniques. During low-flow purging, an AECOM geologist monitored groundwater quality parameters of pH, conductivity, temperature, turbidity, DO, and ORP using a flow-through cell. Each well was purged until a minimum of three well volumes was removed and groundwater quality parameters stabilized. Groundwater samples were collected into laboratory-provided sample containers as described in the Work Plan. All purge water is currently stored in a 300-gallon poly tank and staged onsite pending disposal.

The groundwater sample containers were labeled and placed into an ice-filled cooler and delivered by AECOM staff under chain-of-custody protocol to TestAmerica Laboratories, Inc. (ETAL), a NYSDOH ELAP certified analytical laboratory, located in Amherst, New York. Samples were submitted for analysis of the following parameters:

- 1,4-dioxane by EPA Method 8270 Selective Ion Monitoring (SIM) analyzed by ETAL Buffalo, New York; and,
- 21 PFAS compounds by United States Environmental Protection Agency (EPA) Method 537 Modified (low level) analyzed by ETAL Sacramento, California.

# 3.0 Groundwater Monitoring Program Results

## 3.1 Groundwater Elevations and Flow Directions

A summary of groundwater elevation monitoring data for the monitoring events 2016 through 2020 is provided in Table 2, including New York State Plane Coordinate System location coordinates, top of casing elevation, depth to water and calculated groundwater elevations for the monitoring wells, injection wells, and performance monitoring wells.

Overburden groundwater contour maps based on the water level from the sampling events 2016 through 2020 are presented in Figures 3 through 7, respectively. In general, groundwater flow is from northeast to southwest. Overall overburden groundwater in the central portion of the site exhibited little change in slope. Gradients and flow directions were more defined in both the northeast and southwest corners of the site.

Figure 4 presents an overburden groundwater contour map based on the September 11, 2017 water level data. Overburden groundwater was measured at elevations between 589.41 ft AMSL (INJ-6U) in the north central portion of the Site to 584.59 ft AMSL (MW-3A) in the northeast corner of the Site. Overburden groundwater is mounded in the north central region of the Site as a result of the higher elevations observed in the area of MW-16A, INJ-6U, and INJ-7 as compared to MW-3A. As a result, groundwater flow is to the northeast toward MW-3A and to the southwest toward MW-11A off of this high with gently sloping gradients. With respect to the groundwater elevation at MW-3A, historically, the general groundwater flow trend is from the northeast (MW-3A) to the southwest (MW-11A) and water elevations in MW-3A, MW-7A, MW-16A, and MW-19A move in relative harmony; however, on 5 of 33 occasions since 2000, the elevation at MW-3A has been recorded lower than one or more of these three wells causing the apparent mound in the vicinity of MW-16A as observed during this event.

Bedrock groundwater contour maps based on the water level from the sampling events 2016 through 2020 are presented in Figures 8 through 12, respectively. The general bedrock groundwater flow direction is west/southwesterly towards Hyde Park Boulevard and Rhode Island Avenue, consistent with historical observations of groundwater flow. Overall the gradient is shallow. There is a localized area of a slight groundwater mound in the central part of the site near PMW-7.

Downward vertical gradients were observed more commonly in overburden/bedrock well pairs in the north, east and central portions of the Site; upward vertical gradients were observed more commonly in well pairs in the south/southwest portion of the Site.

## 3.2 Data Summary

Groundwater samples from the annual groundwater monitoring program were submitted to the analytical laboratory for select CVOC analysis and other parameters as discussed in Section 2.2 and as summarized on Table 1. A summary of the analytical laboratory data by sample year is provided in Tables 3 through 7. Figure 13 presents select CVOC concentrations in overburden groundwater for 2000 (baseline) and 2009 through 2020 and Figure 14 presents select CVOC concentrations in bedrock groundwater for the same sampling events. Field parameter measurements are not presented herein but are available in the respective Annual Groundwater Monitoring Reports.

Overburden Source Area Wells:

The concentration of TCE at MW-7A in Spring 2020 was below groundwater standards[1] and consistent with historical post-injection concentrations. However, the concentrations of DCE and VC at MW-7A have increased from April 2016 through March 2020, and above groundwater standards (Figures 13 and 16). MW-7A is in an area that exhibited the highest CVOC concentrations in shallow groundwater prior to the first injection and is within the area that was targeted during the emulsified vegetable oil substrate injections in 2008, 2009, 2011 and 2013. MW-7A will continue to be monitored as a part of the annual sampling program.

MW-16A was targeted in the November 2011 injection event to address VC concentrations, but only a negligible amount of substrate was injected due to low permeability of the soils. Concentrations of TCE and DCA have been below groundwater standards since 2007. DCE has been below 10 µg/L since 2012 through 2020. VC concentration was detected at a historical high for this location (Figures 13 and 22). VC is a degradation product of TCE via DCE, and VC concentrations in MW-16A have increased since the start of the injection program. MW-16A will continue to be monitored as a part of the annual sampling program.

MW-17A is an overburden well in the area of targeted bedrock injections in 2009 and 2013. The 2020 DCE concentration was lower than recent historical data for the third year in a row and TCE, VC, and DCA concentrations were consistent with recent historical data. Since 2009, TCE has been reduced to non-detect, DCE (38 µg/L) has steadily decreased to about one-third of the 2016 concentration (110 µg/L), while VC (78 µg/L) has increased as compared to pre-injection concentration (18 µg/L), but has been relatively stable since 2016 (89 µg/l). MW-17A will continue to be monitored as a part of the annual sampling program.

Overburden Downgradient Wells:

MW-5A, located south of the east end of the former facility building, showed sporadic increases and decreases in DCE and VC before and after substrate injections in 2009, 2011, and 2013 (Figure 13). This trend continued from Spring 2016 through Spring 2020 where concentrations of DCE, VC, and DCA fluctuated but remained within the mid-range of the historical average (Figure 17). There appears to be a direct relationship between degradation product concentrations and water level fluctuations in MW-5A. Furthermore, there is a consistent upward hydraulic gradient between the bedrock and overburden zones at this location. MW-5A will continue to be monitored as a part of the annual sampling program.

MW-10A is located central to and south of the former facility building. From 2016 through 2020, DCE and VC concentrations in MW-10A displayed changes suggestive of biodegradation, where DCE decreased from 960 µg/l to 570 µg/l, while VC increased from 83 µg/l to 130 µg/l (Figure 18). Over the same time period, TCE increased slightly from an estimated 0.57 µg/l to 7.6 µg/L, slightly above groundwater standard (5 µg/L). DCA was non-detect from 2017 through 2020. Groundwater elevation measurements indicate an upward hydraulic gradient between MW-10A and MW-10B (from bedrock to overburden). MW-10A will continue to be monitored as a part of the annual sampling program.

[1] NYSDEC Technical & Operational Guidance Series (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations and revisions

MW-12A, located west of the former facility building along Hyde Park Boulevard, was found destroyed during the Fall 2019 sampling event and no sample was collected in Fall 2019 or Spring 2020. From 2016 through 2018, CVOC concentrations were stable. Recent historical data are presented on Figure 13 and Figure 19.

MW-18A, located east of the former facility building, showed VC and DCA concentration below groundwater standards from 2016 through 2020. Concentrations of TCE and DCE have remained stable from 2010 through 2019 (Figure 13). MW-18A will continue to be monitored as a part of the annual sampling program.

#### 3.2.2.2 Bedrock Results

Figure 14 shows a summary of the bedrock well CVOC analytical results from Fall 2009 through Spring 2020 annual sampling events, and data from 2000 as a reference point. Key observations are listed below.

Bedrock Source Area Wells:

Significant reductions in DCE and VC concentrations have been observed in MW-6 relative to 2000 concentrations, which were measured prior to bioremediation injections in the area of MW-7A in 2008. Since 2009, DCE has steadily decreased (85 µg/L in 2009 to 11 µg/L in 2020). Since 2016, DCE has decreased from 18 µg/l to 11 µg/l. Concentrations of VC increased from 59 µg/l to 72 µg/l between 2016 and 2020, but were within the observed range at his location and again, similar to the previous sampling event. The reduction of DCE to the current result with a generally stable VC concentration indicates natural attenuation is continuing to occur, although the rate of reduction of VC is less than that of DCE. TCE and DCA have consistently been non-detect or detected at an estimated concentration below the groundwater standard since 2000. MW-6 will continue to be monitored as a part of the annual sampling program to monitor progress of attenuation of DCE and VC.

Significant reductions in DCE and VC concentrations have been observed in MW-7B relative to 2000 concentrations, which were measured prior to bioremediation injections in the area of MW-7A in 2008. TCE, and DCA concentrations have been below groundwater standard since 2012. From 2016 through 2020 the DCE concentration increased from 0.82 µg/l to 5.4 µg/L which is just above standard. Similarly, the VC concentration increased from 10 µg/l to 18 µg/L from 2016 to 2020 but was within the historic range. MW-7B will continue to be monitored as a part of the annual sampling program to monitor progress of attenuation of VC.

TCE, DCE, and VC concentrations increased at MW-16B in early 2012 and 2013 after injections were performed at overburden injection wells (INJ-6L, INJ-7 and INJ-8) in the vicinity of MW-16A in October 2011. TCE concentrations decreased in 2013 and have remained below groundwater standard since that time. DCE and VC concentrations remained elevated through 2015 and then sharply decreased in 2016. DCE has been below groundwater standard since 2016 and VC only slightly above groundwater standard but decreasing from 4.3 µg/l in 2016 to 2.9 µg/l in 2020. (Figure 14 and Figure 22). MW-16B will continue to be monitored as a part of the annual sampling program to monitor progress of attenuation of VC.

The TCE concentration in MW-17B has been non-detect for more than the past decade except for an estimated value in 2017 (0.68 J µg/L) (Figures 14 and 23). DCE concentrations have fluctuated from 2016 to 2020, ranging from non-detect in Spring 2016 to 11 µg/l in Fall 2019, but was below standard in Spring 2020 (1.4 µg/L). VC concentration decreased over the course of the bioremediation

injections from 69 µg/L in 2000 to 0.88 µg/L in April 2016, and was 2.6 µg/L in Spring 2020. MW-17B is located within the area of the bedrock bioremediation injections performed in November 2009 and September 2013 and was the location of the highest CVOCs in bedrock prior to bioremediation activities. MW-17B will continue to be monitored as a part of the annual sampling program to monitor progress of attenuation of VC.

At MW-18B, TCE and DCA have consistently been non-detect at the reporting limit since 2009. DCE and VC concentrations have fluctuated since 2009, with historical lows occurring in October 2014 following injections at MW-18B in September 2013. DCE and VC have fluctuated between 2016 and 20, peaking in September 2017 (380 µg/l DCE and 210 µg/l VC), followed by decreases through Spring 2020 (32 µg/L DCE and 51 µg/L VC) (Figures 14 and 23). MW-18B will continue to be monitored as a part of the annual sampling program to monitor progress of attenuation of DCE and VC. MW-19B is located east of the main facility in the area remediated as part of OU1. Concentrations of TCE and DCA have been below groundwater standards from 2012 through 2020. Concentrations of DCE and VC in MW-19B have fluctuated from 2016 through 2020. Over this period, DCE concentrations ranged from 1.1 µg/l to 24 µg/l, with a concentration of 11 µg/l in Spring 2020 while VC concentrations ranged from 1.1 µg/l to 5.0 µg/l, with a concentration of 2.3 µg/l in Spring 2020. MW-19B will continue to be monitored as a part of the annual sampling program to monitor progress of attenuation of DCE and VC.

Bedrock Downgradient Wells:

At MW-5B, TCE has consistently been non-detect or detected at an estimated concentration near the reporting limit since 2000, indicating this area is not a source area for TCE. Total concentrations of DCE and VC have remained relatively constant since 2009, with a slightly decreasing trend of DCE and an increasing trend of VC indicating ongoing reductive dechlorination (Figure 17). MW-5B will continue to be monitored as a part of the annual sampling program.

At MW-10B, TCE has consistently been non-detect since 2009, indicating this area is not a source area for TCE. In addition, DCA has consistently been non-detect or detected at a concentration near the reporting limit and below groundwater standard since 2000. DCE and VC concentrations have remained relatively constant since 2009 (Figure 18). MW-10B will continue to be monitored as a part of the annual sampling program.

At downgradient location MW-12B, TCE has consistently been non-detect or detected at an estimated concentration near the reporting limit since 2000, indicating this area is not a source area for TCE. In addition, DCA has consistently been non-detect or detected at a concentration near the reporting limit and below groundwater standard since 2000. Significant reductions in DCE and VC concentrations have been observed in MW-12B relative to concentrations measured prior to bioremediation injections in the vicinity of MW-17B in 2009. Concentrations of DCE and VC increased following injections in the vicinity of MW-17B in 2013 and have remained relatively stable since, showing little change from 2016 through 2020 (Figures 14 and 19). MW-12B will continue to be monitored as a part of the annual sampling program to monitor attenuation of DCE and VC.

Significant reductions in TCE, DCE, and VC concentrations have also been observed in downgradient well MW-14B relative to concentrations measured prior to bioremediation injections (Figures 14 and 21). Including March 2020 data, TCE, DCE, and DCA concentrations have been below groundwater standards since 2011. VC concentrations had been below groundwater standards since August 2013, except for a September 2017 VC concentration of 2.9 µg/L; VC concentration in December 2020 (1 µg/L) was below groundwater standard. It is recommended that MW-14B continue to be monitored as

part of the annual sampling program to monitor for perimeter concentrations of constituents of concern.

MW-15B is currently sampled every five years. The well was last sampled on June 14, 2018. Consistent with prior results, TCE and DCA concentrations were below groundwater standard. DCE and VC concentrations increased above groundwater standards (5.2 µg/L for DCE and 16 µg/L for VC), similar to May 2010 concentrations.

### 3.2.3 Attenuation Monitoring Results

As part of the ongoing groundwater sampling program, natural attenuation parameters have been sampled during each monitoring event (see Tables 3 through 7). Natural attenuation parameters have generally remained consistent for several years. Notable changes and/or trends observed over the 2016 through 2020 period include:

- TOC concentrations decreased in several wells from 2016 through. These decreases are in areas targeted during the 2013 injections and represent continued depletion of the injected carbon substrate. TOC decreases over this period are observed in overburden wells MW-4A, MW-7A, and MW-16A, and bedrock wells MW-7B, MW-16B, MW-18B. TOC concentrations in these wells have decreased to the point where they are near pre-injection concentrations.
- Decreases in BOD and COD levels were observed in wells (MW-4A, MW-7A, MW-16A, MW-17A, MW-7B, MW-16B, MW-17B, and MW-18B) from 2016 through 2019. Similar to TOC, this may represent continued depletion of the 2013 injectate.
- From 2016 through 2020, chloride concentrations decreased in overburden wells MW-7A, MW10A, MW-17A, MW-18A, and bedrock well MW-17B. Since chloride is produced during reductive dichlorination of CVOCs, this may indicate that anaerobic biodegradation processes are ongoing, but may be slowing to pre-injection rates in the areas targeted during the 2013 injections. The presence of chloride in several other wells suggests biodegradation is ongoing.
- Ethene is the final degradation product of TCE, providing solid evidence of substantial biodegradation. For the 2016 through 2020 period, the only trend in ethene concentration was noted in well MW-10A. Several other wells had ethene concentrations that were either stable or fluctuated somewhat over this period. The presence of ethene is an indication that biodegradation is continuing.
- Elevated methane concentrations (>20 milligrams per liter are noted in several wells, indicating an environment conducive to anaerobic biodegradation.

Overall, the environmental conditions and Site-wide long-term changes in concentrations indicate that the enhanced biodegradation program has been effective and natural attenuation is an ongoing, active process.

## 3.3 Membrane Interface Probe/Hydraulic Profiling Tool Study

A Site map showing the MIP/HPT boring locations, the MIP/HPT logs and cross-sections are presented in Appendix A. A table summarizing the results are presented in the 2019 Remedy Enhancement Evaluation Work Plan (AECOM 2019b). 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 nearer the bottom approximately 5-8 feet at each sample point (approximately 15 to 20 feet bgs).

The increase in VOC impacts and the increased hydraulic conductivity at the bottom of each point are conditions considered favorable for implementation of an injection-related technology to reduce CVOC concentrations and enhance control of CVOCs in the zones of interest. MIP/HPT cross-sections are presented in Attachment 3. The cross-sections present XSD response (halogenated organics); a greater response indicates potential for greater presence of halogenated organics. The cross-sections show greatest response west of MW-5A and south of PMW-7. This information would be considered when evaluating the locations of the potential remedy enhancement pilot study areas.

## 3.4 Emerging Contaminants Sampling

Results from the October 4-5, 2018 emerging contaminants sampling are presented in Table 8 and are summarized below.

*1,4-dioxane*

1,4-dioxane was detected at each of the wells ranging from 0.61 micrograms/liter (µg/L) to 1.5 µg/L.

*PFAS*

As presented in Table 1, some PFAS compounds were detected at each well ranging from 0.41 J nanograms/liter (ng/L) to 15 ng/L. PFOS was not detected at any of the sample wells.

# 4.0 Conclusions and Recommendations

The following conclusions and recommendations were developed upon evaluation of the activities performed and data collected over the five-year period from 2016 through 2020:

Conclusions:

CVOC concentrations have steadily declined in the overburden and bedrock groundwater over the past 20 years, with more recent substantial declines related to the 2008, 2009, 2011, and 2013 bioremediation injections.

MW-7A, located in the area of the vegetable oil substrate injections conducted in September 2008, November 2009, November 2011, and September 2013, continued to show decreased levels of CVOCs. Fluctuations in concentrations of CVOC degradation products at MW-5A appear to have a direct relationship with water level fluctuations and are consistent with historical concentrations following substrate injections. MW-16A VC and ethene results increased sharply compared to recent years. Overall, overburden groundwater CVOC concentrations in 2020 were generally consistent with the previous sampling program results.

Bedrock groundwater CVOC concentrations generally showed declines related to the previous substrate injections. Notably, CVOC concentrations decreased substantially in several downgradient bedrock monitoring wells since 2009. TCE was non-detect in all bedrock wells sampled. This trend will continue to be monitored.

Groundwater samples for natural attenuation monitoring have been collected since October 2000 and continue to indicate that natural attenuation processes are active. The results for Spring 2020 were generally consistent with recent monitoring events.

Natural anaerobic biodegradation of TCE, which was occurring at the Site prior to 2008, was substantially enhanced by the bioremediation injection program conducted over multiple years. The enhanced bioremediation injections effectively contributed to the observed decreasing concentration trends, and ongoing natural attenuation processes continue to improve groundwater quality at the Site. Additional enhanced bioremediation injections could further reduce groundwater CVOC concentrations.

The MIP/HPT investigation confirmed that the CVOC concentrations and hydraulic conductivity both peak in the upper weathered bedrock. This result is confirmed by monitoring well data and suggest conditions favorable to an injection-based remedial technology.

Recommendations:

The annual groundwater monitoring program should be continued as currently established. At present, CVOCs within the source area and downgradient of that area have decreased as a result of remedial measures including emulsified vegetable oil substrate injections in 2008, 2009, 2011 and 2013. Terra Systems, Inc. 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. Evaluation of targeted injections to enhance the natural attenuation process is being performed.

# 5.0 References

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# Tables

**Table 1**
**Annual Sampling Program**
**Five-Year Review**
**Former Carborundum Company, Hyde Park Facility**
**Niagara, New York**

| Location | Unit | Spring 2016 | Fall 2017 | Spring 2018 | Fall 2019 | Spring 2020 |
|---|---|---|---|---|---|---|
| **Existing Site Investigation Monitoring Wells** | | | | | | |
| MW-2B | bedrock | VOCs[1], WHA[3], FA[4] | VOCs[1], WHA[3], FA[4] | VOCs[1], WHA[3], FA[4] | Not Sampled[7] | Not Sampled[7] |
| MW-4A | overburden | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], Nat Att.[2], WHA[3], FA[4] | Not Sampled[7] | Not Sampled[7] |
| MW-5A | overburden | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], Nat Att.[2], WHA[3], FA[4] |
| MW-5B | bedrock | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], Nat Att.[2], WHA[3], FA[4] |
| MW-6 | bedrock | VOCs[1], WHA[3], FA[4] | VOCs[1], WHA[3], FA[4] | VOCs[1], WHA[3], FA[4] | VOCs[1], WHA[3], FA[4], CENSUS[5] | VOCs[1], WHA[3], FA[4] |
| MW-7A | overburden | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], WHA[3], FA[4], CENSUS[5] | VOCs[1], Nat Att.[2], WHA[3], FA[4] |
| MW-7B | bedrock | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], Nat Att.[2], WHA[3], FA[4] |
| MW-8 | bedrock | VOCs[1], WHA[3], FA[4] | VOCs[1], WHA[3], FA[4] | VOCs[1], WHA[3], FA[4] | Not Sampled[7] | Not Sampled[7] |
| MW-10A | overburden | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], WHA[3], FA[4], CENSUS[5] | VOCs[1], Nat Att.[2], WHA[3], FA[4] |
| MW-10B | bedrock | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], WHA[3], FA[4], CENSUS[5] | VOCs[1], Nat Att.[2], WHA[3], FA[4] |
| MW-11B | bedrock | VOCs[1], WHA[3], FA[4] | VOCs[1], WHA[3], FA[4] | VOCs[1], WHA[3], FA[4] | Not Sampled[7] | Not Sampled[7] |
| MW-12A | overburden | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], Nat Att.[2], WHA[3], FA[4] | Well Destroyed | Well Destroyed |
| MW-12B | bedrock | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], Nat Att.[2], WHA[3], FA[4] |
| MW-13B | bedrock | VOCs[1], WHA[3], FA[4] | VOCs[1], WHA[3], FA[4] | VOCs[1], WHA[3], FA[4] | VOCs[1], WHA[3], FA[4] | VOCs[1], WHA[3], FA[4] |
| MW-14B | bedrock | VOCs[1], WHA[3], FA[4] | VOCs[1], WHA[3], FA[4] | VOCs[1], WHA[3], FA[4] | VOCs[1], WHA[3], FA[4] | VOCs[1], WHA[3], FA[4] |
| MW-15[6] | bedrock | Not Sampled | Not Sampled | VOCs[1],WHA[3], FA[4] | Not Sampled | Not Sampled |
| MW-16A | overburden | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], Nat Att.[2], WHA[3], FA[4] |
| MW-16B | bedrock | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], Nat Att.[2], WHA[3], FA[4] |
| MW-17A | overburden | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], Nat Att.[2], WHA[3], FA[4] |
| MW-17B | bedrock | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], Nat Att.[2], WHA[3], FA[4] |
| MW-18A | overburden | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], WHA[3], FA[4], CENSUS[5] | VOCs[1], Nat Att.[2], WHA[3], FA[4] |
| MW-18B | bedrock | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], Nat Att.[2], WHA[3], FA[4] | VOCs[1], WHA[3], FA[4], CENSUS[5] | VOCs[1], Nat Att.[2], WHA[3], FA[4] |
| MW-19B | bedrock | VOCs[1], WHA[3], FA[4] | VOCs[1], WHA[3], FA[4] | VOCs[1], WHA[3], FA[4] | VOCs[1], WHA[3], FA[4] | VOCs[1], WHA[3], FA[4] |

**See Page 2 of 2 for notes.**

**Table 1**
**Annual Sampling Program**
**Five-Year Review**
**Former Carborundum Company, Hyde Park Facility**
**Niagara, New York**

**QA/QC**

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

Name field duplicates blind, using a similar scheme but non-existent well, such as MW-190B or MW-60.

**Notes:**

(1) VOCs (volatile organic compounds) (SW8260C): tetrachloroethene, trichloroethene, cis-1,2-dichloroethene, trans-1,2- dichloroethene, 1,1-dichloroethene, 1,1-dichloroethane, 1,1,1-trichloroethane, vinyl chloride, and chloroethane.

(2) Natural Attenuation Parameters: Methane, Ethane, Ethene, and Propane (RSKSOP-175mod); Chloride (300.0); Total Organic Carbon (5310C) BOD (5120B); COD (410.4); Dissolved Iron (6010C); Nitrate (353.2); Nitrite (353.2); Sulfide (SM 4500-S2)

(3) Well Head Analysis including dissolved oxygen, oxidation-reduction potential, pH, temperature, electrical conductivity, turbidity,

and visual appearance.

(4) Field Analysis including alkalinity, carbon dioxide, hydrogen sulfide, and ferrous iron.

(5) Microbial CENSUS analysis includes: DHC, DHC functional genes (bvc, tce, vcr), and DHBt

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

Requires permit from the Department of Transportation (DOT), Niagara County Residency (716) 438-2396.

(7) Wells MW-2A, MW-4A, MW-8, and MW-11B removed from smpling program.

BOD - biological oxygen demand

COD - chemical oxygen demand

Table 2
Water Level Measurements
Five-Year Review
Former Carborundum Company, Hyde Park Facility
Niagara, New York

| | | | | 4/18/2016 | | 9/11/2017 | | 4/23/2018 | | 11/26/2019 | | 3/17/2020 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Well ID | Elevation Top of Casing | Easting | Northing | Depth to Water | Groundwater Elevation | Depth to Water | Groundwater Elevation | Depth to Water | Groundwater Elevation | Depth to Water | Groundwater Elevation | Depth to Water | Groundwater Elevation |
| PMW-1 | 596.62 | 1028372.30 | 1136886.30 | 6.01 | 590.61 | 8.38 | 588.24 | 6.06 | 590.56 | 7.33 | 589.29 | 6.34 | 590.28 |
| PMW-2 | 595.98 | 1028371.76 | 1136875.49 | 5.30 | 590.68 | 7.66 | 588.32 | 5.17 | 590.81 | 6.35 | 589.63 | 5.12 | 590.86 |
| PMW-3 | 596.59 | 1028379.73 | 1136882.30 | 5.42 | 591.17 | 7.71 | 588.88 | 5.42 | 591.17 | 6.79 | 589.80 | 5.48 | 591.11 |
| PMW-4 | 597.05 | 1028384.66 | 1136909.84 | 6.91 | 590.14 | 8.85 | 588.20 | 6.55 | 590.50 | 7.76 | 589.29 | 6.56 | 590.49 |
| PMW-5 | 592.65 | 1028308.62 | 1136764.72 | 3.42 | 589.23 | 5.14 | 587.51 | 2.97 | 589.68 | 2.54 | 590.11 | 3.00 | 589.65 |
| PMW-6 | 592.44 | 1028310.46 | 1136747.77 | 3.54 | 588.90 | 5.23 | 587.21 | 27.33 | 565.11 | 4.25 | 588.19 | 3.14 | 589.30 |
| PMW-7 | 592.93 | 1028325.51 | 1136758.05 | 3.89 | 589.04 | 5.69 | 587.24 | 3.49 | 589.44 | 4.42 | 588.51 | 3.54 | 589.39 |
| PMW-8 | 593.11 | 1028352.65 | 1136824.51 | 3.82 | 589.29 | 5.56 | 587.55 | 3.37 | 589.74 | 4.55 | 588.56 | 3.44 | 589.67 |
| PMW-9 | 592.45 | 1028282.58 | 1136689.24 | 3.20 | 589.25 | 4.92 | 587.53 | 3.03 | 589.42 | 3.92 | 588.53 | 2.97 | 589.48 |
| INJ-1 | 596.66 | 1028382.45 | 1136887.25 | 5.91 | 590.75 | 8.05 | 588.61 | 5.87 | 590.79 | 7.09 | 589.57 | 5.94 | 590.72 |
| INJ-2 | 595.89 | 1028374.60 | 1136890.69 | 5.79 | 590.10 | 7.90 | 587.99 | 5.72 | 590.17 | 7.00 | 588.89 | 5.84 | 590.05 |
| INJ-3 | 592.87 | 1028313.28 | 1136774.48 | 3.67 | 589.20 | 5.38 | 587.49 | 3.22 | 589.65 | 4.39 | 588.48 | 3.27 | 589.60 |
| INJ-4 | 593.26 | 1028332.65 | 1136771.29 | 3.81 | 589.45 | 5.54 | 587.72 | 24.05 | 569.21 | 2.23 | 591.03 | 3.41 | 589.85 |
| INJ-5U | 596.08 | 1028365.66 | 1136878.92 | 5.50 | 590.58 | 7.89 | 588.19 | 5.56 | 590.52 | 7.30 | 588.78 | 4.42 | 591.66 |
| INJ-5L | 596.00 | 1028365.66 | 1136878.92 | 5.96 | 590.04 | 8.02 | 587.98 | 5.97 | 590.03 | 6.42 | 589.58 | 6.14 | 589.86 |
| INJ-6U | 596.96 | 1028376.98 | 1136868.99 | 5.10 | 591.86 | 7.55 | 589.41 | 4.87 | 592.09 | 6.09 | 590.87 | 4.87 | 592.09 |
| INJ-6L | 595.97 | 1028376.98 | 1136868.99 | 5.97 | 590.00 | 8.18 | 587.79 | 5.98 | 589.99 | 7.15 | 588.82 | 6.10 | 589.87 |
| INJ-7 | 592.76 | 1028409.44 | 1136837.46 | 3.34 | 589.42 | 3.38 | 589.38 | 2.34 | 590.42 | 2.46 | 590.30 | 1.95 | 590.81 |
| INJ-8 | 592.98 | 1028418.16 | 1136832.59 | 2.80 | 590.18 | 4.95 | 588.03 | 2.52 | 590.46 | 3.18 | 589.80 | 3.21 | 589.77 |
| INJ-9 | 591.62 | 1028023.50 | 1136898.15 | 2.66 | 588.96 | 4.23 | 587.39 | 2.24 | 589.38 | 3.29 | 588.33 | 2.33 | 589.29 |
| INJ-10 | 591.49 | 1028032.17 | 1136890.90 | 2.40 | 589.09 | 4.13 | 587.36 | 2.03 | 589.46 | 2.67 | 588.82 | 2.02 | 589.47 |
| MW-1A | 597.56 | 1028606.44 | 1136554.99 | 7.42 | 590.14 | 9.52 | 588.04 | 6.97 | 590.59 | 8.35 | 589.21 | 6.91 | 590.65 |
| MW-1B | 597.64 | 1028611.01 | 1136554.66 | 7.47 | 590.17 | 9.62 | 588.02 | 7.02 | 590.62 | 8.46 | 589.18 | 7.06 | 590.58 |
| MW-2A | 595.73 | 1028335.27 | 1136881.61 | 4.69 | 591.04 | 7.14 | 588.59 | 4.58 | 591.15 | 5.58 | 590.15 | 4.45 | 591.28 |
| MW-2B | 595.80 | 1028337.09 | 1136888.34 | 6.44 | 589.36 | 8.15 | 587.65 | 6.00 | 589.80 | 7.19 | 588.61 | 6.04 | 589.76 |
| MW-3A | 599.94 | 1028627.22 | 1136895.86 | 4.49 | 595.45 | 15.35 | 584.59 | 4.45 | 595.49 | 10.49 | 589.45 | 4.38 | 595.56 |
| MW-3B | 599.70 | 1028624.57 | 1136899.80 | 9.79 | 589.91 | 11.72 | 587.98 | 9.40 | 590.30 | 10.62 | 589.08 | 9.44 | 590.26 |
| MW-4A | 591.60 | 1028027.77 | 1136890.77 | 2.45 | 589.15 | 4.15 | 587.45 | 2.24 | 589.36 | 0.60 | 591.00 | 2.00 | 589.60 |
| MW-4B | 591.49 | 1028023.72 | 1136890.65 | 2.25 | 589.24 | 4.00 | 587.49 | 1.84 | 589.65 | 2.99 | 588.50 | 2.69 | 588.80 |
| MW-5A | 597.91 | 1028256.93 | 1136567.66 | 9.03 | 588.88 | 10.74 | 587.17 | 8.68 | 589.23 | 9.50 | 588.41 | 8.66 | 589.25 |
| MW-5B | 597.79 | 1028256.86 | 1136562.36 | 8.59 | 589.20 | 10.31 | 587.48 | 8.15 | 589.64 | 9.19 | 588.60 | 8.24 | 589.55 |
| MW-6 | 595.51 | 1028293.24 | 1136889.98 | 6.23 | 589.28 | 7.95 | 587.56 | 5.82 | 589.69 | 6.95 | 588.56 | 5.87 | 589.64 |
| MW-7A | 596.59 | 1028379.67 | 1136889.32 | 5.95 | 590.64 | 8.35 | 588.24 | 5.83 | 590.76 | 6.89 | 589.70 | 5.81 | 590.78 |
| MW-7B | 596.66 | 1028377.01 | 1136884.33 | 6.82 | 589.84 | 8.72 | 587.94 | 6.41 | 590.25 | 7.57 | 589.09 | 6.46 | 590.20 |
| MW-8 | 599.63 | 1028584.29 | 1136897.91 | 9.46 | 590.17 | 11.43 | 588.20 | 9.02 | 590.61 | 10.32 | 589.31 | 9.06 | 590.57 |
| MW-10A | 596.87 | 1028134.19 | 1136571.96 | 8.08 | 588.79 | 9.81 | 587.06 | 7.72 | 589.15 | 8.83 | 588.04 | 7.76 | 589.11 |
| MW-10B | 596.71 | 1028129.79 | 1136571.87 | 7.50 | 589.21 | 9.24 | 587.47 | 7.11 | 589.60 | 8.19 | 588.52 | 7.19 | 589.52 |
| MW-11A | 595.48 | 1027992.43 | 1136576.28 | 7.30 | 588.18 | 8.84 | 586.64 | 6.95 | 588.53 | 7.91 | 587.57 | 6.98 | 588.50 |
| MW-11B | 595.57 | 1027996.44 | 1136575.71 | 6.91 | 588.66 | 8.56 | 587.01 | 6.57 | 589.00 | 7.74 | 587.83 | 6.74 | 588.83 |
| MW-12A[1] | 590.79 | 1027887.31 | 1136654.88 | 3.45 | 587.34 | 4.75 | 586.04 | 3.25 | 587.54 | NA | NA | NA | NA |
| MW-12B | 590.89 | 1027886.62 | 1136658.22 | 1.68 | 589.21 | 3.41 | 587.48 | 1.25 | 589.64 | 2.31 | 588.58 | 1.36 | 589.53 |
| MW-13A | 595.18 | 1028202.92 | 1136517.75 | 6.36 | 588.82 | 8.22 | 586.96 | 5.95 | 589.23 | 7.16 | 588.02 | 6.02 | 589.16 |
| MW-13B | 594.73 | 1028199.59 | 1136517.64 | 6.08 | 588.65 | 7.71 | 587.02 | 5.58 | 589.15 | 6.73 | 588.00 | 5.71 | 589.02 |
| MW-14A | 592.97 | 1027954.11 | 1136524.76 | 7.10 | 585.87 | 7.62 | 585.35 | 9.35 | 583.62 | 7.49 | 585.48 | 7.31 | 585.66 |
| MW-14B | 592.85 | 1027951.17 | 1136524.55 | 3.89 | 588.96 | 5.53 | 587.32 | 3.46 | 589.39 | 4.40 | 588.45 | 3.48 | 589.37 |
| MW-15[2] | 591.44 | 1027851.99 | 1136475.97 | NA | NA | 4.37 | 587.07 | NA | NA | NA | NA | NA | NA |
| MW-16A | 591.64 | 1028415.02 | 1136829.41 | 6.90 | 584.74 | 3.21 | 588.43 | 0.75 | 590.89 | 3.22 | 588.42 | 2.49 | 589.15 |
| MW-16B | 592.38 | 1028414.66 | 1136826.44 | 2.40 | 589.98 | 4.35 | 588.03 | 1.98 | 590.40 | 3.15 | 589.23 | 2.01 | 590.37 |
| MW-17A | 593.13 | 1028319.92 | 1136765.00 | 3.07 | 590.06 | 4.65 | 588.48 | 2.69 | 590.44 | 3.36 | 589.77 | 2.72 | 590.41 |
| MW-17B | 592.92 | 1028319.47 | 1136763.41 | 3.40 | 589.52 | 5.43 | 587.49 | 4.20 | 588.72 | 3.37 | 589.55 | 3.29 | 589.63 |
| MW-18A | 593.78 | 1028377.39 | 1136661.13 | 4.00 | 589.78 | 5.41 | 588.37 | 3.64 | 590.14 | 4.76 | 589.02 | 3.59 | 590.19 |
| MW-18B | 593.43 | 1028375.07 | 1136659.79 | 4.12 | 589.31 | 5.88 | 587.55 | 3.96 | 589.47 | 4.88 | 588.55 | 3.76 | 589.67 |
| MW-19A | 594.95 | 1028610.90 | 1136747.48 | 4.45 | 590.50 | 6.60 | 588.35 | 4.30 | 590.65 | 5.47 | 589.48 | 3.99 | 590.96 |
| MW-19B | 594.65 | 1028611.64 | 1136749.89 | 4.51 | 590.14 | 6.46 | 588.19 | 4.07 | 590.58 | 1.40 | 593.25 | 4.19 | 590.46 |

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 3
Monitoring Well Groundwater Analytical Result Summary - Spring 2016
Former Carborundum Company, Hyde Park Facility
Niagara, New York

| Parameter | Criteria[1] | MW-2B | MW-4A | MW-5A | MW-5B | MW-6 | MW-7A | MW-7B | MW-8 | MW-10A | MW-10B | MW-11B |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Volatile Organic Compounds | | | | | | | | | | | | |
| PCE (µg/L) | 5 | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U |
| TCE (µg/L) | 5 | 1.0 U | 3.4 | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 0.57 J | 1.0 U | 1.0 U |
| Cis-1,2-DCE (µg/L) | 5 | 0.95 J | 2.8 | 340 D | 32 | 18 | 1.9 | 0.82 J | 1.9 | 960 D | 220 | 0.54 J |
| Trans-1,2-DCE (µg/L) | 5 | 1.0 U | 1.0 U | 5.4 | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 12 | 1.1 | 0.76 J |
| 1,1-DCE (µg/L) | 5 | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 0.71 J | 1.0 U | 1.0 U |
| Vinyl Chloride (µg/L) | 2 | 2.2 | 1.1 | 340 D | 71 | 59 | 3.7 | 10 | 1.8 | 83 | 6.1 | 9.7 |
| 1,1,1-Trichloroethane (µg/L) | 5 | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U |
| 1,1-Dichloroethane (µg/L) | 5 | 0.96 J | 1.4 | 4.2 | 1.0 U | 1.0 U | 12 | 1.0 U | 1.0 U | 5.4 | 1.0 U | 1.7 |
| Chloroethane (µg/L) | 5 | 1.0 U | 3 | 1.0 U | 1.0 U | 1.0 U | 4.2 | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U |
| Dissolved Metals | | | | | | | | | | | | |
| Dissolved Iron (mg/L) | -- | NA | 9.67 | 0.400 U | 0.332 J | NA | 2.18 | 0.400 U | NA | 0.831 | 0.400 U | NA |
| Dissolved Gases | | | | | | | | | | | | |
| Ethane (µg/L) | -- | NA | 4.3 J | 12 | 5.0 U | NA | 4 J | 5.0 U | NA | 5.0 U | 5.0 U | NA |
| Ethene (µg/L) | -- | NA | 8.6 | 87 | 1.6 J | NA | 1.3 J | 5.6 | NA | 6.4 | 5.0 U | NA |
| Methane (µg/L) | -- | NA | 26000 D | 7500 | 86 | NA | 16000 D | 5000 D | NA | 88 | 9.1 | NA |
| Propane (µg/L) | | NA | 5.0 U | 5.0 U | 5.0 U | NA | 5.0 U | 5.0 U | NA | 5.0 U | 5.0 U | NA |
| Miscellaneous Parameters | | | | | | | | | | | | |
| TOC (mg/L) | -- | NA | 20.4 | 1.2 | 3 | NA | 50.1 | 6.9 | NA | 0.9 J | 2.9 | NA |
| Sulfate (mg/L) | 250 | NA | 7.6 | 70.2 | 259 | NA | 5.1 | 162 | NA | 216 | 272 | NA |
| Sulfide (mg/L) | 0.05 | NA | 0.069 J | 0.10 U | 0.10 U | NA | 0.5 | 16.5 | NA | 0.10 U | 0.10 U | NA |
| BOD (mg/L) | | NA | 34.3 | 7.3 | 3.3 U | NA | 62 | 27.1 | NA | 3.4 U | 3.6 U | NA |
| COD (mg/L) | | NA | 181 | 24.4 J | 24.4 J | NA | 217 | 142 | NA | 33.6 J | 26.7 J | NA |
| Chloride (mg/L)[3] | 250 | NA | 179 | 151 | 166 | NA | 27.4 | 172 | NA | 523 | 160 | NA |
| Nitrate (mg/L)[3] | 10 | NA | 0.10 U | 0.56 | 0.10 U | NA | 0.10 U | 0.10 U | NA | 0.10 U | 0.087 J | NA |
| Nitrite (mg/L)[3] | 1 | NA | 0.050 U | 0.050 U | 0.050 U | NA | 0.050 U | 0.050 U | NA | 0.050 U | 0.050 U | NA |

See Page 2 of 2 for notes.

