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September 30, 2010

Michael J. Hinton P.E.
New York State Department of Environmental Conservation
Division of Environmental Remediation, Region 9
270 Michigan Ave.
Buffalo, NY 14203-2999

Re: Carborundum Globar Site No. 932036
Town of Niagara, Niagara County
Five-Year Review Report

Dear Mr. Hinton:

Enclosed is the Five-Year Review Report for the referenced Site. This report discusses activities and work accomplished during the 5-year period from 2005 to 2010, evaluates the work in relation to compliance with the October 2000 Record of Decision, and provides a proposed path forward with recommendations for a modified monitoring program.

If you have any questions regarding this report, feel free to contact William Barber at (216) 271-8038.

Sincerely,

Mark S. Raybuck

Mark Raybuck
Project Manager

cc: W. Barber

FIVE-YEAR REVIEW REPORT

Former Carborundum Company, Hyde Park Facility
(Site No. 932036)

Town of Niagara, Niagara County, NY

SUBMITTED TO:

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

DIVISION OF HAZARDOUS WASTE REMEDIATION

SUBMITTED BY:

Atlantic Richfield Company

A BP affiliated company

4850 East 49th Street
Cuyahoga Heights, Ohio 44125

PREPARED BY:

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SEPTEMBER 2010

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SECTION 1
INTRODUCTION AND BACKGROUND

1.1 PURPOSE

This Five-Year Review report summarizes the investigation, remediation, and monitoring activities completed between 2005 and 2010 at the Former Carborundum Company Hyde Park Facility (Site) in the Town of Niagara, New York (Figure 1.1). For completeness, the report also provides water level and chemical analytical data in tables and figures from 1999 through 2010.

1.2 BACKGROUND

The Site is listed on the New York State Department of Environmental Conservation (NYSDEC) list of Inactive Hazardous Waste Disposal Sites, and is currently listed as a Class 2 site (Site No. 932036). A Site location map is provided as Figure 1.1, and a Site plan is included as Figure 1.2.

The Site is a 5 acre former manufacturing facility located in the Town of Niagara at the intersection of Hyde Park Boulevard and Rhode Island Street. Residential communities are located to the south and east, with mixed industrial properties to the north. Westward, across Hyde Park Boulevard, there are mixed commercial and residential use properties.

The Carborundum Company purchased the property from the Globar Company in 1936 and manufactured heating elements and electronic components from silicon carbide. BP America purchased the Carborundum Company. The Globar facility was subsequently sold to CESIWID, Inc. in 1993. CESIWID, Inc. sold the facility to Kanthal-Globar. In 2008, the Site was sold to 3425 Hyde Park Boulevard, LLC. BP America retained the responsibility for certain pre-existing conditions when they sold the facility to CESIWID, Inc.

In 1985, the Carborundum Company installed monitoring wells and collected soil and groundwater samples to access soil and groundwater contamination. In 1987, the USEPA completed a preliminary Assessment and referred the site to the State of New York. In 1990, the NYSDEC completed a Preliminary Site Assessment (PSA) Task 1. As a result of these investigations, the site remained on the Registry of Inactive Hazardous Waste Disposal Sites as a Class 2a site.

In 1993, the Carborundum Company completed a PSA. The PSA found hazardous waste resulting from past spills and leaks from bulk chemical storage. The past spills and leaks resulted in contamination of site soils and groundwater. As a result of this PSA, the Site was upgraded to a Class 2 Inactive Hazardous Waste Disposal site in the New York State registry.

Since 1993, a series of investigations has been completed to identify the extent of soil and groundwater contamination resulting from historical operations. The Order on Consent for the site was executed in 1995 and required a Remedial Investigation/Feasibility Study (RI/FS). The RI work began in 1995 and the RI Report was issued in January 1997. A supplemental investigation was completed and results were reported in the Phase II RI Report (Phase II RI) in May 1998.

A soil removal interim remedial measure (IRM) was completed in 1999 to remove onsite soils impacted with VOCs.

A Feasibility Study (FS) was completed in January 2000. In 2000, the NYSDEC completed a Record of Decision (ROD) (NYSDEC, 2000), which segmented the Site into the following three Operable Units:

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

Additional soil removal was conducted east of the property boundaries in 2002. OU1 and OU3 have been closed.

The ROD identified the need for continued groundwater monitoring with semi-annual reporting for a minimum 5-year period. Following their review of the initial 5-year groundwater monitoring summary report (Intera, 2005), the NYSDEC requested that groundwater monitoring be continued for another five years, but on an annual basis. Annual groundwater monitoring was then conducted on an alternating spring/fall schedule through May 2010, and includes the collection of groundwater samples for the chemical analysis of VOCs and natural attenuation parameters. The key chemicals of potential concern (COPCs) are: vinyl chloride (VC), cis- and trans- 1,2-dichloroethene (DCE), trichloroethene (TCE), and 1,1-dichloroethane.

The groundwater sampling targets two water bearing zones: (1) low permeability shallow soils consisting of silt and clay with lenses of sand, approximately five to 20 feet below ground surface (BGS); and (2) fractured dolomitic bedrock (greater than 20 feet).

Although natural attenuation has been documented in groundwater, Atlantic Richfield is currently applying methods to enhance the groundwater remediation using an *in situ* remediation treatment for COPCs. Section 3 discusses the *in situ* remediation activities and results.

1.3 KEY ACOMPLISHMENTS

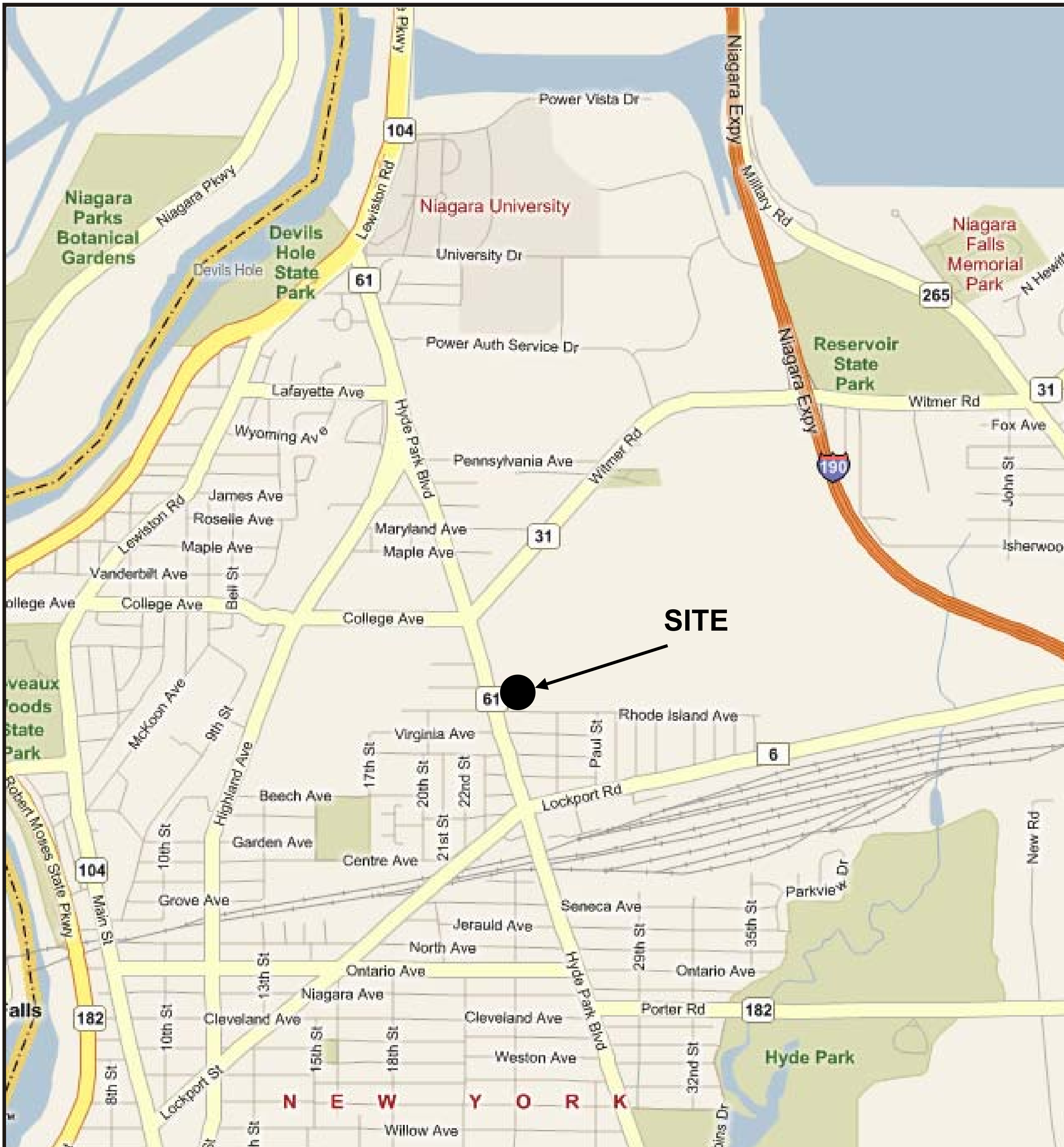
Since the last Five-Year Review report (Intera, 2005), there have been several key accomplishments, including:

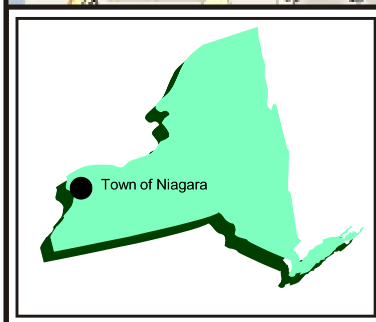
- A soil vapor intrusion investigation was conducted, showing that vapors are not migrating to offsite structures (Section 2). A Soil Vapor Intrusion report was submitted to the NYSDEC (Parsons, 2007). An email correspondence was received from NYSDEC on December 5, 2008 (NYSDEC, 2008) stating that no further action was required regarding potential offsite movement of soil vapor. However, if the current manufacturing facility changes its use, further soil vapor evaluation would be required for the facility. Atlantic Richfield and NYSDEC have been in contact with the current owner to discuss a deed restriction or other mechanism so that if property use changed, the potential for soil vapor intrusion into the structure would be evaluated.

- Groundwater monitoring, sampling and analysis have been completed in compliance with the groundwater monitoring program (Section 4). Results demonstrate that natural attenuation is an active process and has reduced concentrations through time.

- Annual monitoring reports have been submitted to the NYSDEC (Section 5), from 2000 to 2010. These include summaries of the analytical results and groundwater elevation contour maps.

- Overburden and bedrock pilot test injections have been completed and show that they have enhanced the rate of biodegradation of chlorinated solvents in groundwater (Section 3). The Pilot Test Report (Parsons, 2010) was submitted to the NYSDEC on August 27, 2010.





New York

FIGURE 1.1

FORMER CARBORUNDUM CO.
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SITE LOCATION MAP

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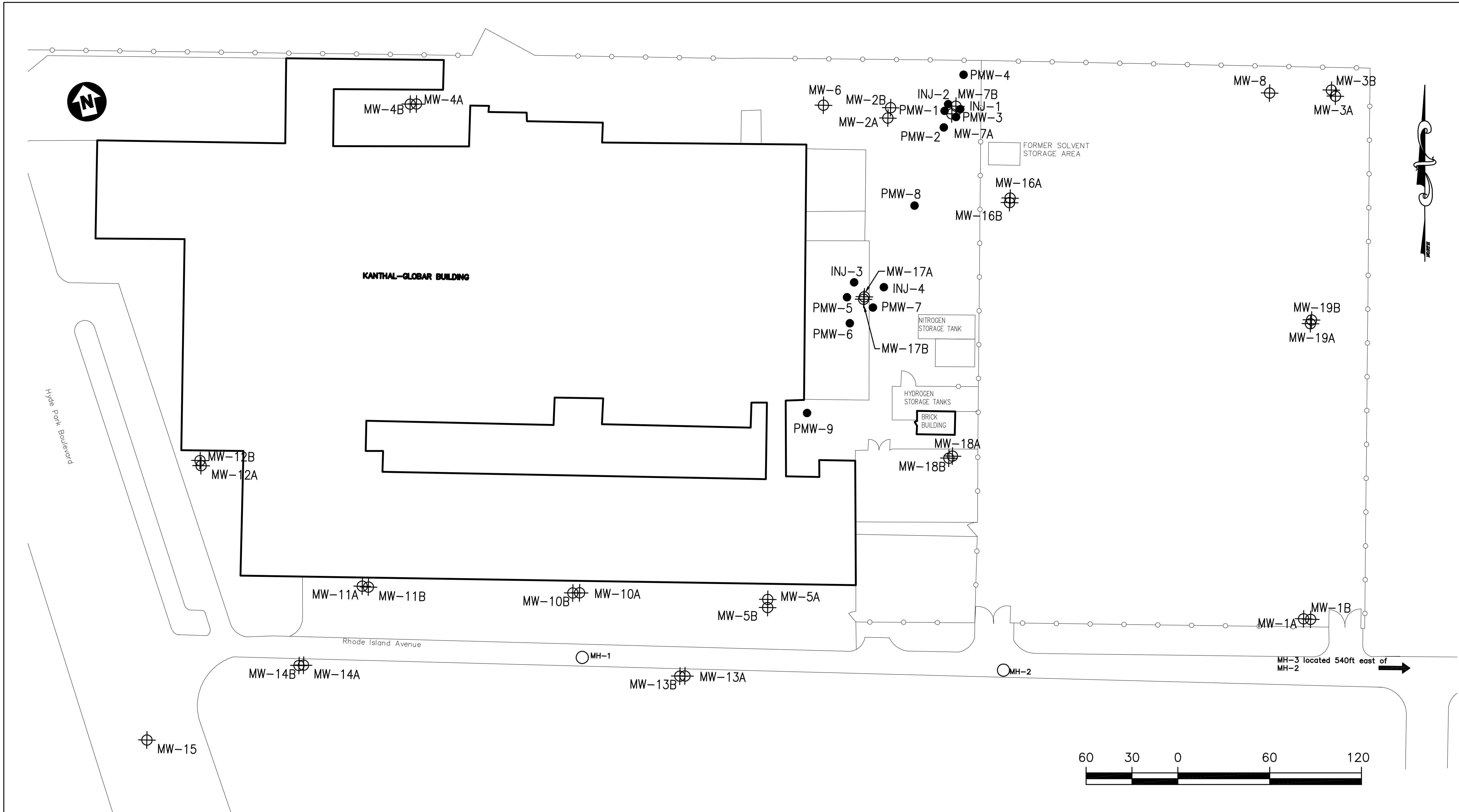

HORIZONTAL DATUM: NAD83/96 NEW YORK STATE PLANE COORDINATE SYSTEM WEST ZONE.
VERTICAL DATUM NAVD 88 DATUM

LEGEND:

⌖	MW–5A MW–5B	MONITORING WELL LOCATION (A=OVERBURDEN, B=BEDROCK)
○	MH–1	MANHOLE / SANITARY SEWER SAMPLE LOCATION
●	INJ–1	INJECTION WELL LOCATION
●	PMW–2	PERFORMANCE MONITORING WELL LOCATION

SOURCE: INTERA, 2006

FIGURE 1.2

FORMER CARBORUNDUM COMPANY
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TOWN OF NIAGARA, NEW YORK

SITE PLAN

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SECTION 2
SOIL VAPOR INTRUSION INVESTIGATION

2.1 BACKGROUND

In a July 27, 2006 letter, the NYSDEC requested that a work plan be developed to investigate the soil vapor to indoor air intrusion pathway at the Site. On November 16, 2006, a soil vapor work plan (Parsons, 2006) was issued. The field work was conducted in March and July 2007.

2.2 FIELD INVESTIGATION

In March 2007, six temporary soil vapor sampling points were installed around the western and southern perimeter of the Site (Figure 2.1). The sampling points were installed at approximately five feet below ground surface (NYSDOH, 2006), which is less than two feet above the water table. The purpose of the sampling points was to test the vadose zone for site COPCs and evaluate the potential for vapor phase COPCs to migrate to indoor air in the residential area on the south side of Rhode Island Avenue.

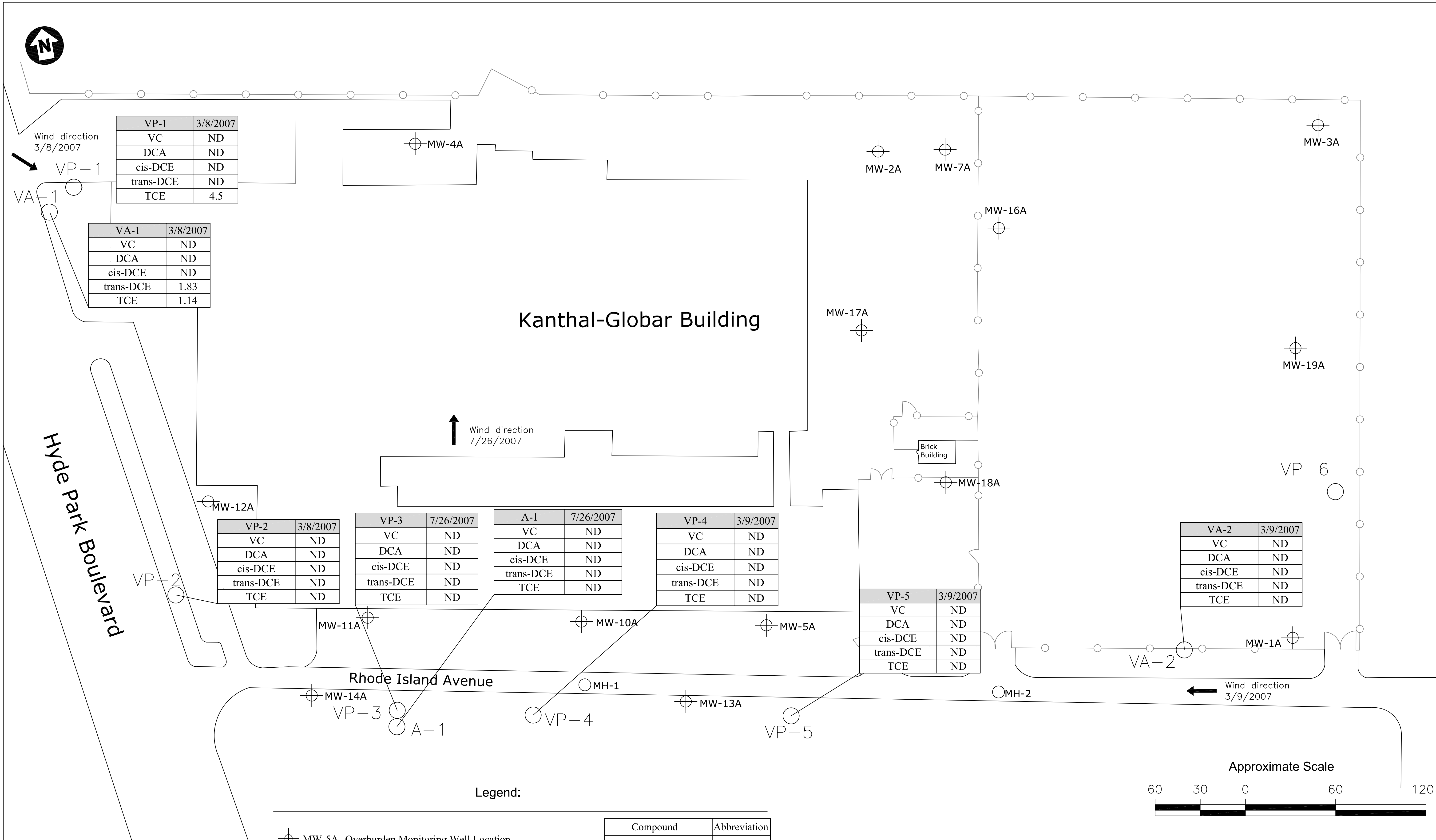
2.3 INVESTIGATION RESULTS

Four of the six locations (VP-1, 2, 4, and 5) were sampled on March 8 and 9, 2007 (Figure 2.1). One ambient air sample was collected during each day of sampling at an upwind location. Soil vapor points VP-3 and VP-6 were not sampled due to water in the implants. At both locations, the depth to groundwater at nearby wells (7.85 feet BGS at MW-14A and 7.54 feet BGS at MW-1A) indicated that water in the implants was not groundwater.

Results from the sampling are presented in Figure 2.1. COPCs in all samples were non-detect, with the exception of sample VP-1 and ambient air sample VA-1, both located in the northwest corner of the Site. The only detection at VP-1 was TCE at 4.50 $\mu g/m^3$. The concentration is below the NYSDOH indoor air concentration guideline (NYSDOH, 2006). The detections at VA-1 (ambient outdoor air sample) were: 1.83 $\mu g/m^3$ DCE and 1.14 $\mu g/m^3$ TCE. Analytical results from the residual soils generated during the vapor probe installation indicated that soil concentrations were non-detect for COPCs.

An addendum to the May 24, 2007 soil vapor intrusion assessment report was provided to NYSDEC on September 14, 2007. In accordance with a NYSDEC request, a single soil vapor sample was collected from location VP-3, on Rhode Island Avenue near Hyde Park Boulevard, on July 26, 2007. The sampling was conducted in conformance with the November 16, 2006 work plan, and in the same manner as the March 2007 sampling event. No CPOCs were detected in VP-3.

The results of the SVI assessment indicated a lack of potential for soil vapor intrusion from the Site to impact nearby residences. An email was received from NYSDEC stating that no further action was required regarding soil vapor on December 5, 2008 (NYSDEC, 2008). However if the Site building use changes, a mechanism needs to put into place such that further soil vapor intrusion evaluation would be required. At that time, this mechanism will be used by NYSDEC to support re-classifying the Site from Class 2 (significant threat) to Class 4 (closed, requires continued management). Atlantic Richfield and NYSDEC have contacted the current property owner regarding a deed restriction, but the issue has not yet been resolved.



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

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

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

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

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

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

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

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

Legend:

- MW-5A Overburden Monitoring Well Location
- MH-1 Manhole / Sanitary Sewer Sample Location
- VP-1 Sample Location
  - VA - Ambient Air Sample (March 2007)
  - A-1 - Ambient Air Sample (July 2007)
  - VP - Soil Vapor Sample

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

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FIGURE 2.1

FORMER CARBORUNDUM COMPANY
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TOWN OF NIAGARA, NEW YORK

SOIL VAPOR INTRUSION INVESTIGATION RESULTS

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No XREFs

SECTION 3
REMEDIAL ACTIONS

The Record of Decision (ROD) for the site (NYSDEC, 2000) selected no further action for the soils and no further action with monitoring for groundwater. As required by the ROD, a groundwater monitoring program was developed (DE&S, 2000) and results were reported to the NYSDEC annually. Required additional monitoring wells were installed as directed by the ROD. Groundwater and sewer water samples were collected and analyzed as outlined in the monitoring program. The ROD also states that the necessity for deed restrictions will be evaluated in the event that the site zoning changes. The site zoning has not changed, and therefore evaluation of deed restrictions has not been necessary.