Table 3
Monitoring Well Groundwater Analytical Result Summary - Spring 2016
Former Carborundum Company, Hyde Park Facility
Niagara, New York

| Parameter | Criteria | MW-12A | MW-12B | MW-13B | MW-14B | MW-16A | MW-16B | MW-17A | MW-17B | MW-18A | MW-18B | MW-19B |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Volatile Organic Compounds | | | | | | | | | | | | |
| PCE (µg/L) | 5 | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U |
| TCE (µg/L) | 5 | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 37 | 1.0 U | 1.0 U |
| Cis-1,2-DCE (µg/L) | 5 | 9.5 | 73 | 9.9 | 0.94 J | 6.5 | 1.0 U | 110 | 1.0 U | 51 | 90 | 1.1 |
| Trans-1,2-DCE (µg/L) | 5 | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 6.8 | 1.0 U | 1.0 U | 0.83 J | 1.0 U | 1.0 U |
| 1,1-DCE (µg/L) | 5 | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 0.99 J | 1.0 U | 1.0 U |
| Vinyl Chloride (µg/L) | 2 | 8.8 | 59 | 12 | 1.2 | 18 | 4.3 | 89 | 0.88 J | 0.62 J | 120 | 1.1 |
| 1,1,1-Trichloroethane (µg/L) | 5 | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U |
| 1,1-Dichloroethane (µg/L) | 5 | 1.1 | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 2 | 15 | 1.7 | 4.3 | 1.0 U | 1.0 U |
| Chloroethane (µg/L) | 5 | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 6.7 | 1.0 U | 1.0 U | 1.0 U |
| Dissolved Metals | | | | | | | | | | | | |
| Dissolved Iron (mg/L) | -- | 0.847 | 0.0618 J | NA | NA | 0.400 U | 0.400 U | 0.955 | 17.3 | 0.463 | 0.893 | NA |
| Dissolved Gases | | | | | | | | | | | | |
| Ethane (µg/L) | -- | 5.0 U | 5.0 U | NA | NA | 5.0 U | 17 | 7.4 | 8 | 5.0 U | 2.8 J | NA |
| Ethene (µg/L) | -- | 1.8 J | 2.6 J | NA | NA | 1.1 J | 300 | 11 | 7 | 5.0 U | 16 | NA |
| Methane (µg/L) | -- | 170 | 200 | NA | NA | 5.0 U | 31000 D | 15000 D | 18000 D | 5.2 | 19000 D | NA |
| Propane (µg/L) | | 5.0 U | 5.0 U | NA | NA | 5.0 U | 5.0 U | 5.0 U | 5.0 U | 5.0 U | 5.0 U | NA |
| Miscellaneous Parameters | | | | | | | | | | | | |
| TOC (mg/L) | -- | 3.4 | 3 | NA | NA | 6.2 | 26.5 | 3.2 | 25 | 1.4 | 21.7 | NA |
| Sulfate (mg/L) | 250 | 192 | 204 | NA | NA | 1140 | 8.2 | 131 | 7.2 | 144 | 189 | NA |
| Sulfide (mg/L) | 0.05 | 0.10 U | 0.10 U | NA | NA | 0.10 U | 50.5 | 0.10 U | 1 | 0.10 U | 4.8 | NA |
| BOD (mg/L) | | 3.4 UJ | 3.5 UJ | NA | NA | 2.9 U | 62.4 | 7.8 | 20.4 | 4.2 U | 22.1 | NA |
| COD (mg/L) | | 19.8 J | 19.8 J | NA | NA | 33.6 J | 201 | 26.7 J | 103 | 19.8 J | 88.7 | NA |
| Chloride (mg/L)[3] | 250 | 96 | 177 | NA | NA | 907 | 73.8 | 161 | 327 | 233 | 122 | NA |
| Nitrate (mg/L)[3] | 10 | 0.10 U | 0.10 U | NA | NA | 0.14 | 0.10 U | 0.10 U | 0.10 U | 0.10 U | 0.10 U | NA |
| Nitrite (mg/L)[3] | 1 | 0.050 U | 0.050 U | NA | NA | 0.050 U | 0.050 U | 0.050 U | 0.050 U | 0.050 U | 0.050 U | NA |

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.
3. Samples analyzed for chloride, nitrate, and nitrite were field filtered with the exception of monitoring wells MW-5A, MW-5B, MW-10A, and MW-10B.

NA - Not Analyzed
J - The reported concentration is an estimated value.
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.

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 4
Monitoring Well Groundwater Analytical Result Summary - Fall 2017
Former Carborundum Company, Hyde Park Facility
Niagara, New York

| Parameter | Criteria[1] | MW- 2B | MW- 4A | MW- 5A | MW- 5B | MW- 6 | MW- 7A | MW- 7B | MW- 8 | MW-10A | MW-10B | MW-11B |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Volatile Organic Compounds | | | | | | | | | | | | |
| PCE (µg/L) | 5 | 1.0 U | 1.0 U | 2.0 U | 5.0 U | 5.0 U | 2.0 U | 1.0 U | 1.0 U | 20 U | 10 U | 1.0 U |
| TCE (µg/L) | 5 | 1.0 U | 1.3 | 2.0 U | 5.0 U | 5.0 U | 2.0 U | 1.0 U | 1.0 U | 20 U | 10 U | 1.0 U |
| Cis-1,2-DCE (µg/L) | 5 | 0.77 J | 0.68 J | 61 | 36 | 16 | 26 | 2.2 | 1.7 | 590 | 360 | 1.1 |
| Trans-1,2-DCE (µg/L) | 5 | 1.0 U | 1.0 U | 0.74 J | 5.0 U | 5.0 U | 2.0 U | 1.0 U | 1.0 U | 6.8 J | 10 U | 1.0 U |
| 1,1-DCE (µg/L) | 5 | 1.0 U | 1.0 UJ | 2.0 U | 5.0 U | 5.0 U | 2.0 U | 1.0 U | 1.0 U | 20 U | 10 U | 1.0 U |
| Vinyl Chloride (µg/L) | 2 | 1.8 | 2.6 | 68 | 91 | 79 | 33 | 18 | 1.4 | 130 | 270 | 6.5 |
| 1,1,1-Trichloroethane (µg/L) | 5 | 1.0 U | 1.0 U | 2.0 U | 5.0 U | 5.0 U | 2.0 U | 1.0 U | 1.0 U | 20 U | 10 U | 1.0 U |
| 1,1-Dichloroethane (µg/L) | 5 | 0.5 J | 1.4 | 0.88 J | 5.0 U | 5.0 U | 61 J | 1.0 U | 1.0 U | 20 UJ | 10 UJ | 0.95 J |
| Chloroethane (µg/L) | 5 | 1.0 U | 2.7 | 2.0 U | 5.0 U | 5.0 U | 19 | 1.0 U | 1.0 U | 20 U | 10 U | 1.0 U |
| Dissolved Metals | | | | | | | | | | | | |
| Dissolved Iron (mg/L) | -- | NA | 11 | 0.100 U | 0.54 | NA | 1.7 | 0.100 U | NA | 1.4 | 0.24 | NA |
| Dissolved Gases | | | | | | | | | | | | |
| Ethane (µg/L) | -- | NA | 3.9 | 2.1 | 0.50 U | NA | 2.9 | 0.50 U | NA | 0.38 J | 4.5 | NA |
| Ethene (µg/L) | -- | NA | 5.5 | 9.8 | 2.2 | NA | 4.1 | 1.9 | NA | 11 | 130 | NA |
| Methane (µg/L) | -- | NA | 5400 D | 460 | 110 | NA | 3400 D | 370 | NA | 400 | 3900 | NA |
| Propane (µg/L) | -- | NA | 1.0 U | 1.0 U | 0.40 J | NA | 1.0 U | 1.0 U | NA | 1.0 U | 8.6 | NA |
| Miscellaneous Parameters | | | | | | | | | | | | |
| TOC (mg/L) | -- | NA | 17 | 0.76 J | 3.4 | NA | 52 | 4.8 | NA | 1.1 | 3.2 | NA |
| Sulfate (mg/L) | 250 | NA | 2.1 J | 99 | 240 | NA | 93 | 180 | NA | 170 | 230 | NA |
| Sulfide (mg/L) | 0.05 | NA | 1.0 U | 1.0 U | 1.0 U | NA | 1.0 U | 1.1 | NA | 1.0 U | 1.0 U | NA |
| BOD (mg/L) | -- | NA | 27 | 2.0 U | 2.0 U | NA | 61 | 9.6 | NA | 2.0 U | 2.0 U | NA |
| COD (mg/L) | -- | NA | 48 | 12 | 17 | NA | 170 | 41 | NA | 13 | 17 | NA |
| Chloride (mg/L) | 250 | NA | 26 | 69 | 110 | NA | 25 | 170 | NA | 310 | 150 | NA |
| Nitrate (mg/L) | 10 | NA | 0.25 U | 0.25 U | 0.50 U | NA | 0.25 U | 0.25 U | NA | 0.50 U | 0.50 U | NA |
| Nitrite (mg/L) | 1 | NA | 0.050 UJ | 0.050 U | 0.050 U | NA | 0.050 UJ | 0.050 UJ | NA | 0.050 U | 0.050 U | NA |

See Page 2 of 2 for notes.

Table 4
Monitoring Well Groundwater Analytical Result Summary - Fall 2017
Former Carborundum Company, Hyde Park Facility
Niagara, New York

| Parameter | Criteria[1] | MW-12A | MW-12B | MW-13B | MW-14B | MW-16A | MW-16B | MW-17A | MW-17B | MW-18A | MW-18B | MW-19B |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Volatile Organic Compounds | | | | | | | | | | | | |
| PCE (µg/L) | 5 | 1.0 U | 2.0 U | 1.0 U | 1.0 U | 10 U | 1.0 U | 5.0 U | 1.0 U | 2.0 U | 20 U | 1.0 U |
| TCE (µg/L) | 5 | 1.0 U | 2.0 U | 1.0 U | 1.0 U | 10 U | 1.0 U | 5.0 U | 0.68 J | 29 | 20 U | 1.0 U |
| Cis-1,2-DCE (µg/L) | 5 | 21 | 52 | 22 | 0.92 J | 7.3 J | 1.0 U | 120 | 10 | 58 | 380 | 1.6 |
| Trans-1,2-DCE (µg/L) | 5 | 0.34 J | 2.0 U | 1.0 U | 1.0 U | 10 U | 0.44 J | 5.0 U | 0.45 J | 0.8 J | 20 U | 1.0 U |
| 1,1-DCE (µg/L) | 5 | 1.0 U | 2.0 U | 1.0 U | 1.0 U | 10 U | 1.0 U | 5.0 U | 1.0 U | 1 J | 20 U | 1.0 U |
| Vinyl Chloride (µg/L) | 2 | 13 | 110 | 38 | 2.9 | 190 | 2.6 | 120 | 12 | 1.8 J | 210 | 1.5 |
| 1,1,1-Trichloroethane (µg/L) | 5 | 1.0 U | 2.0 U | 1.0 U | 1.0 U | 10 U | 1.0 U | 5.0 U | 1.0 U | 2.0 U | 20 U | 1.0 U |
| 1,1-Dichloroethane (µg/L) | 5 | 1.6 | 0.66 J | 1.0 UJ | 0.43 J | 10 U | 0.39 J | 17 | 6.3 J | 5 | 20 UJ | 1.0 UJ |
| Chloroethane (µg/L) | 5 | 1.0 U | 2.0 U | 1.0 U | 1.0 U | 10 U | 1.0 U | 5.0 U | 7.6 | 2.0 U | 20 U | 1.0 U |
| Dissolved Metals | | | | | | | | | | | | |
| Dissolved Iron (mg/L) | -- | 1.5 | 0.032 J | NA | NA | 0.100 U | 0.100 U | 0.92 | 5.3 | 1.2 | 0.52 | NA |
| Dissolved Gases | | | | | | | | | | | | |
| Ethane (µg/L) | -- | 0.31 J | 0.45 J | NA | NA | 0.47 J | 15 | 5.5 | 3.5 | 0.50 U | 6.8 | NA |
| Ethene (µg/L) | -- | 2.7 | 3.9 | NA | NA | 33 | 34 | 8.4 | 4.6 | 0.50 U | 38 | NA |
| Methane (µg/L) | -- | 210 | 140 | NA | NA | 28 | 8200 D | 3700 D | 6800 | 5.3 | 5000 D | NA |
| Propane (µg/L) | -- | 1.0 U | 0.77 J | NA | NA | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | NA |
| Miscellaneous Parameters | | | | | | | | | | | | |
| TOC (mg/L) | -- | 4.2 | 2.7 | NA | NA | 6.4 | 6.8 | 3 | 17 | 1.3 | 11 | NA |
| Sulfate (mg/L) | 250 | 650 | 530 | NA | NA | 1000 | 120 | 97 | 47 | 120 | 140 | NA |
| Sulfide (mg/L) | 0.05 | 1.0 U | 1.0 U | NA | NA | 1.0 U | 29 | 1.0 U | 0.73 J | 1.0 U | 7.3 | NA |
| BOD (mg/L) | -- | 2.0 U | 2.0 U | NA | NA | 2.0 U | 39 | 3.4 | 6.2 | 2.0 U | 23 | NA |
| COD (mg/L) | -- | 49 | 17 | NA | NA | 28 | 99 | 17 | 78 | 12 | 99 | NA |
| Chloride (mg/L) | 250 | 330 | 280 | NA | NA | 250 | 120 | 82 | 210 | 86 | 110 | NA |
| Nitrate (mg/L) | 10 | 1.0 U | 0.50 U | NA | NA | 0.50 U | 0.25 U | 0.25 U | 0.50 U | 0.25 U | 0.50 U | NA |
| Nitrite (mg/L) | 1 | 0.050 U | 0.050 U | NA | NA | 0.050 UJ | 0.050 UJ | 0.050 UJ | 0.050 UJ | 0.050 U | 0.050 U | NA |

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.

NA - Not Analyzed
J - The reported concentration is an estimated value.
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.

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 5
Monitoring Well Groundwater Analytical Result Summary - Spring 2018
Former Carborundum Company, Hyde Park Facility
Niagara, New York

| Parameter | Criteria[1] | MW-2B | MW-4A | MW-5A | MW-5B | MW-6 | MW-7A | MW-7B | MW-8 | MW-10A | MW-10B | MW-11B |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Volatile Organic Compounds | | | | | | | | | | | | |
| PCE (µg/L) | 5 | 1.0 U | 1.0 U | 13 U | 1.0 U | 1.0 U | 5.0 U | 1.0 U | 1.0 U | 20 U | 8.0 U | 1.0 U |
| TCE (µg/L) | 5 | 1.0 U | 0.44 J | 13 U | 1.0 U | 1.0 U | 5.0 U | 1.0 U | 1.0 U | 20 U | 8.0 U | 1.0 U |
| Cis-1,2-DCE (µg/L) | 5 | 1.3 | 1.1 | 250 | 32 | 12 | 46 | 2.2 | 1.9 | 540 | 210 | 0.65 J |
| Trans-1,2-DCE (µg/L) | 5 | 1.0 U | 0.51 J | 13 U | 1.0 U | 1.0 U | 5.0 U | 1.0 U | 1.0 U | 20 U | 8.0 U | 0.74 J |
| 1,1-DCE (µg/L) | 5 | 1.0 U | 1.0 U | 13 U | 1.0 U | 1.0 U | 5.0 U | 1.0 U | 1.0 U | 20 U | 8.0 U | 1.0 U |
| Vinyl Chloride (µg/L) | 2 | 2.6 | 0.96 J | 310 | 78 | 48 | 42 | 17 | 1.6 | 94 | 12 | 1.9 |
| 1,1,1-Trichloroethane (µg/L) | 5 | 1.0 U | 1.0 U | 13 U | 1.0 U | 1.0 U | 5.0 U | 1.0 U | 1.0 U | 20 U | 8.0 U | 1.0 U |
| 1,1-Dichloroethane (µg/L) | 5 | 1.0 U | 1.8 | 3.3 J | 0.3 J | 1.0 U | 140 | 1.0 U | 1.0 U | 20 U | 8.0 U | 1.9 |
| Chloroethane (µg/L) | 5 | 1.0 U | 2.5 | 13 U | 1.0 U | 1.0 U | 23 | 1.0 U | 1.0 U | 20 U | 8.0 U | 1.0 U |
| Dissolved Metals | | | | | | | | | | | | |
| Dissolved Iron (mg/L) | -- | NA | 14 | 0.200 U | 0.4 | NA | 0.55 | 0.200 U | NA | 1.2 | 0.14 J | NA |
| Dissolved Gases | | | | | | | | | | | | |
| Ethane (µg/L) | -- | NA | 10 U | 18 | 1.0 U | NA | 61 | 1.0 U | NA | 1.0 U | 1.0 U | NA |
| Ethene (µg/L) | -- | NA | 10 U | 69 | 3.3 | NA | 63 | 6.4 | NA | 12 | 1.0 U | NA |
| Methane (µg/L) | -- | NA | 21000 | 4200 | 160 | NA | 14000 | 240 | NA | 640 | 25 | NA |
| Propane (µg/L) | -- | NA | 10 U | 2.0 U | 1.0 U | NA | 10 U | 1.0 U | NA | 1.0 U | 1.0 U | NA |
| Miscellaneous Parameters | | | | | | | | | | | | |
| TOC (mg/L) | -- | NA | 7.2 | 1.5 | 3.6 | NA | 32 | 4.7 | NA | 1.4 | 3.6 | NA |
| Sulfate (mg/L) | 250 | NA | 3.7 J | 60 | 240 | NA | 56 | 260 | NA | 160 | 240 | NA |
| Sulfide (mg/L) | 0.05 | NA | 1.0 U | 1.0 U | 1.0 U | NA | 1.1 | 1.0 U | NA | 1.0 U | 1.0 U | NA |
| BOD (mg/L) | -- | NA | 7.6 | 4 | 2.0 U | NA | 9.2 J | 2 | NA | 2.0 U | 2.4 UJ | NA |
| COD (mg/L) | -- | NA | 23 | 4.2 J | 8.3 J | NA | 97 | 29 | NA | 10 | 10 U | NA |
| Chloride (mg/L) | 250 | NA | 110 | 120 | 110 | NA | 25 | 140 | NA | 260 | 130 | NA |
| Nitrate (mg/L) | 10 | NA | 0.25 U | 0.13 J | 0.25 UJ | NA | 0.25 U | 0.25 U | NA | 0.25 U | 0.25 U | NA |
| Nitrite (mg/L) | 1 | NA | 0.050 UJ | 0.050 UJ | 0.050 UJ | NA | 0.027 J | 0.050 U | NA | 0.050 U | 0.050 U | NA |

See Page 2 of 2 for notes.

Table 5
Monitoring Well Groundwater Analytical Result Summary - Spring 2018
Former Carborundum Company, Hyde Park Facility
Niagara, New York

| Parameter | Criteria[1] | MW-12A | MW-12B | MW-13B | MW-14B | MW-15 | MW-16A | MW-16B | MW-17A | MW-17B | MW-18A | MW-18B | MW-19B |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Volatile Organic Compounds | | | | | | | | | | | | | |
| PCE (µg/L) | 5 | 1.0 U | 2.5 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 5.0 U | 1.0 U | 1.0 U | 2.5 U | 1.0 U |
| TCE (µg/L) | 5 | 1.0 U | 2.5 U | 1.0 U | 1.0 U | 1.0 UJ | 1.0 U | 1.0 U | 5.0 U | 1.0 U | 36 | 2.5 U | 1.0 U |
| Cis-1,2-DCE (µg/L) | 5 | 16 | 62 | 7.8 | 0.72 J | 5.2 | 1.4 | 0.63 J | 59 | 4.9 | 42 | 69 | 24 |
| Trans-1,2-DCE (µg/L) | 5 | 1.0 U | 2.5 U | 1.0 U | 1.0 U | 0.62 J | 1.0 U | 1.0 U | 5.0 U | 0.39 J | 0.61 J | 2.5 U | 1.0 U |
| 1,1-DCE (µg/L) | 5 | 1.0 U | 2.5 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 5.0 U | 1.0 U | 0.88 J | 2.5 U | 1.0 U |
| Vinyl Chloride (µg/L) | 2 | 9.2 | 73 | 9.7 | 1.3 | 16 | 33 | 4.6 | 91 | 7.9 | 1.1 | 92 | 5 |
| 1,1,1-Trichloroethane (µg/L) | 5 | 1.0 U | 2.5 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 5.0 U | 1.0 U | 1.0 U | 2.5 U | 1.0 U |
| 1,1-Dichloroethane (µg/L) | 5 | 0.91 J | 2.5 U | 1.0 U | 0.34 J | 1.1 | 1.0 U | 1.0 U | 11 | 4.5 | 3.7 | 2.5 U | 1.0 U |
| Chloroethane (µg/L) | 5 | 1.0 U | 2.5 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 5.0 U | 3.7 | 1.0 U | 2.5 U | 1.0 U |
| Dissolved Metals | | | | | | | | | | | | | |
| Dissolved Iron (mg/L) | -- | 0.6 | 0.027 J | NA | NA | NA | 0.026 J | 0.200 U | 1.0 | 4.7 | 0.99 | 0.41 | NA |
| Dissolved Gases | | | | | | | | | | | | | |
| Ethane (µg/L) | -- | 1.0 U | 1.0 U | NA | NA | NA | 1.0 U | 1.0 U | 10 U | 19 | 1.0 U | 2 | NA |
| Ethene (µg/L) | -- | 2 | 4.4 | NA | NA | NA | 13 | 2.8 | 10 U | 27 | 1.0 U | 12 | NA |
| Methane (µg/L) | -- | 200 | 340 | NA | NA | NA | 12 | 9900 D | 13000 | 22000 | 13 | 17000 D | NA |
| Propane (µg/L) | -- | 1.0 U | 1.0 U | NA | NA | NA | 1.0 U | 1.0 U | 10 U | 10 U | 1.0 U | 1.0 U | NA |
| Miscellaneous Parameters | | | | | | | | | | | | | |
| TOC (mg/L) | -- | 3.9 | 3.5 | NA | NA | NA | 5.8 | 5.7 | 3.7 | 20 | 1.5 | 12 | NA |
| Sulfate (mg/L) | 250 | 190 | 190 | NA | NA | NA | 190 | 230 | 100 | 45 | 130 | 130 | NA |
| Sulfide (mg/L) | 0.05 | 1.0 U | 1.0 U | NA | NA | NA | 1.0 U | 6.9 | 1.0 U | 2.1 | 1.0 U | 10 | NA |
| BOD (mg/L) | -- | 2.0 U | 2.0 U | NA | NA | NA | 2.0 U | 13 | 4.8 J | 6.8 | 2.0 U | 17 | NA |
| COD (mg/L) | -- | 11 | 12 | NA | NA | NA | 17 J | 49 | 19 | 89 | 12 | 71 | NA |
| Chloride (mg/L) | 250 | 82 | 150 | NA | NA | NA | 48 | 120 | 92 | 170 | 81 | 97 | NA |
| Nitrate (mg/L) | 10 | 0.25 UJ | 0.25 U | NA | NA | NA | 0.21 J | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | NA |
| Nitrite (mg/L) | 1 | 0.050 UJ | 0.050 U | NA | NA | NA | 0.050 U | 0.050 U | 0.050 U | 0.039 J | 0.050 U | 0.050 U | NA |

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.

NA - Not Analyzed
J - The reported concentration is an estimated value.
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.

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 6
Monitoring Well Groundwater Analytical Result Summary - Fall 2019
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 |
|---|---|---|---|---|---|---|---|---|---|---|
| Volatile Organic Compounds | | | | | | | | | | |
| PCE (µg/L) | 5 | 1.0 U | 2.0 U | 1.0 U | 2.5 U | 1.0 U | 25 U | 20 U | 2.5 U | 1.0 U |
| TCE (µg/L) | 5 | 0.47 J | 2.0 U | 1.0 U | 2.5 U | 1.0 U | 5 J | 20 U | 2.5 U | 0.19 J |
| Cis-1,2-DCE (µg/L) | 5 | 9.5 | 32 | 10 | 21 J | 1.3 | 500 | 420 | 65 | 16 |
| Trans-1,2-DCE (µg/L) | 5 | 1.0 U | 2.0 U | 1.0 U | 2.5 U | 1.0 U | 25 U | 4 J | 2.5 U | 1.0 U |
| 1,1-DCE (µg/L) | 5 | 1.0 U | 2.0 U | 1.0 U | 2.5 U | 1.0 U | 25 U | 20 U | 2.5 U | 1.0 U |
| Vinyl Chloride (µg/L) | 2 | 11 | 90 | 78 | 35 J | 10 | 130 | 180 | 94 | 21 |
| 1,1,1-Trichloroethane (µg/L) | 5 | 1.0 U | 2.0 U | 1.0 U | 2.5 U | 1.0 U | 25 U | 20 U | 2.5 U | 1.0 U |
| 1,1-Dichloroethane (µg/L) | 5 | 1.0 U | 2.0 U | 1.0 U | 69 | 1.0 U | 25 U | 20 U | 2.5 U | 0.17 J |
| Chloroethane (µg/L) | 5 | 1.0 U | 2.0 U | 1.0 U | 44 | 1.0 U | 25 U | 20 U | 2.5 U | 1.0 U |
| Dissolved Metals | | | | | | | | | | |
| Dissolved Iron (mg/L) | -- | 0.20 U | 0.41 | NA | 1.5 | 0.20 U | 1.1 | 0.68 | 0.20 U | NA |
| Dissolved Gases | | | | | | | | | | |
| Ethane (µg/L) | -- | 2.1 | 0.66 J | NA | 95 | 0.58 J | 2.4 | 1.8 | 0.89 J | NA |
| Ethene (µg/L) | -- | 3.7 | 4.8 | NA | 25 | 3.3 | 36 | 27 | 5.3 | NA |
| Methane (µg/L) | -- | 140 | 270 | NA | 13,000 D | 290 | 2,000 | 1,500 | 210 | NA |
| Propane (µg/L) | -- | 1.0 U | 0.69 J | NA | 1.0 U | 1.0 U | 1.0 U | 4.1 | 1.2 | NA |
| Miscellaneous Parameters | | | | | | | | | | |
| TOC (mg/L) | -- | 0.68 J | 3.3 | NA | 17 | 3.3 | 1.4 | 3 | 2.8 | NA |
| Sulfate (mg/L) | 250 | 97 | 240 | NA | 70 | 190 | 150 | 260 | 240 | NA |
| Sulfide (mg/L) | 0.05 | 1.0 U | 1.1 | NA | 1.0 U | 7.1 | 1.0 U | 1.0 U | 1.0 U | NA |
| BOD (mg/L) | -- | 2.0 U | 2.0 U | NA | 14 J- | 2.0 U | 2.0 UJ | 2.0 U | 2.0 U | NA |
| COD (mg/L) | -- | 4.1 J | 9.4 J | NA | 42 | 12 | 4.2 J | 10 U | 10 U | NA |
| Chloride (mg/L) | 250 | 89 | 110 | NA | 12 | 180 | 200 | 220 | 150 | NA |
| Nitrate (mg/L) | 10 | 0.59 | 0.25 U | NA | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | NA |
| Nitrite (mg/L)[2] | 1 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Microbial CENSUS | | | | | | | | | | |
| DHC (cells/mL) | -- | NA | NA | 2.13E+01 | 2.30E+03 | NA | 2.50E+00 | 3.87E+01 | NA | NA |
| BVC (cells/mL) | -- | NA | NA | 5.00E-01 U | 2.41E+02 | NA | 5.00E-01 U | 4.50E+00 | NA | NA |
| TCE (cells/mL) | -- | NA | NA | 5.00E-01 U | 2.03E+02 | NA | 1.40E+00 | 5.73E+02 | NA | NA |
| VCR (cells/mL) | -- | NA | NA | 7.70E+00 | 9.46E+02 | NA | 5.00E-01 U | 4.75E+01 | NA | NA |
| DHBt (cells/mL) | -- | NA | NA | 4.90E+00 U | 2.17E+01 U | NA | 5.00E+00 U | 5.30E+00 U | NA | NA |

See Page 3 of 3 for notes.

Table 6
Monitoring Well Groundwater Analytical Result Summary - Fall 2019
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-5A (Duplicate) | MW-18B (Duplicate) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Volatile Organic Compounds | | | | | | | | | | | |
| PCE (µg/L) | 5 | 1.0 U | 4.0 U | 1.0 U | 2.0 U | 1.0 U | 2.0 U | 2.0 U | 1.0 U | 1.0 U | NA |
| TCE (µg/L) | 5 | 1.0 U | 0.6 J | 1.0 U | 2.0 U | 1.0 U | 32 | 2.0 U | 1.0 U | 0.40 J | NA |
| Cis-1,2-DCE (µg/L) | 5 | 0.37 J | 3.6 J | 1 | 50 | 11 | 43 | 56 | 1.4 | 10 | NA |
| Trans-1,2-DCE (µg/L) | 5 | 1.0 U | 4.0 U | 1.0 U | 2.0 U | 0.28 J | 0.66 J | 2.0 U | 1.0 U | 1.0 U | NA |
| 1,1-DCE (µg/L) | 5 | 1.0 U | 4.0 U | 1.0 U | 2.0 U | 1.0 U | 0.93 J | 2.0 U | 1.0 U | 1.0 U | NA |
| Vinyl Chloride (µg/L) | 2 | 0.7 J | 120 | 6.7 | 83 | 14 | 0.97 J | 70 | 1.2 | 13 | NA |
| 1,1,1-Trichloroethane (µg/L) | 5 | 1.0 U | 4.0 U | 1.0 U | 2.0 U | 1.0 U | 2.0 U | 2.0 U | 1.0 U | 1.0 U | NA |
| 1,1-Dichloroethane (µg/L) | 5 | 0.19 J | 4.0 U | 1.0 U | 13 | 4.3 | 3.6 | 2.0 U | 1.0 U | 0.17 J | NA |
| Chloroethane (µg/L) | 5 | 1.0 U | 4.0 U | 1.0 U | 2.0 U | 6.6 | 2.0 U | 2.0 U | 1.0 U | 1.0 U | NA |
| Dissolved Metals | | | | | | | | | | | |
| Dissolved Iron (mg/L) | -- | NA | 0.20 U | 0.20 U | 0.55 | 3.1 | 0.9 | 0.35 | NA | 0.20 U | NA |
| Dissolved Gases | | | | | | | | | | | |
| Ethane (µg/L) | -- | NA | 1 | 4.2 | 11 | 24 | 0.36 J | 2.3 | NA | 2.4 | NA |
| Ethene (µg/L) | -- | NA | 49 | 17 | 17 | 17 | 1.0 U | 9.9 | NA | 4.3 | NA |
| Methane (µg/L) | -- | NA | 77 | 9,300 D | 9,400 D | 27,000 D | 9.2 | 24,000 D | NA | 160 | NA |
| Propane (µg/L) | -- | NA | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | NA | 1.0 U | NA |
| Miscellaneous Parameters | | | | | | | | | | | |
| TOC (mg/L) | -- | NA | 6.1 | 4 | 2.8 | 5.9 | 1.3 | 8.8 | NA | 0.64 J | NA |
| Sulfate (mg/L) | 250 | NA | 810 | 220 | 67 | 67 | 130 | 130 | NA | 98 | NA |
| Sulfide (mg/L) | 0.05 | NA | 1.0 U | 9.5 | 1.0 U | 2.3 | 1.0 U | 13 | NA | 1.1 | NA |
| BOD (mg/L) | -- | NA | 2.0 U | 14 | 4.2 | 9.7 J- | 2.0 U | 35 J- | NA | 2.0 U | NA |
| COD (mg/L) | -- | NA | 18 | 25 | 10 U | 19 | 10 U | 49 | NA | 10 U | NA |
| Chloride (mg/L) | 250 | NA | 170 | 110 | 57 | 140 | 67 | 96 | NA | 89 | NA |
| Nitrate (mg/L) | 10 | NA | 0.50 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | NA | 0.59 | NA |
| Nitrite (mg/L)[2] | 1 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Microbial CENSUS | | | | | | | | | | | |
| DHC (cells/mL) | -- | NA | NA | NA | NA | NA | 1.30E+00 | 2.72E+02 | NA | NA | 1.59E+02 |
| BVC (cells/mL) | -- | NA | NA | NA | NA | NA | 5.00E-01 U | 6.00E-01 J | NA | NA | 5.00E-01 J |
| tceA (cells/mL) | -- | NA | NA | NA | NA | NA | 5.00E-01 U | 4.90E+00 | NA | NA | 3.10E+00 |
| VCR (cells/mL) | -- | NA | NA | NA | NA | NA | 5.00E-01 U | 1.15E+02 | NA | NA | 7.19E+01 |
| DHBt (cells/mL) | -- | NA | NA | NA | NA | NA | 4.90E+00 U | 8.80E+00 U | NA | NA | 7.50E+00 U |

See Page 3 of 3 for notes.

Table 6
Monitoring Well Groundwater Analytical Result Summary - Fall 2019
Former Carborundum Company, Hyde Park Facility
Niagara, New York

Notes:
1. NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations, April 2000, Glass GA.
2. In Fall 2019, the nitrite was not processed due to 48hr hold times and a miscommunication with the laboratory.
3. Bold concentrations exceed criteria.

NA - Not Analyzed
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.

µg/L - micrograms per liter
mg/L - milligrams per liter
mL - milliliter
PCE - tetrachlorethene
TCE- trichloroethene
DCE - dichloroethene
TOC - total organic carbon

BOD - biological oxygen demand
COD - chemical oxygen demand
DHC - Dehalococcoids
BVC - BAV1 vinyl chloride reductase
VCR - vinyl chloride reductase
DHBt - Dehalobacter species
tceA - tceA reductase

Table 7
Monitoring Well Groundwater Analytical Result Summary - Spring 2020
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 |
|---|---|---|---|---|---|---|---|---|---|---|
| Volatile Organic Compounds | | | | | | | | | | |
| PCE (µg/L) | 5 | 5.0 U | 2.0 U | 1.0 U | 2.0 U | 1.0 U | 20 U | 5.0 U | 2.0 U | 1.0 U |
| TCE (µg/L) | 5 | 0.52 J | 2.0 U | 1.0 U | 2.0 U | 1.0 U | 7.6 J | 5.0 U | 2.0 U | 1.0 U |
| Cis-1,2-DCE (µg/L) | 5 | 130 | 26 | 11 | 50 | 5.4 | 570 | 210 | 51 | 1.6 |
| Trans-1,2-DCE (µg/L) | 5 | 1.2 J | 2.0 U | 1.0 U | 2.0 U | 1.0 U | 4.4 J | 5.0 U | 2.0 U | 1.0 U |
| 1,1-DCE (µg/L) | 5 | 5.0 U | 2.0 U | 1.0 U | 2.0 U | 1.0 U | 20 U | 5.0 U | 2.0 U | 1.0 U |
| Vinyl Chloride (µg/L) | 2 | 180 | 68 | 72 | 45 | 18 | 130 | 23 | 85 | 2.0 |
| 1,1,1-Trichloroethane (µg/L) | 5 | 5.0 U | 2.0 U | 1.0 U | 2.0 U | 1.0 U | 20 U | 5.0 U | 2.0 U | 1.0 U |
| 1,1-Dichloroethane (µg/L) | 5 | 2.5 J | 2.0 U | 1.0 U | 59 | 1.0 U | 20 U | 5.0 U | 0.41 J | 1.0 U |
| Chloroethane (µg/L) | 5 | 5.0 U | 2.0 U | 1.0 U | 23 | 1.0 U | 20 U | 5.0 U | 2.0 U | 1.0 U |
| Dissolved Metals | | | | | | | | | | |
| Dissolved Iron (mg/L) | -- | 0.2 U | 0.37 | NA | 0.91 | 0.2 U | 0.88 | 0.086 J | 0.2 U | NA |
| Dissolved Gases | | | | | | | | | | |
| Ethane (µg/L) | -- | 38 | 1.0 U | NA | 80 | 1.0 U | 2.7 | 1.0 U | 1.0 U | NA |
| Ethene (µg/L) | -- | 47 | 2.9 | NA | 20 | 6.4 | 34 | 1.9 | 5.9 | NA |
| Methane (µg/L) | -- | 2,600 | 160 | NA | 16,000 D | 230 | 2,400 | 78 | 410 | NA |
| Propane (µg/L) | -- | 0.80 J | 0.65 J | NA | 1.0 U | 1.0 U | 1.0 U | 0.55 J | 0.81 J | NA |
| Miscellaneous Parameters | | | | | | | | | | |
| TOC (mg/L) | -- | 1.2 | 3.2 | NA | 12 | 3.2 | 1.4 | 3.2 | 3.1 | NA |
| Sulfate (mg/L) | 250 | 67 | 220 | NA | 82 | 260 | 120 | 230 | 220 | NA |
| Sulfide (mg/L) | 0.05 | 1.0 U | 1.0 U | NA | 2.1 | 1.7 | 1.0 U | 1.0 U | 0.67 J | NA |
| BOD (mg/L) | -- | 1.3 J | 2.0 U | NA | NA | NA | 2.0 U | 2.0 U | NA | NA |
| COD (mg/L) | -- | 12 | 10 | NA | 36 | 11 | 8.3 J | 12 | 7.3 J | NA |
| Chloride (mg/L) | 250 | 130 | 140 | NA | 8 | 130 | 190 | 140 | 150 | NA |
| Nitrate (mg/L) | 10 | 0.098 J | 0.50 U | NA | 0.50 UJ | 0.50 UJ | 0.50 U | 0.50 U | 0.50 UJ | NA |
| Nitrite (mg/L) | 1 | 0.10 U | 0.10 U | NA | 0.10 UJ | 0.10 UJ | 0.10 U | 0.10 U | 0.10 UJ | NA |

See Page 2 of 2 for notes.

Table 7
Monitoring Well Groundwater Analytical Result Summary - Spring 2020
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-5A (Duplicate) |
|---|---|---|---|---|---|---|---|---|---|---|
| Volatile Organic Compounds | | | | | | | | | | |
| PCE (µg/L) | 5 | 1.0 U | 13 U | 1.0 U | 2.0 U | 1.0 U | 2.0 U | 2.0 U | 1.0 U | 5.0 U |
| TCE (µg/L) | 5 | 1.0 U | 13 U | 1.0 U | 2.0 U | 1.0 U | 34 | 2.0 U | 1.0 U | 0.52 J |
| Cis-1,2-DCE (µg/L) | 5 | 1.0 U | 8.7 J | 0.6 J | 38 | 1.4 | 46 | 32 | 11 | 120 |
| Trans-1,2-DCE (µg/L) | 5 | 1.0 U | 13 U | 1.0 U | 2.0 U | 1.0 U | 0.81 J | 2.0 U | 1.0 U | 1.2 J |
| 1,1-DCE (µg/L) | 5 | 1.0 U | 13 U | 1.0 U | 2.0 U | 1.0 U | 0.87 J | 2.0 U | 1.0 U | 5.0 U |
| Vinyl Chloride (µg/L) | 2 | 1 | 560 | 2.9 | 78 | 2.6 | 1.1 J | 51 | 2.3 | 180 |
| 1,1,1-Trichloroethane (µg/L) | 5 | 1.0 U | 13 U | 1.0 U | 2.0 U | 1.0 U | 2.0 U | 2.0 U | 1.0 U | 5.0 U |
| 1,1-Dichloroethane (µg/L) | 5 | 0.24 J | 13 U | 1.0 U | 12 | 4.5 | 3.7 | 2.0 U | 1.0 U | 2.4 J |
| Chloroethane (µg/L) | 5 | 1.0 U | 13 U | 1.0 U | 2.0 U | 8.9 | 2.0 U | 2.0 U | 1.0 U | 5.0 U |
| Dissolved Metals | | | | | | | | | | |
| Dissolved Iron (mg/L) | -- | NA | 0.43 | 0.048 J | 0.7 | 4.1 | 0.99 | 0.23 | NA | 0.2 U |
| Dissolved Gases | | | | | | | | | | |
| Ethane (µg/L) | -- | NA | 3.1 | 1.5 | 17 | 23 | 1.0 U | 2.5 | NA | 43 |
| Ethene (µg/L) | -- | NA | 270 | 1.1 | 21 | 6.5 | 1.0 U | 29 | NA | 53 |
| Methane (µg/L) | -- | NA | 290 | 14,000 D | 17,000 D | 33,000 D | 17 | 24,000 D | NA | 2,800 |
| Propane (µg/L) | -- | NA | 0.43 J | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | NA | 0.86 J |
| Miscellaneous Parameters | | | | | | | | | | |
| TOC (mg/L) | -- | NA | 6.7 | 3.4 | 2.7 | 5.4 | 1.3 | 7.2 | NA | 1.2 |
| Sulfate (mg/L) | 250 | NA | 1,000 | 250 | 70 | 39 | 130 | 170 | NA | 67 |
| Sulfide (mg/L) | 0.05 | NA | 1.0 U | 13 | 1.0 U | 2.9 | 1.0 U | 16 | NA | 1.0 U |
| BOD (mg/L) | -- | NA | 2.0 U | 17 | NA | NA | NA | NA | NA | 2.0 U |
| COD (mg/L) | -- | NA | 17 | 32 | 7.6 J | 21 | 4.1 J | 53 | NA | 8.0 J |
| Chloride (mg/L) | 250 | NA | 210 | 120 | 53 | 110 | 65 | 100 | NA | 130 |
| Nitrate (mg/L) | 10 | NA | 1.0 U | 0.50 U | 0.50 UJ | 0.50 UJ | 0.50 UJ | 0.50 UJ | NA | 0.10 |
| Nitrite (mg/L) | 1 | NA | 0.10 U | 0.10 U | 0.10 UJ | 0.10 UJ | 0.10 UJ | 0.10 UJ | NA | 0.10 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.

NA - Not Analyzed
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.

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

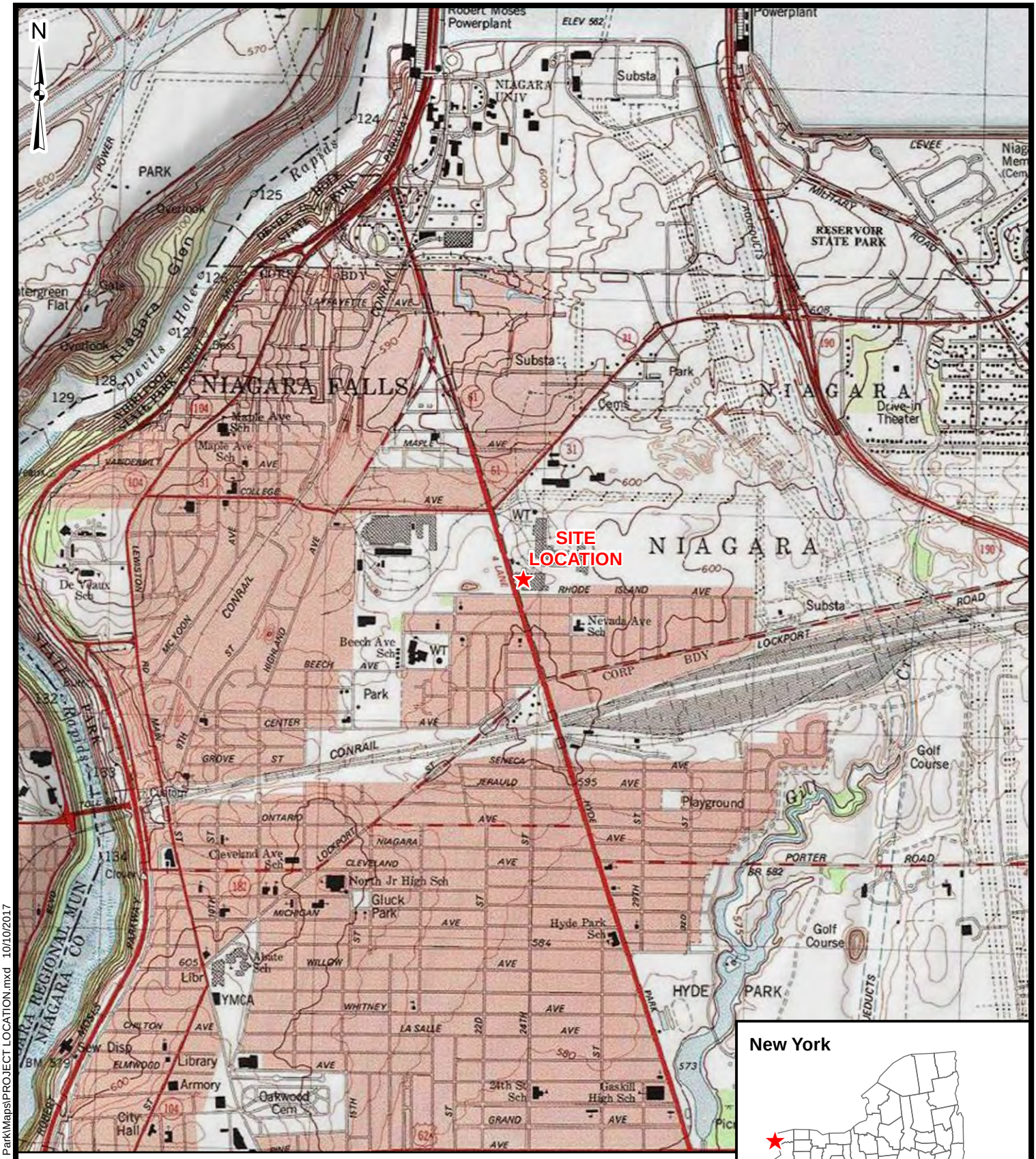
**Table 8**

**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 | 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] | 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 | ng/L | 0.41 J | 0.19 U | 0.18 U | 0.17 U | 0.18 U |
| | Perfluorohexanesulfonic acid (PFHxS) | NA | ng/L | 1.8 U | 1.9 U | 1.8 U | 0.25 J | 0.25 J |
| | Perfluoroheptanesulfonic Acid (PFHpS) | NA | ng/L | 0.17 U | 0.19 U | 0.18 U | 0.16 U | 0.17 U |
| | Perfluorooctanesulfonic acid (PFOS) | 70[2] | ng/L | 0.49 U | 0.53 U | 0.50 U | 0.45 U | 0.47 U |
| | Perfluorodecanesulfonic acid (PFDS) | NA | ng/L | 0.29 U | 0.31 U | 0.30 U | 0.27 U | 0.28 U |
| Perfluoroalkyl carboxylates | Perfluorobutanoic acid (PFBA) | NA | ng/L | 7.9 | 5 | 6.5 | 0.29 U | 0.31 U |
| | Perfluoropentanoic acid (PFPeA) | NA | ng/L | 5 | 0.48 U | 2.2 | 0.41 U | 0.43 U |
| | Perfluorohexanoic acid (PFHxA) | NA | ng/L | 3.2 | 2.6 | 4.7 | 0.48 U | 0.51 U |
| | Perfluoroheptanoic acid (PFHpA) | NA | ng/L | 0.56 J | 0.24 U | 0.82 J | 0.21 U | 0.22 U |
| | Perfluorooctanoic acid (PFOA) | 70[2] | ng/L | 1.2 J | 3.7 | 15 | 0.71 U | 0.75 U |
| | Perfluorononanoic acid (PFNA) | NA | ng/L | 0.24 U | 0.26 U | 0.25 U | 0.29 J | 0.24 U |
| | Perfluorodecanoic acid (PFDA) | NA | ng/L | 0.28 U | 0.30 U | 0.29 U | 0.26 U | 0.27 U |
| | Perfluoroundecanoic acid (PFUnA) | NA | ng/L | 1.0 U | 1.1 U | 1.0 U | 0.92 U | 0.97 U |
| | Perfluorododecanoic acid(PFDoA) | NA | ng/L | 0.5 U | 0.54 U | 0.51 U | 0.46 U | 0.48 U |
| | Perfluorotridecanoic acid (PFTriA) | NA | ng/L | 1.2 U | 1.3 U | 1.2 U | 1.1 U | 1.1 U |
| | Perfluorotetradecanoic acid (PFTeA) | 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 | 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 | ng/L | 1.8 U | 1.9 U | 1.8 U | 1.7 U | 1.8 U |
| Perfluorooctanesulfonamide | Perfluorooctanesulfonamide (PFOSA) | NA | ng/L | 0.32 U | 0.34 U | 0.32 U | 0.29 U | 0.31 U |
| Perfluorooctanesulfonamidoacetic acid | N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA | NA | ng/L | 2.8 U | 3 U | 2.9 U | 2.6 U | 2.7 U |
| | N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA) | 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] | 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).
ug/L - micrograms per liter (parts per billion)
ng/L - nanograms per liter (parts per trillion)
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.

# Figures




Source: USA Topo Maps, ESRI Map Service;
1:24,000-scale USGS Topographic Map,
Lewiston, 1996
Niagara Falls, 1996

2,000 0 2,000 Feet

AECOM

FORMER CARBORUNDUM COMPANY
TOWN OF NIAGARA, NEW YORK
SITE LOCATION

FIGURE 1

J:\Projects\60481767_BPIP\MISC\GIS\Hyde Park\Maps\PROJECT LOCATION.mxd 10/10/2017


## Legend

- Injection Well
- Monitoring Well
- Performance Monitoring Well
- Fence Line

Source: ESRI World Imagery

60 0 60 Feet

FORMER CARBORUNDUM COMPANY
TOWN OF NIAGARA, NEW YORK
SITE PLAN

AECOM

FIGURE 2

J:\Projects\60481767_BPIPO\MISC\GIS\Hyde Park\Maps\SITE PLAN.mxd 10/26/2017


## Legend

- Injection Well
- Monitoring Well
- Performance Monitoring Well
- Groundwater Flow Direction
- Groundwater Contour Elevation
- Fence Line

Note:
Monitoring well, MW-16A, was not included in contour generation.

Source:
ESRI World Imagery

60 0 60 Feet

FORMER CARBORUNDUM COMPANY
TOWN OF NIAGARA, NEW YORK
GROUNDWATER CONTOURS
OVERBURDEN WELLS
(APRIL 18, 2016)

AECOM

FIGURE 3

J:\Projects\60481767_BPIPO\MISC\GIS\Hyde Park\Maps\2016\GROUNDWATER CONTOURS - OVERBURDEN.mxd 6/30/2016 EJE

N

INJ- 9, 587.39
INJ-10, 587.36
MW- 4A, 587.45
KANTHAL-GLOBAR BUILDING
MW- 7A, 588.24
PMW- 4, 588.20
INJ- 2, 587.99
PMW- 1, 588.24
INJ- 1, 588.61
MW- 2A, 588.59
PMW- 3, 588.88
INJ- 5U, 588.19
INJ- 6U, 589.41
INJ- 5L, 587.98
INJ- 6L, 587.79
PMW- 2, 588.32
588
INJ- 8, 588.03
INJ- 7, 589.38
MW-16A, 588.43
589
MW- 3A, 584.59
585
586
587
588
MW-17A, 588.48
MW-19A, 588.35
BRICK BLDG
MW-18A, 588.37
MW-12A, 586.04
MW-11A, 586.64
MW-10A, 587.06
MW- 5A, 587.17
MW- 1A, 588.04
MW-14A, 585.35
586
MW-13A, 586.96
587
588
HYDE PARK BOULEVARD
RHODE ISLAND AVENUE

## Legend

- Injection Well
- Monitoring Well
- Performance Monitoring Well
- Groundwater Flow Direction
- Fence Line
- Groundwater Elevation Contour

Source: ESRI World Imagery

60 0 60 Feet

FORMER CARBORUNDUM COMPANY
TOWN OF NIAGARA, NEW YORK
GROUNDWATER CONTOURS
OVERBURDEN WELLS (SEPTEMBER 11, 2017)

AECOM

FIGURE 4

J:\Projects\60481767_BPIPOMISC\GIS\Hyde Park\Maps\2017\GROUNDWATER CONTOURS - OVERBURDEN.mxd 10/4/2017

N

INJ- 9, 589.38
INJ-10, 589.46
MW- 4A, 589.36
KANTHAL-GLOBAR BUILDING
PMW- 4, 590.50
INJ- 2, 590.17
MW- 7A, 590.76
PMW- 1, 590.56
INJ- 1, 590.79
MW- 2A, 591.15
PMW- 3, 591.17
INJ- 5U, 590.52
INJ- 6U, 592.09
INJ- 5L, 590.03
INJ- 6L, 589.99
PMW- 2, 590.81
INJ- 7, 590.42
INJ- 8, 590.46
MW-16A, 590.89
MW- 3A, 595.49
MW-17A, 590.44
MW-19A, 590.65
BRICK BLDG
MW-18A, 590.14
MW-12A, 587.54
MW-11A, 588.53
MW-10A, 589.15
MW- 5A, 589.23
MW- 1A, 590.59
MW-14A, 583.62
MW-13A, 589.23
HYDE PARK BOULEVARD
RHODE ISLAND AVENUE
591
590
595
594
593
592
591
590
589
588
587
586
585
584

## Legend

- Injection Well
- Monitoring Well
- Performance Monitoring Well
- Groundwater Flow Direction
- Fence Line
- Groundwater Elevation Contour

Source: ESRI World Imagery

60 0 60 Feet

FORMER CARBORUNDUM COMPANY
TOWN OF NIAGARA, NEW YORK
GROUNDWATER CONTOURS
OVERBURDEN WELLS (APRIL 23, 2018)

AECOM

FIGURE 5

J:\Projects\60481767_BPIPOMISC\GIS\Hyde Park\Maps\2018\GROUNDWATER CONTOURS - OVERBURDEN.mxd 5/3/2018

N

INJ- 9, 588.33
INJ-10, 588.82
MW- 4A, 591.00
KANTHAL-GLOBAR BUILDING
INJ- 2, 588.89
PMW- 4, 589.29
MW- 7A, 589.70
PMW- 1, 589.29
INJ- 1, 589.57
MW- 2A, 590.15
PMW- 3, 589.80
INJ- 5U, 588.78
INJ- 6U, 590.87
INJ- 5L, 589.58
INJ- 6L, 588.82
PMW- 2, 589.63
INJ- 7, 590.30
INJ- 8, 589.80
MW-16A, 588.42
MW- 3A, 589.45
MW-17A, 589.77
MW-19A, 589.48
BRICK BLDG
MW-12A, NM
MW-18A, 589.02
MW-11A, 587.57
MW-10A, 588.04
MW- 5A, 588.41
MW- 1A, 589.21
MW-14A, 585.48
MW-13A, 588.02
HYDE PARK BOULEVARD
RHODE ISLAND AVENUE
589
590
588
587
586

## Legend

- Injection Well
- Monitoring Well
- Performance Monitoring Well
- Groundwater Flow Direction
- Fence Line
- Groundwater Elevation Contour

Source: ESRI World Imagery

Note: MW-4A was not used in generation of groundwater contours due to anomalous reading.

60 0 60 Feet

FORMER CARBORUNDUM COMPANY
TOWN OF NIAGARA, NEW YORK
GROUNDWATER CONTOURS
OVERBURDEN WELLS (NOVEMBER 26, 2019)

AECOM

FIGURE 6

J:\Projects\60481767_BPIPOMISC\GIS\Hyde Park\Maps\2019\GROUNDWATER CONTOURS - OVERBURDEN.mxd 12/6/2019

N

INJ- 9, 589.29
INJ-10, 589.47
MW- 4A, 589.60
KANTHAL-GLOBAR BUILDING
INJ- 2, 590.05
PMW- 4, 590.49
MW- 7A, 590.78
PMW- 1, 590.28
INJ- 1, 590.72
MW- 2A, 591.28
PMW- 3, 591.11
INJ- 5U, 591.66
INJ- 6U, 592.09
INJ- 5L, 589.86
INJ- 6L, 589.87
PMW- 2, 590.86
INJ- 7, 590.81
INJ- 8, 589.77
MW-16A, 589.15
MW- 3A, 595.56
595
594
593
592
591
590
589
588
587
586
MW-17A, 590.41
MW-19A, 590.96
BRICK BLDG
MW-12A
MW-18A, 590.19
MW-11A, 588.50
MW-10A, 589.11
MW- 5A, 589.25
MW- 1A, 590.65
MW-14A, 585.66
MW-13A, 589.16
HYDE PARK BOULEVARD
RHODE ISLAND AVENUE

## Legend

- Injection Well
- Monitoring Well
- Monitoring Well (Destroyed)
- Performance Monitoring Well
- Groundwater Flow Direction
- Fence Line
- Groundwater Elevation Contour

Source: ESRI World Imagery

60 0 60 Feet

FORMER CARBORUNDUM COMPANY
TOWN OF NIAGARA, NEW YORK
GROUNDWATER CONTOURS
OVERBURDEN WELLS (MARCH 17, 2020)

AECOM

FIGURE 7

J:\Projects\60481767_BPIPOMISC\GIS\Hyde Park\Maps\2020\GROUNDWATER CONTOURS - OVERBURDEN_rev.mxd 6/18/2020


FORMER CARBORUNDUM COMPANY
TOWN OF NIAGARA, NEW YORK
GROUNDWATER CONTOURS
BEDROCK WELLS
(APRIL 18, 2016)

AECOM

FIGURE 8

J:\Projects\60481767_BPIPO\MISC\GIS\Hyde Park\Maps\2016\GROUNDWATER CONTOURS - BEDROCK.mxd 6/30/2016 EJE


## Legend

- Injection Well
- Monitoring Well
- Performance Monitoring Well
- Groundwater Flow Direction
- Fence Line
- Groundwater Elevation Contour

Source: ESRI World Imagery

60 0 60 Feet

FORMER CARBORUNDUM COMPANY
TOWN OF NIAGARA, NEW YORK
GROUNDWATER CONTOURS
BEDROCK WELLS (SEPTEMBER 11, 2017)

AECOM

FIGURE 9

J:\Projects\60481767_BPIPOMISC\GIS\Hyde Park\Maps\2017\GROUNDWATER CONTOURS - BEDROCK.mxd 10/10/2017


## Legend

- Injection Well
- Monitoring Well
- Performance Monitoring Well
- Groundwater Flow Direction
- Fence Line
- Groundwater Elevation Contour

Source: ESRI World Imagery

NOTE: PMW-6 and INJ-4 were not used in production of groundwater contours due to anomalous readings.

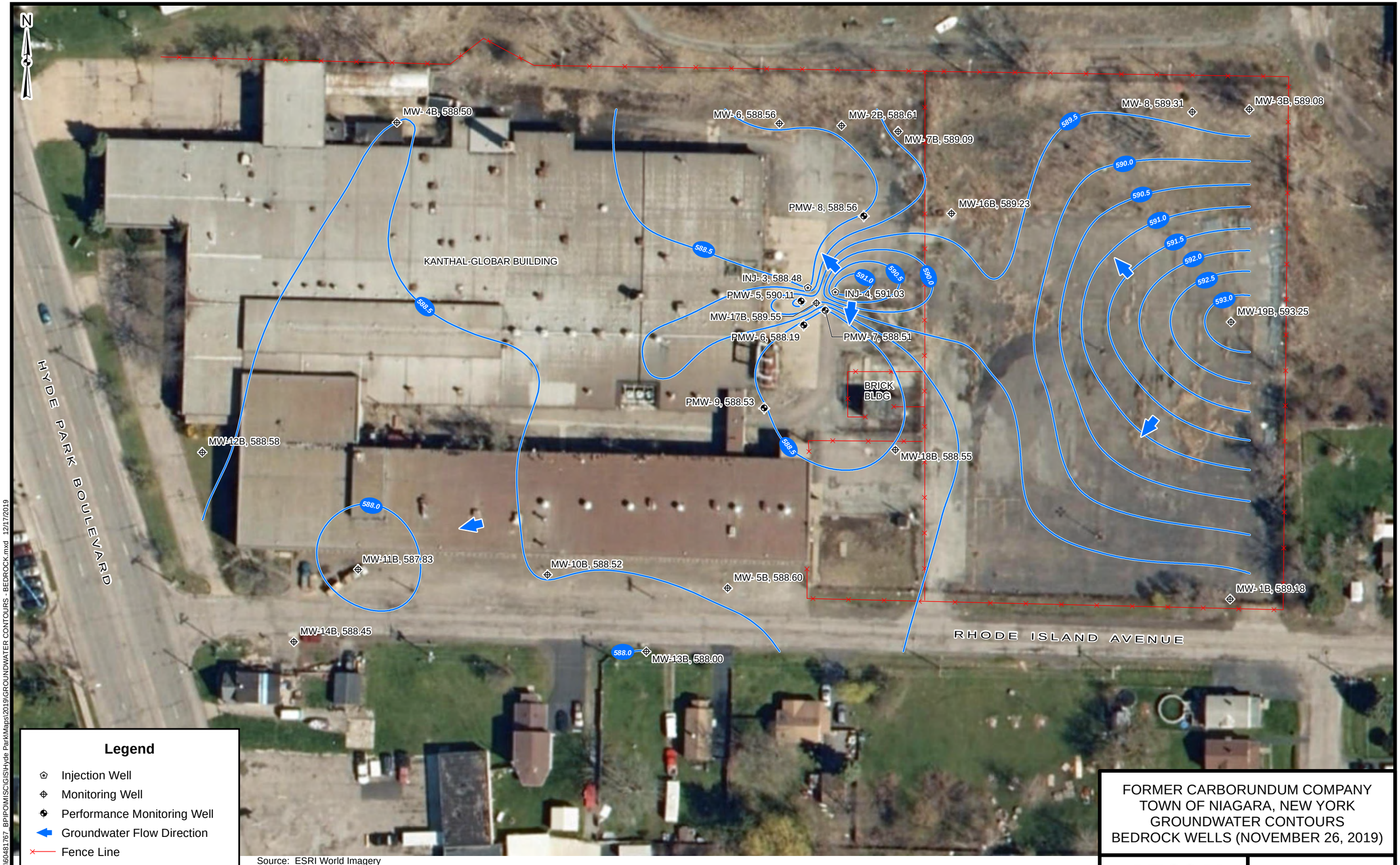
60 0 60 Feet

# FORMER CARBORUNDUM COMPANY
# TOWN OF NIAGARA, NEW YORK
# GROUNDWATER CONTOURS
# BEDROCK WELLS (APRIL 23, 2018)

AECOM

FIGURE 10

J:\Projects\60481767_BPIPOM\ISC\GIS\Hyde Park\Maps\2018\GROUNDWATER CONTOURS - BEDROCK.mxd 5/3/2018




## Legend

- Injection Well
- Monitoring Well
- Performance Monitoring Well
- Groundwater Flow Direction
- Fence Line
- Groundwater Elevation Contour

Source: ESRI World Imagery

60 0 60 Feet

FORMER CARBORUNDUM COMPANY
TOWN OF NIAGARA, NEW YORK
GROUNDWATER CONTOURS
BEDROCK WELLS (NOVEMBER 26, 2019)

AECOM

FIGURE 11

J:\Projects\60481767_BPIPOMISC\GIS\Hyde Park\Maps\2019\GROUNDWATER CONTOURS - BEDROCK.mxd 12/17/2019


## Legend

- Injection Well
- Monitoring Well
- Performance Monitoring Well
- Groundwater Flow Direction
- Fence Line
- Groundwater Elevation Contour

Source: ESRI World Imagery

60 0 60 Feet

FORMER CARBORUNDUM COMPANY
TOWN OF NIAGARA, NEW YORK
GROUNDWATER CONTOURS
BEDROCK WELLS (MARCH 17, 2020)

AECOM

FIGURE 12

J:\Projects\60481767_BPIPOMISC\GIS\Hyde Park\Maps\2020\GROUNDWATER CONTOURS - BEDROCK.mxd 4/2/2020


| MW-7A | 2000 | Oct-09 | May-10 | Oct-11 | Jun-12 | Aug-13 | Apr-14 | Nov-15 | Apr-16 | Sep-17 | Apr-18 | Dec-19 | Mar-20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TCE | 1200 | 1.8 J | 1 U | 1 U | 1.2 J | 1 U | 0.5 U | 0.5 U | 0.5 U | 0.66 U | 1.7 U | 0.25 U | 0.20 U |
| DCE | 4800 | 210 | 65 | 20 | 3.8 J | 3.9 J | 3 | 1.5 | 1.9 | 26 | 46 | 21 J | 50 |
| VC | 220 | 150 | 50 | 19 | 1 U | 2.2 J | 1 | 3.1 | 3.7 | 33 | 42 | 35 J | 45 |
| DCA | 1000 | 49 | 33 | 22 | 9.1 | 15 | 12 | 11 | 12 | 61 J | 140 | 69 | 59 |

| MW-4A | 2000 | Oct-09 | May-10 | Oct-11 | Jun-12 | Aug-13 | Apr-14 | Nov-15 | Apr-16 | Sep-17 | Apr-18 | Dec-19 | Mar-20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TCE | 2.8 J | 130 | 94 | 160 | 7.5 | 4.2 J | 1.2 | 1.2 | 3.4 | 1.3 | 0.44 J | NS | NS |
| DCE | 74 | 115.7 | 254.9 | 150 | 140 | 31 | 3.7 | 1.3 | 2.8 | 0.68 J | 1.1 | NS | NS |
| VC | 45 | 41 | 45 | 73 | 20 | 11 | 4.1 | 1.1 | 1.1 | 2.6 | 0.96 J | NS | NS |
| DCA | 4.6 J | 17 | 21 | 18 | 5.4 | 1.3 J | 0.5 U | 1 | 1.4 | 1.4 | 1.8 | NS | NS |

| MW-2A | 2000 | Oct-09 | May-10 | Oct-11 | Jun-12 | Aug-13 | Apr-14 | Nov-15 | Apr-16 | Sep-17 | Apr-18 | Dec-19 | Mar-20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TCE | 5 U | 5 U | 1 U | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| DCE | 1.2 J | 5 U | 5 U | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| VC | 2 U | 1.3 J | 1.2 U | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| DCA | 13 J | 26 | 18 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |

| MW-3A | 2000 | Oct-09 | May-10 | Oct-11 | Jun-12 | Aug-13 | Apr-14 | Nov-15 | Apr-16 | Sep-17 | Apr-18 | Dec-19 | Mar-20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TCE | 0.43 J | 5 U | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| DCE | 1.5 J | 5 U | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| VC | 2 U | 2 U | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| DCA | 5 U | 5 U | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |

| MW-16A | 2000 | Oct-09 | May-10 | Oct-11 | Jun-12 | Aug-13 | Apr-14 | Nov-15 | Apr-16 | Sep-17 | Apr-18 | Dec-19 | Mar-20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TCE | NS | 5 U | 1 U | 1 U | 1 U | 1 U | 0.5 U | 0.5 U | 0.5 U | 3.3 U | 0.33 U | 0.6 J | 1.3 U |
| DCE | NS | 8.2 | 10 | 11 | 8.4 | 8.5 | 5.9 | 9.1 | 6.5 | 7.3 J | 1.4 | 3.6 J | 8.7 J |
| VC | NS | 75 | 180 | 340 | 110 | 300 | 140 | 250 | 18 | 190 | 33 | 120 | 560 |
| DCA | NS | 5 U | 1 U | 1 U | 1 U | 1 U | 0.5 U | 0.5 U | 0.5 U | 2.5 U | 0.25 U | 0.68 U | 2.1 U |

| MW-17A | 2000 | Oct-09 | May-10 | Oct-11 | Jun-12 | Aug-13 | Apr-14 | Nov-15 | Apr-16 | Sep-17 | Apr-18 | Dec-19 | Mar-20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TCE | 115 | 22 | 15 | 11 | 5.3 | 3.1 J | 0.62 J | 0.5 U | 0.5 U | 1.7 U | 1.7 U | 0.20 U | 0.20 U |
| DCE | 230 | 180 | 210 | 160 | 140 | 180 | 150 | 160 | 110 | 120 | 59 | 50 | 38 |
| VC | 18 | 25 | 27 | 30 | 25 | 45 | 49 | 86 | 89 | 120 | 91 | 83 | 78 |
| DCA | 59 | 30 | 20 | 26 | 21 | 22 | 16 | 18 | 15 | 17 | 11 | 13 | 12 |

| MW-19A | 2000 | Oct-09 | May-10 | Oct-11 | Jun-12 | Aug-13 | Apr-14 | Nov-15 | Apr-16 | Sep-17 | Apr-18 | Dec-19 | Mar-20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TCE | 1.7 J | 5 U | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| DCE | 33 | 3.7 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| VC | 2 U | 2.8 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| DCA | 5 U | 5 U | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |

| MW-12A | 2000 | Oct-09 | May-10 | Oct-11 | Jun-12 | Aug-13 | Apr-14 | Nov-15 | Apr-16 | Sep-17 | Apr-18 | Dec-19 | Mar-20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TCE | 2.6 J | 5 U | 1 U | 1 U | 1 U | 1 U | 0.5 U | 0.5 U | 0.5 U | 0.33 U | 0.33 U | NS | NS |
| DCE | 540 | 64 | 16 | 19 | 19 | 22 | 8.9 | 1.6 | 9.5 | 21 | 16 | NS | NS |
| VC | 49 | 38 | 16 | 16 | 13 | 14 | 6.8 | 9.6 | 8.8 | 13 | 9.2 | NS | NS |
| DCA | 5.9 | 2.7 | 1.6 J | 1.8 J | 1.8 J | 1.9 J | 0.89 J | 0.7 J | 1.1 | 1.6 | 0.91 J | NS | NS |

| MW-18A | 2000 | Oct-09 | May-10 | Oct-11 | Jun-12 | Aug-13 | Apr-14 | Nov-15 | Apr-16 | Sep-17 | Apr-18 | Dec-19 | Mar-20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TCE | 36 | 25 | 25 | 23 | 21 | 25 | 27 | 38 | 37 | 29 | 36 | 32 | 34 |
| DCE | 47 | 43 | 51 | 42 | 56 | 58 | 43 | 53 | 51 | 58 | 42 | 43 | 46 |
| VC | 4.4 | 7 | 2.6 J | 8.4 | 2.4 J | 3.4 J | 0.86 J | 2.3 | 0.62 J | 1.8 J | 1.1 | 0.97 J | 1.1 J |
| DCA | 5.6 | 4.7 J | 4.2 J | 4.7 J | 4.2 J | 4.9 J | 3.6 | 4.7 | 4.3 | 5.0 | 3.7 | 3.6 | 3.7 |

| MW-10A | 2000 | Oct-09 | May-10 | Oct-11 | Jun-12 | Aug-13 | Apr-14 | Nov-15 | Apr-16 | Sep-17 | Apr-18 | Dec-19 | Mar-20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TCE | 5 U | 5 U | 1 U | 1 U | 1 U | 1 U | 0.5 U | 0.5 U | 0.57 J | 6.6 U | 6.6 U | 5 J | 7.6 |
| DCE | 1200 | 409.4 | 397.6 | 630 | 620 | 580 | 560 | 710 | 960 D | 590 | 540 | 500 | 570 |
| VC | 86 | 140 | 140 | 250 | 170 | 130 | 95 | 130 | 83 | 130 | 94 | 130 | 130 |
| DCA | 25 | 6.4 | 5.7 | 7.7 | 7 | 5.6 | 4.4 | 5.3 | 5.4 | 5.0 UJ | 5.0 U | 4.3 U | 3.4 U |

| MW-5A | 2000 | Oct-09 | May-10 | Oct-11 | Jun-12 | Aug-13 | Apr-14 | Nov-15 | Apr-16 | Sep-17 | Apr-18 | Dec-19 | Mar-20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TCE | 1.3 J | 5 U | 1 U | 1 U | 1 U | 1 U | 0.5 U | 0.5 U | 0.5 U | 0.66 U | 4.1 U | 0.47 J | 0.52 J |
| DCE | 320 | 5.9 | 110.97 | 5.7 | 88 | 110 | 240 | 150 | 340 D | 61 | 250 | 10 | 130 |
| VC | 42 | 1.8 | 84 | 3.3 J | 82 | 190 | 300 | 140 | 340 D | 68 | 310 | 13 | 180 |
| DCA | 2.1 J | 5 U | 1 U | 1 U | 1 U | 1.3 U | 3.3 | 1.4 | 4.2 | 0.88 J | 3.3 J | 0.17 J | 2.5 J |

| MW-11A | 2000 | Oct-09 | May-10 | Oct-11 | Jun-12 | Aug-13 | Apr-14 | Nov-15 | Apr-16 | Sep-17 | Apr-18 | Dec-19 | Mar-20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TCE | 5 U | 5 U | 1 U | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| DCE | 1.3 J | 5 U | 1.9 J | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| VC | 2 U | 2 U | 3.2 J | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| DCA | 5 U | 5 U | 1 U | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |

| MW-1A | 2000 | Oct-09 | May-10 | Oct-11 | Jun-12 | Aug-13 | Apr-14 | Nov-15 | Apr-16 | Sep-17 | Apr-18 | Dec-19 | Mar-20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TCE | 5 U | 1 U | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| DCE | 2.4 J | 1 U | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| VC | 0.44 J | 1 U | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| DCA | 5 UJ | 1 U | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |

| MW-13A | 2000 | Oct-09 | May-10 | Oct-11 | Jun-12 | Aug-13 | Apr-14 | Nov-15 | Apr-16 | Sep-17 | Apr-18 | Dec-19 | Mar-20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TCE | 5 U | 5 U | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| DCE | 5 U | 5 U | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| VC | 2 U | 2 U | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| DCA | 5 U | 5 U | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |

| MW-14A | 2000 | Oct-09 | May-10 | Oct-11 | Jun-12 | Aug-13 | Apr-14 | Nov-15 | Apr-16 | Sep-17 | Apr-18 | Dec-19 | Mar-20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TCE | 5 U | 5 U | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| DCE | 1.6 J | 1.4 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| VC | 0.37 J | 2.7 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| DCA | 5 U | 5 U | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |

## Legend

- Monitoring Well
- Fence Line

LOCATION ID — DATE

| | MW-1A | 2000 |
|---|---|---|
| TRICHLOROETHENE | TCE | 5 U |
| CIS 1,2-DICHLOROETHENE | DCE | 2.4 J |
| VINYL CHLORIDE | VC | 0.44 J |
| 1,1 DICHLOROETHANE | DCA | 5 UJ |

RESULT

Notes:
1. Units are shown in µg/L
2. NS = Not Sampled
3. D = Result reported from a secondary dilution analysis.
4. J = The reported concentration is an estimated value.
5. U = Not detected above the reported method detection limit.
6. UJ = Not detected. The reported method detection limit is an estimated value.
7. Monitoring well MW-12A was found destroyed in December 2019.