The remedial goals for the site were dependent on natural attenuation. After reviewing the Five Year Review Report (Intera, 2005), NYSDEC suggested that, although natural attenuation was occurring, degradation was making slow progress towards remediation.

Historical data from the site were evaluated for remedial alternatives, and the results were submitted to the NYSDEC in a remedial alternatives report (Parsons, 2006a). Application of enhanced *in situ* bioremediation techniques were chosen as the preferred alternative for pilot testing. *In situ* bioremediation pilot tests were completed and their results are described in the following subsections. Figure 3.1 shows the locations of the pilot tests. More detail can be found in the pilot test reports submitted to NYSDEC in July 2009 and August 2010.

3.1 ENHANCED *IN SITU* BIOREMEDIATION

A Pilot Test Work Plan for *In Situ* Treatment Using Enhanced Bioremediation (Parsons, 2008) was developed to assess the applicability and feasibility of *in situ* bioremediation for chlorinated compounds of concern (COCs) in groundwater. The pilot tests evaluated treatment of overburden and bedrock groundwater using an organic substrate (emulsified vegetable oil mixed with Site groundwater), and microbial organisms injected into groundwater to promote biodegradation of chlorinated VOCs.

The pilot tests were comprised of two procedures, (1) treatment application and (2) performance monitoring. The treatment application involves all processes and monitoring related to the field application of bioremediation solutions to overburden and bedrock groundwater. Performance monitoring included methods to assess the remedial technology. Due to the potential comingling of overburden and bedrock groundwater, the tests in each area were started at different times.

3.1.1 Enhanced *In Situ* Bioremediation in Overburden

Overburden wells related to the pilot test were installed in July 2008. Two overburden injection wells and four performance monitoring wells were installed (see Figure 3.1). Additionally, one bedrock well was installed in July 2008. Wells were installed in the area of the highest levels of chlorinated ethenes. Baseline groundwater monitoring was completed in August 2008. An underground injection control permit was obtained from the United States Environmental Protection Agency (USEPA) prior to application of the substrate. Substrate injections were completed on September 4 and 5, 2008. The substrate consisted of Site bedrock groundwater and SRS® (proprietary vegetable-oil based substrate with emulsifiers). Bioaugmentation was completed in October 2008 with a microbial consortium including both *Dehalococcoides* (DHC) and *Dehalobacter* (DHB) species of bacteria. A pH buffer (sodium bicarbonate) was included with the bioaugmentation. Performance monitoring was completed at approximately 4, 13, 20, and 26 weeks after substrate injection.

A second phase of injections was completed on November 17 and 18, 2009 and a second bioaugmentation was completed between December 17 and 22, 2009. During the second injection event (Phase 2), the SRS was modified such that ionic emulsifiers were used (instead of non-ionic emulsifiers) to enhance sorption of the vegetable oil to the soils. Additional groundwater performance monitoring of the overburden was completed approximately 4, 13, 20, and 26 weeks after the second phase of injections.

The complete degradation pathway of chlorinated ethenes to ethene was observed in the overburden groundwater system. Figure 3.2 shows overburden well MW-7A chlorinated ethene concentrations between 1995 and 2010. A general decreasing trend in TCE, DCE, and VC was observed over time, with stronger declines in TCE and DCE after the substrate injections. These data indicate that (1) natural attenuation has continued as a long-term process that degrades TCE and DCE; and (2) the rate of attenuation increased after the pilot test injections.

Throughout the test, the percentage of chlorinated VOCs decreased and the percentage of ethene increased within the pilot test treatment area. This represents a completed biodegradation pathway, and suggests that bioremediation is effectively transforming COCs to ethene. Secondary evidence of the increased biodegradation following the pilot test injections includes the concentrations of geochemical parameters and microbial populations. Geochemical parameters results indicated that biological activity was stimulated, and that conditions were within an acceptable range for anaerobic biodegradation.

The pilot test in the overburden was successful in distributing the substrate throughout the desired treatment area. Results of the overburden pilot test indicated that treatment applications were effective in degradation of chlorinated COCs and that conditions are within an acceptable range for anaerobic degradation of chlorinated COCs to occur (e.g., a decrease in oxidation reduction potential (ORP) and a stable pH above 6.0). The following observations suggested that the groundwater geochemistry is appropriate for bioremediation in the overburden:

- pH initially dropped after the 2008 substrate injections (no buffer), but quickly rebounded after the 2008 bioaugmentation (with buffer) at 4 weeks. The pH increased after the buffered substrate injection in 2009, and then decreased to near neutral.

- ORP quickly decreased within the treatment area and remained low during the duration of the test.

- Sulfate and TOC, which are inversely related, followed opposite trends. Sulfate quickly decreased after the first addition of substrate (indicated by total organic carbon), and rebounded as TOC was depleted. After the second substrate injection, sulfate decreased and remained low for the remainder of the test. TOC decreased at a slower rate after the second injection.

- TOC was readily depleted after the first overburden injection. However, in the second injection, the increase in dosage and use of an ionic surfactant appear to increase the longevity of the substrate.

Sampling and analysis of dechlorinating bacteria and reductase enzymes indicate that the microbial populations responded positively to the substrate injections and bioaugmentation. Dechlorinating microorganisms generally increased throughout the test, although there was variability and some anomalous results. Overall, the results demonstrate that microbial populations capable of dechlorinating chlorinated ethenes are abundant and support other evidence that dechlorination is occurring through biological pathways.

3.1.2 Enhanced *In Situ* Bioremediation in Bedrock

Bedrock wells related to the pilot test were installed in September and October 2009. Two bedrock injection wells and five performance monitoring wells were installed (see Figure 3.1). Wells were installed in the area of the highest levels of chlorinated ethenes. Baseline groundwater monitoring was completed in October 2009. Substrate injections were completed on November 11 and 12, 2009. The substrate consisted of site bedrock groundwater and SRS-FR®, which is similar to SRS® (proprietary vegetable-oil based substrate) but with a larger emulsion droplet size to limit transport of the emulsion droplets out of the pilot test area. A pH buffer (sodium bicarbonate) was included with the substrate injection. Bioaugmentation was completed in December 2009 with a microbial consortium including both *Dehalococcoides* (DHC) and *Dehalobacter* (DHB) species of bacteria. Performance monitoring was completed at approximately 4, 13, 20, and 26 weeks after substrate injection.

The pilot test in the bedrock was successful in distributing the substrate throughout the desired treatment area. Results of the bedrock pilot test indicated that injection of substrate was effective in stimulating biodegradation of chlorinated COCs. A complete pathway for degradation of chlorinated ethenes to ethene was observed in the bedrock groundwater system. Figure 3.2 (MW-17B), Figure 3.3 (MW-11B and MW-15), and Figure 3.4 (MW-12B) show chlorinated ethene concentrations in bedrock wells over time. A general decreasing trend in TCE, DCE, and VC was observed over time, with stronger declines in TCE and DCE following the substrate injections. Similar to the overburden groundwater, these data indicate that (1) natural attenuation has occurred as a long-term process that degrades TCE and DCE; and (2) the rate of attenuation increased after the pilot test injections.

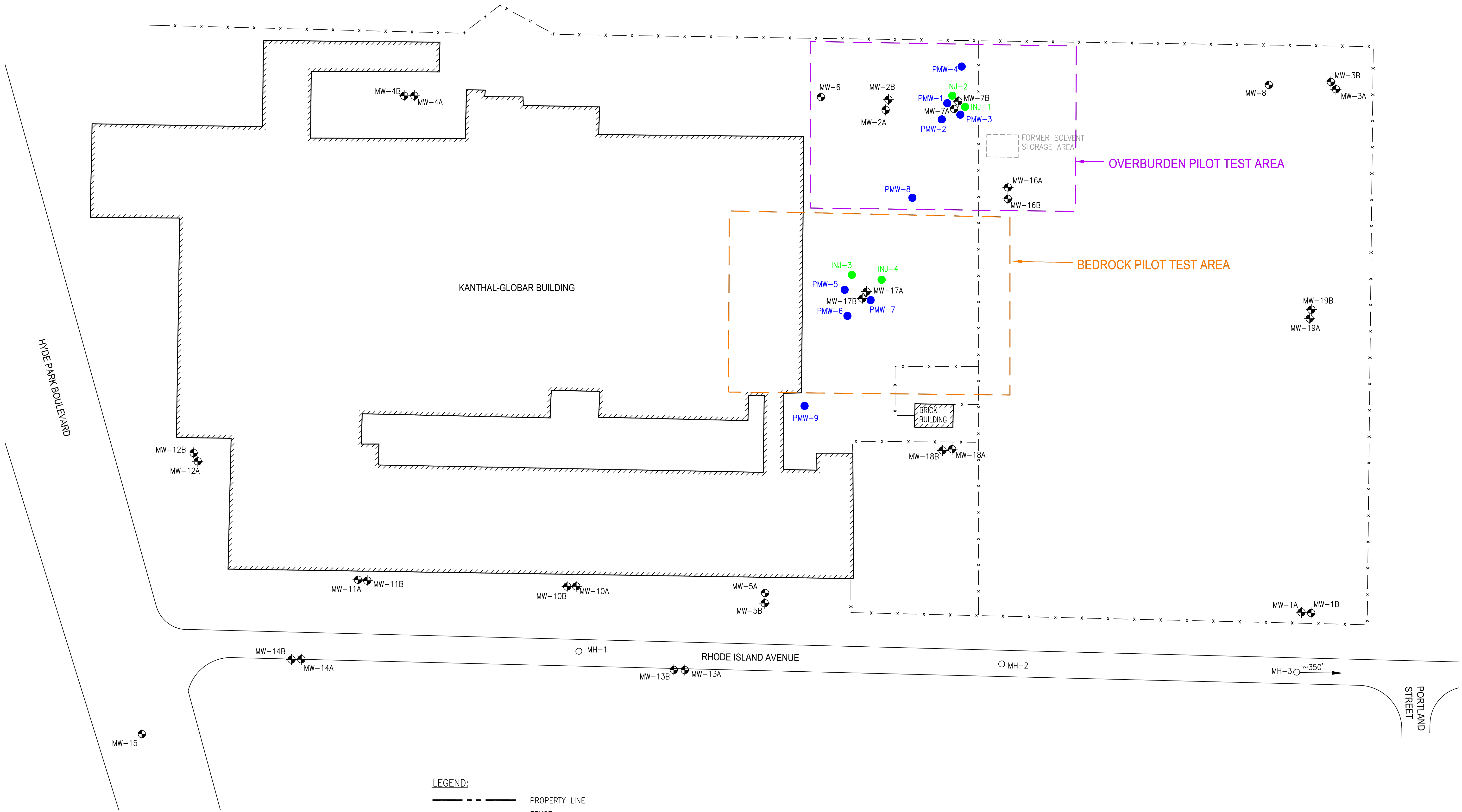
Throughout the test, the percentage of chlorinated VOCs decreased and the percentage of ethene increased within the pilot test treatment area. This represents a completed biodegradation pathway, and demonstrates that bioremediation is effectively transforming COCs to ethene. Secondary evidence of anaerobic bioremediation includes the results of geochemical parameters and microbial population monitoring. Geochemical parameters results indicated that biological activity was stimulated, and that conditions were within an acceptable range for anaerobic degradation. The following observations suggested that the groundwater geochemistry is appropriate for bioremediation in the bedrock:

- pH slightly decreased over time but remained in the optimal range in all but one instance.

- ORP quickly decreased within the treatment area and remained low for the length of the test.