Source: ESRI World Imagery

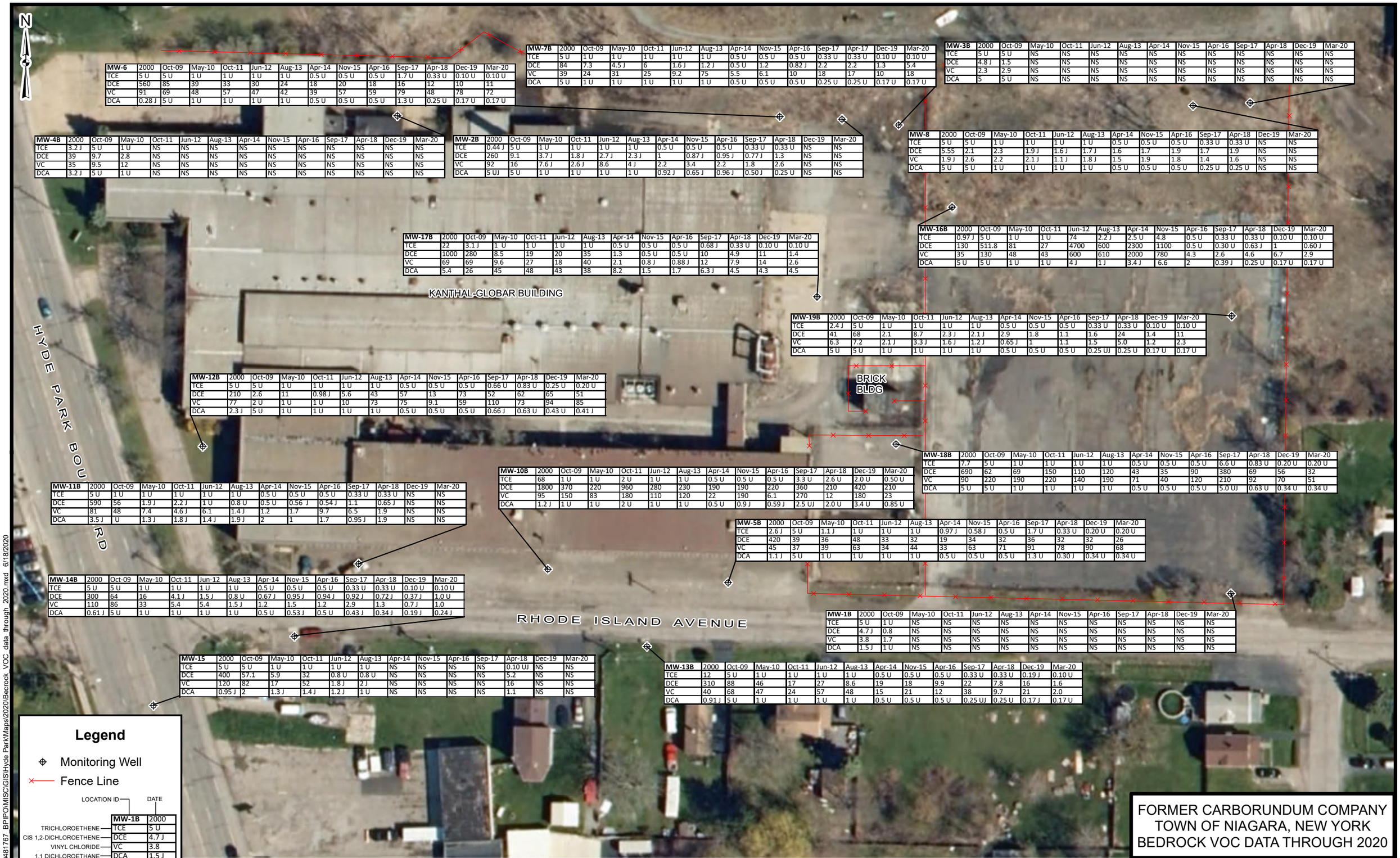
60 0 60 Feet

# FORMER CARBORUNDUM COMPANY
# TOWN OF NIAGARA, NEW YORK
# OVERBURDEN VOC DATA THROUGH 2020

AECOM

FIGURE 13

J:\Projects\60481767_BPIP\MISC\GIS\Hyde Park\Maps\2020\Overburden_VOC_data_through_2020.mxd 3/17/2021




| MW-6 | 2000 | Oct-09 | May-10 | Oct-11 | Jun-12 | Aug-13 | Apr-14 | Nov-15 | Apr-16 | Sep-17 | Apr-18 | Dec-19 | Mar-20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TCE | 5 U | 5 U | 1 U | 1 U | 1 U | 1 U | 0.5 U | 0.5 U | 0.5 U | 1.7 U | 0.33 U | 0.10 U | 0.10 U |
| DCE | 560 | 85 | 39 | 33 | 30 | 24 | 18 | 20 | 18 | 16 | 12 | 10 | 11 |
| VC | 91 | 69 | 48 | 57 | 47 | 42 | 39 | 57 | 59 | 79 | 48 | 78 | 72 |
| DCA | 0.28 J | 5 U | 1 U | 1 U | 1 U | 1 U | 0.5 U | 0.5 U | 0.5 U | 1.3 U | 0.25 U | 0.17 U | 0.17 U |

| MW-7B | 2000 | Oct-09 | May-10 | Oct-11 | Jun-12 | Aug-13 | Apr-14 | Nov-15 | Apr-16 | Sep-17 | Apr-17 | Dec-19 | Mar-20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TCE | 5 U | 1 U | 1 U | 1 U | 1 U | 1 U | 0.5 U | 0.5 U | 0.5 U | 0.33 U | 0.33 U | 0.10 U | 0.10 U |
| DCE | 84 | 7.3 | 4.5 J | 6 | 1.6 J | 1.2 J | 0.5 U | 1.2 | 0.82 J | 2.2 | 2.2 | 1.3 | 5.4 |
| VC | 39 | 24 | 31 | 25 | 9.2 | 75 | 5.5 | 6.1 | 10 | 18 | 17 | 10 | 18 |
| DCA | 5 U | 1 U | 1 U | 1 U | 1 U | 1 U | 0.5 U | 0.5 U | 0.5 U | 0.25 U | 0.25 U | 0.17 U | 0.17 U |

| MW-3B | 2000 | Oct-09 | May-10 | Oct-11 | Jun-12 | Aug-13 | Apr-14 | Nov-15 | Apr-16 | Sep-17 | Apr-18 | Dec-19 | Mar-20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TCE | 5 U | 5 U | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| DCE | 4.8 J | 1.5 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| VC | 2.3 | 2.9 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| DCA | 5 | 5 U | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |

| MW-4B | 2000 | Oct-09 | May-10 | Oct-11 | Jun-12 | Aug-13 | Apr-14 | Nov-15 | Apr-16 | Sep-17 | Apr-18 | Dec-19 | Mar-20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TCE | 3.2 J | 5 U | 1 U | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| DCE | 39 | 9.7 | 2.8 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| VC | 35 | 9.5 | 12 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| DCA | 3.2 J | 5 U | 1 U | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |

| MW-2B | 2000 | Oct-09 | May-10 | Oct-11 | Jun-12 | Aug-13 | Apr-14 | Nov-15 | Apr-16 | Sep-17 | Apr-18 | Dec-19 | Mar-20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TCE | 0.44 J | 5 U | 1 U | 1 U | 1 U | 1 U | 0.5 U | 0.5 U | 0.5 U | 0.33 U | 0.33 U | NS | NS |
| DCE | 260 | 9.1 | 3.7 J | 1.8 J | 2.7 J | 2.3 J | 1 | 0.87 J | 0.95 J | 0.77 J | 1.3 | NS | NS |
| VC | 92 | 16 | 7.6 J | 2.6 J | 8.6 | 4 J | 2.2 | 3.4 | 2.2 | 1.8 | 2.6 | NS | NS |
| DCA | 5 UJ | 5 U | 1 U | 1 U | 1 U | 1 U | 0.92 J | 0.65 J | 0.96 J | 0.50 J | 0.25 U | NS | NS |

| MW-8 | 2000 | Oct-09 | May-10 | Oct-11 | Jun-12 | Aug-13 | Apr-14 | Nov-15 | Apr-16 | Sep-17 | Apr-18 | Dec-19 | Mar-20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TCE | 5 U | 5 U | 1 U | 1 U | 1 U | 1 U | 0.5 U | 0.5 U | 0.5 U | 0.33 U | 0.33 U | NS | NS |
| DCE | 5.55 | 2.1 | 2.3 | 1.9 J | 1.6 J | 1.7 J | 1.6 | 1.7 | 1.9 | 1.7 | 1.9 | NS | NS |
| VC | 1.9 J | 2.6 | 2.2 | 2.1 J | 1.1 J | 1.8 J | 1.5 | 1.9 | 1.8 | 1.4 | 1.6 | NS | NS |
| DCA | 5 U | 5 U | 1 U | 1 U | 1 U | 1 U | 0.5 U | 0.5 U | 0.5 U | 0.25 U | 0.25 U | NS | NS |

| MW-17B | 2000 | Oct-09 | May-10 | Oct-11 | Jun-12 | Aug-13 | Apr-14 | Nov-15 | Apr-16 | Sep-17 | Apr-18 | Dec-19 | Mar-20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TCE | 22 | 3.1 J | 1 U | 1 U | 1 U | 1 U | 0.5 U | 0.5 U | 0.5 U | 0.68 J | 0.33 U | 0.10 U | 0.10 U |
| DCE | 1000 | 280 | 8.5 | 19 | 20 | 35 | 1.3 | 0.5 U | 0.5 U | 10 | 4.9 | 11 | 1.4 |
| VC | 69 | 69 | 9.6 | 27 | 18 | 40 | 2.1 | 0.8 J | 0.88 J | 12 | 7.9 | 14 | 2.6 |
| DCA | 5.4 | 26 | 45 | 48 | 43 | 38 | 8.2 | 1.5 | 1.7 | 6.3 J | 4.5 | 4.3 | 4.5 |

| MW-16B | 2000 | Oct-09 | May-10 | Oct-11 | Jun-12 | Aug-13 | Apr-14 | Nov-15 | Apr-16 | Sep-17 | Apr-18 | Dec-19 | Mar-20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TCE | 0.97 J | 5 U | 1 U | 1 U | 74 | 2.2 J | 2.5 U | 4.8 | 0.5 U | 0.33 U | 0.33 U | 0.10 U | 0.10 U |
| DCE | 130 | 511.8 | 81 | 27 | 4700 | 600 | 2300 | 1100 | 0.5 U | 0.30 U | 0.63 J | 1 | 0.60 J |
| VC | 35 | 130 | 48 | 43 | 600 | 610 | 2000 | 780 | 4.3 | 2.6 | 4.6 | 6.7 | 2.9 |
| DCA | 5 U | 5 U | 1 U | 1 U | 4 J | 1 J | 3.4 J | 6.6 | 2 | 0.39 J | 0.25 U | 0.17 U | 0.17 U |

| MW-19B | 2000 | Oct-09 | May-10 | Oct-11 | Jun-12 | Aug-13 | Apr-14 | Nov-15 | Apr-16 | Sep-17 | Apr-18 | Dec-19 | Mar-20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TCE | 2.4 J | 5 U | 1 U | 1 U | 1 U | 1 U | 0.5 U | 0.5 U | 0.5 U | 0.33 U | 0.33 U | 0.10 U | 0.10 U |
| DCE | 41 | 68 | 2.1 | 8.7 | 2.3 J | 2.1 J | 2.9 | 1.8 | 1.1 | 1.6 | 24 | 1.4 | 11 |
| VC | 6.3 | 7.2 | 2.1 J | 3.3 J | 1.6 J | 1.2 J | 0.65 J | 1 | 1.1 | 1.5 | 5.0 | 1.2 | 2.3 |
| DCA | 5 U | 5 U | 1 U | 1 U | 1 U | 1 U | 0.5 U | 0.5 U | 0.5 U | 0.25 UJ | 0.25 U | 0.17 U | 0.17 U |

| MW-12B | 2000 | Oct-09 | May-10 | Oct-11 | Jun-12 | Aug-13 | Apr-14 | Nov-15 | Apr-16 | Sep-17 | Apr-18 | Dec-19 | Mar-20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TCE | 5 U | 5 U | 1 U | 1 U | 1 U | 1 U | 0.5 U | 0.5 U | 0.5 U | 0.66 U | 0.83 U | 0.25 U | 0.20 U |
| DCE | 210 | 2.6 | 11 | 0.98 J | 5.6 | 43 | 57 | 13 | 73 | 52 | 62 | 65 | 51 |
| VC | 77 | 2 U | 1 U | 1 U | 10 | 73 | 75 | 9.1 | 59 | 110 | 73 | 94 | 85 |
| DCA | 2.3 J | 5 U | 1 U | 1 U | 1 U | 1 U | 0.5 U | 0.5 U | 0.5 U | 0.66 J | 0.63 U | 0.43 U | 0.41 J |

| MW-18B | 2000 | Oct-09 | May-10 | Oct-11 | Jun-12 | Aug-13 | Apr-14 | Nov-15 | Apr-16 | Sep-17 | Apr-18 | Dec-19 | Mar-20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TCE | 7.7 | 5 U | 1 U | 1 U | 1 U | 1 U | 0.5 U | 0.5 U | 0.5 U | 6.6 U | 0.83 U | 0.20 U | 0.20 U |
| DCE | 690 | 62 | 69 | 150 | 110 | 120 | 43 | 35 | 90 | 380 | 69 | 56 | 32 |
| VC | 90 | 220 | 190 | 220 | 140 | 190 | 71 | 40 | 120 | 210 | 92 | 70 | 51 |
| DCA | 5 U | 5 U | 1 U | 1 U | 1 U | 1 U | 0.5 U | 0.5 U | 0.5 U | 5.0 UJ | 0.63 U | 0.34 U | 0.34 U |

| MW-10B | 2000 | Oct-09 | May-10 | Oct-11 | Jun-12 | Aug-13 | Apr-14 | Nov-15 | Apr-16 | Sep-17 | Apr-18 | Dec-19 | Mar-20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TCE | 68 | 1 U | 1 U | 2 U | 1 U | 1 U | 0.5 U | 0.5 U | 0.5 U | 3.3 U | 2.6 U | 2.0 U | 0.50 U |
| DCE | 1800 | 370 | 220 | 960 | 280 | 230 | 190 | 190 | 220 | 360 | 210 | 420 | 210 |
| VC | 95 | 150 | 83 | 180 | 110 | 120 | 22 | 190 | 6.1 | 270 | 12 | 180 | 23 |
| DCA | 1.2 J | 1 U | 1 U | 2 U | 1 U | 1 U | 0.5 U | 0.9 J | 0.59 J | 2.5 UJ | 2.0 U | 3.4 U | 0.85 U |

| MW-5B | 2000 | Oct-09 | May-10 | Oct-11 | Jun-12 | Aug-13 | Apr-14 | Nov-15 | Apr-16 | Sep-17 | Apr-18 | Dec-19 | Mar-20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TCE | 2.6 J | 5 U | 1.1 J | 1 U | 1 U | 1 U | 0.97 J | 0.58 J | 0.5 U | 1.7 U | 0.33 U | 0.20 U | 0.20 U |
| DCE | 420 | 39 | 36 | 48 | 33 | 32 | 19 | 34 | 32 | 36 | 32 | 32 | 26 |
| VC | 45 | 37 | 39 | 63 | 34 | 44 | 33 | 63 | 71 | 91 | 78 | 90 | 68 |
| DCA | 1.1 J | 5 U | 1 U | 1 U | 1 U | 1 U | 0.5 U | 0.5 U | 0.5 U | 1.3 U | 0.30 J | 0.34 U | 0.34 U |

| MW-11B | 2000 | Oct-09 | May-10 | Oct-11 | Jun-12 | Aug-13 | Apr-14 | Nov-15 | Apr-16 | Sep-17 | Apr-18 | Dec-19 | Mar-20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TCE | 5 U | 1 U | 1 U | 1 U | 1 U | 0.8 U | 0.5 U | 0.56 J | 0.54 J | 1.1 | 0.65 J | NS | NS |
| DCE | 590 | 56 | 1.9 J | 2.2 J | 1 U | 0.8 U | 0.5 U | 0.5 U | 0.5 U | 0.33 U | 0.33 U | NS | NS |
| VC | 81 | 48 | 7.4 | 4.6 J | 6.1 | 1.4 J | 1.2 | 1.7 | 9.7 | 6.5 | 1.9 | NS | NS |
| DCA | 3.5 J | U | 1.3 J | 1.8 J | 1.4 J | 1.9 J | 2 | 1 | 1.7 | 0.95 J | 1.9 | NS | NS |

| MW-14B | 2000 | Oct-09 | May-10 | Oct-11 | Jun-12 | Aug-13 | Apr-14 | Nov-15 | Apr-16 | Sep-17 | Apr-18 | Dec-19 | Mar-20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TCE | 5 U | 5 U | 1 U | 1 U | 1 U | 1 U | 0.5 U | 0.5 U | 0.5 U | 0.33 U | 0.33 U | 0.10 U | 0.10 U |
| DCE | 300 | 64 | 16 | 4.1 J | 1.5 J | 0.8 U | 0.67 J | 0.95 J | 0.94 J | 0.92 J | 0.72 J | 0.37 J | 1.0 U |
| VC | 110 | 86 | 33 | 5.4 | 5.4 | 1.5 J | 1.2 | 1.5 | 1.2 | 2.9 | 1.3 | 0.7 J | 1.0 |
| DCA | 0.61 J | 5 U | 1 U | 1 U | 1 U | 1 U | 0.5 U | 0.53 J | 0.5 U | 0.43 J | 0.34 J | 0.19 J | 0.24 J |

| MW-1B | 2000 | Oct-09 | May-10 | Oct-11 | Jun-12 | Aug-13 | Apr-14 | Nov-15 | Apr-16 | Sep-17 | Apr-18 | Dec-19 | Mar-20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TCE | 5 U | 1 U | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| DCE | 4.7 J | 0.8 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| VC | 3.8 | 1.7 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| DCA | 1.5 J | 1 U | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |

| MW-15 | 2000 | Oct-09 | May-10 | Oct-11 | Jun-12 | Aug-13 | Apr-14 | Nov-15 | Apr-16 | Sep-17 | Apr-18 | Dec-19 | Mar-20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TCE | 5 U | 5 U | 1 U | 1 U | 1 U | 1 U | NS | NS | NS | NS | 0.10 UJ | NS | NS |
| DCE | 400 | 57.1 | 5.9 | 32 | 0.8 U | 0.8 U | NS | NS | NS | NS | 5.2 | NS | NS |
| VC | 120 | 82 | 17 | 52 | 1.8 J | 2 J | NS | NS | NS | NS | 16 | NS | NS |
| DCA | 0.95 J | 2 | 1.3 J | 1.4 J | 1.2 J | 1 U | NS | NS | NS | NS | 1.1 | NS | NS |

| MW-13B | 2000 | Oct-09 | May-10 | Oct-11 | Jun-12 | Aug-13 | Apr-14 | Nov-15 | Apr-16 | Sep-17 | Apr-18 | Dec-19 | Mar-20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TCE | 12 | 5 U | 1 U | 1 U | 1 U | 1 U | 0.5 U | 0.5 U | 0.5 U | 0.33 U | 0.33 U | 0.19 J | 0.10 U |
| DCE | 310 | 88 | 46 | 17 | 27 | 8.6 | 19 | 18 | 9.9 | 22 | 7.8 | 16 | 1.6 |
| VC | 40 | 68 | 47 | 24 | 57 | 48 | 15 | 21 | 12 | 38 | 9.7 | 21 | 2.0 |
| DCA | 0.91 J | 5 U | 1 U | 1 U | 1 U | 1 U | 0.5 U | 0.5 U | 0.5 U | 0.25 UJ | 0.25 U | 0.17 J | 0.17 U |

## Legend

- Monitoring Well
- Fence Line

LOCATION ID — DATE

| MW-1B | 2000 |
|---|---|
| TCE | 5 U |
| DCE | 4.7 J |
| VC | 3.8 |
| DCA | 1.5 J |

TRICHLOROETHENE — CIS 1,2-DICHLOROETHENE — VINYL CHLORIDE — 1,1 DICHLOROETHANE — RESULT

Notes:
1. Units are shown in µg/L
2. NS = Not Sampled
3. D = Result reported from a secondary dilution analysis.
4. J = The reported concentration is an estimated value.
5. U = Not detected above the reported method detection limit.
6. UJ = Not detected. The reported method detection limit is an estimated value.

Source:
ESRI World Imagery

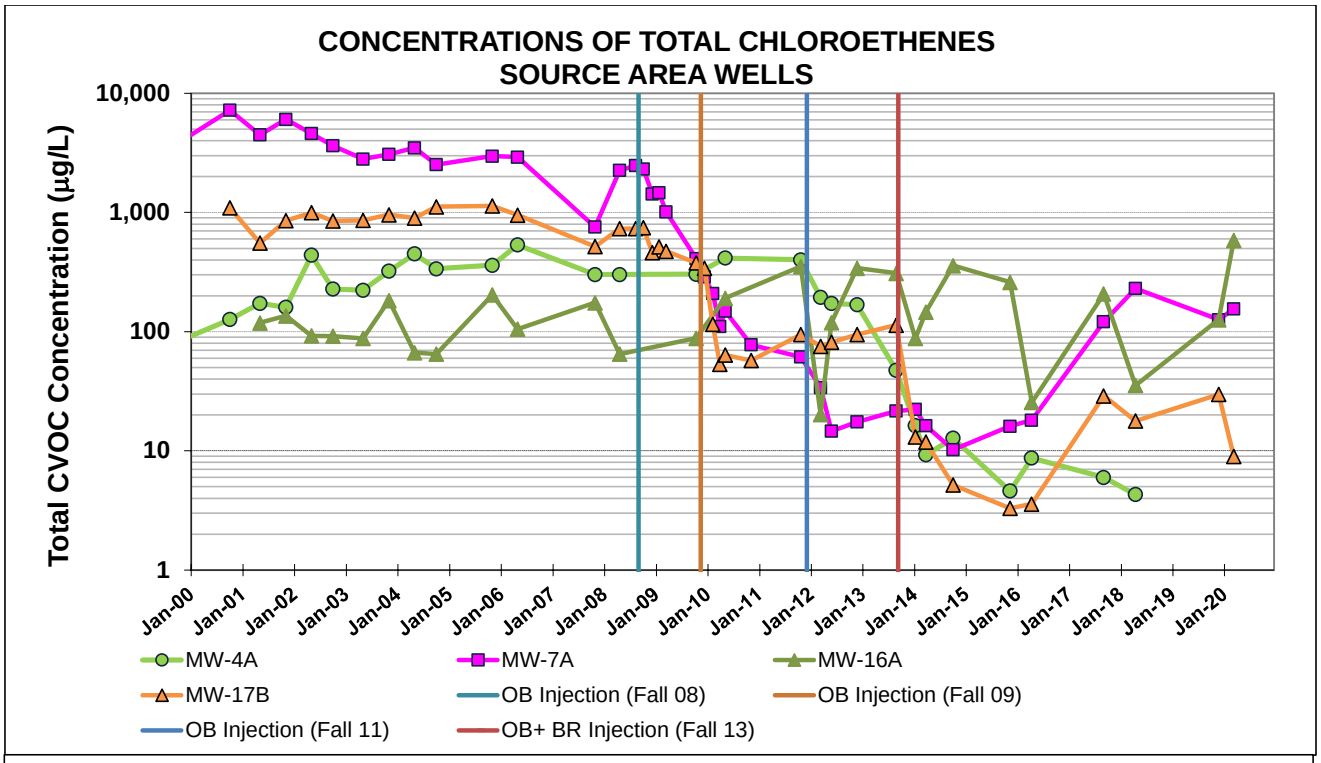
60 0 60 Feet

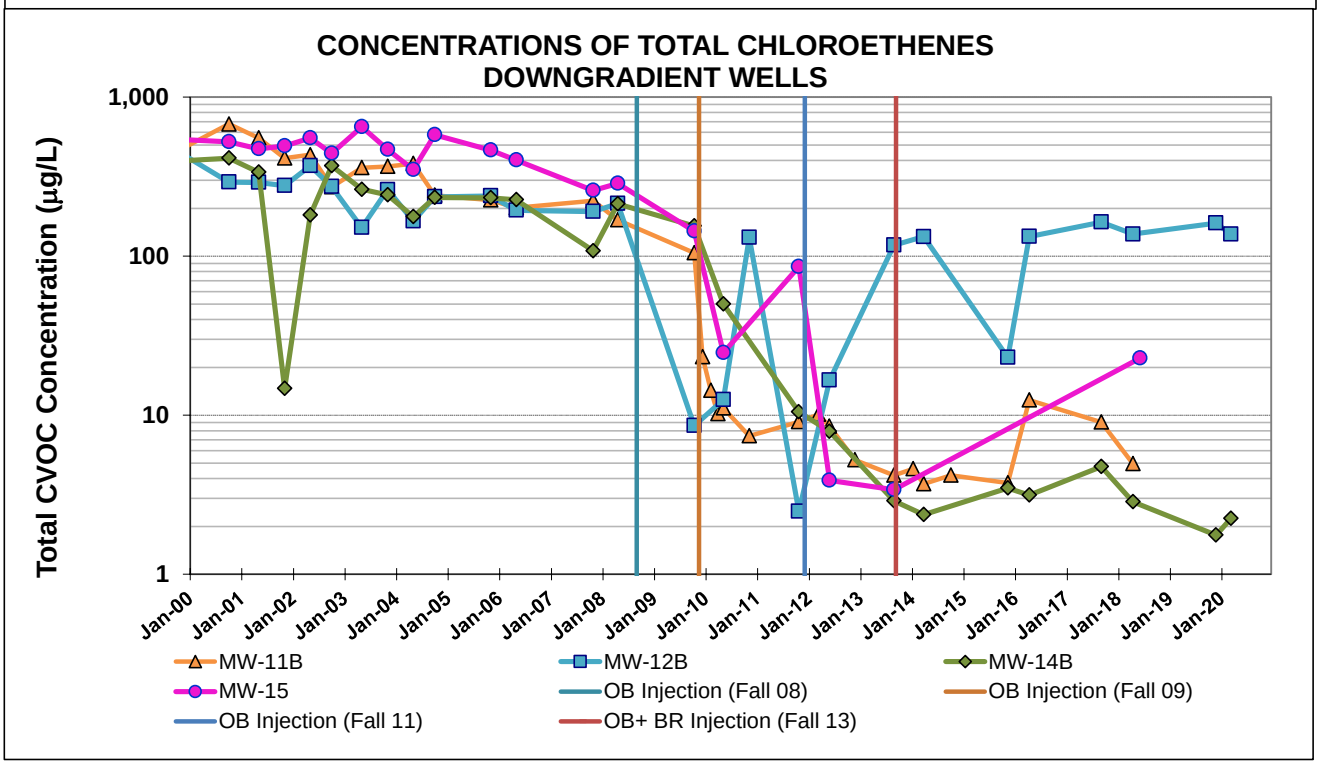
# FORMER CARBORUNDUM COMPANY
# TOWN OF NIAGARA, NEW YORK
# BEDROCK VOC DATA THROUGH 2020

AECOM

FIGURE 14

J:\Projects\60481767_BPIPOMISC\GIS\Hyde Park\Maps\2020\Becrock_VOC_data_through_2020.mxd 6/18/2020




Note:
Total CVOC Concentration is the sum of TCE, cis-1,2-DCE, VC, and DCA concentrations.

FIGURE 15

FORMER CARBORUNDUM COMPANY

LONG TERM TRENDS OF TOTAL CHLORINATED ETHENES IN SOURCE AREA AND DOWNGRADIENT WELLS

**AECOM**

257 West Genesee Street, Buffalo, NY 14202

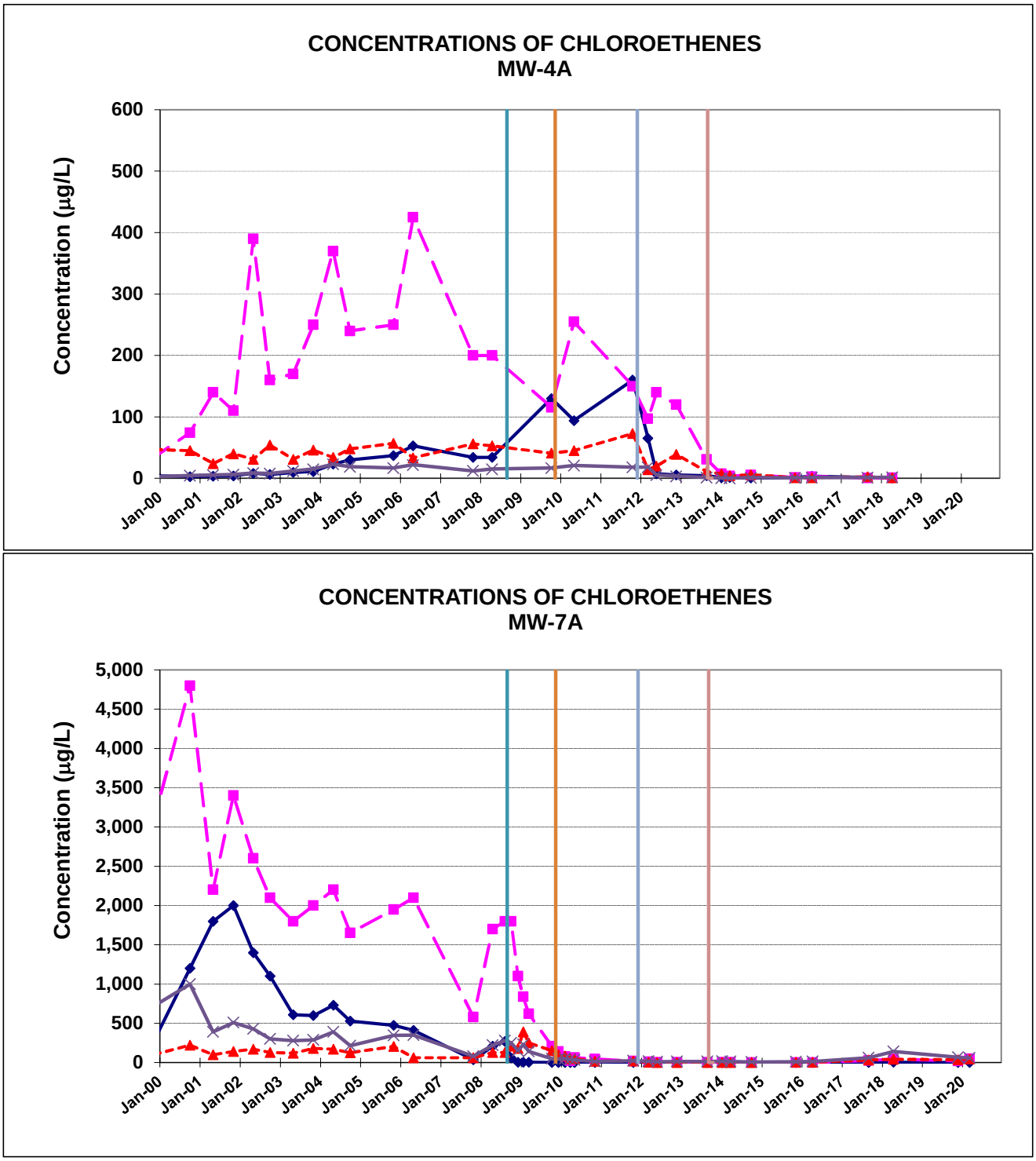
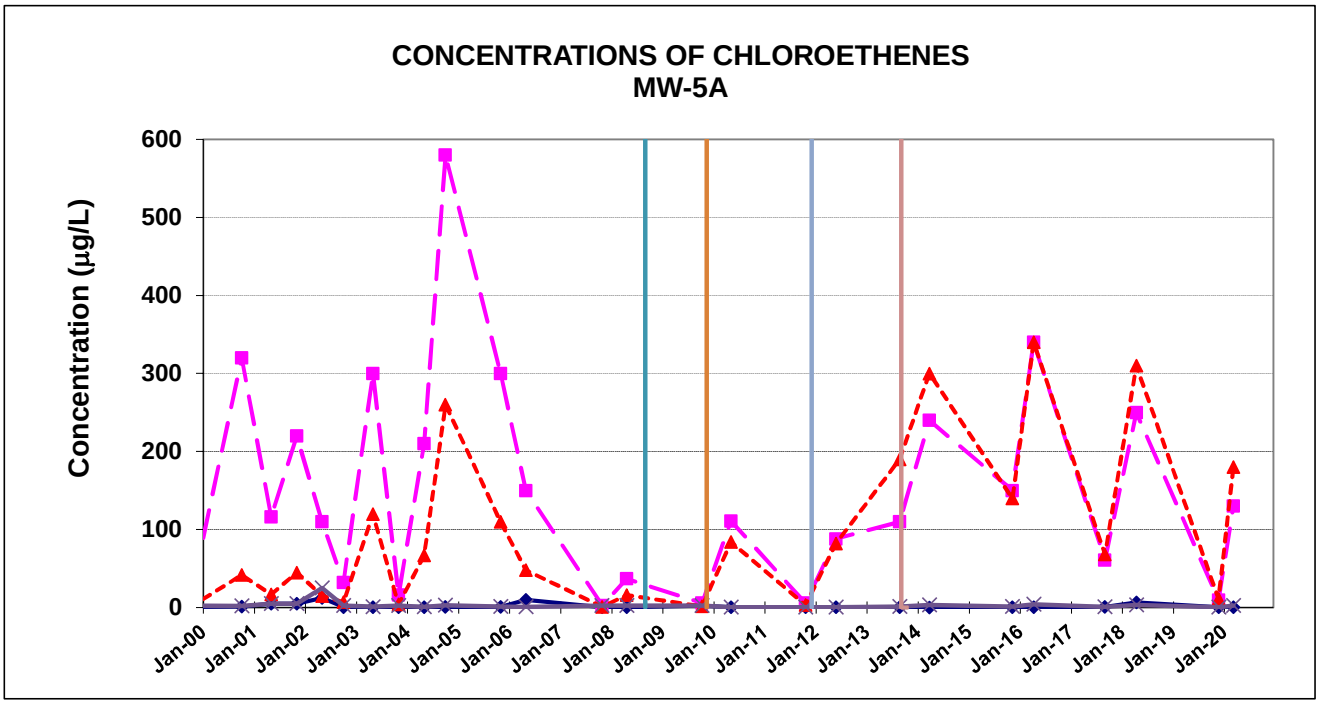


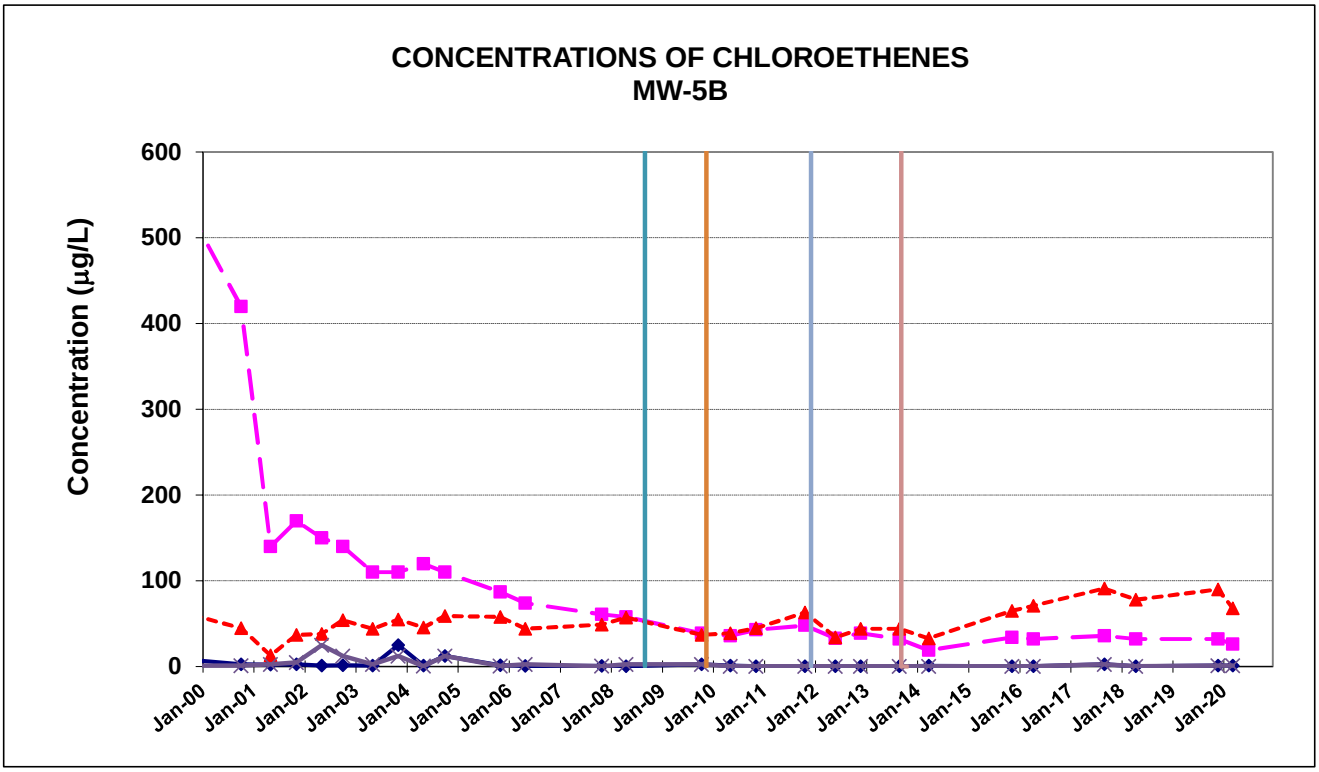

FIGURE 16

FORMER CARBORUNDUM COMPANY

LONG TERM TRENDS OF CHLORINATED ETHENES IN WELLS MW-4A AND MW-7A

**AECOM**
257 West Genesee Street, Buffalo, NY 14202



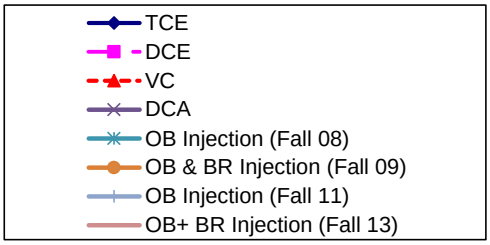




FIGURE 17

FORMER CARBORUNDUM COMPANY

LONG TERM TRENDS OF CHLORINATED ETHENES IN WELLS MW-5A AND MW-5B

**AECOM**

257 West Genesee Street, Buffalo, NY 14202

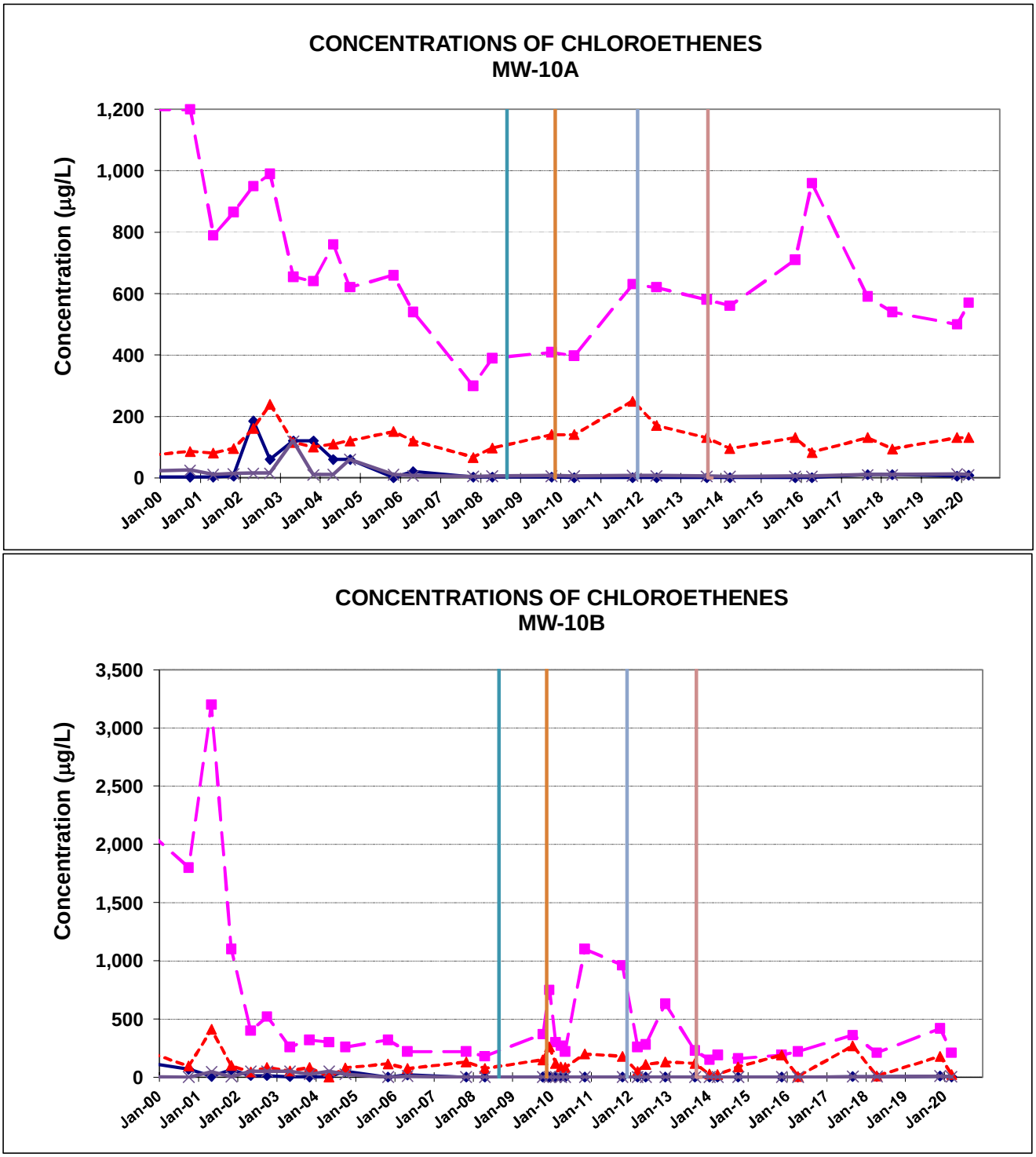



FIGURE 18

FORMER CARBORUNDUM COMPANY

LONG TERM TRENDS OF CHLORINATED ETHENES IN WELLS MW-10A AND MW-10B

**AECOM**

257 West Genesee Street, Buffalo, NY 14202

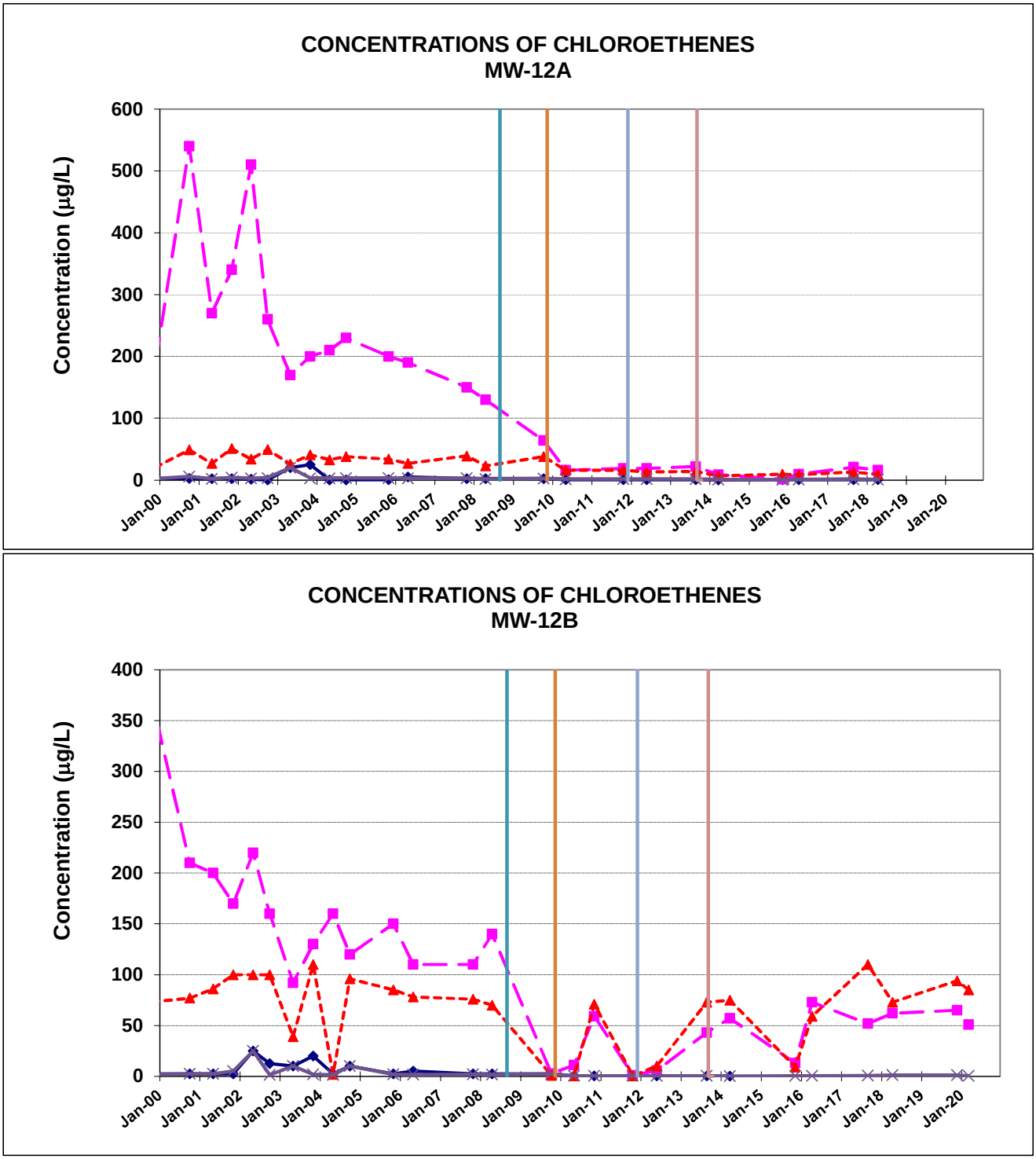


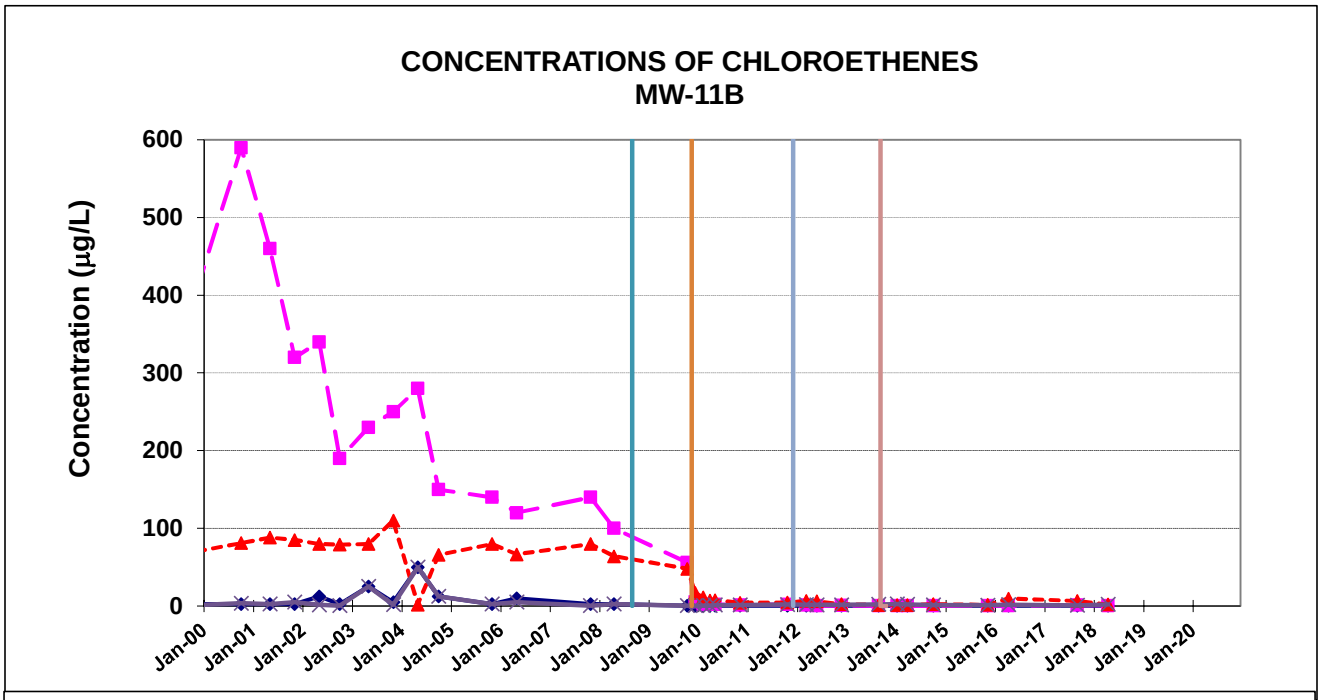

FIGURE 19

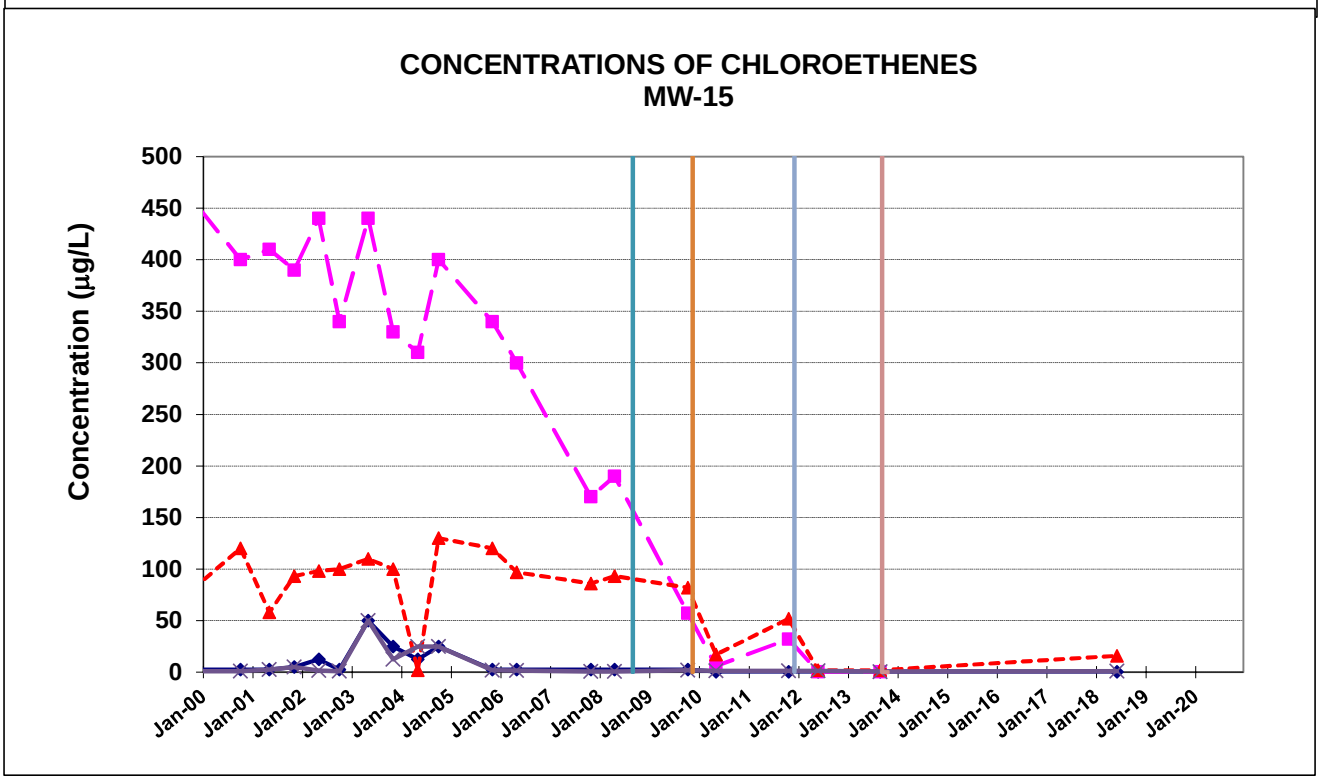
FORMER CARBORUNDUM COMPANY

LONG TERM TRENDS OF CHLORINATED ETHENES IN WELLS MW-12A AND MW-12B

**AECOM**

257 West Genesee Street, Buffalo, NY 14202



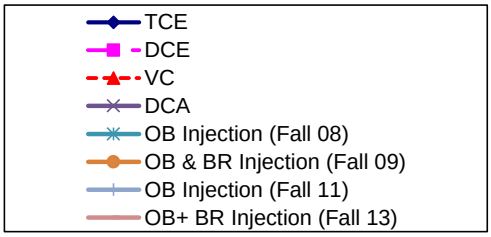



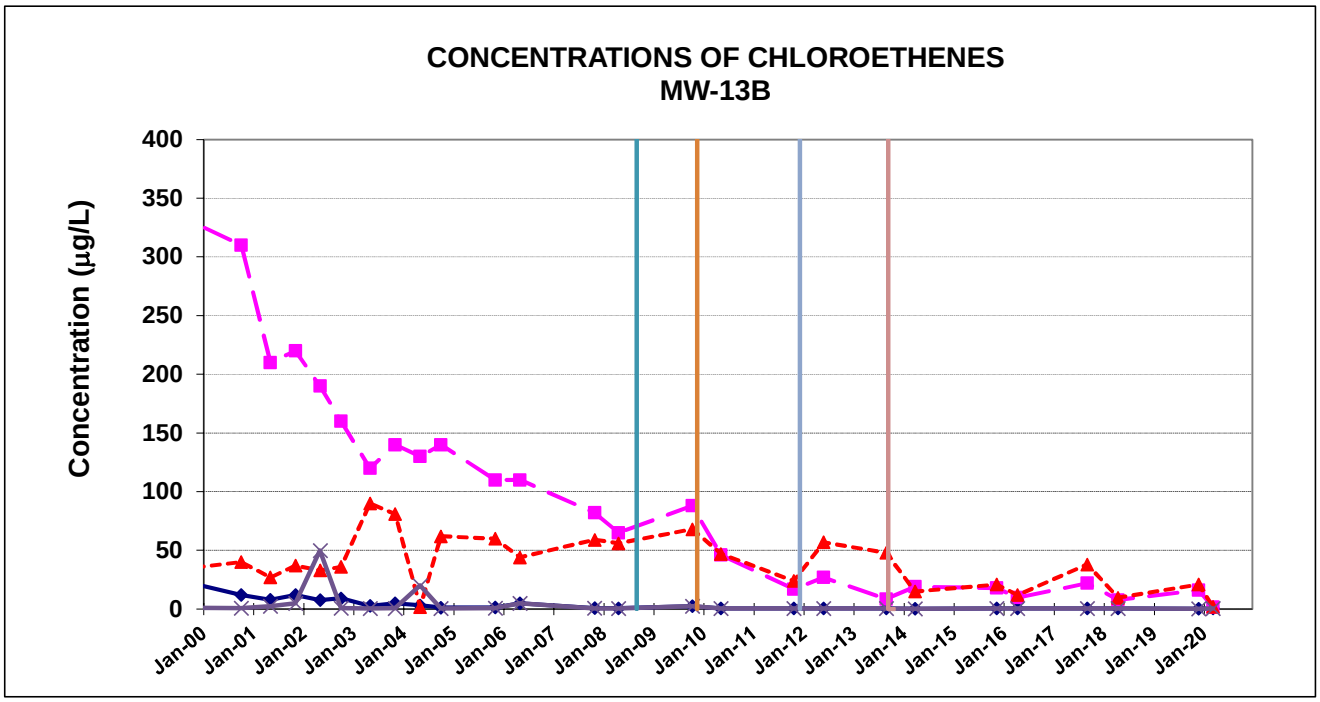

FIGURE 20

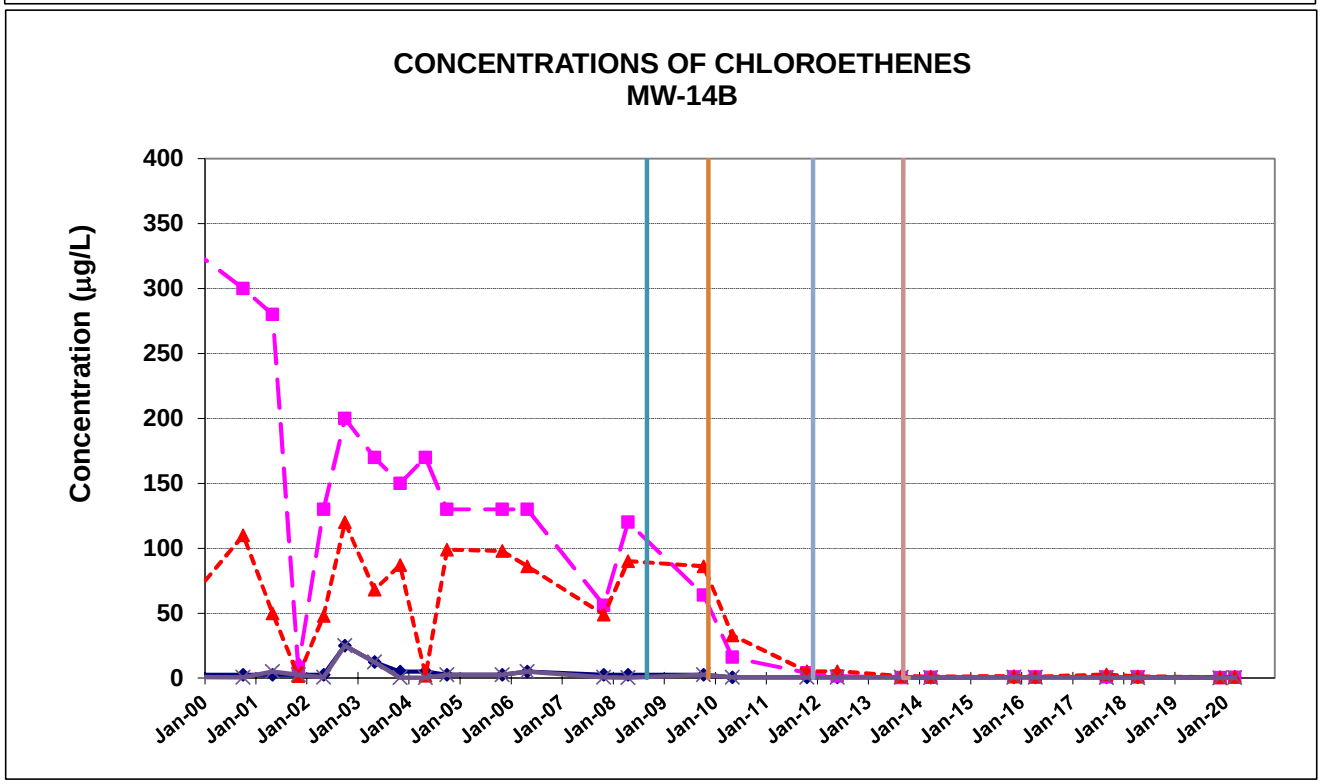
FORMER CARBORUNDUM COMPANY

LONG TERM TRENDS OF CHLORINATED ETHENES IN WELLS MW-11B AND MW-15

**AECOM**

257 West Genesee Street, Buffalo, NY 14202



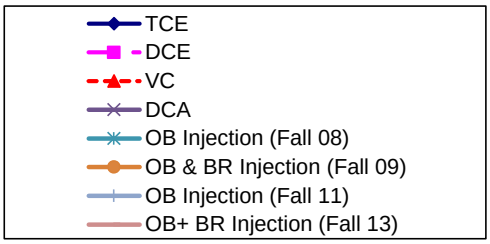



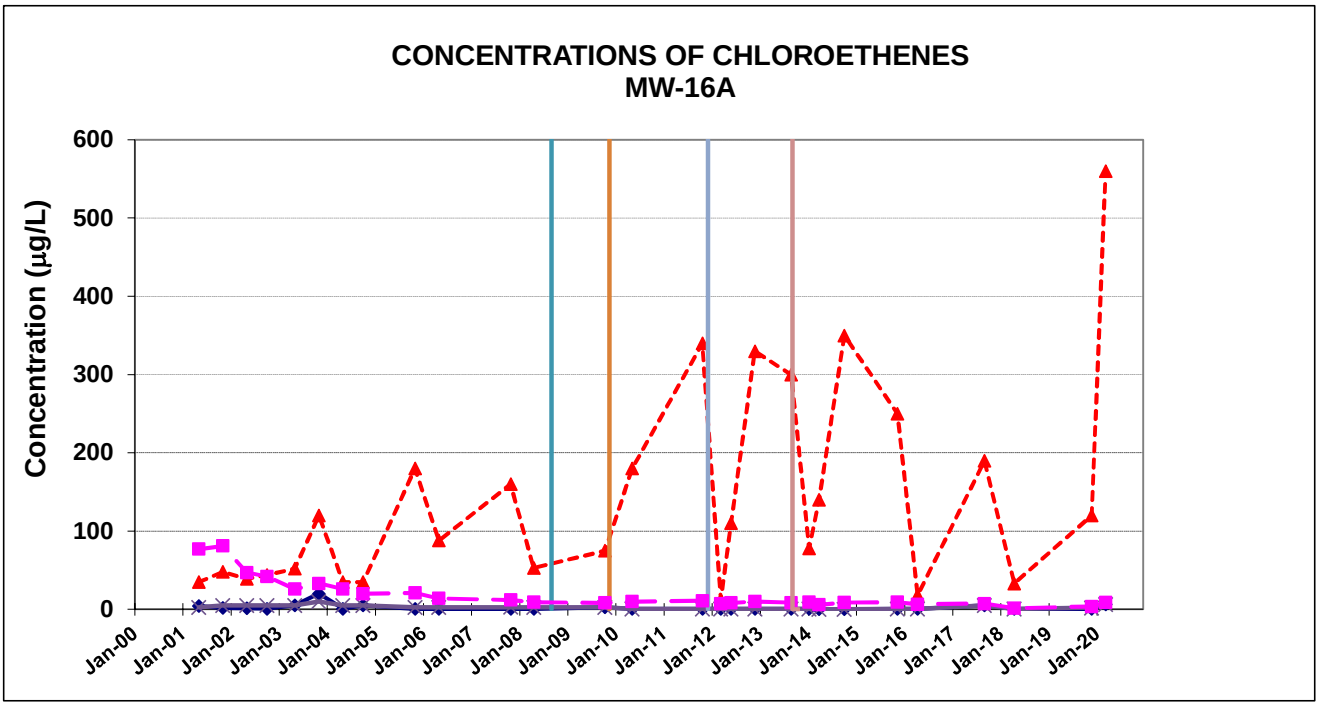

FIGURE 21

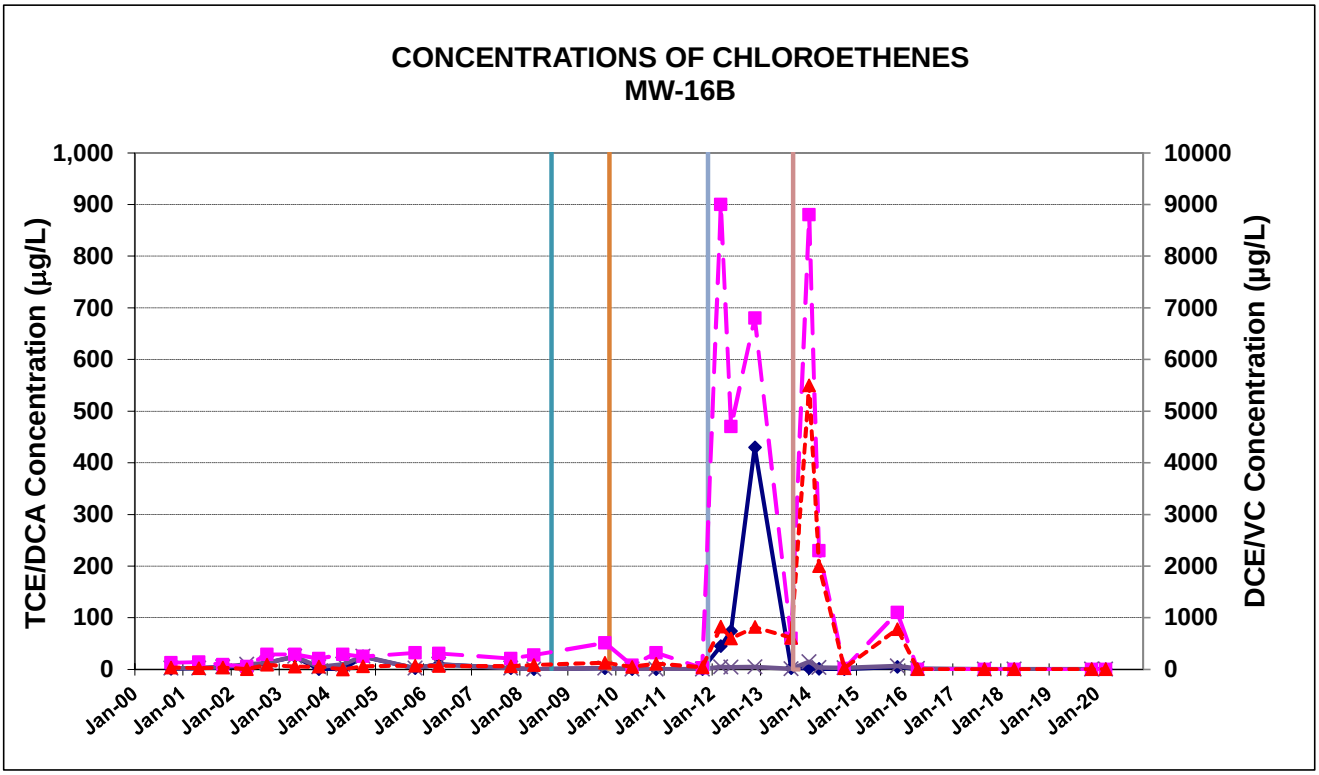
FORMER CARBORUNDUM COMPANY

LONG TERM TRENDS OF CHLORINATED ETHENES IN WELLS MW-13B AND MW-14B

**AECOM**

257 West Genesee Street, Buffalo, NY 14202



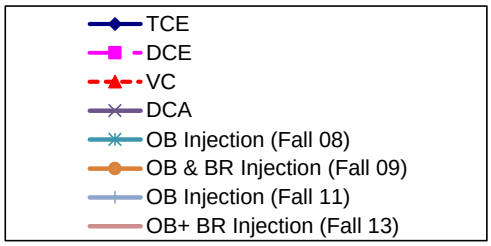




FIGURE 22

FORMER CARBORUNDUM COMPANY

LONG TERM TRENDS OF CHLORINATED ETHENES IN WELLS MW-16A AND MW-16B

**AECOM**

257 West Genesee Street, Buffalo, NY 14202

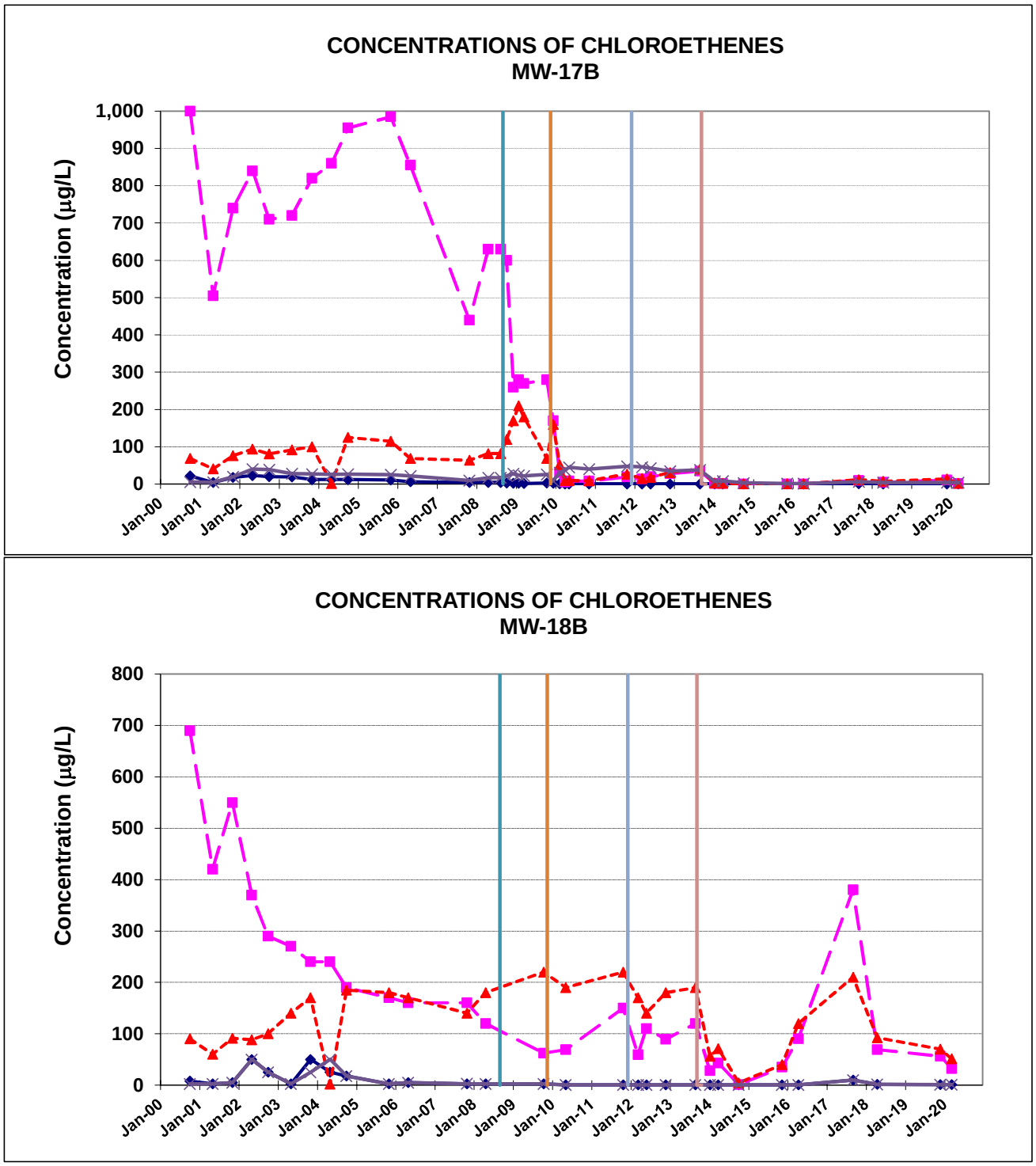



FIGURE 23

FORMER CARBORUNDUM COMPANY

LONG TERM TRENDS OF CHLORINATED ETHENES IN WELLS MW-17B AND MW-18B

**AECOM**

257 West Genesee Street, Buffalo, NY 14202

# Appendix A

# Membrane Interface Probe/Hydraulic Profiling Tool Logs

N

PMW- 1
INJ- 2
INJ- 5L
INJ- 5U
PMW- 4
MW-7A
INJ- 1
MW- 2B
MW- 6
PMW- 3
MW- 2A
PMW- 2
MW-7B
INJ- 6L
INJ- 6U
INJ- 7
INJ- 8
MW-16A
MW-16B
PMW- 8
INJ- 9
MW- 4B
INJ-10
MW- 4A
MW- 8
MW- 3B
MW- 3A
KANTHAL-GLOBAR BUILDING
MW-17A
MIP-7
INJ- 3
INJ- 4
MW-17A AREA
MIP-5
PMW- 5
MW-17B
PMW- 7
PMW-6
MIP-6
MW-19B
MW-19A
BRICK BLDG
PMW- 9
MW-18A
MIP-8
MIP-9
MW-18B
MW-18A AREA
MW-12B
MW-12A
HYDE PARK BOULEVARD
MW-10A/MW-5A AREA
MW-11A
MW-11B
MW-10B
MW-10A
MW- 5A
MIP-1
MIP-2
MIP-3
MIP-4
MW- 5B
MW- 1A
MW- 1B
RHODE ISLAND AVENUE
MW-14B
MW-14A
MW-13B
MW-13A
MW-15

**Legend**

- MIP Sample Location
- Injection Well
- Monitoring Well
- Performance Monitoring Well
- Fence Line

Source: ESRI World Imagery

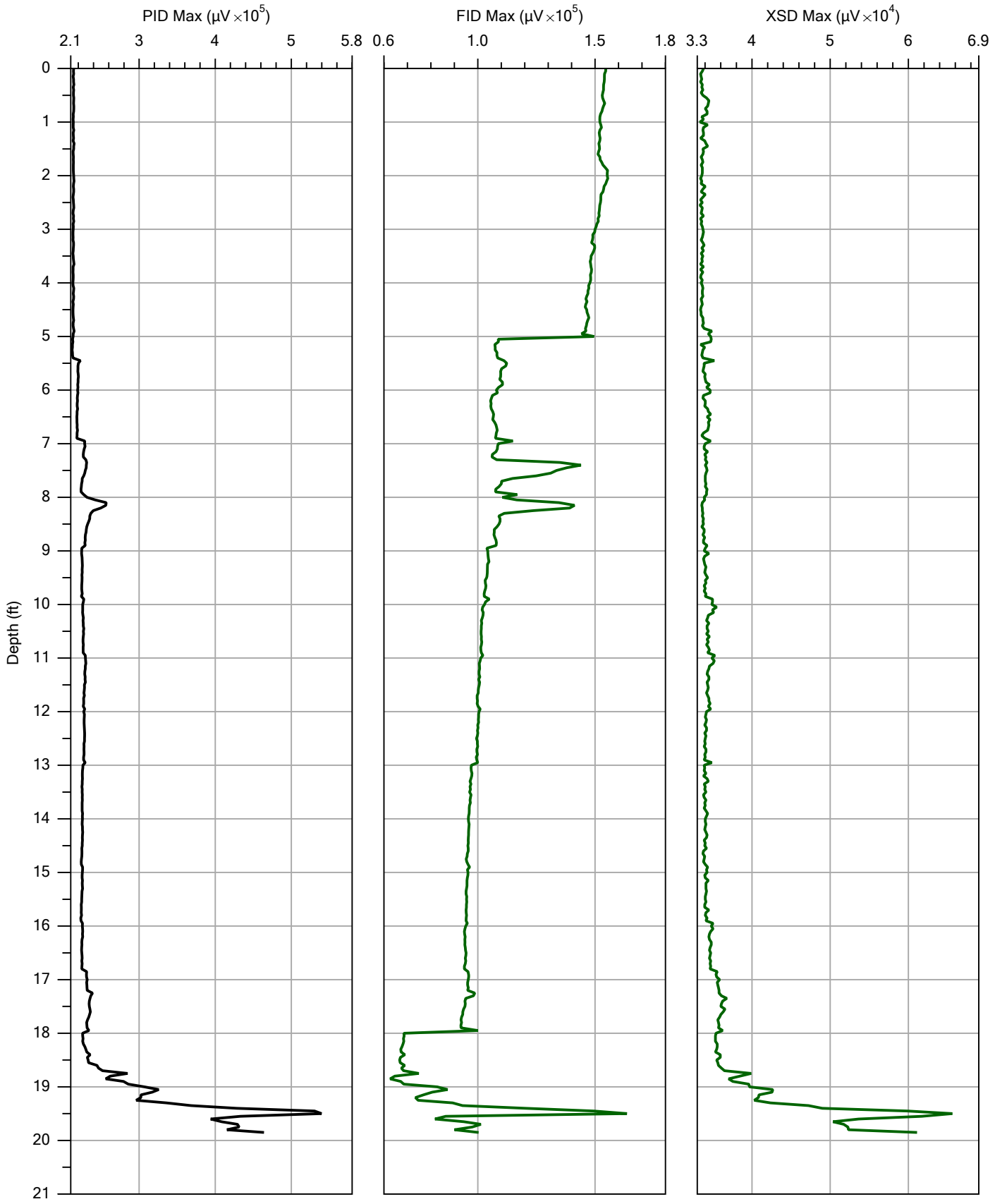
60 0 60 Feet

FORMER CARBORUNDUM COMPANY
TOWN OF NIAGARA, NEW YORK
MIP/HPT LOCATIONS
(NOVEMBER 2016)

AECOM

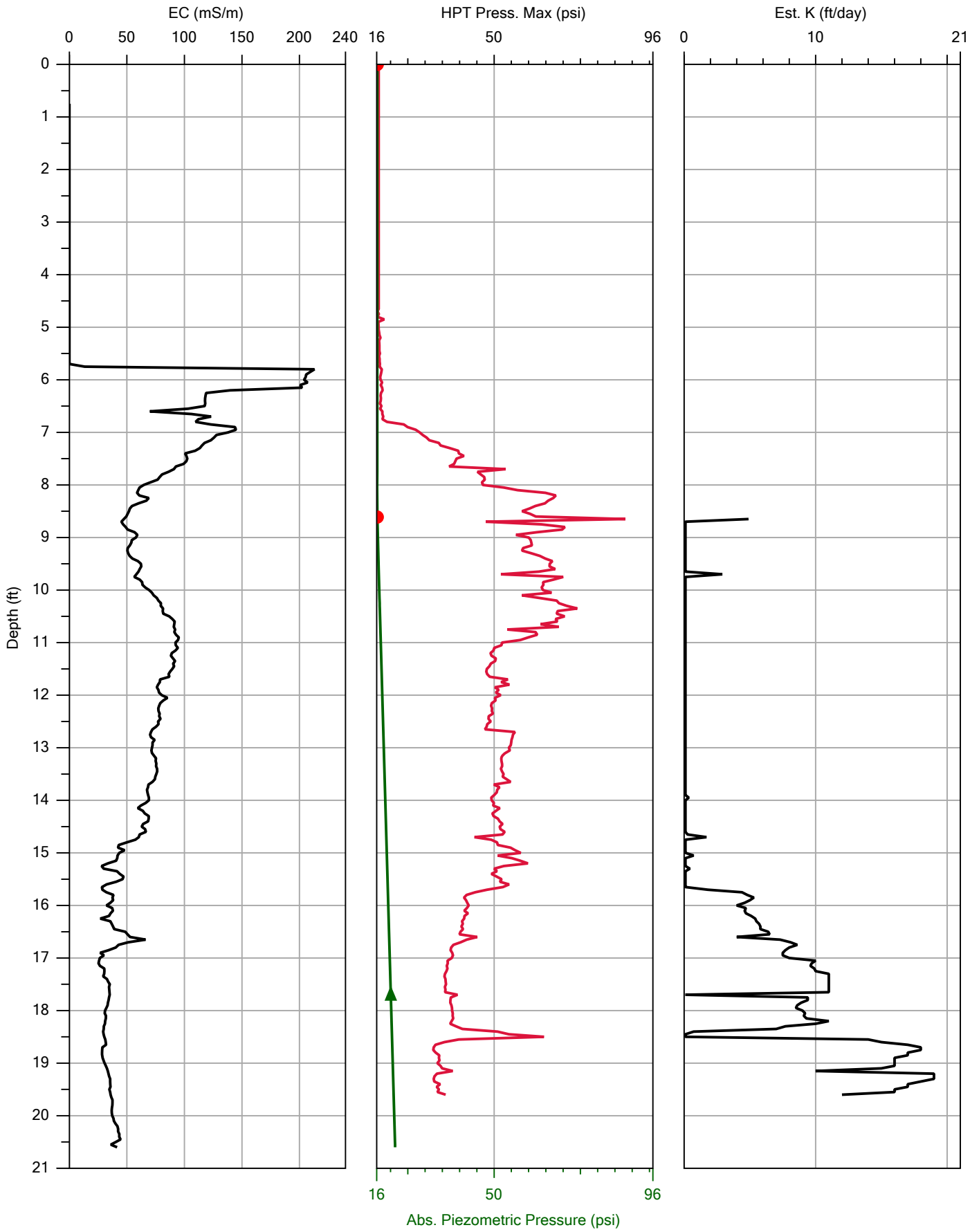
FIGURE 3

\\URSBuffalo.us.ie.urs\BuffaloProjects\60481767_BPIPO\MISC\GIS\Hyde Park\Maps\MIP_WorkPlan\MIP_Locations_Rev.mxd 9/20/2019




parratt wolff inc

| | | | |
|---|---|---|---|
| | | | File: MIHPT - 1.MHP |
| Company: Parratt-Wolff, Inc. | | Operator: Danylo Kulczycky | Date: 11/29/2016 |
| Project ID: 16135 | | Client: AECOM | Location: |




parratt wolff inc

| | | |
|---|---|---|
| | | File: MIHPT - 1.MHP |
| Company: Parratt-Wolff, Inc. | Operator: Danylo Kulczycky | Date: 11/29/2016 |
| Project ID: 16135 | Client: AECOM | Location: |