- Sulfate and TOC, which are inversely related, follow opposite trends. Sulfate quickly decreased after the addition of substrate, and remained deleted as TOC increased.

As with the overburden pilot test, sampling and analysis of dechlorinating bacteria and reductase enzymes indicate that the microbial populations responded positively to the substrate injections and bioaugmentation. Dechlorinating microorganisms generally increased throughout the test. Overall, the results demonstrate that microbial populations capable of dechlorinating chlorinated ethenes are abundant and support other evidence that dechlorination is occurring through biological pathways.



LEGEND:

(line)	PROPERTY LINE
— x — x —	FENCE
MW-5A / MW-5B	MONITORING WELL LOCATION (A=OVERBURDEN, B=BEDROCK)
PMW-1	PERFORMANCE MONITORING WELL LOCATION
INJ-1	INJECTION WELL LOCATION
MH-1	MANHOLE (SANITARY SEWER SAMPLE LOCATION)

SOURCE: INTERA, 2006

HORIZONTAL DATUM: NAD83/96 NEW YORK STATE PLANE COORDINATE SYSTEM WEST ZONE.
VERTICAL DATUM NAVD 88 DATUM

60 40 20 0 60
SCALE IN FEET

N

FIGURE 3.1

FORMER CARBORUNDUM COMPANY
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TOWN OF NIAGARA, NEW YORK

PILOT TEST SITE PLAN

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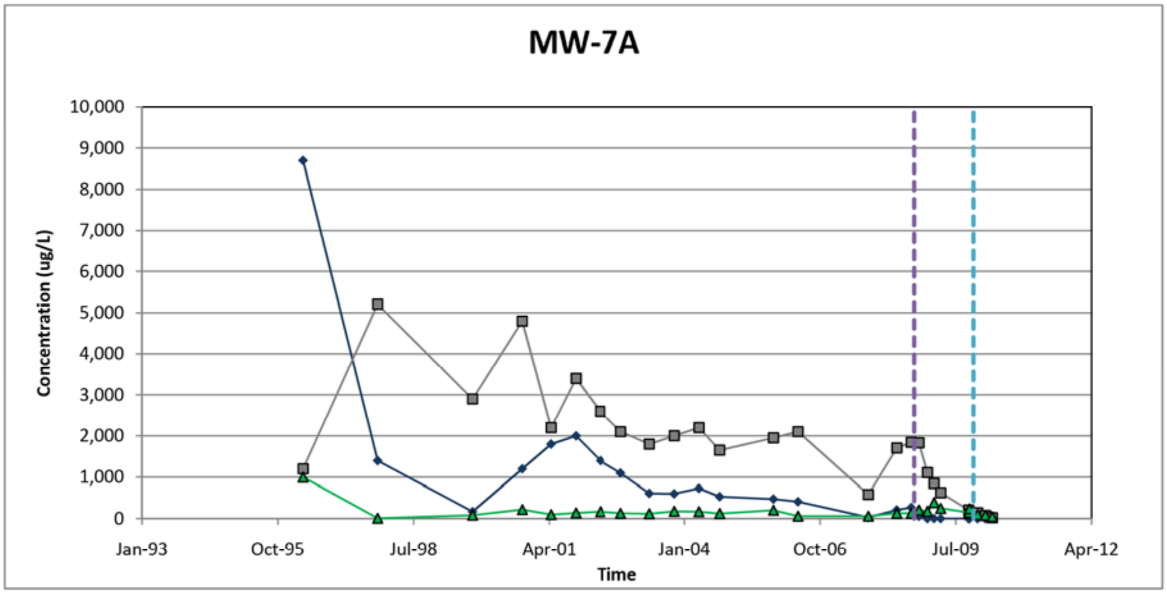

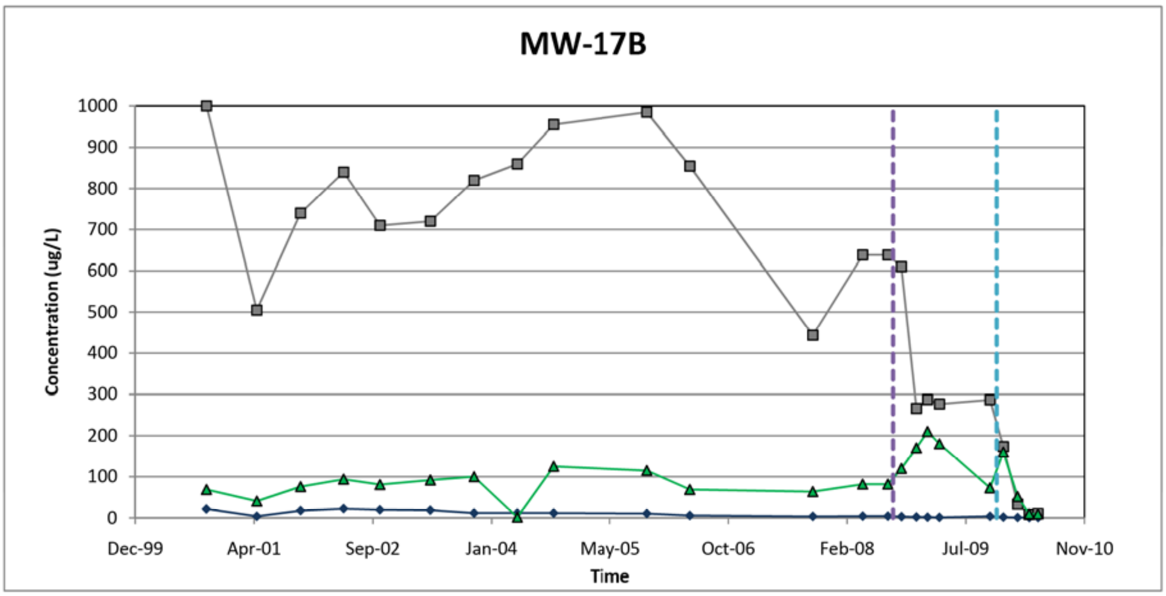

TCE

DCE

VC

OVERBURDEN INJECTION 1

OVERBURDEN INJECTION 2 AND BEDROCK INJECTION 1

FIGURE 3.2

FORMER CARBORUNDUM COMPANY
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LONG TERM TRENDS OF CHLORINATED ETHENES IN WELLS MW-7A AND MW-17B

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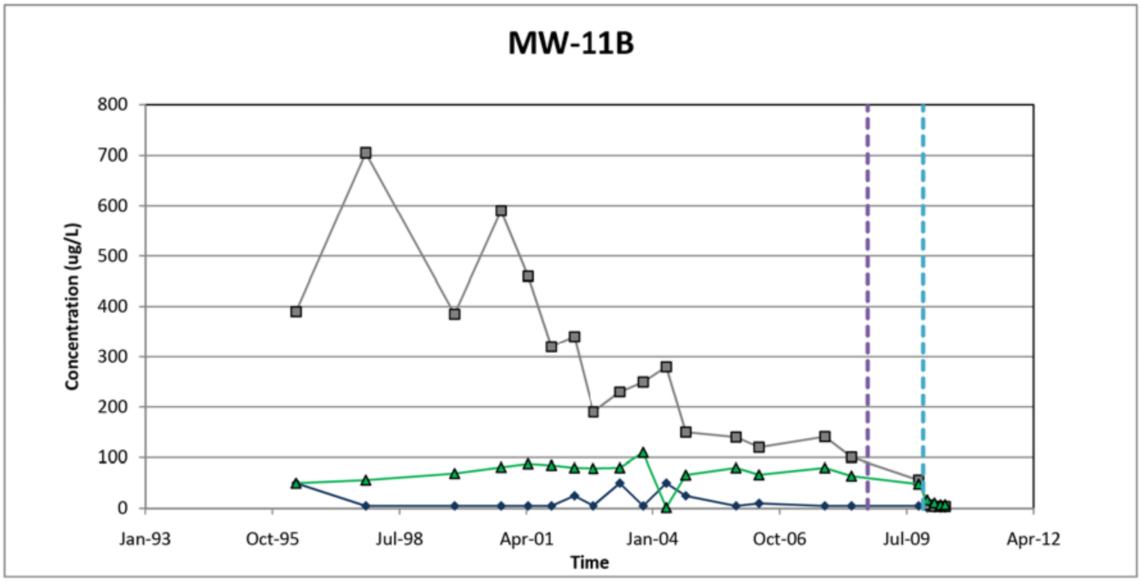

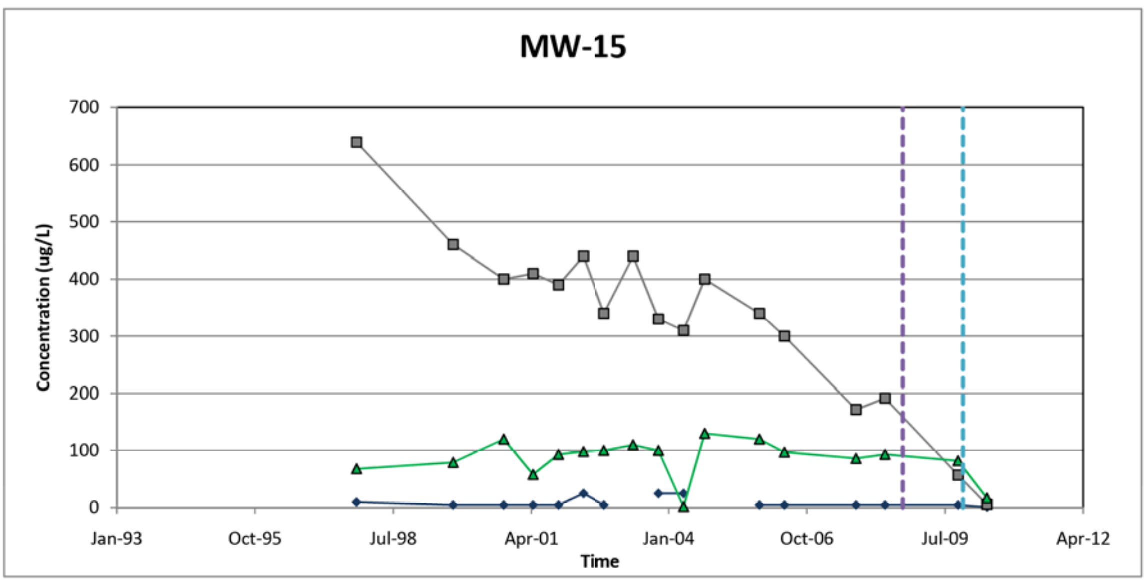

TCE

DCE

VC

OVERBURDEN INJECTION 1

OVERBURDEN INJECTION 2 AND BEDROCK INJECTION 1

FIGURE 3.3

FORMER CARBORUNDUM COMPANY
TOWN OF NIAGARA, NY

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

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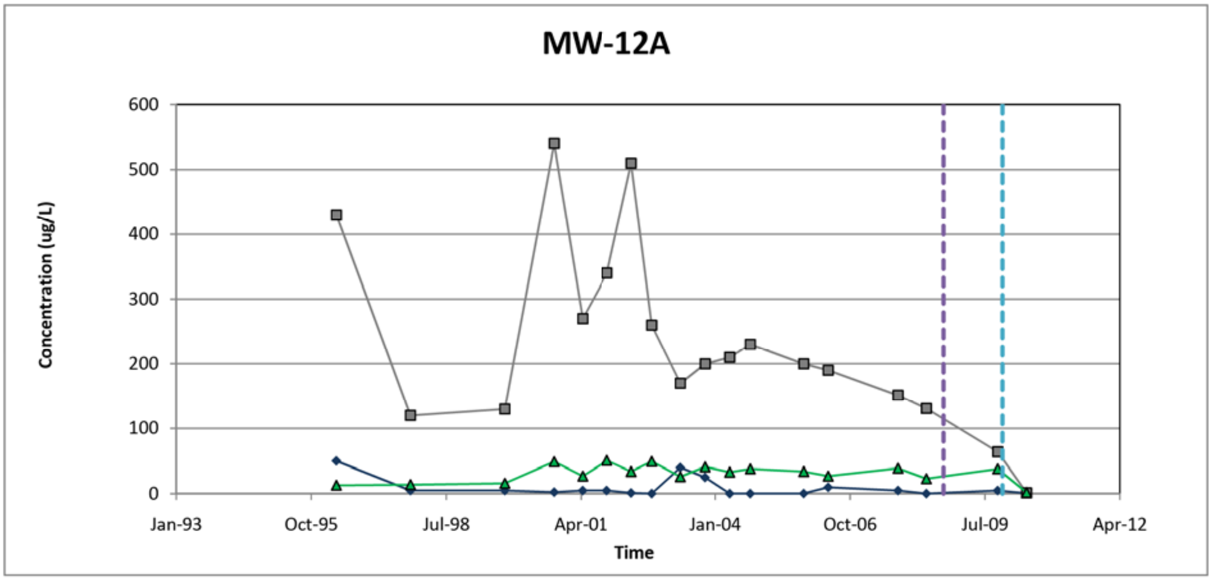