MiHPT - 1.zip

SITE INFORMATION -- DIRECT IMAGE MIP+HPT PROBE

Geoprobe DI Acquisition Software for Windows
Version: 1.7  Build: 15012

Pre-Log EC Load Tests

| Test | Target (mS/m) | Actual (mS/m) | % Diff | P/F |
|---|---|---|---|---|
| Low | 55.0 | 54.8 | 0.4 | PASS |
| High | 290.0 | 290.3 | 0.1 | PASS |

COMPANY: Parratt-Wolff, Inc.
OPERATOR: Danylo Kulczycky
PROJECT ID: 16135
CLIENT: AECOM
UNITS: ENGLISH
PROBE AND ARRAY: MH6530/6532 MiHPT Probe with Top Dipole
LOCATION: 3425 Hyde Park
100 INCH STRING POT USED
ROD LENGTH: 5 feet

MIP PRE-LOG RESPONSE TEST

FILENAME: MiHPT - 1.pre.tim
COMPOUND: TCE
CONCENTRATION: 20 ppm
FLOW: 43.5 mL/min
RESPONSE TEST START TIME: Tue Nov 29 2016 08:14:02

RESPONSE TEST ATTENUATION CHANGES

| TIME | DET1 | DET2 | DET3 | DET4 |
|---|---|---|---|---|
| 0 | 1 | 1 | 1 | 1 |

TRIP TIME: 50 sec
Gas Used: nitrogen

PRE-LOG HPT REFERENCE TEST VALUES

PRE TEST TIME: Tue Nov 29 2016 08:18:06

| TEST | HPT PRESSURE (psi) | FLOW (mL/min) | HPT PRESSURE (kPa) |
|---|---|---|---|
| TOP with FLOW=0 | 16.558 | 0.0 | 114.160 |
| TOP with FLOW>0 | 16.975 | 268.4 | 117.040 |
| BOTTOM with FLOW=0 | 16.339 | 0.0 | 112.650 |
| BOTTOM with FLOW>0 | 16.765 | 270.1 | 115.590 |

EXPECTED FLOW=0 HPT DIFF.: 0.22 psi (1.5 kPa) +/- 10%
  ACTUAL FLOW=0 HPT DIFF.: 0.22 psi (1.5 kPa)

TRANSDUCER TEST PASSED

DETECTOR NAME: XSD NA PID FID
HPT IDEAL COEFFS: 2.2696e1,-2.2356
HPT SENSOR CAL NUMBERS: DEFAULT, 0.000, 0.000, 0.000, 0.000, 1.000, 0.000

Temperature out of range (20.9 deg C) at 0.00 ft (0.000 m)

Probe advancement with HPT flow valve and/or pump switch turned off at 0.05 ft (0.015 m).
LOG START TIME: Tue Nov 29 2016 08:27:51

Temperature out of range (16.6 deg C) at 4.90 ft (1.494 m)

Probe advancement with HPT flow valve and/or pump switch turned off at 4.95 ft (1.509 m).
Probe advancement with HPT flow valve and/or pump switch turned off at 5.00 ft (1.524 m).
Probe advancement with HPT flow valve and/or pump switch turned off at 5.10 ft (1.554 m).
ATTENUATION CHANGES

| DEPTH (ft) | DEPTH (m) | DET1 | DET2 | DET3 | DET4 |
|---|---|---|---|---|---|
| 0.00 | 0.000 | 1 | 1 | 1 | 1 |

LOG END DEPTH: 19.85 ft (6.050 m)
LOG END TIME: Tue Nov 29 2016 09:35:17

LATITUDE: 0.000000000
LONGITUDE: 0.000000000
ELEVATION: 0.000 METERS 0.00 FEET
GPS Quality: None

MIP POST-LOG RESPONSE TEST

FILENAME: MiHPT - 1.post.tim
COMPOUND: TCE
CONCENTRATION: 20 ppm
FLOW: 38.9 mL/min
RESPONSE TEST START TIME: Tue Nov 29 2016 10:02:06

RESPONSE TEST ATTENUATION CHANGES

| TIME | DET1 | DET2 | DET3 | DET4 |
|---|---|---|---|---|
| 0 | 1 | 1 | 1 | 1 |

POST-LOG HPT REFERENCE TEST VALUES

POST TEST TIME: Tue Nov 29 2016 10:06:14

| TEST | HPT PRESSURE (psi) | FLOW (mL/min) | HPT PRESSURE (kPa) |
|---|---|---|---|
| TOP with FLOW=0 | 16.521 | 0.0 | 113.910 |
| TOP with FLOW>0 | 16.801 | 177.0 | 115.840 |
| BOTTOM with FLOW=0 | 16.297 | 0.0 | 112.360 |
| BOTTOM with FLOW>0 | 16.588 | 175.5 | 114.370 |

EXPECTED FLOW=0 HPT DIFF.: 0.22 psi (1.5 kPa) +/- 10%

ACTUAL FLOW=0 HPT DIFF.: 0.22 psi (1.5 kPa)

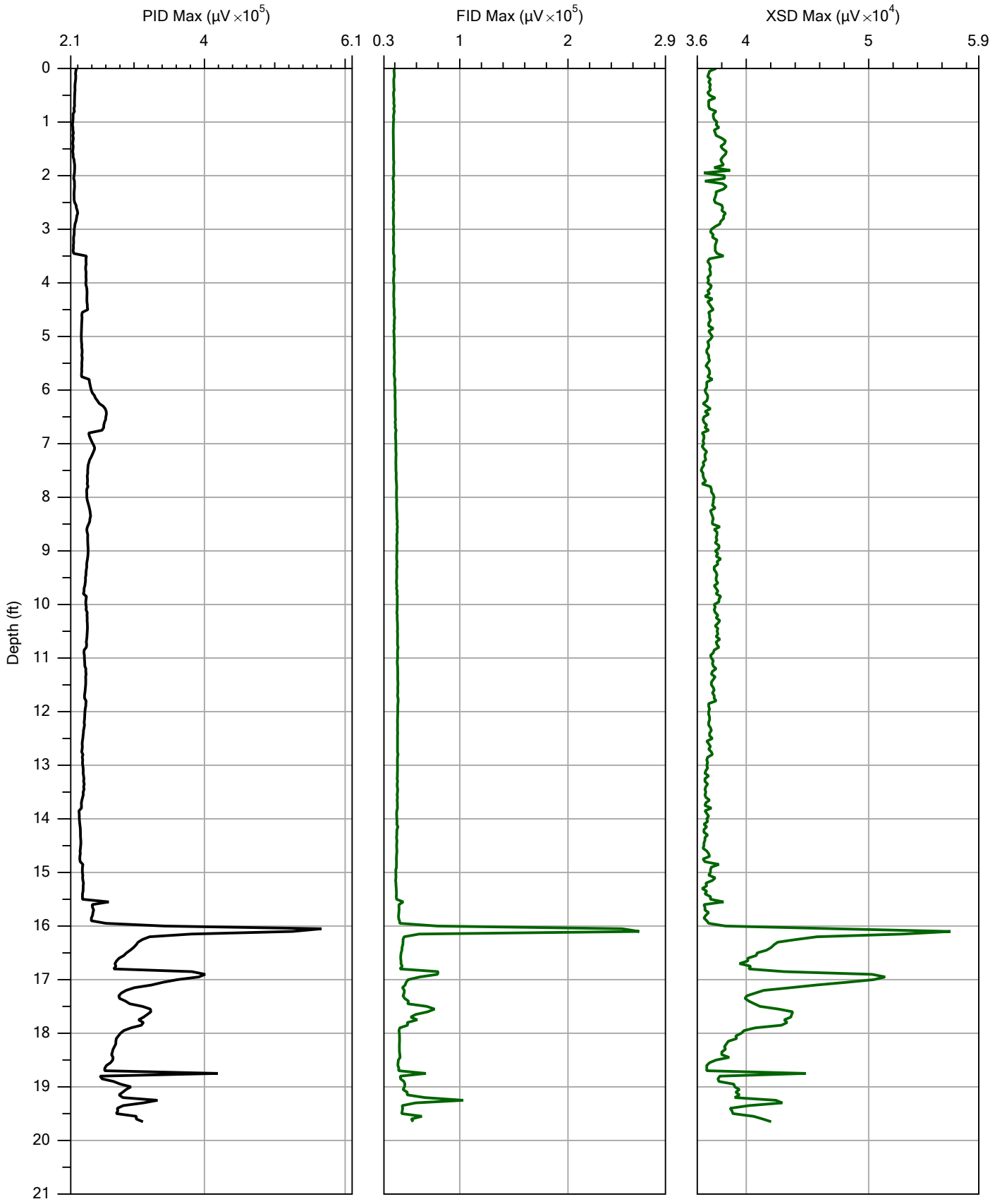
TRANSDUCER TEST PASSED

Post-Log EC Load Tests

| Test | Target (mS/m) | Actual (mS/m) | % Diff | P/F |
|---|---|---|---|---|
| Low | 55.0 | 55.6 | 1.1 | PASS |
| High | 290.0 | 301.0 | 3.8 | PASS |

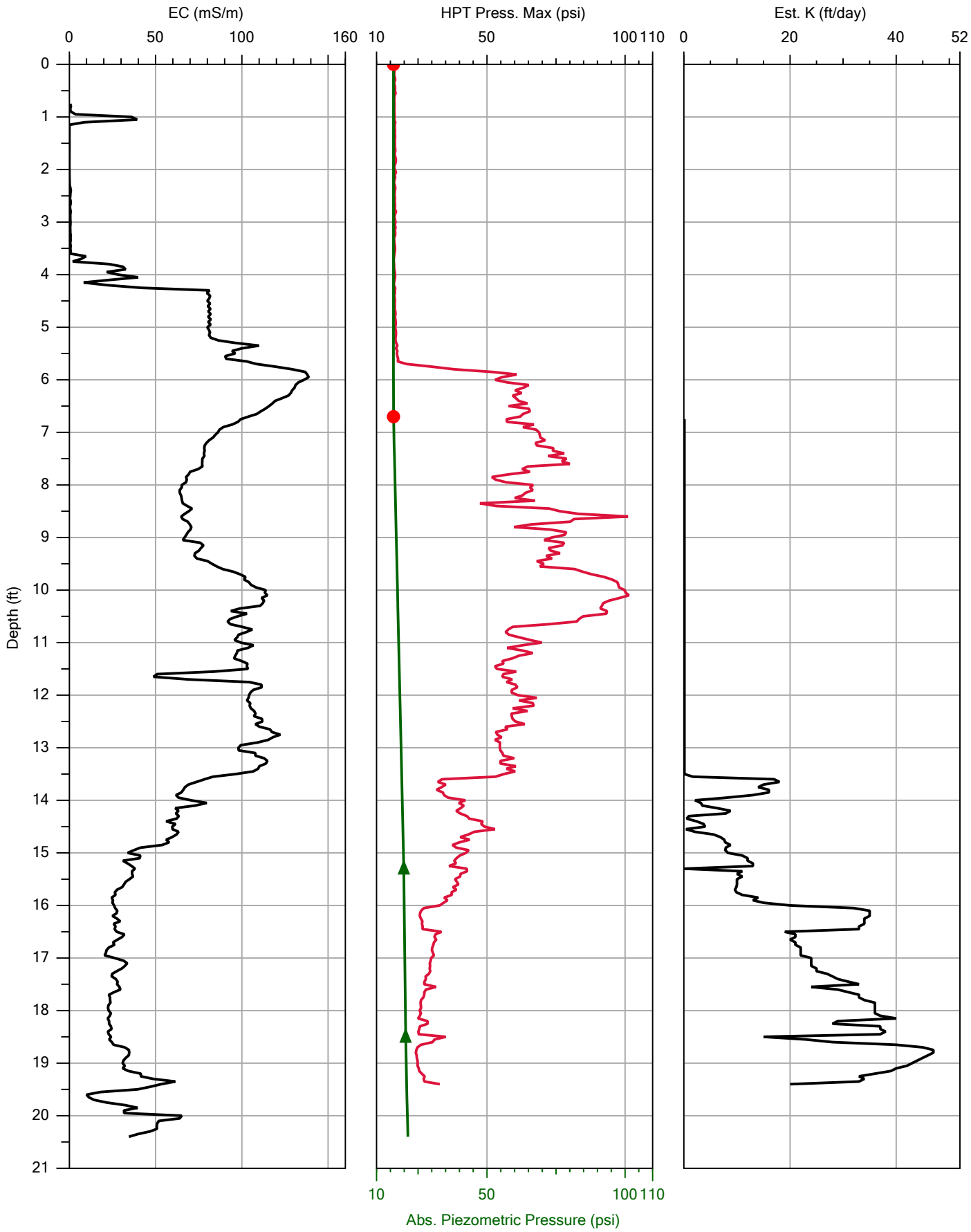
********** USER NOTES **********

0-5' open hole for 5' pre-clear. Pump and heat turned on at 5'.




parratt wolff inc

| | | |
|---|---|---|
| | | File: MIHPT - 2.MHP |
| Company: Parratt-Wolff, Inc. | Operator: Danylo Kulczycky | Date: 11/29/2016 |
| Project ID: 16135 | Client: AECOM | Location: |




parratt wolff inc

| | | |
|---|---|---|
| | | File: MIHPT - 2.MHP |
| Company: Parratt-Wolff, Inc. | Operator: Danylo Kulczycky | Date: 11/29/2016 |
| Project ID: 16135 | Client: AECOM | Location: |

MiHPT - 2.zip

SITE INFORMATION -- DIRECT IMAGE MIP+HPT PROBE

Geoprobe DI Acquisition Software for Windows
Version: 1.7  Build: 15012

Pre-Log EC Load Tests (Post-Log From MiHPT - 1.zip)

| Test | Target (mS/m) | Actual (mS/m) | % Diff | P/F |
|---|---|---|---|---|
| Low | 55.0 | 55.6 | 1.1 | PASS |
| High | 290.0 | 301.0 | 3.8 | PASS |

COMPANY: Parratt-Wolff, Inc.
OPERATOR: Danylo Kulczycky
PROJECT ID: 16135
CLIENT: AECOM
UNITS: ENGLISH
PROBE AND ARRAY: MH6530/6532 MiHPT Probe with Top Dipole
LOCATION: 3425 Hyde Park
100 INCH STRING POT USED
ROD LENGTH: 5 feet

MIP PRE-LOG RESPONSE TEST (Post-Log From MiHPT - 1.zip)

FILENAME: MiHPT - 2.pre.tim
COMPOUND: TCE
CONCENTRATION: 20 ppm
FLOW: 38.9 mL/min
RESPONSE TEST START TIME: Tue Nov 29 2016 10:02:06

RESPONSE TEST ATTENUATION CHANGES

| TIME | DET1 | DET2 | DET3 | DET4 |
|---|---|---|---|---|
| 0 | 1 | 1 | 1 | 1 |

TRIP TIME: 50 sec
Gas Used: nitrogen

PRE-LOG HPT REFERENCE TEST VALUES (Post-Log From MiHPT - 1.zip)

PRE TEST TIME: Tue Nov 29 2016 10:06:14

| TEST | HPT PRESSURE (psi) | FLOW (mL/min) | HPT PRESSURE (kPa) |
|---|---|---|---|
| TOP with FLOW=0 | 16.521 | 0.0 | 113.910 |
| TOP with FLOW>0 | 16.801 | 177.0 | 115.840 |
| BOTTOM with FLOW=0 | 16.297 | 0.0 | 112.360 |
| BOTTOM with FLOW>0 | 16.588 | 175.5 | 114.370 |

EXPECTED FLOW=0 HPT DIFF.: 0.22 psi (1.5 kPa) +/- 10%
  ACTUAL FLOW=0 HPT DIFF.: 0.22 psi (1.5 kPa)

TRANSDUCER TEST PASSED

DETECTOR NAME: XSD NA PID FID
HPT IDEAL COEFFS: 2.2696e1,-2.2356
HPT SENSOR CAL NUMBERS: DEFAULT, 0.000, 0.000, 0.000, 0.000, 1.000, 0.000

Temperature out of range (34.6 deg C) at 0.00 ft (0.000 m)

LOG START TIME: Tue Nov 29 2016 10:11:16

ATTENUATION CHANGES

| DEPTH (ft) | DEPTH (m) | DET1 | DET2 | DET3 | DET4 |
|---|---|---|---|---|---|
| 0.00 | 0.000 | 1 | 1 | 1 | 1 |

LOG END DEPTH: 19.65 ft (5.989 m)
LOG END TIME: Tue Nov 29 2016 11:01:19

LATITUDE: 0.000000000
LONGITUDE: 0.000000000
ELEVATION: 0.000 METERS 0.00 FEET
GPS Quality: None

MIP POST-LOG RESPONSE TEST

FILENAME: MiHPT - 2.post.tim
COMPOUND: TCE
CONCENTRATION: 20 ppm
FLOW: 38.9 mL/min
RESPONSE TEST START TIME: Tue Nov 29 2016 11:13:38

RESPONSE TEST ATTENUATION CHANGES

| TIME | DET1 | DET2 | DET3 | DET4 |
|---|---|---|---|---|
| 0 | 1 | 1 | 1 | 1 |

POST-LOG HPT REFERENCE TEST VALUES

POST TEST TIME: Tue Nov 29 2016 11:17:47

| TEST | HPT PRESSURE (psi) | FLOW (mL/min) | HPT PRESSURE (kPa) |
|---|---|---|---|
| TOP with FLOW=0 | 16.558 | 0.0 | 114.170 |
| TOP with FLOW>0 | 16.915 | 181.5 | 116.630 |
| BOTTOM with FLOW=0 | 16.339 | 0.0 | 112.650 |
| BOTTOM with FLOW>0 | 16.667 | 180.3 | 114.910 |

EXPECTED FLOW=0 HPT DIFF.: 0.22 psi (1.5 kPa) +/- 10%
ACTUAL FLOW=0 HPT DIFF.: 0.22 psi (1.5 kPa)

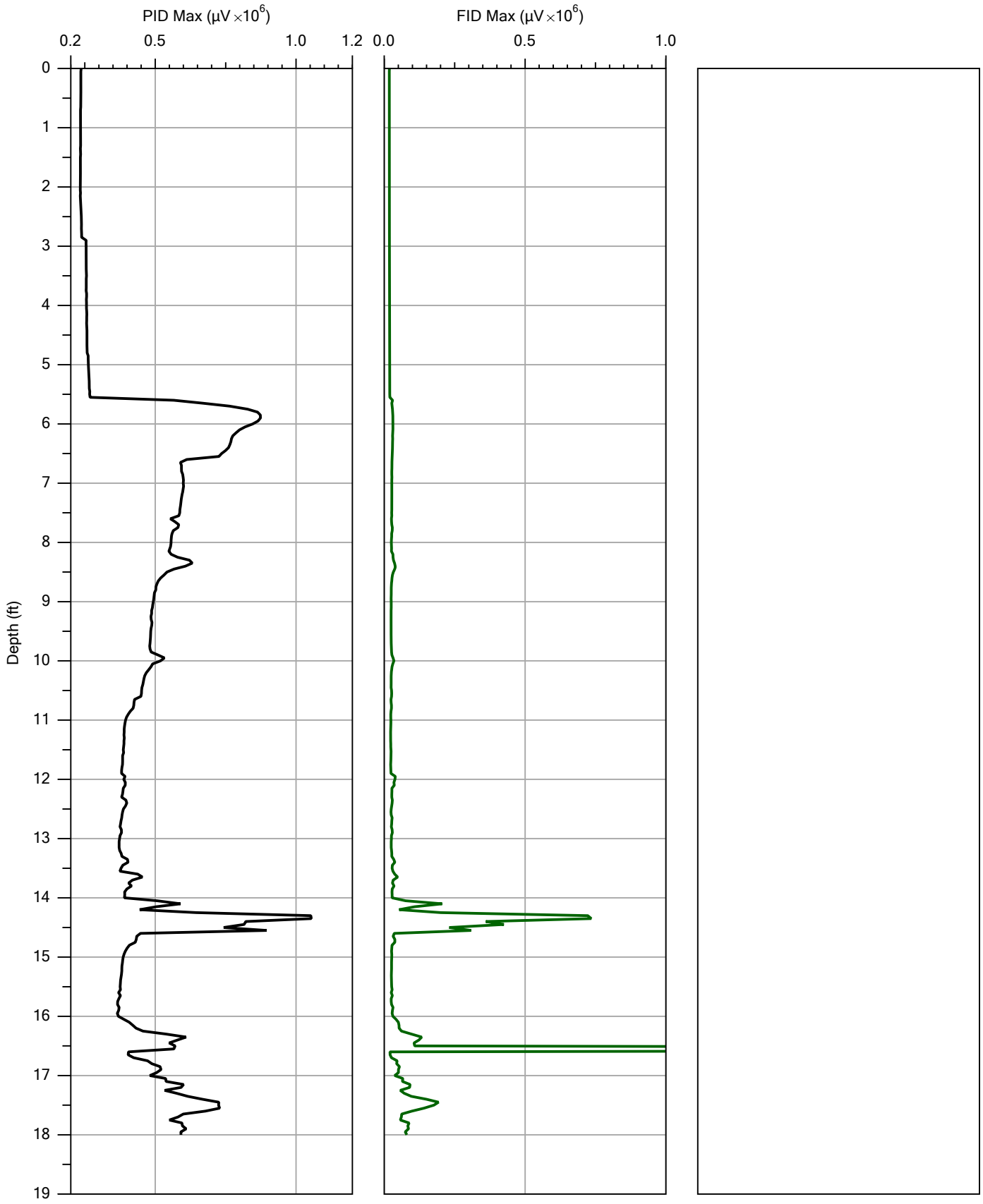
TRANSDUCER TEST PASSED

Post-Log EC Load Tests

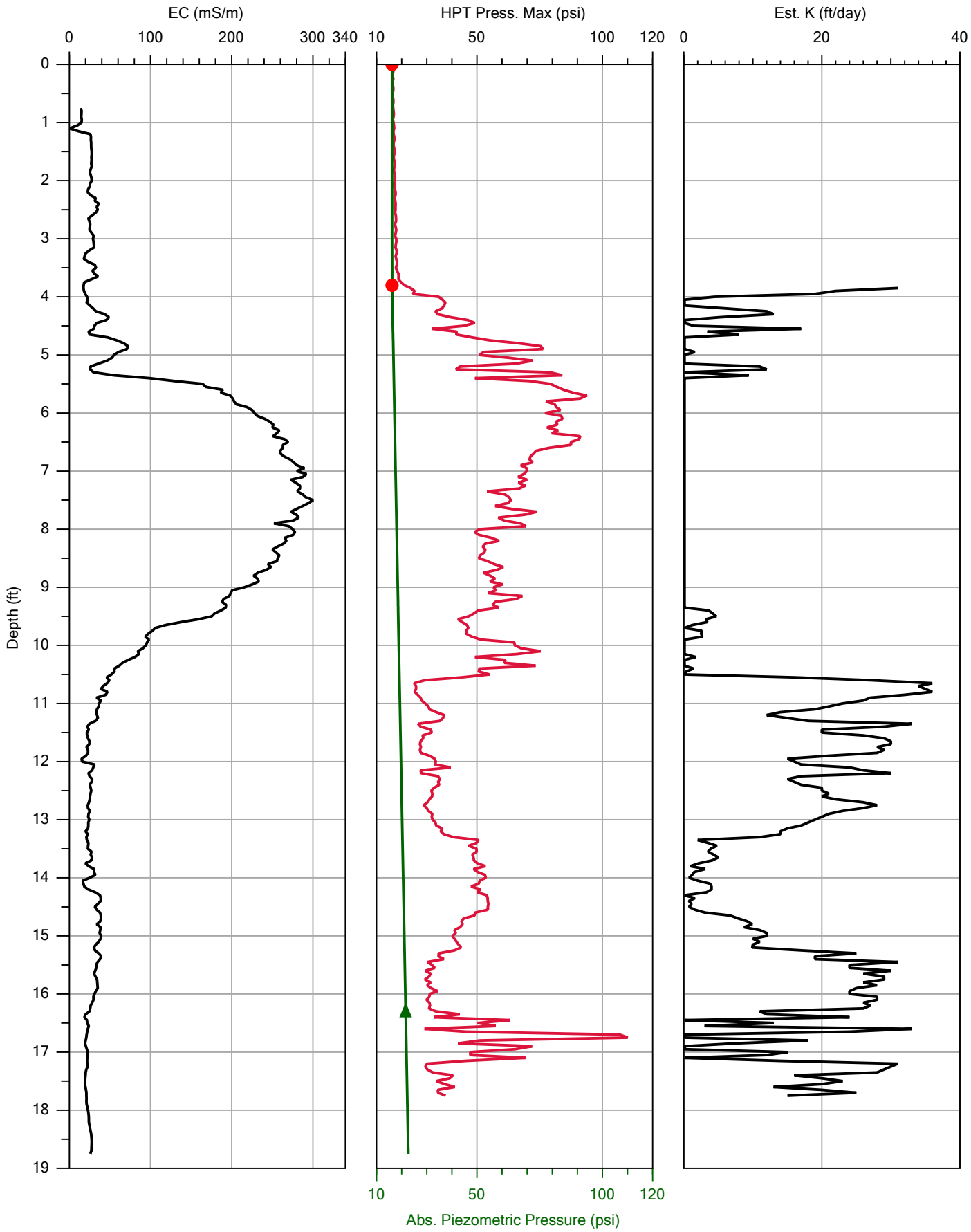
| Test | Target (mS/m) | Actual (mS/m) | % Diff | P/F |
|---|---|---|---|---|
| Low | 55.0 | 55.3 | 0.5 | PASS |
| High | 290.0 | 301.3 | 3.9 | PASS |

********** USER NOTES **********

5' pre clear.




| | | | |
|---|---|---|---|
| | | | File: MIHPT - 3.MHP |
| Company: Parratt-Wolff, Inc. | | Operator: Danylo Kulczycky | Date: 11/29/2016 |
| Project ID: 16135 | | Client: AECOM | Location: |




parratt wolff inc

| | | |
|---|---|---|
| | | File: MIHPT - 3.MHP |
| Company: Parratt-Wolff, Inc. | Operator: Danylo Kulczycky | Date: 11/29/2016 |
| Project ID: 16135 | Client: AECOM | Location: |

MiHPT - 3.zip

SITE INFORMATION -- DIRECT IMAGE MIP+HPT PROBE

Geoprobe DI Acquisition Software for Windows
Version: 1.7  Build: 15012

EC PRE-LOG TESTS BYPASSED

COMPANY: Parratt-Wolff, Inc.
OPERATOR: Danylo Kulczycky
PROJECT ID: 16135
CLIENT: AECOM
UNITS: ENGLISH
PROBE AND ARRAY: MH6530/6532 MiHPT Probe with Top Dipole
LOCATION: 3425 Hyde Park
100 INCH STRING POT USED
ROD LENGTH: 5 feet

MIP PRE-LOG RESPONSE TEST

FILENAME: MiHPT - 3.pre.tim
COMPOUND: TCE
CONCENTRATION: 20 ppm
FLOW: 38.9 mL/min
RESPONSE TEST START TIME: Tue Nov 29 2016 15:17:10

RESPONSE TEST ATTENUATION CHANGES

| TIME | DET1 | DET2 | DET3 | DET4 |
|---|---|---|---|---|
| 0 | 1 | 1 | 1 | 1 |

TRIP TIME: 50 sec
Gas Used: nitrogen

PRE-LOG HPT REFERENCE TEST VALUES (Post-Log From MiHPT - 1.zip)

PRE TEST TIME: Tue Nov 29 2016 15:22:09

| TEST | HPT PRESSURE (psi) | FLOW (mL/min) | HPT PRESSURE (kPa) |
|---|---|---|---|
| TOP with FLOW=0 | 16.546 | 0.0 | 114.080 |
| TOP with FLOW>0 | 16.912 | 180.4 | 116.600 |
| BOTTOM with FLOW=0 | 16.321 | 0.0 | 112.530 |
| BOTTOM with FLOW>0 | 16.699 | 177.4 | 115.140 |

EXPECTED FLOW=0 HPT DIFF.: 0.22 psi (1.5 kPa) +/- 10%
  ACTUAL FLOW=0 HPT DIFF.: 0.23 psi (1.6 kPa)

TRANSDUCER TEST PASSED

DETECTOR NAME: XSD NA PID FID
HPT IDEAL COEFFS:  2.2696e1,-2.2356
HPT SENSOR CAL NUMBERS: DEFAULT, 0.000, 0.000, 0.000, 0.000, 1.000, 0.000

Temperature out of range (39.3 deg C) at 0.00 ft (0.000 m)

Temperature out of range (31.6 deg C) at 0.00 ft (0.000 m)

LOG START TIME: Tue Nov 29 2016 15:24:45

MIP Pressure out of range (12.7 psi / 88 kPa) at 4.90 ft (1.494 m)

ATTENUATION CHANGES

| DEPTH (ft) | DEPTH (m) | DET1 | DET2 | DET3 | DET4 |
|---|---|---|---|---|---|
| 0.00 | 0.000 | 1 | 1 | 1 | 1 |

LOG END DEPTH: 18.00 ft (5.486 m)
LOG END TIME: Tue Nov 29 2016 16:04:09

LATITUDE: 0.000000000
LONGITUDE: 0.000000000
ELEVATION: 0.000 METERS  0.00 FEET
GPS Quality: None

MIP POST-LOG RESPONSE TEST

FILENAME: MiHPT - 3.post.tim
COMPOUND: TCE
CONCENTRATION: 20 ppm
FLOW: 38.9 mL/min
RESPONSE TEST START TIME: Tue Nov 29 2016 16:18:25

RESPONSE TEST ATTENUATION CHANGES

| TIME | DET1 | DET2 | DET3 | DET4 |
|---|---|---|---|---|
| 0 | 1 | 1 | 1 | 1 |

POST-LOG HPT REFERENCE TEST VALUES

POST TEST TIME: Tue Nov 29 2016 16:23:11

| TEST | HPT PRESSURE (psi) | FLOW (mL/min) | HPT PRESSURE (kPa) |
|---|---|---|---|
| TOP with FLOW=0 | 16.607 | 0.0 | 114.500 |
| TOP with FLOW>0 | 16.845 | 182.8 | 116.140 |
| BOTTOM with FLOW=0 | 16.372 | 0.0 | 112.880 |
| BOTTOM with FLOW>0 | 16.640 | 183.2 | 114.730 |

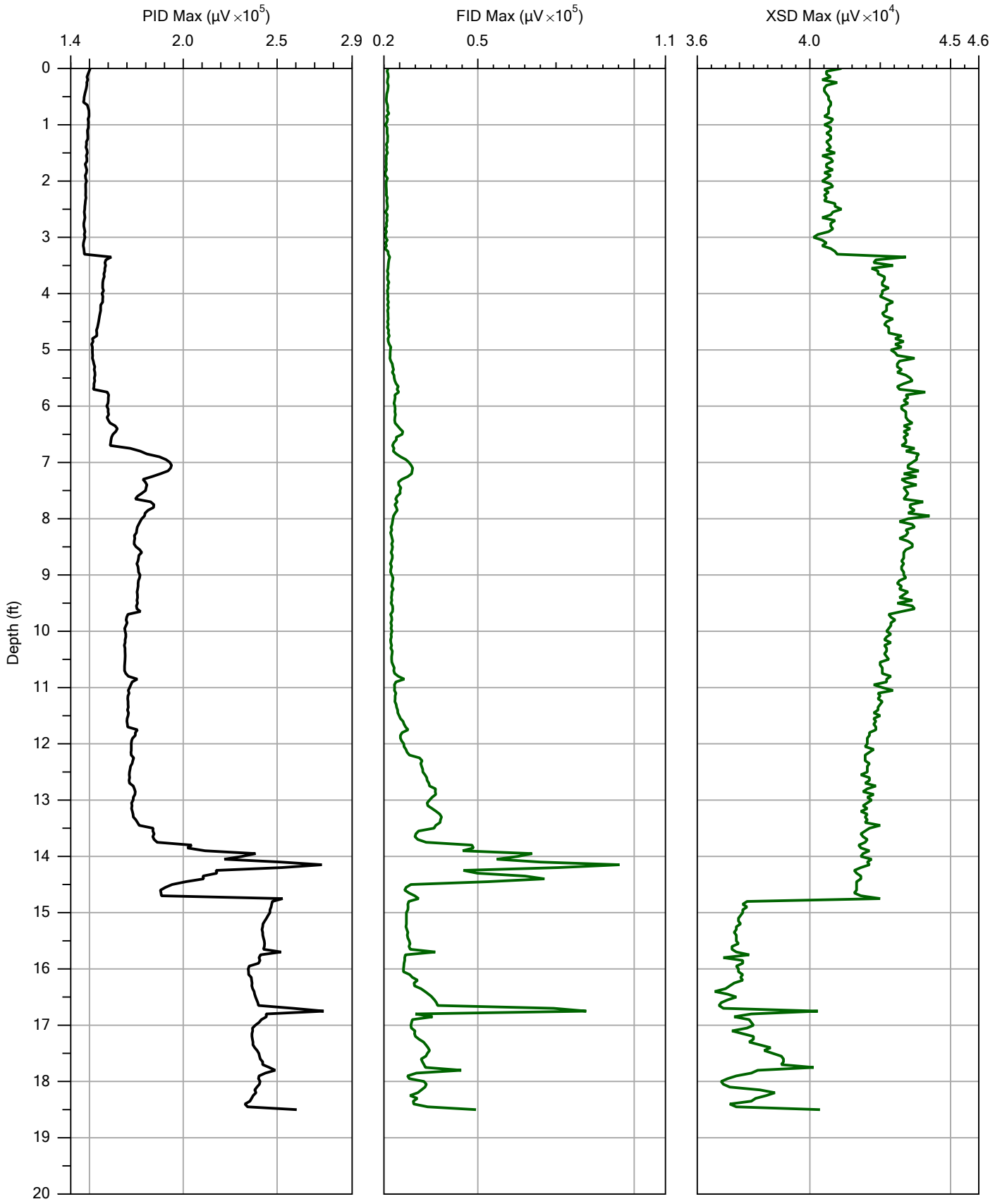
EXPECTED FLOW=0 HPT DIFF.: 0.22 psi (1.5 kPa) +/- 10%
  ACTUAL FLOW=0 HPT DIFF.: 0.23 psi (1.6 kPa)

TRANSDUCER TEST PASSED

EC POST-LOG TESTS BYPASSED

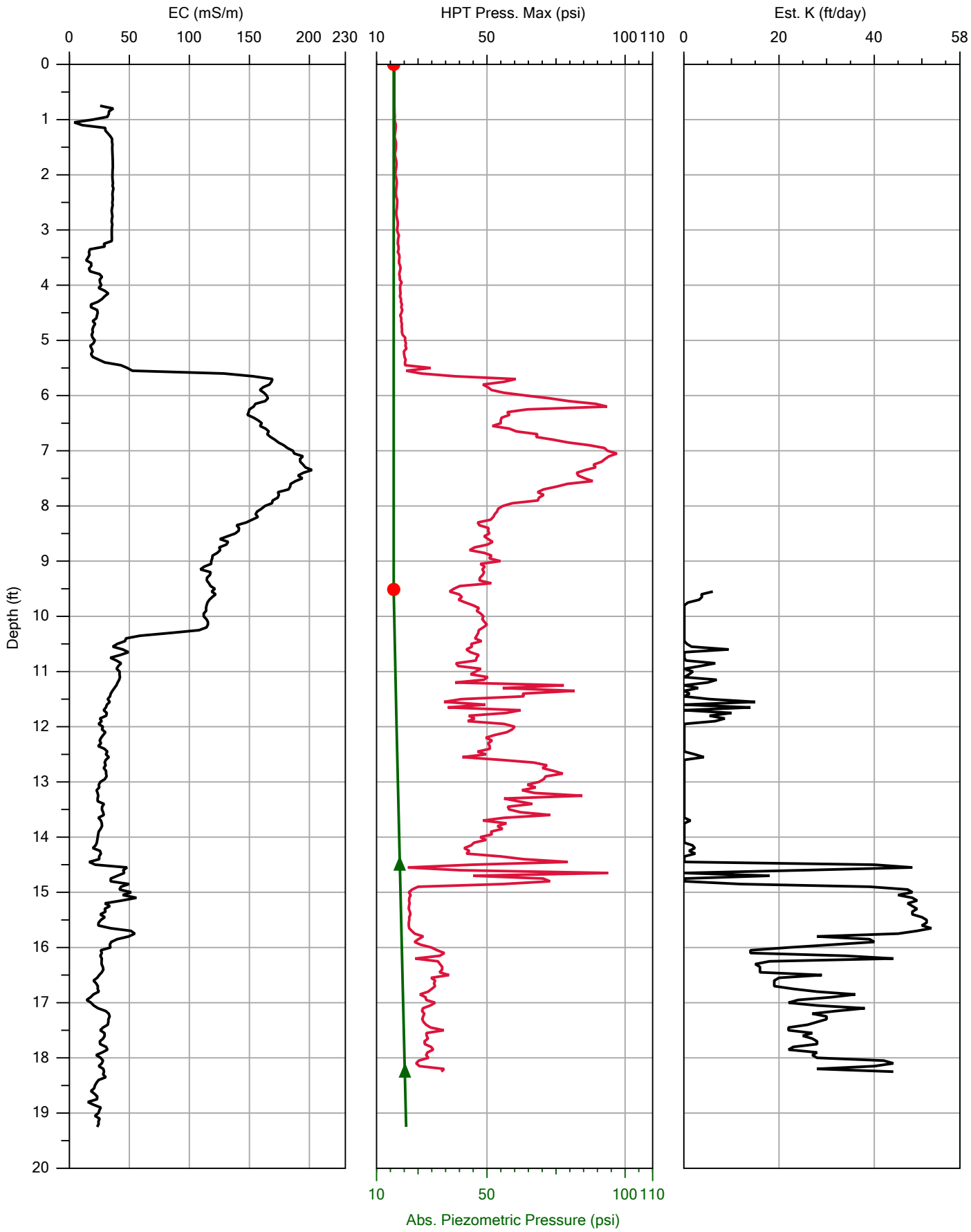
********** USER NOTES **********

0-5' pre clear. XSD not responding.




parratt wolff inc

| | | |
|---|---|---|
| | | File: MIHPT - 4.MHP |
| Company: Parratt-Wolff, Inc. | Operator: Danylo Kulczycky | Date: 11/30/2016 |
| Project ID: 16135 | Client: AECOM | Location: |




parratt wolff inc

| | | | |
|---|---|---|---|
| | | | File: MIHPT - 4.MHP |
| Company: Parratt-Wolff, Inc. | | Operator: Danylo Kulczycky | Date: 11/30/2016 |
| Project ID: 16135 | | Client: AECOM | Location: |

MiHPT - 4.zip

SITE INFORMATION -- DIRECT IMAGE MIP+HPT PROBE

Geoprobe DI Acquisition Software for Windows
Version: 1.7  Build: 15012

Pre-Log EC Load Tests

| Test | Target (mS/m) | Actual (mS/m) | % Diff | P/F |
|---|---|---|---|---|
| Low | 55.0 | 54.8 | 0.4 | PASS |
| High | 290.0 | 286.3 | 1.3 | PASS |

COMPANY: Parratt-Wolff, Inc.
OPERATOR: Danylo Kulczycky
PROJECT ID: 16135
CLIENT: AECOM
UNITS: ENGLISH
PROBE AND ARRAY: MH6530/6532 MiHPT Probe with Top Dipole
LOCATION: 3425 Hyde Park
100 INCH STRING POT USED
ROD LENGTH: 5 feet