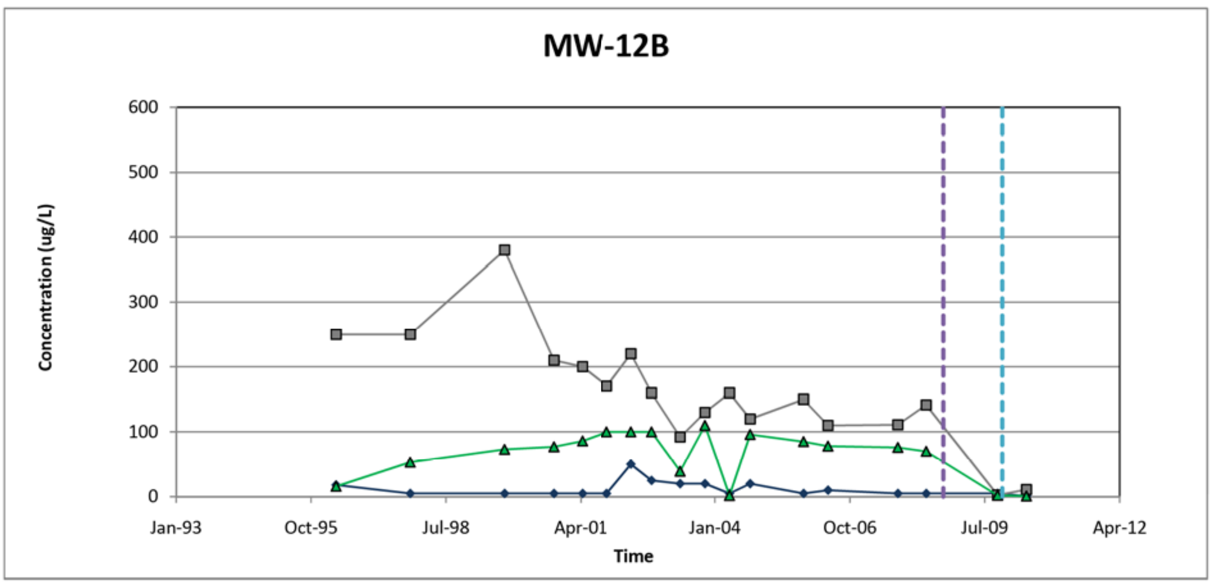

TCE

DCE

VC

OVERBURDEN INJECTION 1

OVERBURDEN INJECTION 2 AND BEDROCK INJECTION 1

FIGURE 3.4

FORMER CARBORUNDUM COMPANY
TOWN OF NIAGARA, NY

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

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SECTION 4
GROUNDWATER MONITORING PROGRAM SUMMARY

4.1 GROUNDWATER ELEVATIONS AND FLOW DIRECTIONS

A summary of the groundwater elevations collected over the period of August 1992 through May 2010 is provided in Table 4.1. Table 4.1 also includes well location coordinates, and elevations for the top of casing and ground surface elevations at each monitoring well.

Overburden and bedrock groundwater contour maps were developed based on the water levels and are provided in Appendix A. The overburden groundwater flow direction is to the southwest, towards Hyde Park Boulevard. The overburden groundwater gradient across the Site is approximately 0.008 feet/foot.

Bedrock groundwater potentiometric surface contour maps were developed based on the water levels and are provided in Appendix A. The bedrock groundwater flow direction is generally west-southwest towards Hyde Park Boulevard. The bedrock groundwater gradient across the Site is approximately 0.002 feet/foot.

4.1.1 Interconnection Between Overburden and Bedrock

Observations during the enhanced *in situ* bioremediation injection events indicated a hydraulic connection between the overburden and the bedrock units. Dilute concentrations of substrate were observed in MW-7B (screened in bedrock) during the overburden injections. Furthermore, concentrations of total organic carbon (TOC) and acetic acid spiked (increased) in bedrock well MW-17B during the October 2008 4-week performance monitoring event. A potential cause of this spike is the sodium lactate portion of the substrate (miscible in water) migrating with groundwater flow. The significance of this observation is that substrate injections in the overburden formation may also impact and treat the bedrock groundwater. Additional details were provided in the Bioremediation Pilot Test and Spring 2010 Annual Groundwater Monitoring report (Parsons, 2010).

4.2 GROUNDWATER SAMPLING RESULTS

Groundwater sampling is conducted to evaluate changes and degradation of COCs over time. COC data is the primary line of evidence used to demonstrate that dechlorination is occurring (AFCEE, 2004). Additional evidence used to demonstrate degradation includes geochemical parameters such as pH, ORP, DO, etc. The analytical data results for COCs from 1999 to 2010 are included as Appendix B. Field measurements collected during the groundwater sampling events between 2004 and 2010 are provided in Table 4.2.

4.2.1 COC Results

More than 10 years of groundwater monitoring have shown that reductive dechlorination of chlorinated ethenes has occurred at the Site under natural conditions, both in the overburden and bedrock groundwater. Figures 4.1 and 4.2 show COC concentrations in overburden and bedrock groundwater from 2000 through 2010.

Natural attenuation is observed at wells such as MW-7A, MW-10A, MW-12A, and MW-16A in the overburden. For example, at source area well MW-7A, the concentrations of TCE ranged from 1200 to 1800 µg/L in the first two years of monitoring (2000-2001) and decreased to the range of 36 to 210 µg/L in 2007 to 2008, prior to substrate injections. DCE ranged from 4800 to 2200 µg/L in the first two years of monitoring (2000-2001), and decreased to the range of 1706 to 210 µg/L in 2007 to 2008. VC was relatively low and stable over time, ranging from 60 to 205 µg/L prior to substrate injections. At downgradient well MW-10A, TCE has been relatively absent (only one detection of 0.63 µg/L) which indicates that natural attenuation is active. Furthermore, DCE concentrations decreased from a range of 790 to 1200 µg/L in 2000-2001 to approximately 400 µg/L in 2008. These trends were also observed at several other wells (see figures 4.1 and 3.2). An exception to the degradation observed in the overburden wells exists at MW-4A, side gradient of the source area, where TCE has increased to approximately 100 µg/L over the 10-year monitoring period.

Natural attenuation was observed at nearly every bedrock monitoring well. For example, at well MW-17B, the concentrations of TCE decreased from approximately 20 µg/L in 2000 to 4 µg/L in 2007, prior to substrate injections. DCE decreased from approximately 1000 µg/L to 443 µg/L in 2007. VC was relatively low and stable over time, ranging from 41 to 125 µg/L. At downgradient well MW-15, TCE has been below detection limits for the entire monitoring period, which indicates that natural attenuation is active. Furthermore, DCE concentrations decreased from approximately 400 µg/L in 2000 to 57 in 2009. VC was relatively low and stable over time, ranging from 58 to 130 µg/L prior to substrate injections. These trends were also observed at several other wells (see figures 4.1 and 3.2).

As discussed in Section 3, pilot tests were completed in both overburden and bedrock in an effort to enhance the rate of the ongoing degradation process, and to evaluate whether bioremediation could be used to increase the rate of degradation of chlorinated ethenes in the groundwater.

The results of the pilot tests suggest that enhanced *in situ* bioremediation of chlorinated ethenes appears to be a viable treatment option for groundwater. Figures 3.2, 3.3, and 3.4 show long term trends of chlorinated ethenes and the effects of the pilot test on chlorinated ethene concentrations. The data generated during two years of pilot testing and monitoring are detailed in the pilot test reports (Parsons 2009, 2010) and support the following conclusions:

- Within the overburden injection area, there was a rapid transformation of TCE to degradation products at all injection and performance monitoring wells that were treated with substrate. TCE is absent in most of the bedrock groundwater.
- DCE decreased at all performance monitoring wells within the radius of influence (overburden and bedrock). Increases of vinyl chloride (VC), where present, were relatively less significant with respect to the overall Site conditions.
- Generation of ethene indicates that the biodegradation pathway is complete, and that DCE or VC can be effectively degraded, in both the overburden and bedrock systems.
- The depth to groundwater, hydraulic conductivity, and connectivity of overburden and bedrock are suitable for distribution of substrate.
- The groundwater velocity in the overburden is relatively high; therefore TOC is readily depleted. However, an increased dosage of substrate and use of an ionic surfactant appeared to increase the longevity.
- Groundwater velocity in the bedrock was sufficient so that downgradient wells showed evidence of degradation.
- The addition of a bioaugmentation culture appeared to enhance the populations of dechlorinating microbes.

4.2.2 Natural Attenuation Parameter Results

As part of the groundwater monitoring program, natural attenuation parameters were sampled during each monitoring event (methane, ethane, ethane, BOD, COD, sulfate, sulfide, and others). In general, the concentrations of these compounds indicate that natural attenuation is occurring but limited. ORP and DO are generally low enough, but there is limited TOC (without considering the pilot test additions). These geochemical results relative to declining COC trends suggest that abiotic processes in addition to biodegradation may be occurring.

4.3 SEWER WATER SAMPLING RESULTS

Monitoring results of sewer water sampling from 1992 to 2009 have been included in Appendix B. Historically, low levels (generally 5 μg/L or less) of TCE and DCE have been detected in the sewer water samples. Similar concentrations were found in upstream sample location MH-3 compared to MH-1 and MH-2, located adjacent to the Site. Other VOCs were typically below the analytical detection limits.