MIP PRE-LOG RESPONSE TEST

FILENAME: MiHPT - 4.pre.tim
COMPOUND: TCE
CONCENTRATION: 20 ppm
FLOW: 40.3 mL/min
RESPONSE TEST START TIME: Wed Nov 30 2016 08:50:41

RESPONSE TEST ATTENUATION CHANGES

| TIME | DET1 | DET2 | DET3 | DET4 |
|---|---|---|---|---|
| 0 | 1 | 1 | 1 | 1 |

TRIP TIME: 50 sec
Gas Used: nitrogen

PRE-LOG HPT REFERENCE TEST VALUES

PRE TEST TIME: Wed Nov 30 2016 08:55:39

| TEST | HPT PRESSURE (psi) | FLOW (mL/min) | HPT PRESSURE (kPa) |
|---|---|---|---|
| TOP with FLOW=0 | 16.619 | 0.0 | 114.580 |
| TOP with FLOW>0 | 16.865 | 188.5 | 116.280 |
| BOTTOM with FLOW=0 | 16.387 | 0.0 | 112.980 |
| BOTTOM with FLOW>0 | 16.650 | 187.1 | 114.800 |

EXPECTED FLOW=0 HPT DIFF.: 0.22 psi (1.5 kPa) +/- 10%
  ACTUAL FLOW=0 HPT DIFF.: 0.23 psi (1.6 kPa)

TRANSDUCER TEST PASSED

DETECTOR NAME: XSD NA PID FID
HPT IDEAL COEFFS: 2.2696e1,-2.2356
HPT SENSOR CAL NUMBERS: DEFAULT, 0.000, 0.000, 0.000, 0.000, 1.000, 0.000

Temperature out of range (33.7 deg C) at 0.00 ft (0.000 m)

Temperature out of range (30.2 deg C) at 0.00 ft (0.000 m)

LOG START TIME: Wed Nov 30 2016 09:02:38

ATTENUATION CHANGES

| DEPTH (ft) | DEPTH (m) | DET1 | DET2 | DET3 | DET4 |
|---|---|---|---|---|---|
| 0.00 | 0.000 | 1 | 1 | 1 | 1 |

LOG END DEPTH: 18.50 ft (5.639 m)
LOG END TIME: Wed Nov 30 2016 10:01:50

LATITUDE: 0.000000000
LONGITUDE: 0.000000000
ELEVATION: 0.000 METERS 0.00 FEET
GPS Quality: None

MIP POST-LOG RESPONSE TEST

FILENAME: MiHPT - 4.post.tim
COMPOUND: TCE
CONCENTRATION: 20 ppm
FLOW: 40.3 mL/min
RESPONSE TEST START TIME: Wed Nov 30 2016 10:12:37

RESPONSE TEST ATTENUATION CHANGES

| TIME | DET1 | DET2 | DET3 | DET4 |
|---|---|---|---|---|
| 0 | 1 | 1 | 1 | 1 |

POST-LOG HPT REFERENCE TEST VALUES

POST TEST TIME: Wed Nov 30 2016 10:17:12

| TEST | HPT PRESSURE (psi) | FLOW (mL/min) | HPT PRESSURE (kPa) |
|---|---|---|---|
| TOP with FLOW=0 | 16.576 | 0.0 | 114.290 |
| TOP with FLOW>0 | 16.940 | 181.0 | 116.800 |
| BOTTOM with FLOW=0 | 16.352 | 0.0 | 112.740 |
| BOTTOM with FLOW>0 | 16.695 | 182.1 | 115.110 |

EXPECTED FLOW=0 HPT DIFF.: 0.22 psi (1.5 kPa) +/- 10%
ACTUAL FLOW=0 HPT DIFF.: 0.22 psi (1.5 kPa)

TRANSDUCER TEST PASSED

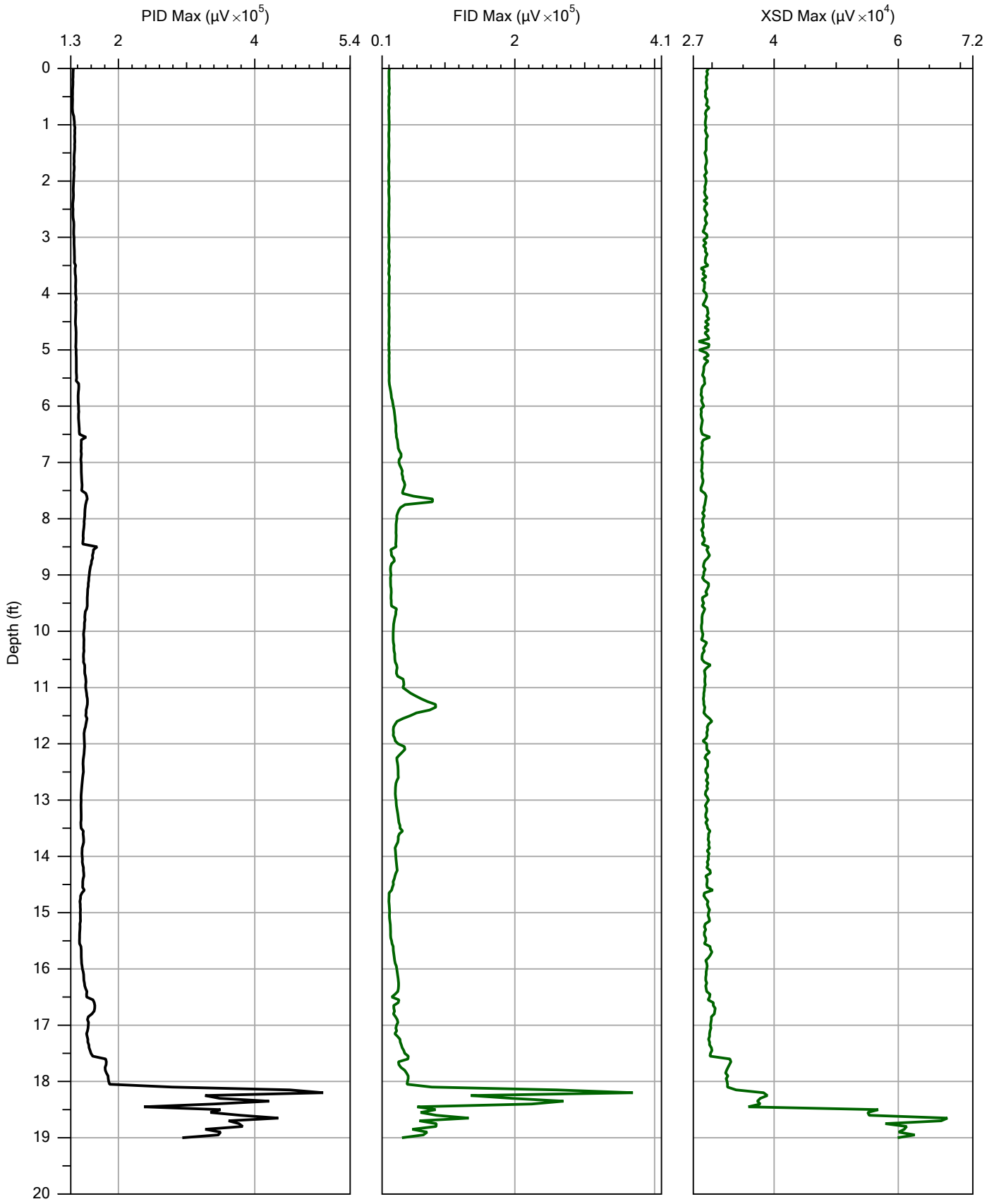
Post-Log EC Load Tests

| Test | Target (mS/m) | Actual (mS/m) | % Diff | P/F |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| Low | 55.0 | 55.7 | 1.4 | PASS |
| High | 290.0 | 294.2 | 1.5 | PASS |

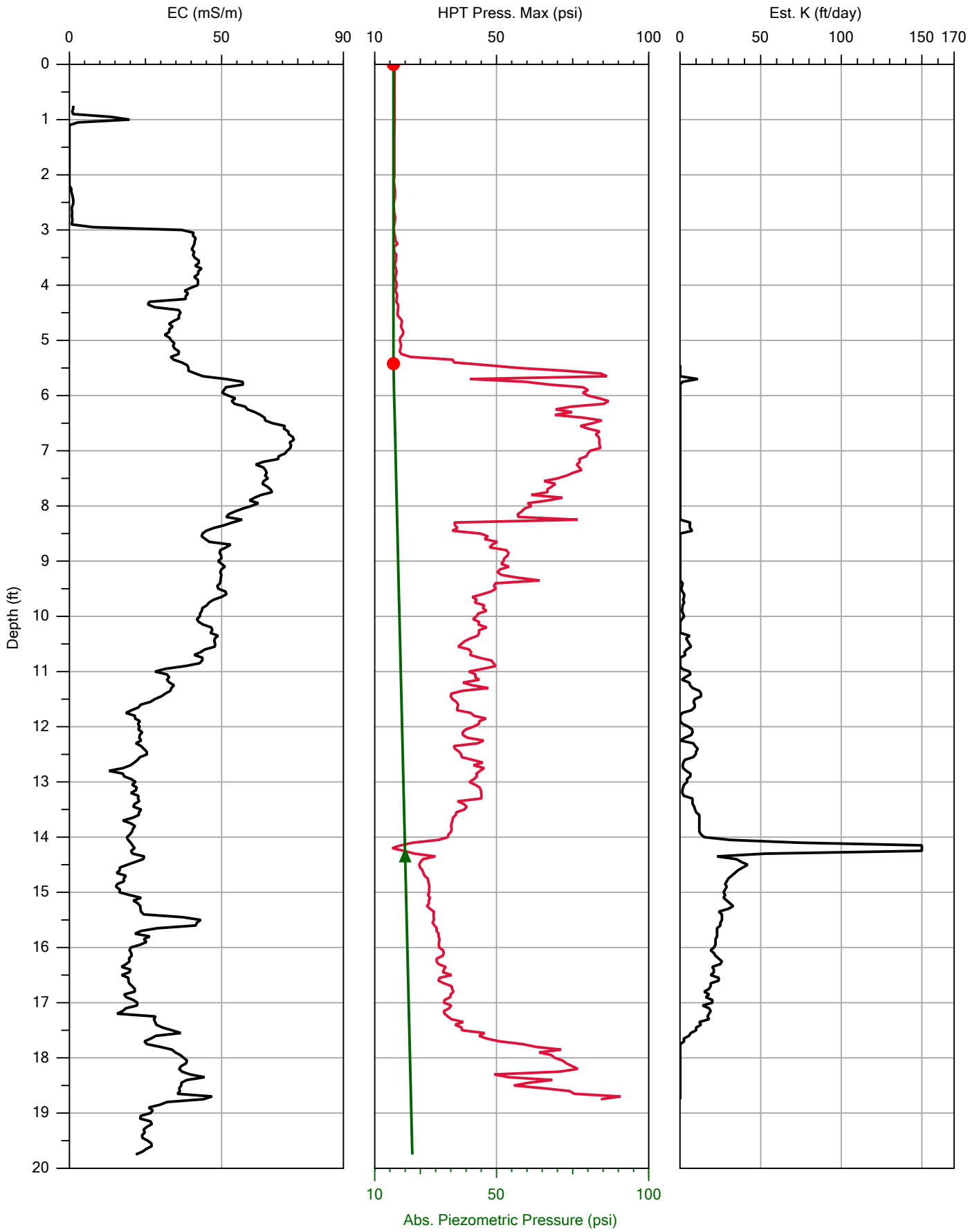
********** USER NOTES **********

Pre clear 0-5'.




parratt wolff inc

| | | | |
|---|---|---|---|
| | | | File: MIHPT - 5.MHP |
| Company: Parratt-Wolff, Inc. | | Operator: Danylo Kulczycky | Date: 11/30/2016 |
| Project ID: 16135 | | Client: AECOM | Location: |




parratt wolff inc

| | | |
|---|---|---|
| | | File: MIHPT - 5.MHP |
| Company: Parratt-Wolff, Inc. | Operator: Danylo Kulczycky | Date: 11/30/2016 |
| Project ID: 16135 | Client: AECOM | Location: |

MiHPT - 5.zip

SITE INFORMATION -- DIRECT IMAGE MIP+HPT PROBE

Geoprobe DI Acquisition Software for Windows
Version: 1.7  Build: 15012

Pre-Log EC Load Tests

| Test | Target (mS/m) | Actual (mS/m) | % Diff | P/F |
|---|---|---|---|---|
| Low | 55.0 | 55.1 | 0.1 | PASS |
| High | 290.0 | 301.1 | 3.8 | PASS |

COMPANY: Parratt-Wolff, Inc.
OPERATOR: Danylo Kulczycky
PROJECT ID: 16135
CLIENT: AECOM
UNITS: ENGLISH
PROBE AND ARRAY: MH6530/6532 MiHPT Probe with Top Dipole
LOCATION: 3425 Hyde Park
100 INCH STRING POT USED
ROD LENGTH: 5 feet

MIP PRE-LOG RESPONSE TEST

FILENAME: MiHPT - 5.pre.tim
COMPOUND: TCE
CONCENTRATION: 20 ppm
FLOW: 40.3 mL/min
RESPONSE TEST START TIME: Wed Nov 30 2016 11:02:50

RESPONSE TEST ATTENUATION CHANGES

| TIME | DET1 | DET2 | DET3 | DET4 |
|---|---|---|---|---|
| 0 | 1 | 1 | 1 | 1 |

TRIP TIME: 50 sec
Gas Used: nitrogen

PRE-LOG HPT REFERENCE TEST VALUES

PRE TEST TIME: Wed Nov 30 2016 11:09:05

| TEST | HPT PRESSURE (psi) | FLOW (mL/min) | HPT PRESSURE (kPa) |
|---|---|---|---|
| TOP with FLOW=0 | 16.559 | 0.0 | 114.170 |
| TOP with FLOW>0 | 16.902 | 177.9 | 116.540 |
| BOTTOM with FLOW=0 | 16.336 | 0.0 | 112.630 |
| BOTTOM with FLOW>0 | 16.674 | 178.0 | 114.970 |

EXPECTED FLOW=0 HPT DIFF.: 0.22 psi (1.5 kPa) +/- 10%
  ACTUAL FLOW=0 HPT DIFF.: 0.22 psi (1.5 kPa)

TRANSDUCER TEST PASSED

DETECTOR NAME: XSD NA PID FID
HPT IDEAL COEFFS: 2.2696e1,-2.2356
HPT SENSOR CAL NUMBERS: DEFAULT, 0.000, 0.000, 0.000, 0.000, 1.000, 0.000

Temperature out of range (39.7 deg C) at 0.00 ft (0.000 m)

LOG START TIME: Wed Nov 30 2016 11:14:20

ATTENUATION CHANGES

| DEPTH (ft) | DEPTH (m) | DET1 | DET2 | DET3 | DET4 |
|---|---|---|---|---|---|
| 0.00 | 0.000 | 1 | 1 | 1 | 1 |

LOG END DEPTH: 19.00 ft (5.791 m)
LOG END TIME: Wed Nov 30 2016 11:41:10

LATITUDE: 0.000000000
LONGITUDE: 0.000000000
ELEVATION: 0.000 METERS 0.00 FEET
GPS Quality: None

MIP POST-LOG RESPONSE TEST

FILENAME: MiHPT - 5.post.tim
COMPOUND: TCE
CONCENTRATION: 20 ppm
FLOW: 40.3 mL/min
RESPONSE TEST START TIME: Wed Nov 30 2016 11:49:14

RESPONSE TEST ATTENUATION CHANGES

| TIME | DET1 | DET2 | DET3 | DET4 |
|---|---|---|---|---|
| 0 | 1 | 1 | 1 | 1 |

POST-LOG HPT REFERENCE TEST VALUES

POST TEST TIME: Wed Nov 30 2016 11:55:38

| TEST | HPT PRESSURE (psi) | FLOW (mL/min) | HPT PRESSURE (kPa) |
|---|---|---|---|
| TOP with FLOW=0 | 16.529 | 0.0 | 113.970 |
| TOP with FLOW>0 | 16.913 | 185.1 | 116.610 |
| BOTTOM with FLOW=0 | 16.310 | 0.0 | 112.450 |
| BOTTOM with FLOW>0 | 16.702 | 184.7 | 115.160 |

EXPECTED FLOW=0 HPT DIFF.: 0.22 psi (1.5 kPa) +/- 10%
ACTUAL FLOW=0 HPT DIFF.: 0.22 psi (1.5 kPa)

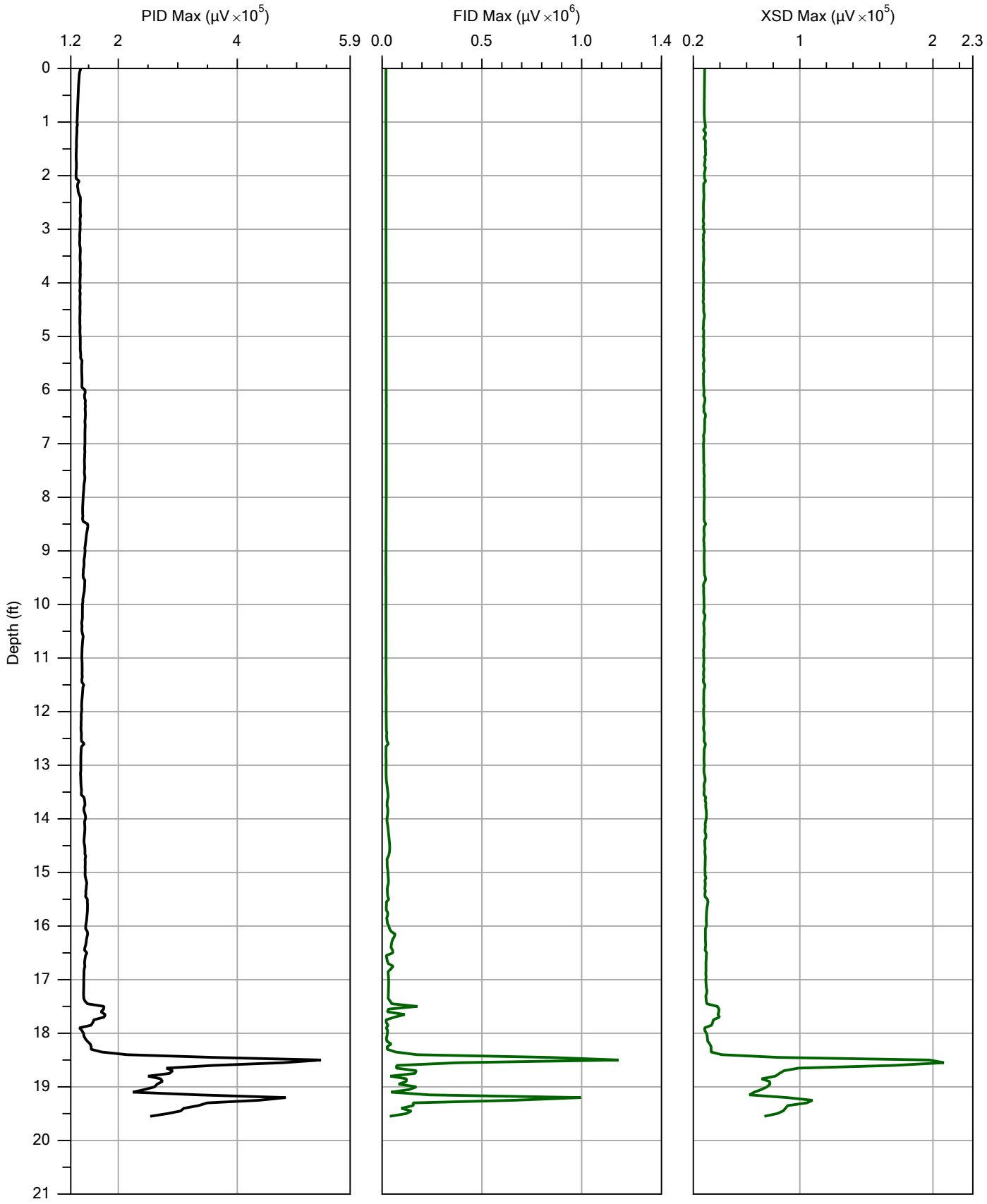
TRANSDUCER TEST PASSED

Post-Log EC Load Tests

| Test | Target (mS/m) | Actual (mS/m) | % Diff | P/F |
|---|---|---|---|---|
| Low | 55.0 | 55.5 | 0.8 | PASS |
| High | 290.0 | 300.4 | 3.6 | PASS |

********** USER NOTES **********

0-5' pre clear.

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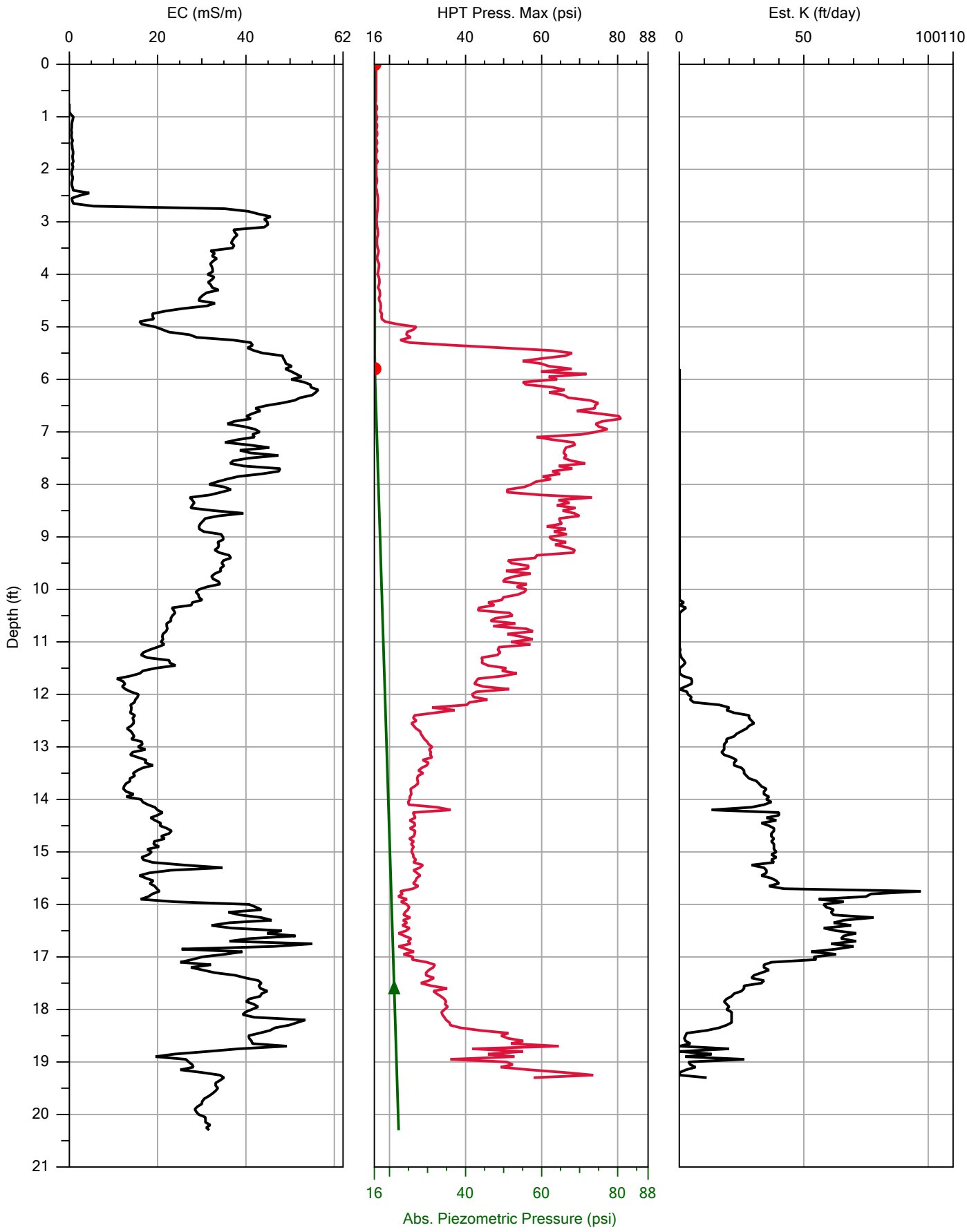
| | | |
|---|---|---|
| | | File: MIHPT - 6.MHP |
| Company: Parratt-Wolff, Inc. | Operator: Danylo Kulczycky | Date: 11/30/2016 |
| Project ID: 16135 | Client: AECOM | Location: |

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| | | |
|---|---|---|
| | | File: MIHPT - 6.MHP |
| Company: Parratt-Wolff, Inc. | Operator: Danylo Kulczycky | Date: 11/30/2016 |
| Project ID: 16135 | Client: AECOM | Location: |

MiHPT - 6.zip

SITE INFORMATION -- DIRECT IMAGE MIP+HPT PROBE

Geoprobe DI Acquisition Software for Windows
Version: 1.7  Build: 15012

Pre-Log EC Load Tests (Post-Log From MiHPT - 5.zip)

| Test | Target (mS/m) | Actual (mS/m) | % Diff | P/F |
|---|---|---|---|---|
| Low | 55.0 | 55.5 | 0.8 | PASS |
| High | 290.0 | 300.4 | 3.6 | PASS |

COMPANY: Parratt-Wolff, Inc.
OPERATOR: Danylo Kulczycky
PROJECT ID: 16135
CLIENT: AECOM
UNITS: ENGLISH
PROBE AND ARRAY: MH6530/6532 MiHPT Probe with Top Dipole
LOCATION: 3425 Hyde Park
100 INCH STRING POT USED
ROD LENGTH: 5 feet

MIP PRE-LOG RESPONSE TEST (Post-Log From MiHPT - 5.zip)

FILENAME: MiHPT - 6.pre.tim
COMPOUND: TCE
CONCENTRATION: 20 ppm
FLOW: 40.3 mL/min
RESPONSE TEST START TIME: Wed Nov 30 2016 11:49:14

RESPONSE TEST ATTENUATION CHANGES

| TIME | DET1 | DET2 | DET3 | DET4 |
|---|---|---|---|---|
| 0 | 1 | 1 | 1 | 1 |

TRIP TIME: 50 sec
Gas Used: nitrogen

PRE-LOG HPT REFERENCE TEST VALUES (Post-Log From MiHPT - 5.zip)

PRE TEST TIME: Wed Nov 30 2016 11:55:38

| TEST | HPT PRESSURE (psi) | FLOW (mL/min) | HPT PRESSURE (kPa) |
|---|---|---|---|
| TOP with FLOW=0 | 16.529 | 0.0 | 113.970 |
| TOP with FLOW>0 | 16.913 | 185.1 | 116.610 |
| BOTTOM with FLOW=0 | 16.310 | 0.0 | 112.450 |
| BOTTOM with FLOW>0 | 16.702 | 184.7 | 115.160 |

EXPECTED FLOW=0 HPT DIFF.: 0.22 psi (1.5 kPa) +/- 10%
  ACTUAL FLOW=0 HPT DIFF.: 0.22 psi (1.5 kPa)

TRANSDUCER TEST PASSED

DETECTOR NAME: XSD NA PID FID
HPT IDEAL COEFFS: 2.2696e1,-2.2356
HPT SENSOR CAL NUMBERS: DEFAULT, 0.000, 0.000, 0.000, 0.000, 1.000, 0.000

Temperature out of range (40.1 deg C) at 0.00 ft (0.000 m)

LOG START TIME: Wed Nov 30 2016 11:58:22

ATTENUATION CHANGES

| DEPTH (ft) | DEPTH (m) | DET1 | DET2 | DET3 | DET4 |
|---|---|---|---|---|---|
| 0.00 | 0.000 | 1 | 1 | 1 | 1 |

LOG END DEPTH: 19.55 ft (5.959 m)
LOG END TIME: Wed Nov 30 2016 12:36:16

LATITUDE: 0.000000000
LONGITUDE: 0.000000000
ELEVATION: 0.000 METERS 0.00 FEET
GPS Quality: None

MIP POST-LOG RESPONSE TEST

FILENAME: MiHPT - 6.post.tim
COMPOUND: TCE
CONCENTRATION: 20 ppm
FLOW: 40.3 mL/min
RESPONSE TEST START TIME: Wed Nov 30 2016 12:48:05

RESPONSE TEST ATTENUATION CHANGES

| TIME | DET1 | DET2 | DET3 | DET4 |
|---|---|---|---|---|
| 0 | 1 | 1 | 1 | 1 |

POST-LOG HPT REFERENCE TEST VALUES

POST TEST TIME: Wed Nov 30 2016 12:53:00

| TEST | HPT PRESSURE (psi) | FLOW (mL/min) | HPT PRESSURE (kPa) |
|---|---|---|---|
| TOP with FLOW=0 | 16.518 | 0.0 | 113.890 |
| TOP with FLOW>0 | 16.838 | 178.9 | 116.090 |
| BOTTOM with FLOW=0 | 16.298 | 0.0 | 112.370 |
| BOTTOM with FLOW>0 | 16.623 | 178.4 | 114.610 |

EXPECTED FLOW=0 HPT DIFF.: 0.22 psi (1.5 kPa) +/- 10%
ACTUAL FLOW=0 HPT DIFF.: 0.22 psi (1.5 kPa)

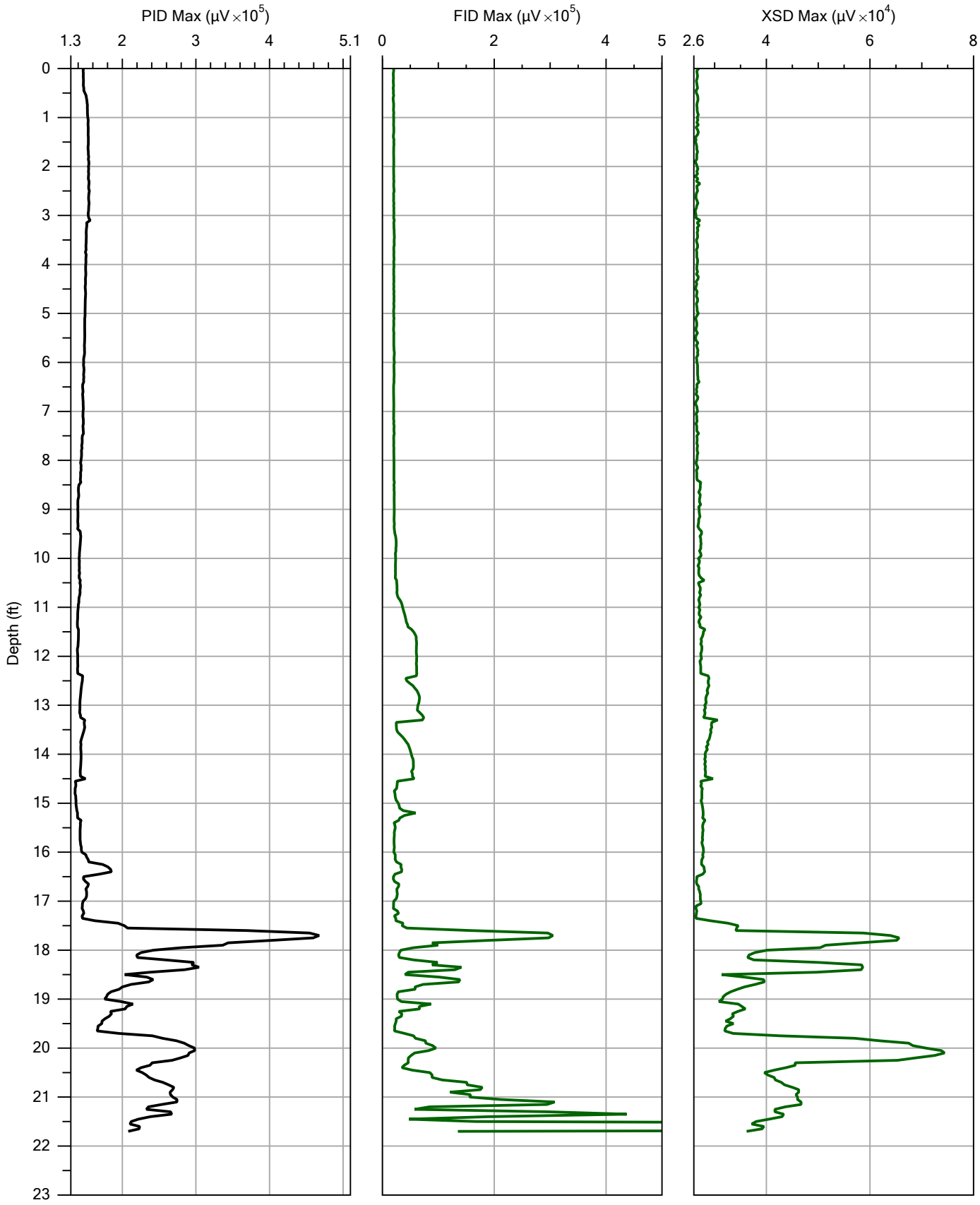
TRANSDUCER TEST PASSED

Post-Log EC Load Tests

| Test | Target (mS/m) | Actual (mS/m) | % Diff | P/F |
|---|---|---|---|---|
| Low | 55.0 | 55.7 | 1.3 | PASS |
| High | 290.0 | 281.6 | 2.9 | PASS |

********** USER NOTES **********

Pre clear 0-5'.

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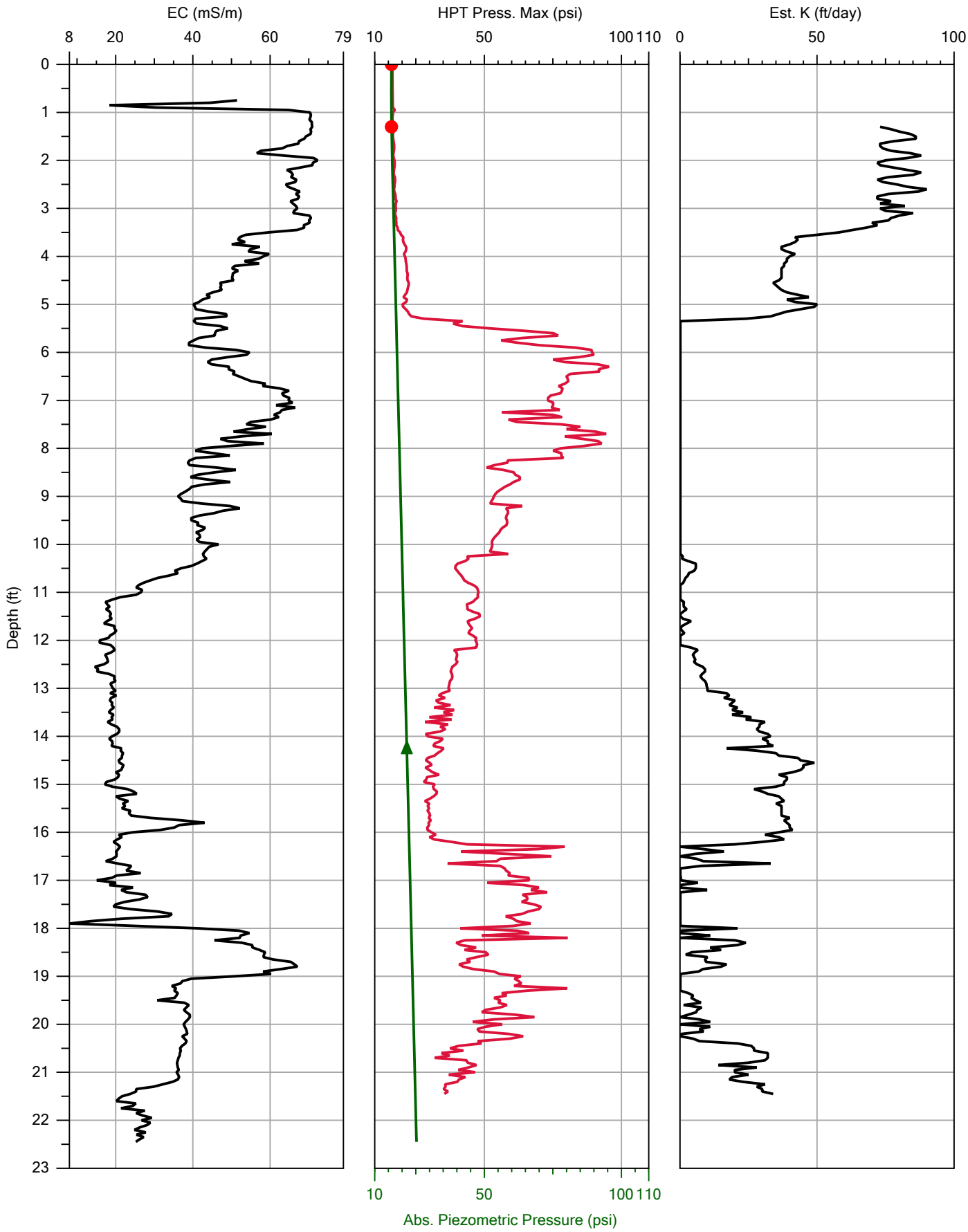
| | | |
|---|---|---|
| | | File: MIHPT - 7.MHP |
| Company: Parratt-Wolff, Inc. | Operator: Danylo Kulczycky | Date: 11/30/2016 |
| Project ID: 16135 | Client: AECOM | Location: |




parratt wolff inc

| | | |
|---|---|---|
| | | File: MIHPT - 7.MHP |
| Company: Parratt-Wolff, Inc. | Operator: Danylo Kulczycky | Date: 11/30/2016 |
| Project ID: 16135 | Client: AECOM | Location: |

MiHPT - 7.zip

SITE INFORMATION -- DIRECT IMAGE MIP+HPT PROBE

Geoprobe DI Acquisition Software for Windows
Version: 1.7  Build: 15012

Pre-Log EC Load Tests (Post-Log From MiHPT - 6.zip)

| Test | Target (mS/m) | Actual (mS/m) | % Diff | P/F |
|---|---|---|---|---|
| Low | 55.0 | 55.7 | 1.3 | PASS |
| High | 290.0 | 281.6 | 2.9 | PASS |

COMPANY: Parratt-Wolff, Inc.
OPERATOR: Danylo Kulczycky
PROJECT ID: 16135
CLIENT: AECOM
UNITS: ENGLISH
PROBE AND ARRAY: MH6530/6532 MiHPT Probe with Top Dipole
LOCATION: 3425 Hyde Park
100 INCH STRING POT USED
ROD LENGTH: 5 feet

MIP PRE-LOG RESPONSE TEST (Post-Log From MiHPT - 6.zip)

FILENAME: MiHPT - 7.pre.tim
COMPOUND: TCE
CONCENTRATION: 20 ppm
FLOW: 40.3 mL/min
RESPONSE TEST START TIME: Wed Nov 30 2016 12:48:05

RESPONSE TEST ATTENUATION CHANGES

| TIME | DET1 | DET2 | DET3 | DET4 |
|---|---|---|---|---|
| 0 | 1 | 1 | 1 | 1 |

TRIP TIME: 50 sec
Gas Used: nitrogen

PRE-LOG HPT REFERENCE TEST VALUES (Post-Log From MiHPT - 6.zip)