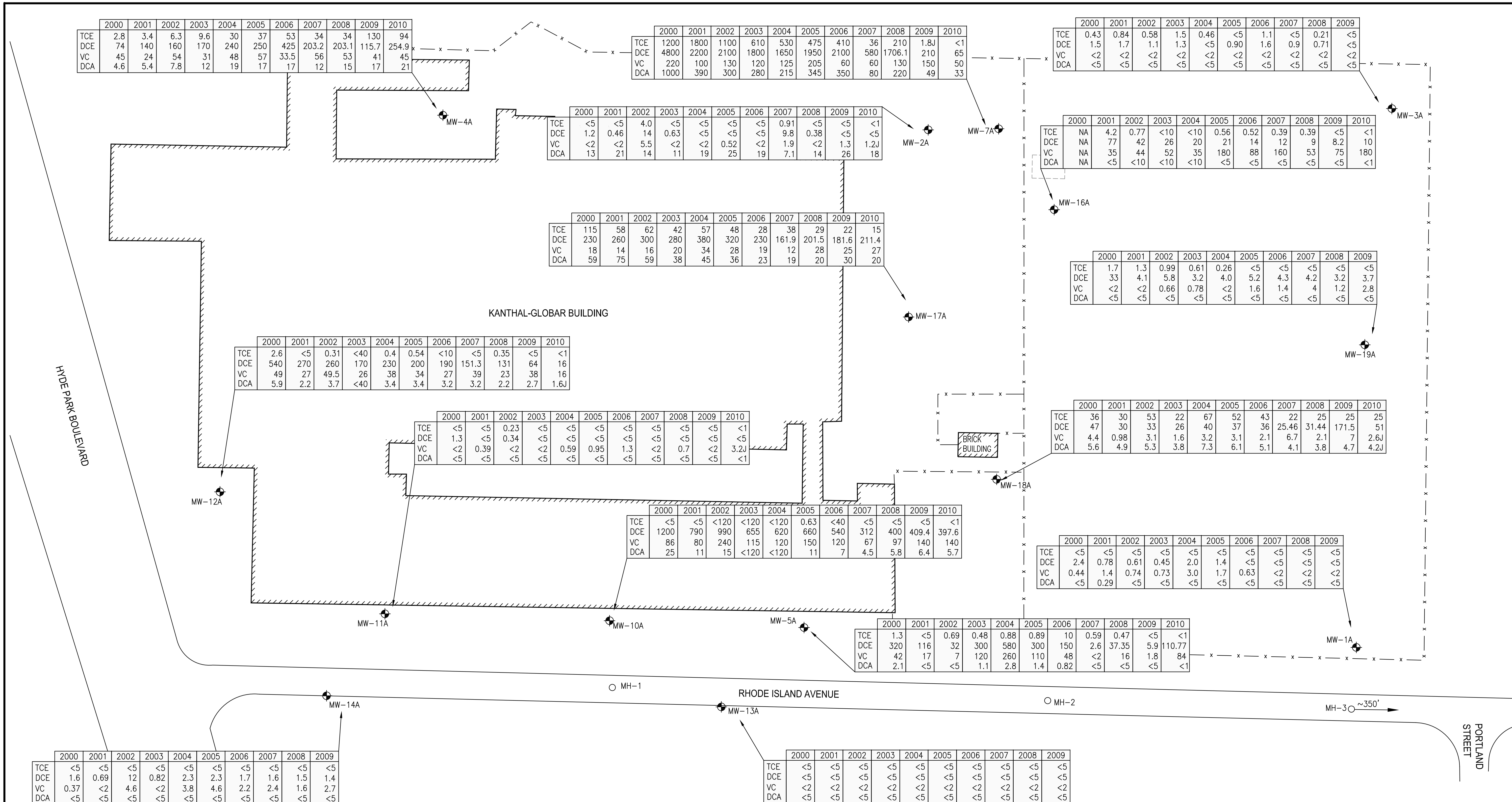
4.4 DATA VALIDATION

Analytical results from samples collected between 2006 and 2010 were reviewed by Parsons for usability with respect to the following requirements (1) the project work plan (DE&S, 2000); (2) NYSDEC Analytical Services Protocol (ASP), and (3) USEPA Region II Standard Operating Procedures (SOPs).

The analytical laboratories for this project were Severn Trent Laboratories, Columbia Analytical Services, and Lancaster Laboratories. These laboratories are approved to conduct analyses through the New York Department of Health (NYDOH) Environmental Laboratory Approval Program (ELAP).

The data submitted by the laboratories were reviewed and validated. The analytical data were found to be acceptable in terms of deliverable completeness, accuracy, precision, representativeness, completeness and comparability. Data validation was performed in accordance with the most current editions of the USEPA Region II SOPs and the NYSDEC ASP for organic and inorganic data review. The data has been found to be valid for its intended use.

Data usability summary reports (DUSR) for groundwater samples are included in the annual groundwater monitoring reports.



MW-4A

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
TCE	2.8	3.4	6.3	9.6	30	37	53	34	34	130	94
DCE	74	140	160	170	240	250	425	203.2	203.1	115.7	254.9
VC	45	24	54	31	48	57	33.5	56	53	41	45
DCA	4.6	5.4	7.8	12	19	17	17	12	15	17	21

MW-7A

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
TCE	1200	1800	1100	610	530	475	410	36	210	1.8J	<1
DCE	4800	2200	2100	1800	1650	1950	2100	580	1706.1	210	65
VC	220	100	130	120	125	205	60	60	130	150	50
DCA	1000	390	300	280	215	345	350	80	220	49	33

MW-3A

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
TCE	0.43	0.84	0.58	1.5	0.46	<5	1.1	<5	0.21	<5
DCE	1.5	1.7	1.1	1.3	<5	0.90	1.6	0.9	0.71	<5
VC	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
DCA	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5

MW-2A

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
TCE	<5	<5	4.0	<5	<5	<5	<5	0.91	<5	<5	<1
DCE	1.2	0.46	14	0.63	<5	<5	<5	9.8	0.38	<5	<5
VC	<2	<2	5.5	<2	<2	0.52	<2	1.9	<2	1.3	1.2J
DCA	13	21	14	11	19	25	19	7.1	14	26	18

MW-16A

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
TCE	NA	4.2	0.77	<10	<10	0.56	0.52	0.39	0.39	<5	<1
DCE	NA	77	42	26	20	21	14	12	9	8.2	10
VC	NA	35	44	52	35	180	88	160	53	75	180
DCA	NA	<5	<10	<10	<10	<5	<5	<5	<5	<5	<1

MW-17A

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
TCE	115	58	62	42	57	48	28	38	29	22	15
DCE	230	260	300	280	380	320	230	161.9	201.5	181.6	211.4
VC	18	14	16	20	34	28	19	12	28	25	27
DCA	59	75	59	38	45	36	23	19	20	30	20

MW-19A

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
TCE	1.7	1.3	0.99	0.61	0.26	<5	<5	<5	<5	<5
DCE	33	4.1	5.8	3.2	4.0	5.2	4.3	4.2	3.2	3.7
VC	<2	<2	0.66	0.78	<2	1.6	1.4	4	1.2	2.8
DCA	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5

MW-12A

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
TCE	2.6	<5	0.31	<40	0.4	0.54	<10	<5	0.35	<5	<1
DCE	540	270	260	170	230	200	190	151.3	131	64	16
VC	49	27	49.5	26	38	34	27	39	23	38	16
DCA	5.9	2.2	3.7	<40	3.4	3.4	3.2	3.2	2.2	2.7	1.6J

MW-11A

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
TCE	<5	<5	0.23	<5	<5	<5	<5	<5	<5	<5	<1
DCE	1.3	<5	0.34	<5	<5	<5	<5	<5	<5	<5	<5
VC	<2	0.39	<2	<2	0.59	0.95	1.3	<2	0.7	<2	3.2J
DCA	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<1

MW-18A

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
TCE	36	30	53	22	67	52	43	22	25	25	25
DCE	47	30	33	26	40	37	36	25.46	31.44	171.5	51
VC	4.4	0.98	3.1	1.6	3.2	3.1	2.1	6.7	2.1	7	2.6J
DCA	5.6	4.9	5.3	3.8	7.3	6.1	5.1	4.1	3.8	4.7	4.2J

MW-10A

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
TCE	<5	<5	<120	<120	<120	0.63	<40	<5	<5	<5	<1
DCE	1200	790	990	655	620	660	540	312	400	409.4	397.6
VC	86	80	240	115	120	150	120	67	97	140	140
DCA	25	11	15	<120	<120	11	7	4.5	5.8	6.4	5.7

MW-1A

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
TCE	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
DCE	2.4	0.78	0.61	0.45	2.0	1.4	<5	<5	<5	<5
VC	0.44	1.4	0.74	0.73	3.0	1.7	0.63	<2	<2	<2
DCA	<5	0.29	<5	<5	<5	<5	<5	<5	<5	<5

MW-5A

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
TCE	1.3	<5	0.69	0.48	0.88	0.89	10	0.59	0.47	<5	<1
DCE	320	116	32	300	580	300	150	2.6	37.35	5.9	110.77
VC	42	17	7	120	260	110	48	<2	16	1.8	84
DCA	2.1	<5	<5	1.1	2.8	1.4	0.82	<5	<5	<5	<1

MW-14A

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
TCE	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
DCE	1.6	0.69	12	0.82	2.3	2.3	1.7	1.6	1.5	1.4
VC	0.37	<2	4.6	<2	3.8	4.6	2.2	2.4	1.6	2.7
DCA	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5

MW-13A

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
TCE	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
DCE	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
VC	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
DCA	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5

LEGEND:

PROPERTY LINE

FENCE

MW-5A
MW-5B
MONITORING WELL LOCATION
(A=OVERBURDEN, B=BEDROCK)

MH-1 MANHOLE (SANITARY SEWER SAMPLE LOCATION)

CONCENTRATIONS IN ug/L (ppb)