PRE TEST TIME: Wed Nov 30 2016 12:53:00

| TEST | HPT PRESSURE (psi) | FLOW (mL/min) | HPT PRESSURE (kPa) |
|---|---|---|---|
| TOP with FLOW=0 | 16.518 | 0.0 | 113.890 |
| TOP with FLOW>0 | 16.838 | 178.9 | 116.090 |
| BOTTOM with FLOW=0 | 16.298 | 0.0 | 112.370 |
| BOTTOM with FLOW>0 | 16.623 | 178.4 | 114.610 |

EXPECTED FLOW=0 HPT DIFF.: 0.22 psi (1.5 kPa) +/- 10%
  ACTUAL FLOW=0 HPT DIFF.: 0.22 psi (1.5 kPa)

TRANSDUCER TEST PASSED

DETECTOR NAME: XSD NA PID FID
HPT IDEAL COEFFS: 2.2696e1,-2.2356
HPT SENSOR CAL NUMBERS: DEFAULT, 0.000, 0.000, 0.000, 0.000, 1.000, 0.000

Temperature out of range (32.7 deg C) at 0.00 ft (0.000 m)

LOG START TIME: Wed Nov 30 2016 12:56:46

ATTENUATION CHANGES

| DEPTH (ft) | DEPTH (m) | DET1 | DET2 | DET3 | DET4 |
|---|---|---|---|---|---|
| 0.00 | 0.000 | 1 | 1 | 1 | 1 |

LOG END DEPTH: 21.70 ft (6.614 m)
LOG END TIME: Wed Nov 30 2016 13:38:48

LATITUDE: 0.000000000
LONGITUDE: 0.000000000
ELEVATION: 0.000 METERS 0.00 FEET
GPS Quality: None

MIP POST-LOG RESPONSE TEST

FILENAME: MiHPT - 7.post.tim
COMPOUND: TCE
CONCENTRATION: 20 ppm
FLOW: 40.3 mL/min
RESPONSE TEST START TIME: Wed Nov 30 2016 13:50:45

RESPONSE TEST ATTENUATION CHANGES

| TIME | DET1 | DET2 | DET3 | DET4 |
|---|---|---|---|---|
| 0 | 1 | 1 | 1 | 1 |

POST-LOG HPT REFERENCE TEST VALUES

POST TEST TIME: Wed Nov 30 2016 13:55:30

| TEST | HPT PRESSURE (psi) | FLOW (mL/min) | HPT PRESSURE (kPa) |
|---|---|---|---|
| TOP with FLOW=0 | 16.505 | 0.0 | 113.790 |
| TOP with FLOW>0 | 16.817 | 178.1 | 115.950 |
| BOTTOM with FLOW=0 | 16.281 | 0.0 | 112.260 |
| BOTTOM with FLOW>0 | 16.616 | 179.5 | 114.570 |

EXPECTED FLOW=0 HPT DIFF.: 0.22 psi (1.5 kPa) +/- 10%
ACTUAL FLOW=0 HPT DIFF.: 0.22 psi (1.5 kPa)

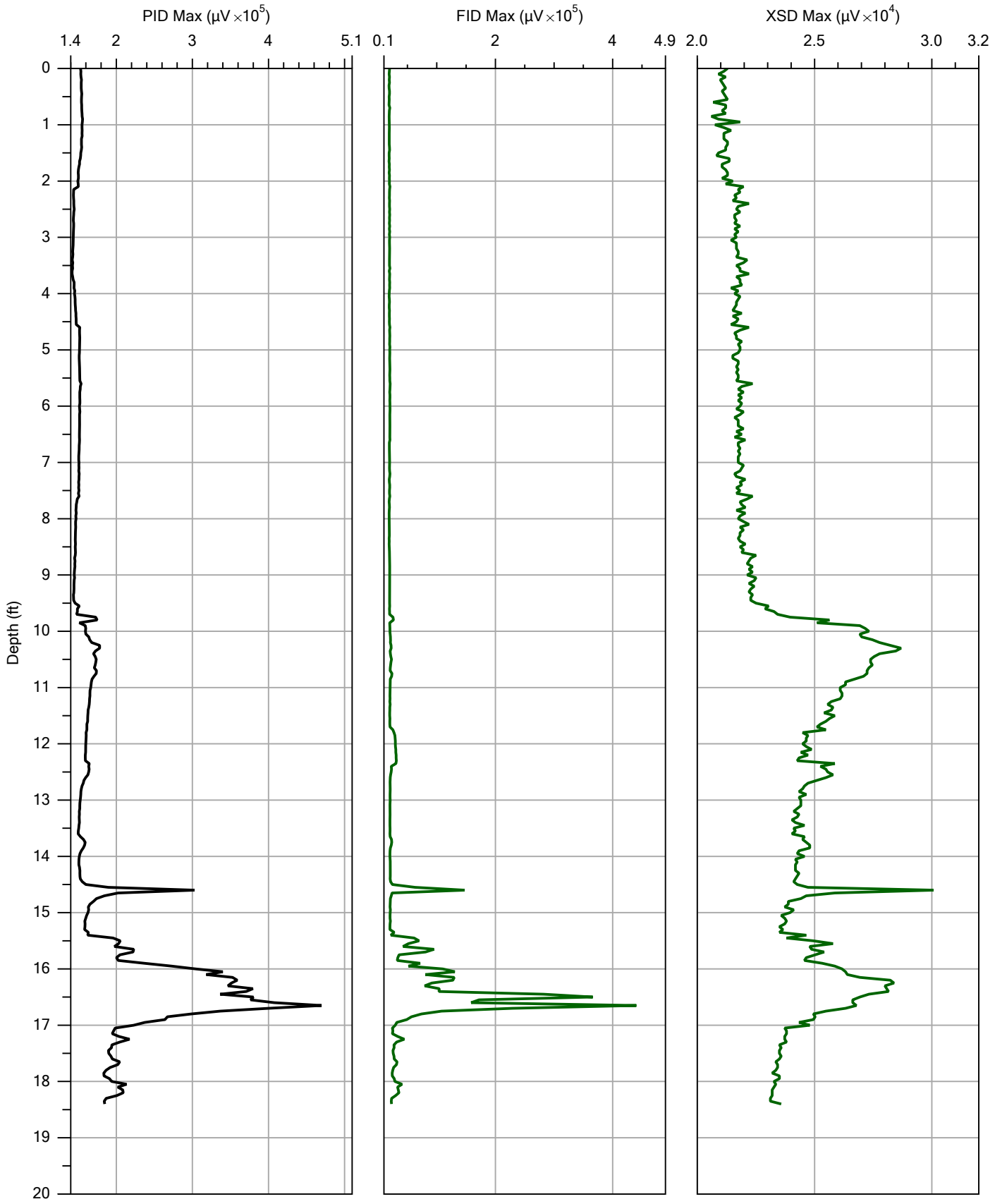
TRANSDUCER TEST PASSED

Post-Log EC Load Tests

| Test | Target (mS/m) | Actual (mS/m) | % Diff | P/F |
|---|---|---|---|---|
| Low | 55.0 | 55.8 | 1.5 | PASS |
| High | 290.0 | 301.4 | 3.9 | PASS |

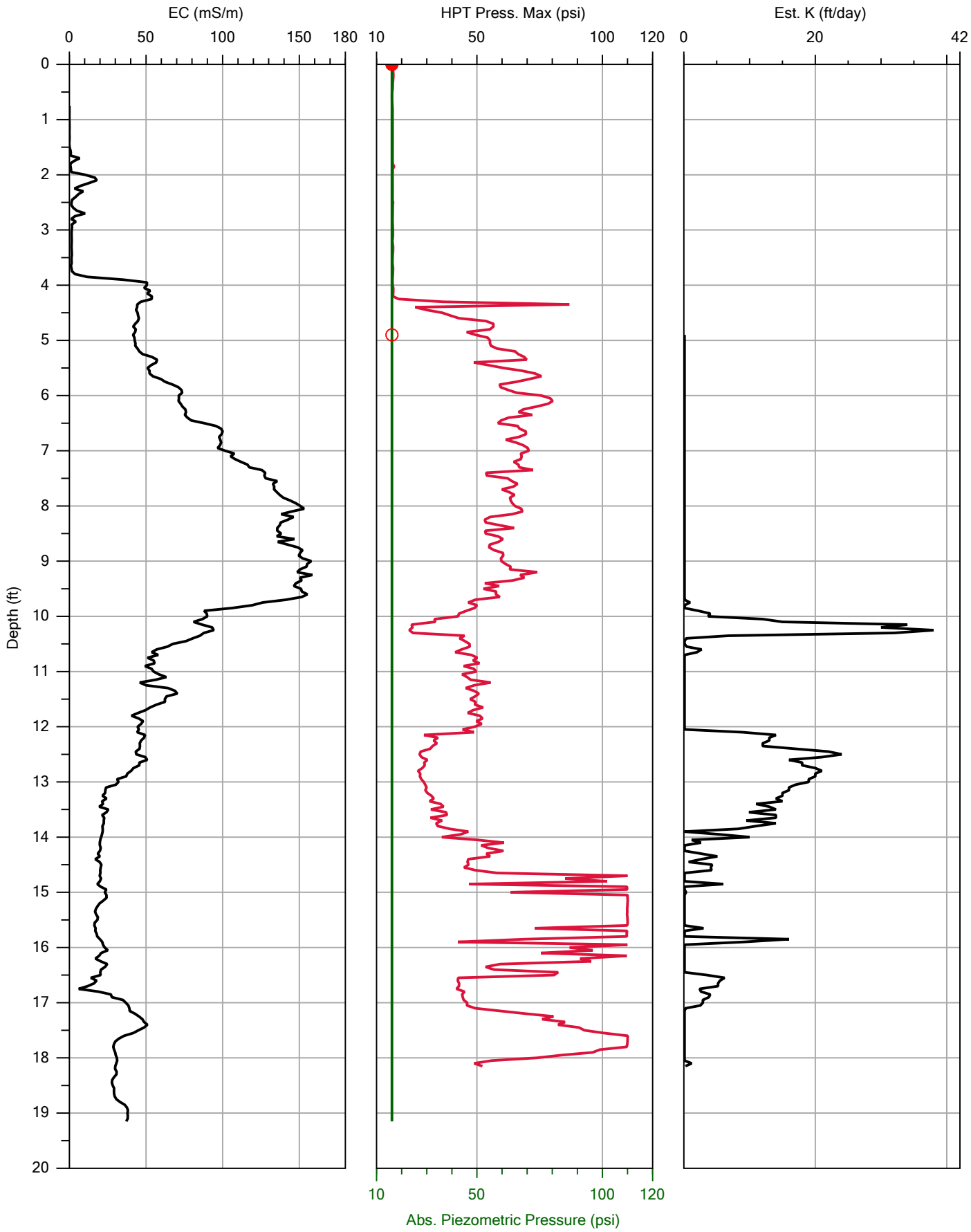
********** USER NOTES **********

Pre clear 0-5'.




parratt wolff inc

| | | |
|---|---|---|
| | | File: MIHPT - 8.MHP |
| Company: Parratt-Wolff, Inc. | Operator: Danylo Kulczycky | Date: 11/30/2016 |
| Project ID: 16135 | Client: AECOM | Location: |




parratt wolff inc

| | | |
|---|---|---|
| | | File: MIHPT - 8.MHP |
| Company: Parratt-Wolff, Inc. | Operator: Danylo Kulczycky | Date: 11/30/2016 |
| Project ID: 16135 | Client: AECOM | Location: |

MiHPT - 8.zip

SITE INFORMATION -- DIRECT IMAGE MIP+HPT PROBE

Geoprobe DI Acquisition Software for Windows
Version: 1.7  Build: 15012

Pre-Log EC Load Tests (Post-Log From MiHPT - 7.zip)

| Test | Target (mS/m) | Actual (mS/m) | % Diff | P/F |
|---|---|---|---|---|
| Low | 55.0 | 55.8 | 1.5 | PASS |
| High | 290.0 | 301.4 | 3.9 | PASS |

COMPANY: Parratt-Wolff, Inc.
OPERATOR: Danylo Kulczycky
PROJECT ID: 16135
CLIENT: AECOM
UNITS: ENGLISH
PROBE AND ARRAY: MH6530/6532 MiHPT Probe with Top Dipole
LOCATION: 3425 Hyde Park
100 INCH STRING POT USED
ROD LENGTH: 5 feet

MIP PRE-LOG RESPONSE TEST (Post-Log From MiHPT - 7.zip)

FILENAME: MiHPT - 8.pre.tim
COMPOUND: TCE
CONCENTRATION: 20 ppm
FLOW: 40.3 mL/min
RESPONSE TEST START TIME: Wed Nov 30 2016 13:50:45

RESPONSE TEST ATTENUATION CHANGES

| TIME | DET1 | DET2 | DET3 | DET4 |
|---|---|---|---|---|
| 0 | 1 | 1 | 1 | 1 |

TRIP TIME: 50 sec
Gas Used: nitrogen

PRE-LOG HPT REFERENCE TEST VALUES (Post-Log From MiHPT - 7.zip)

PRE TEST TIME: Wed Nov 30 2016 13:55:30

| TEST | HPT PRESSURE (psi) | FLOW (mL/min) | HPT PRESSURE (kPa) |
|---|---|---|---|
| TOP with FLOW=0 | 16.505 | 0.0 | 113.790 |
| TOP with FLOW>0 | 16.817 | 178.1 | 115.950 |
| BOTTOM with FLOW=0 | 16.281 | 0.0 | 112.260 |
| BOTTOM with FLOW>0 | 16.616 | 179.5 | 114.570 |

EXPECTED FLOW=0 HPT DIFF.: 0.22 psi (1.5 kPa) +/- 10%
  ACTUAL FLOW=0 HPT DIFF.: 0.22 psi (1.5 kPa)

TRANSDUCER TEST PASSED

DETECTOR NAME: XSD NA PID FID
HPT IDEAL COEFFS: 2.2696e1,-2.2356
HPT SENSOR CAL NUMBERS: DEFAULT, 0.000, 0.000, 0.000, 0.000, 1.000, 0.000

Temperature out of range (26.3 deg C) at 0.00 ft (0.000 m)

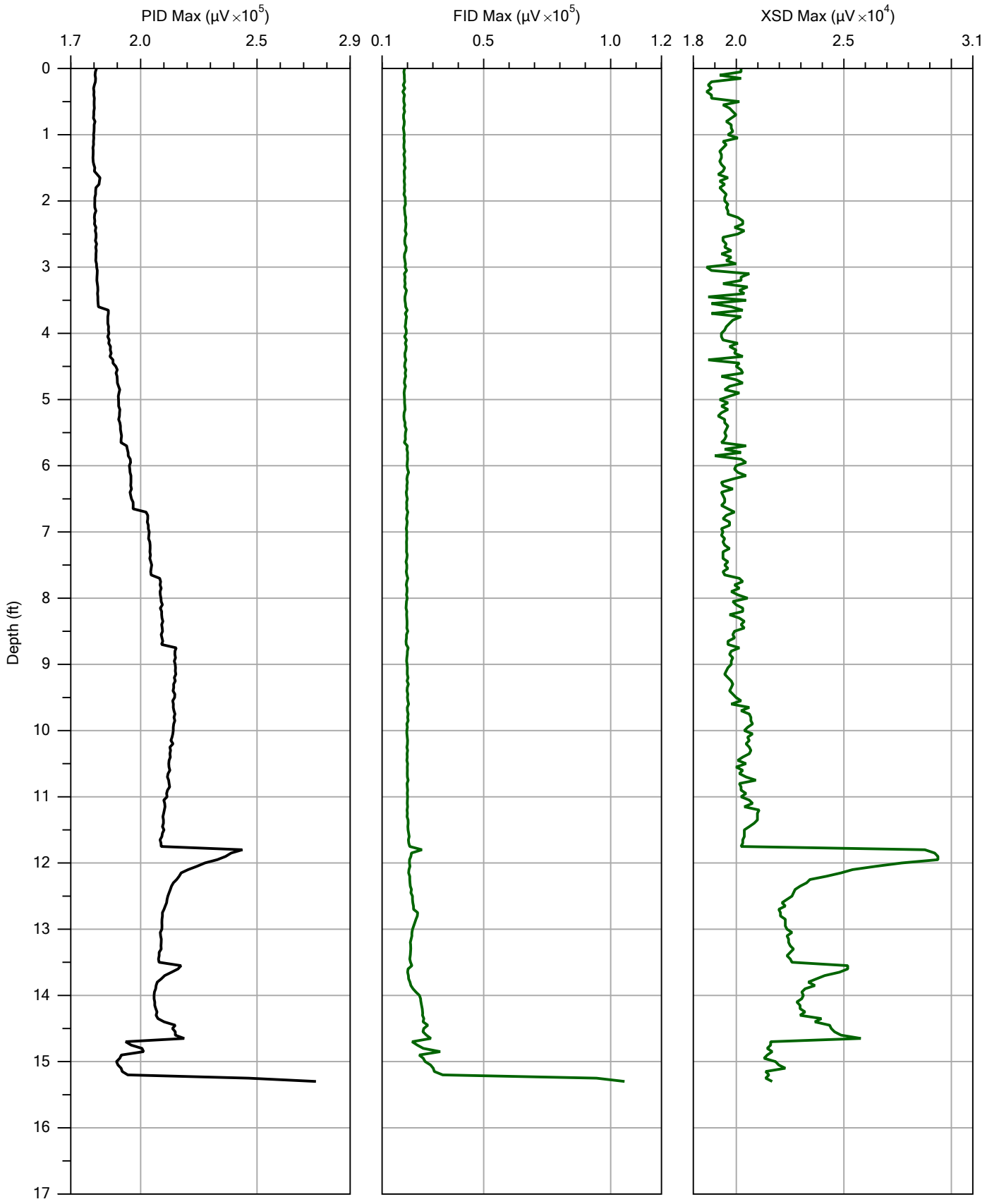
Temperature out of range (25.4 deg C) at 0.00 ft (0.000 m)

LOG START TIME: Wed Nov 30 2016 14:13:16

ATTENUATION CHANGES

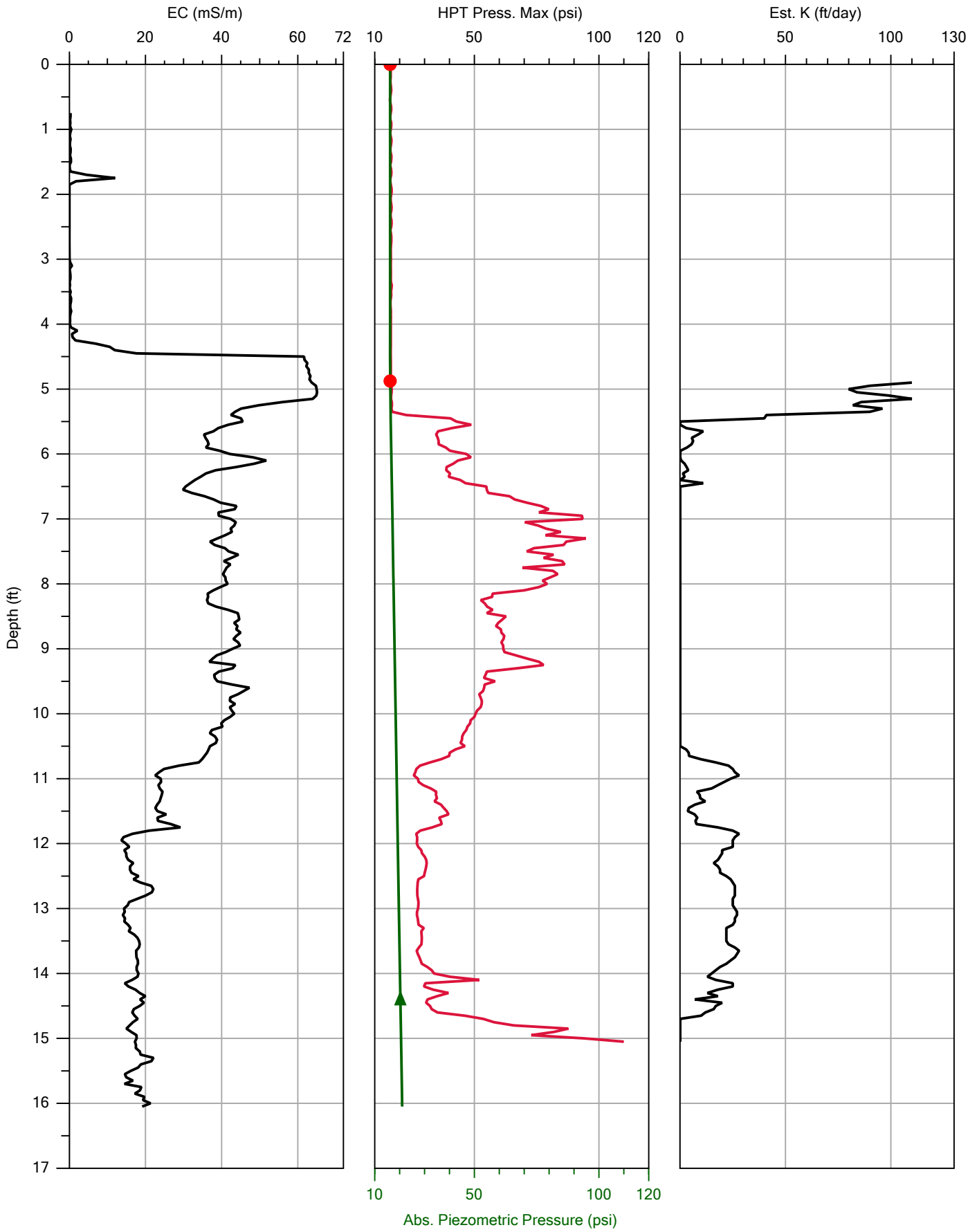
| DEPTH (ft) | DEPTH (m) | DET1 | DET2 | DET3 | DET4 |
|---|---|---|---|---|---|
| 0.00 | 0.000 | 1 | 1 | 1 | 1 |

LOG END DEPTH: 18.40 ft (5.608 m)
LOG END TIME: Wed Nov 30 2016 14:53:49




parratt wolff inc

| | | | |
|---|---|---|---|
| | | | File: MIHPT - 9.MHP |
| Company: Parratt-Wolff, Inc. | | Operator: Danylo Kulczycky | Date: 11/30/2016 |
| Project ID: 16135 | | Client: AECOM | Location: |




parratt wolff inc

| | | | |
|---|---|---|---|
| | | | File: MIHPT - 9.MHP |
| Company: Parratt-Wolff, Inc. | | Operator: Danylo Kulczycky | Date: 11/30/2016 |
| Project ID: 16135 | | Client: AECOM | Location: |

MiHPT - 9.zip

SITE INFORMATION -- DIRECT IMAGE MIP+HPT PROBE

Geoprobe DI Acquisition Software for Windows
Version: 1.7  Build: 15012

Pre-Log EC Load Tests

| Test | Target (mS/m) | Actual (mS/m) | % Diff | P/F |
|---|---|---|---|---|
| Low | 55.0 | 55.3 | 0.5 | PASS |
| High | 290.0 | 300.9 | 3.7 | PASS |

COMPANY: Parratt-Wolff, Inc.
OPERATOR: Danylo Kulczycky
PROJECT ID: 16135
CLIENT: AECOM
UNITS: ENGLISH
PROBE AND ARRAY: MH6530/6532 MiHPT Probe with Top Dipole
LOCATION: 3425 Hyde Park
100 INCH STRING POT USED
ROD LENGTH: 5 feet

MIP PRE-LOG RESPONSE TEST

FILENAME: MiHPT - 9.pre.tim
COMPOUND: TCE
CONCENTRATION: 20 ppm
FLOW: 39.9 mL/min
RESPONSE TEST START TIME: Wed Nov 30 2016 16:19:11

RESPONSE TEST ATTENUATION CHANGES

| TIME | DET1 | DET2 | DET3 | DET4 |
|---|---|---|---|---|
| 0 | 1 | 1 | 1 | 1 |

TRIP TIME: 50 sec
Gas Used: nitrogen

PRE-LOG HPT REFERENCE TEST VALUES

PRE TEST TIME: Wed Nov 30 2016 16:24:17

| TEST | HPT PRESSURE (psi) | FLOW (mL/min) | HPT PRESSURE (kPa) |
|---|---|---|---|
| TOP with FLOW=0 | 16.557 | 0.0 | 114.160 |
| TOP with FLOW>0 | 16.798 | 177.2 | 115.820 |
| BOTTOM with FLOW=0 | 16.356 | 0.0 | 112.770 |
| BOTTOM with FLOW>0 | 16.573 | 178.4 | 114.270 |

EXPECTED FLOW=0 HPT DIFF.: 0.22 psi (1.5 kPa) +/- 10%
  ACTUAL FLOW=0 HPT DIFF.: 0.20 psi (1.4 kPa)

TRANSDUCER TEST PASSED

DETECTOR NAME: XSD NA PID FID
HPT IDEAL COEFFS: 2.2696e1,-2.2356
HPT SENSOR CAL NUMBERS: DEFAULT, 0.000, 0.000, 0.000, 0.000, 1.000, 0.000

Temperature out of range (42.1 deg C) at 0.00 ft (0.000 m)

LOG START TIME: Wed Nov 30 2016 16:28:07

ATTENUATION CHANGES

| DEPTH (ft) | DEPTH (m) | DET1 | DET2 | DET3 | DET4 |
|---|---|---|---|---|---|
| 0.00 | 0.000 | 1 | 1 | 1 | 1 |

LOG END DEPTH: 15.30 ft (4.663 m)
LOG END TIME: Wed Nov 30 2016 16:55:54

LATITUDE: 0.000000000
LONGITUDE: 0.000000000
ELEVATION: 0.000 METERS 0.00 FEET
GPS Quality: None

MIP POST-LOG RESPONSE TEST

FILENAME: MiHPT - 9.post.tim
COMPOUND: TCE
CONCENTRATION: 20 ppm
FLOW: 39.9 mL/min
RESPONSE TEST START TIME: Wed Nov 30 2016 17:07:13

RESPONSE TEST ATTENUATION CHANGES

| TIME | DET1 | DET2 | DET3 | DET4 |
|---|---|---|---|---|
| 0 | 1 | 1 | 1 | 1 |

POST-LOG HPT REFERENCE TEST VALUES

POST TEST TIME: Wed Nov 30 2016 17:11:57

| TEST | HPT PRESSURE (psi) | FLOW (mL/min) | HPT PRESSURE (kPa) |
|---|---|---|---|
| TOP with FLOW=0 | 16.614 | 0.0 | 114.550 |
| TOP with FLOW>0 | 16.819 | 181.8 | 115.960 |
| BOTTOM with FLOW=0 | 16.397 | 0.0 | 113.050 |
| BOTTOM with FLOW>0 | 16.603 | 179.5 | 114.470 |

EXPECTED FLOW=0 HPT DIFF.: 0.22 psi (1.5 kPa) +/- 10%
ACTUAL FLOW=0 HPT DIFF.: 0.22 psi (1.5 kPa)

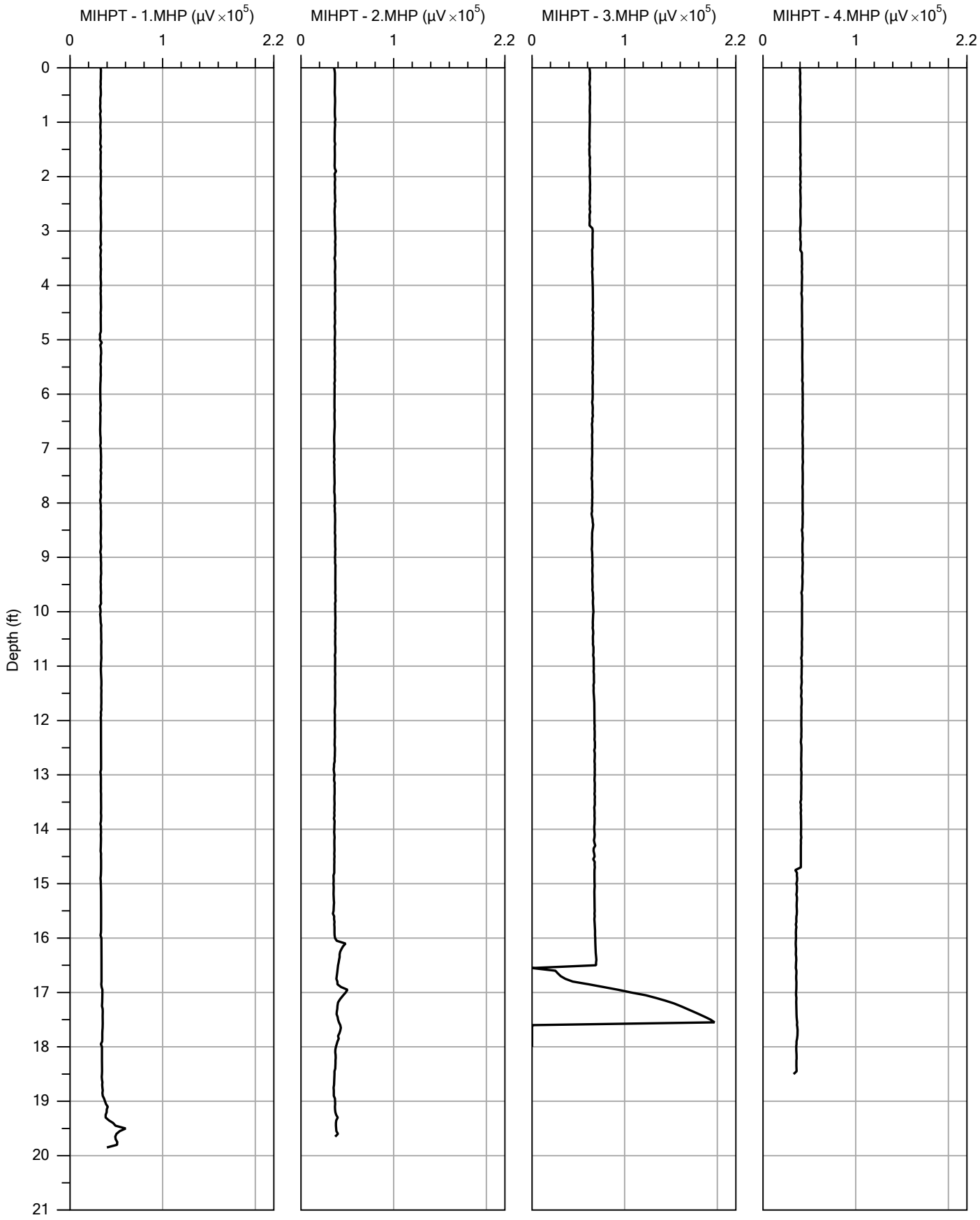
TRANSDUCER TEST PASSED

Post-Log EC Load Tests

| Test | Target (mS/m) | Actual (mS/m) | % Diff | P/F |
|---|---|---|---|---|
| Low | 55.0 | 55.4 | 0.8 | PASS |
| High | 290.0 | 300.9 | 3.7 | PASS |

********** USER NOTES **********

PROBE REFUSAL. Pre clear 0-5'.

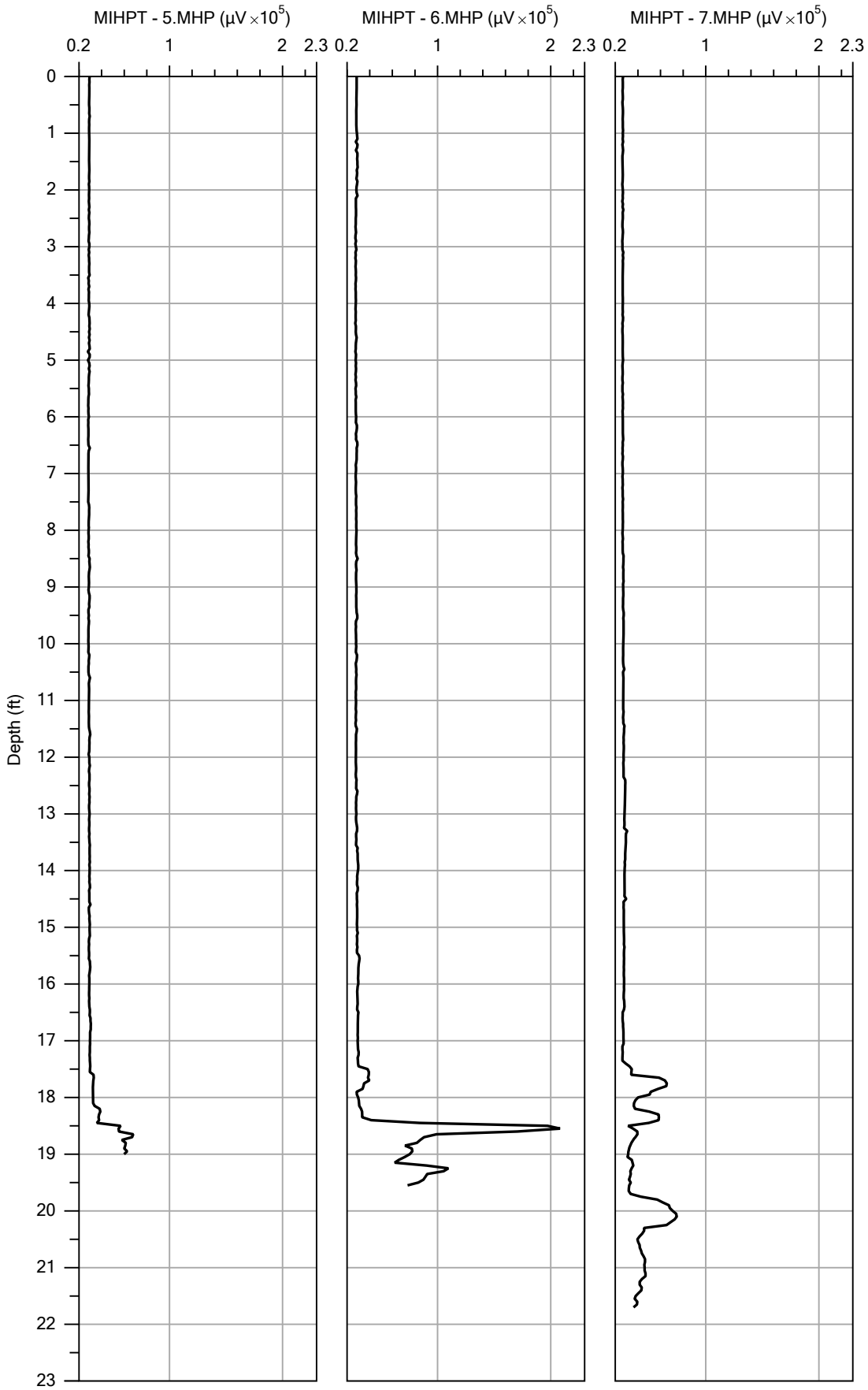



Direct Image® By Geoprobe Systems®

# XSD Min

| | |
|---|---|
| Company: Parratt-Wolff, Inc. | Operator: Danylo Kulczycky |
| Project ID: 16135 | Client: AECOM |

| | |
|---|---|
| MIHPT - 1.MHP | 11/29/2016 |
| MIHPT - 2.MHP | 11/29/2016 |
| MIHPT - 3.MHP | 11/29/2016 |
| MIHPT - 4.MHP | 11/30/2016 |

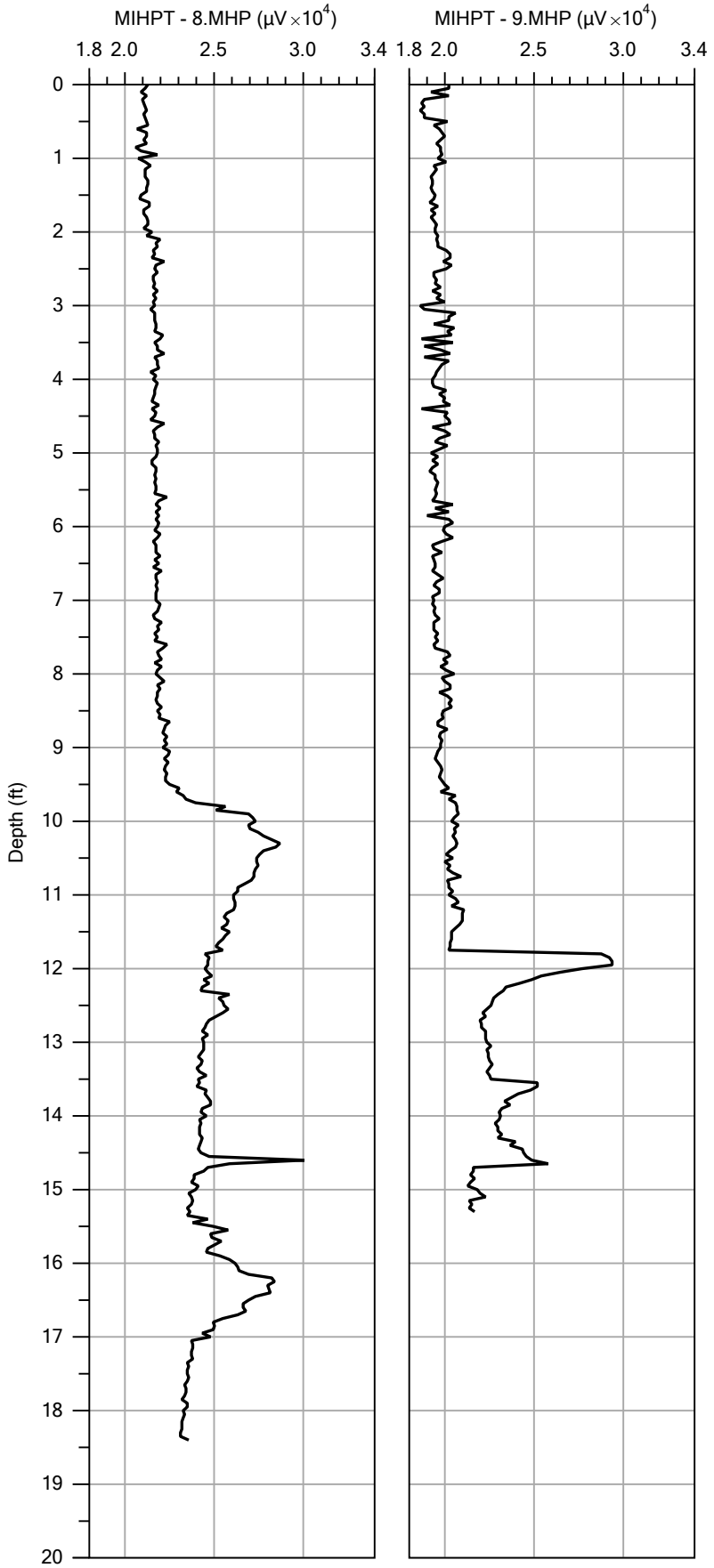



Direct Image® By Geoprobe Systems®

# XSD Max

| | |
|---|---|
| Company: Parratt-Wolff, Inc. | Operator: Danylo Kulczycky |
| Project ID: 16135 | Client: AECOM |

| | |
|---|---|
| MIHPT - 5.MHP | 11/30/2016 |
| MIHPT - 6.MHP | 11/30/2016 |
| MIHPT - 7.MHP | 11/30/2016 |

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# XSD Max

| | | |
|---|---|---|
| Company: Parratt-Wolff, Inc. | Operator: Danylo Kulczycky | MIHPT - 8.MHP 11/30/2016 |
| Project ID: 16135 | Client: AECOM | MIHPT - 9.MHP 11/30/2016 |