SAMPLE DATE	
TCE	TRICHLOROETHENE
DCE	CIS- AND TRANS-1,2-DICHLOROETHENE
VC	VINYL CHLORIDE
DCA	1,1-DICHLOROETHANE

SOURCE: INTERA, 2006

HORIZONTAL DATUM: NAD83/96 NEW YORK STATE PLANE COORDINATE SYSTEM WEST ZONE.
VERTICAL DATUM NAVD 88 DATUM

\buffs01\p:\hyde park\445335\CAD\BP(HydePark)-06.dwg 8/4/10

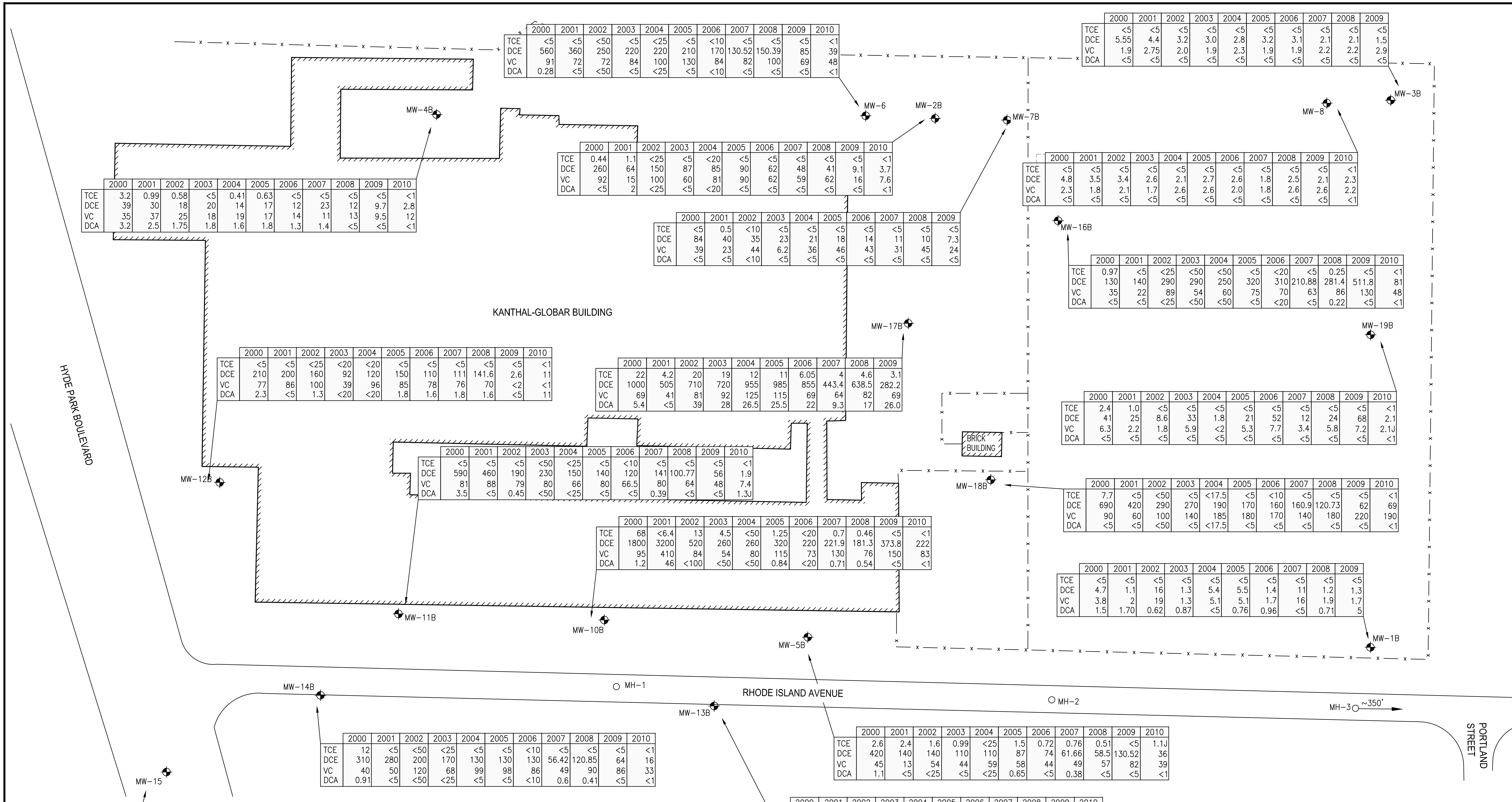
FIGURE 4.1

FORMER CARBORUNDUM COMPANY
ELECTRIC PRODUCTS DIVISION
TOWN OF NIAGARA, NEW YORK

COC CONCENTRATIONS IN OVERBURDEN GROUNDWATER (2000–2010)

PARSONS

40 LA RIVIERE DRIVE, SUITE 350, BUFFALO, NEW YORK 14202 PHONE: 716-541-0730



MW-6

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
TCE	<5	<5	<50	<5	<25	<5	<10	<5	<5	<5	<1
DCE	560	360	250	220	220	210	170	130.52	150.39	85	39
VC	91	72	72	84	100	130	84	82	100	69	48
DCA	0.28	<5	<50	<5	<25	<5	<10	<5	<5	<5	<1

MW-3B

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
TCE	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
DCE	5.55	4.4	3.2	3.0	2.8	3.2	3.1	2.1	2.1	1.5
VC	1.9	2.75	2.0	1.9	2.3	1.9	1.9	2.2	2.2	2.9
DCA	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5

MW-2B

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
TCE	0.44	1.1	<25	<5	<20	<5	<5	<5	<5	<5	<1
DCE	260	64	150	87	85	90	62	48	41	9.1	3.7
VC	92	15	100	60	81	90	62	59	62	16	7.6
DCA	<5	2	<25	<5	<20	<5	<5	<5	<5	<5	<1

MW-4B

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
TCE	3.2	0.99	0.58	<5	0.41	0.63	<5	<5	<5	<5	<1
DCE	39	30	18	20	14	17	12	23	12	9.7	2.8
VC	35	37	25	18	19	17	14	11	13	9.5	12
DCA	3.2	2.5	1.75	1.8	1.6	1.8	1.3	1.4	<5	<5	<1

MW-8

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
TCE	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<1
DCE	4.8	3.5	3.4	2.6	2.1	2.7	2.6	1.8	2.5	2.1	2.3
VC	2.3	1.8	2.1	1.7	2.6	2.6	2.0	1.8	2.6	2.6	2.2
DCA	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<1

MW-7B

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
TCE	<5	0.5	<10	<5	<5	<5	<5	<5	<5	<5
DCE	84	40	35	23	21	18	14	11	10	7.3
VC	39	23	44	6.2	36	46	43	31	45	24
DCA	<5	<5	<10	<5	<5	<5	<5	<5	<5	<5

MW-16B

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
TCE	0.97	<5	<25	<50	<50	<5	<20	<5	0.25	<5	<1
DCE	130	140	290	290	250	320	310	210.88	281.4	511.8	81
VC	35	22	89	54	60	75	70	63	86	130	48
DCA	<5	<5	<25	<50	<50	<5	<20	<5	0.22	<5	<1

MW-12B

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
TCE	<5	<5	<25	<20	<20	<5	<5	<5	<5	<5	<1
DCE	210	200	160	92	120	150	110	111	141.6	2.6	11
VC	77	86	100	39	96	85	78	76	70	<2	<1
DCA	2.3	<5	1.3	<20	<20	1.8	1.6	1.8	1.6	<5	11

MW-17B

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
TCE	22	4.2	20	19	12	11	6.05	4	4.6	3.1
DCE	1000	505	710	720	955	985	855	443.4	638.5	282.2
VC	69	41	81	92	125	115	69	64	82	69
DCA	5.4	<5	39	28	26.5	25.5	22	9.3	17	26.0

MW-19B

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
TCE	2.4	1.0	<5	<5	<5	<5	<5	<5	<5	<5	<1
DCE	41	25	8.6	33	1.8	21	52	12	24	68	2.1
VC	6.3	2.2	1.8	5.9	<2	5.3	7.7	3.4	5.8	7.2	2.1J
DCA	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<1

MW-11B

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
TCE	<5	<5	<5	<50	<25	<5	<10	<5	<5	<5	<1
DCE	590	460	190	230	150	140	120	141	100.77	56	1.9
VC	81	88	79	80	66	80	66.5	80	64	48	7.4
DCA	3.5	<5	0.45	<50	<25	<5	<5	0.39	<5	<5	1.3J

MW-18B

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
TCE	7.7	<5	<50	<5	<17.5	<5	<10	<5	<5	<5	<1
DCE	690	420	290	270	190	170	160	160.9	120.73	62	69
VC	90	60	100	140	185	180	170	140	180	220	190
DCA	<5	<5	<50	<5	<17.5	<5	<5	<5	<5	<5	<1

MW-10B

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
TCE	68	<6.4	13	4.5	<50	1.25	<20	0.7	0.46	<5	<1
DCE	1800	3200	520	260	260	320	220	221.9	181.3	373.8	222
VC	95	410	84	54	80	115	73	130	76	150	83
DCA	1.2	46	<100	<50	<50	0.84	<20	0.71	0.54	<5	<1

MW-1B

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
TCE	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
DCE	4.7	1.1	16	1.3	5.4	5.5	1.4	11	1.2	1.3
VC	3.8	2	19	1.3	5.1	5.1	1.7	16	1.9	1.7
DCA	1.5	1.70	0.62	0.87	<5	0.76	0.96	<5	0.71	5

MW-14B

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
TCE	12	<5	<50	<25	<5	<5	<10	<5	<5	<5	<1
DCE	310	280	200	170	130	130	130	56.42	120.85	64	16
VC	40	50	120	68	99	98	86	49	90	86	33
DCA	0.91	<5	<50	<25	<5	<5	<10	0.6	0.41	<5	<1

MW-5B

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
TCE	2.6	2.4	1.6	0.99	<25	1.5	0.72	0.76	0.51	<5	1.1J
DCE	420	140	140	110	110	87	74	61.66	58.5	130.52	36
VC	45	13	54	44	59	58	44	49	57	82	39
DCA	1.1	<5	<25	<5	<25	0.65	<5	0.38	<5	<5	<1

MW-13B

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
TCE	12	7.9	9.1	2.8	1.2	1.4	<10	0.78	0.74	<5	<1
DCE	310	210	160	120	140	110	110	83.1	68.53	88	46
VC	40	27	36	90	62	60	44	59	65	68	47
DCA	0.91	<5	0.83	0.58	0.56	0.77	<10	0.61	0.48	<5	<1

MW-15

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
TCE	<5	<5	<5	<100	<50	<5	<5	<5	<5	<5	<1
DCE	400	410	340	440	400	340	300	171.5	191.5	57.1	5.9
VC	120	58	100	110	130	120	97	86	93	82	17
DCA	0.95	<5	1.1	<100	<50	2	1.6	0.66	0.58	2	1.3J

LEGEND:

- PROPERTY LINE
- FENCE
- MW-5A, MW-5B: MONITORING WELL LOCATION (A=OVERBURDEN, B=BEDROCK)
- MH-1: MANHOLE (SANITARY SEWER SAMPLE LOCATION)

CONCENTRATIONS IN ug/L (ppb)

SAMPLE DATE	
TCE	TRICHLOROETHENE
DCE	CIS- AND TRANS-1,2-DICHLOROETHENE
VC	VINYL CHLORIDE
DCA	1,1-DICHLOROETHANE

SOURCE: INTERA, 2006

HORIZONTAL DATUM: NAD83/96 NEW YORK STATE PLANE COORDINATE SYSTEM WEST ZONE.
VERTICAL DATUM NAVD 88 DATUM

60 40 20 0 60
SCALE IN FEET

FIGURE 4.2

FORMER CARBORUNDUM COMPANY
ELECTRIC PRODUCTS DIVISION
TOWN OF NIAGARA, NEW YORK

COC CONCENTRATIONS IN BEDROCK GROUNDWATER (2000–2010)

PARSONS

40 LA RIVIERE DRIVE, SUITE 350, BUFFALO. NEW YORK 14202 PHONE: 716-541-0730

\buffs01\p:\hyde park\445335\CAD\BP(HydePark)-06.dwg 8/4/10

Table 4.1
Groundwater Elevation Summary (1992-2009)
Former Carborundum Company, Hyde Park Facility

Well No.	Easting Coordinates (ft)	Northing Coordinates (ft)	Elevation (ft. amsl)		Static Water Level Elevation (ft. amsl)								
			Ground Surface	Top of Monitor Well Casing	1992	1996	1997	1999	2000	2001		2002	
					24-Aug-92	24-May-96	17-Nov-97	18-Oct-99	8-Nov-00	11-May-01	5-Nov-01	13-May-02	28-Oct-02
MW-1A	2955.6087	5008.2713	595.48	597.56	592.62	590.48	587.89	586.26	585.95	588.35	586.70	589.42	585.81
MW-1B	2960.1041	5008.1236	595.44	597.64	592.64	590.45	587.73	586.52	585.87	588.34	586.76	589.50	585.80
MW-2A	2680.1182	5331.3852	593.70	595.73	593.25	591.13	588.96	587.37	586.45	589.43	587.87	590.55	586.58
MW-2B	2681.7002	5337.9356	593.60	595.80	591.92	589.72	586.89	586.03	585.48	587.72	586.38	588.75	585.43
MW-3A	2969.9762	5353.9117	597.90	599.94	597.37	595.49	594.30	592.20	592.09	594.48	589.75	595.81	587.54
MW-3B	2972.3807	5348.8355	597.70	599.70	592.63	590.47	587.77	586.64	585.80	588.18	586.69	589.30	585.69
MW-4A	2372.5988	5336.5134	591.93	591.60	nm	nm	586.79	585.98	585.24	587.52	586.32	588.55	585.10
MW-4B	2368.6508	5336.5000	591.90	591.49	nm	nm	586.80	585.95	585.23	587.55	586.29	588.54	585.35
MW-5A	2605.9294	5016.5936	596.14	597.91	591.18	589.11	586.60	585.79	585.20	587.31	586.00	588.35	585.21
MW-5B	2605.7558	5011.3162	596.03	597.79	591.48	589.55	586.81	585.93	585.25	587.54	586.24	588.57	585.32
MW-6	2638.3679	5339.2224	593.10	595.51	592.26	589.67	586.85	586.03	585.44	587.67	586.36	588.69	585.40
MW-7A	2724.6499	5332.6172	593.90	596.59	593.62	590.94	588.68	587.33	586.45	589.21	587.72	590.27	586.35
MW-7B	2725.0999	5337.8887	593.90	596.66	592.59	589.93	587.26	586.40	585.63	587.93	586.59	589.11	585.64
MW-8	2928.7692	5350.8907	597.50	599.63	592.51	590.38	587.77	586.65	585.94	588.36	586.90	589.52	585.92
MW-10A	2483.0258	5019.0908	594.75	596.87	591.17	588.90	586.51	585.71	585.15	587.20	585.93	588.22	585.16
MW-10B	2478.5765	5019.1388	594.67	596.71	591.71	589.50	586.79	585.93	585.19	587.49	586.21	588.54	585.29
MW-11A	2341.0812	5021.6589	593.53	595.48	589.97	587.85	585.98	585.32	584.85	586.62	585.51	587.61	584.88
MW-11B	2345.1520	5021.2462	593.56	595.57	591.53	589.36	586.41	585.55	585.06	587.03	585.73	587.83	584.91
MW-12A	2235.0446	5098.8980	591.30	590.79	586.33	586.84	585.35	584.82	584.38	585.77	584.90	586.59	584.39
MW-12B	2234.5233	5102.1429	591.30	590.89	588.85	589.25	586.65	585.93	585.21	587.53	586.21	588.56	585.35
MW-13A	2552.3923	4965.9516	595.60	595.18	588.56	589.04	586.51	585.70	585.16	587.30	585.25	588.16	585.17
MW-13B	2549.3819	4965.8826	595.40	594.73	588.62	589.50	586.78	585.90	585.22	587.50	586.22	588.56	585.28
MW-14A	2303.8879	4969.9839	593.42	592.97	585.55	585.87	585.60	585.30	582.91	585.95	585.47	587.56	584.83
MW-14B	2301.0559	4969.7638	593.30	592.85	588.35	589.30	586.72	585.83	585.04	587.08	585.83	587.96	584.94
MW-15	2202.4948	4920.3288	592.01	591.44	nm	nm	586.22	585.57	585.02	587.13	585.86	588.13	585.04
MW-16A	2760.3762	5280.4861	592.60	591.64	nm	nm	nm	nm	nm	587.40	586.11	587.80	586.23
MW-16B	2760.3365	5277.4639	592.60	592.38	nm	nm	nm	nm	585.70	nm	586.70	nm	585.82
MW-17A	2669.1049	5212.5469	593.45	593.13	nm	nm	nm	nm	586.26	588.27	586.81	589.29	586.02
MW-17B	2668.7040	5210.7102	593.44	592.92	nm	nm	nm	nm	585.58	587.63	586.29	588.65	585.39
MW-18A	2725.1577	5111.5508	594.00	593.78	nm	nm	nm	nm	585.76	587.91	586.94	589.25	586.17
MW-18B	2722.9546	5110.1467	594.00	593.43	nm	nm	nm	nm	585.39	587.67	586.34	588.71	585.42
MW-19A	2957.4556	5200.7298	595.44	594.95	nm	nm	nm	nm	586.38	589.16	582.97	590.36	586.09
MW-19B	2958.1664	5203.1593	595.43	594.65	nm	nm	nm	nm	585.91	588.33	586.87	589.50	585.89
MH-1	2485.3313	4977.0431	na	595.29	nm	nm	nm	nm	583.31	583.35	582.86	nm	583.31
MH-2	2760.1474	4972.2985	na	596.51	nm	nm	nm	nm	583.88	583.91	583.85	nm	583.71
MH-3	3300.8154	4964.0866	na	596.79	nm	nm	nm	nm	585.61	585.73	nm	nm	583.99

Notes: ft amsl - feet above mean sea level
nm - water level not measured

Table 4.1
Groundwater Elevation Summary (1992-2009)
Former Carborundum Company, Hyde Park Facility

Well No.	Easting Coordinates (ft)	Northing Coordinates (ft)	Elevation (ft. amsl) Ground Surface	Top of Monitor Well Casing	Static Water Level Elevation (ft. amsl) 2003 20-May-03	4-Nov-03	2004 10-May-04	25-Oct-04	2005 31-Oct-05	15-May-05	2007 29-Oct-07	2008 21-Apr-08	2009 26-Oct-09
MW-1A	2955.6087	5008.2713	595.48	597.56	589.57	587.62	589.92	587.52	588.85	588.77	584.94	588.95	587.36
MW-1B	2960.1041	5008.1236	595.44	597.64	589.59	587.63	589.96	587.53	588.85	588.78	584.94	589.02	587.48
MW-2A	2680.1182	5331.3852	593.70	595.73	590.43	588.91	590.84	588.25	589.75	589.84	585.05	589.68	587.61
MW-2B	2681.7002	5337.9356	593.60	595.80	588.80	586.94	588.99	586.94	588.11	587.90	584.54	587.98	586.82
MW-3A	2969.9762	5353.9117	597.90	599.94	595.48	593.41	596.20	592.62	593.95	595.11	585.37	594.88	591.78
MW-3B	2972.3807	5348.8355	597.70	599.70	589.33	587.40	589.73	587.46	588.74	588.74	585.02	588.97	587.33
MW-4A	2372.5988	5336.5134	591.93	591.60	588.65	586.48	588.84	586.83	587.73	587.65	584.38	587.62	587.07
MW-4B	2368.6508	5336.5000	591.90	591.49	588.64	586.83	588.85	586.81	587.90	587.77	584.47	586.94	587.18
MW-5A	2605.9294	5016.5936	596.14	597.91	588.38	586.82	588.66	586.49	587.76	587.57	584.41	587.63	586.58
MW-5B	2605.7558	5011.3162	596.03	597.79	588.64	586.83	588.85	586.77	587.95	587.73	584.44	587.87	586.77
MW-6	2638.3679	5339.2224	593.10	595.51	588.75	586.91	588.95	586.90	588.06	587.84	578.49	587.96	586.67
MW-7A	2724.6499	5332.6172	593.90	596.59	590.24	588.62	590.59	588.17	589.59	589.55	584.98	589.64	587.39
MW-7B	2725.0999	5337.8887	593.90	596.66	589.13	587.24	589.41	587.29	588.52	588.39	584.86	588.56	587.22
MW-8	2928.7692	5350.8907	597.50	599.63	589.62	587.69	589.93	587.69	588.97	588.85	585.13	**589.07**	**587.52**
MW-10A	2483.0258	5019.0908	594.75	596.87	588.26	586.80	588.52	586.47	587.67	587.45	584.37	**587.51**	**586.52**
MW-10B	2478.5765	5019.1388	594.67	596.71	588.61	586.83	588.82	586.74	587.94	587.74	584.43	587.84	586.77
MW-11A	2341.0812	5021.6589	593.53	595.48	587.67	586.33	587.87	586.06	587.18	586.85	584.14	586.90	586.02
MW-11B	2345.1520	5021.2462	593.56	595.57	587.83	586.42	588.01	586.15	587.30	586.94	584.05	587.15	586.21
MW-12A	2235.0446	5098.8980	591.30	590.79	586.79	585.64	586.87	585.51	586.48	586.00	583.76	585.94	585.34
MW-12B	2234.5233	5102.1429	591.30	590.89	588.64	586.82	588.82	586.76	587.97	587.74	584.45	587.94	586.82
MW-13A	2552.3923	4965.9516	595.60	595.18	588.32	586.91	588.62	586.65	587.52	587.55	588.03	587.83	586.42
MW-13B	2549.3819	4965.8826	595.40	594.73	588.63	586.99	588.82	586.72	587.94	587.71	584.31	*587.86*	*586.34*
MW-14A	2303.8879	4969.9839	593.42	592.97	587.43	586.28	586.19	585.29	586.12	586.46	583.72	*586.16*	*584.87*
MW-14B	2301.0559	4969.7638	593.30	592.85	587.91	586.48	588.13	586.19	587.37	587.08	584.10	*587.13*	*586.16*
MW-15	2202.4948	4920.3288	592.01	591.44	588.18	586.68	588.44	586.35	587.61	587.45	584.24	587.42	586.83
MW-16A	2760.3762	5280.4861	592.60	591.64	587.60	587.28	588.26	588.13	587.72	587.60	587.04	586.54	587.63
MW-16B	2760.3365	5277.4639	592.60	592.38	589.36	587.43	589.64	587.49	588.76	588.64	584.98	587.90	587.32
MW-17A	2669.1049	5212.5469	593.45	593.13	589.32	587.76	589.60	587.47	588.80	588.71	585.13	588.52	587.29
MW-17B	2668.7040	5210.7102	593.44	592.92	588.70	586.90	588.93	586.83	588.08	587.78	584.40	587.92	586.84
MW-18A	2725.1577	5111.5508	594.00	593.78	589.07	587.94	589.58	587.69	588.69	588.68	586.08	587.43	587.90
MW-18B	2722.9546	5110.1467	594.00	593.43	588.77	587.00	588.97	586.90	588.07	587.87	584.51	587.80	586.93
MW-19A	2957.4556	5200.7298	595.44	594.95	589.96	588.58	590.16	589.86	589.68	589.75	588.05	588.53	588.33
MW-19B	2958.1664	5203.1593	595.43	594.65	589.60	587.63	589.89	587.63	588.92	588.84	585.15	589.07	587.55
MH-1	2485.3313	4977.0431	na	595.29	583.35	583.35	583.45	583.64	583.58	nm	nm	nm	nm
MH-2	2760.1474	4972.2985	na	596.51	583.98	583.98	584.04	584.14	584.21	nm	nm	nm	nm
MH-3	3300.8154	4964.0866	na	596.79	584.09	584.09	584.16	584.26	584.72	nm	nm	nm	nm

Notes: ft amsl - feet above mean sea level
nm - water level not measured

Table 4.2 Field Parameter Summary (2004-2010)							
Well ID	**Sample Date**	**pH** (pH Units)	**Conductivity** (mS/cm)	**Temperature** (^{o}C)	**Eh** (mV)	**DO** (mg/L)	**Turbidity** (NTU)
MW-1A	May-04	7.33	0.84	14.20	-41	3.8	220.00
	Oct-04	7.03	0.99	14.70	-3	4.2	nm
	3-Nov-05	7.24	0.67	14.10	-53.3	1.1	72.30
	18-May-06	7.51	0.66	11.2	16.5	--	119.4
	31-Oct-07	11.47	1.26	14.09	-88	5.47	150
	23-Apr-08	7.87	91.60	12.60	-80	8.20	342
	27-Oct-09	8.56	1.17	14.51	-19	0.0	10.14
MW-1B	May-04	7.39	5.96	12.40	-137	1.4	22.0
	Oct-04	6.97	1.32	12.80	-82.4	5.4	nm
	3-Nov-05	6.93	0.89	13.00	-74.1	0.5	6.6
	18-May-06	6.93	0.97	11.9	-69.1	--	5.3
	30-Oct-07	7.20	1.57	13.11	-220	0.0	4.2
	23-Apr-08	7.07	0.15	12.40	-101	0.0	84.2
	27-Oct-09	6.48	1.31	13.33	-150	0.0	13.1
MW-2A	May-04	7.35	5.58	12.9	-131	5.3	82.00
	Oct-04	7.03	1.12	15.0	-51	6.3	62.50
	1-Nov-05	7.08	0.98	14.7	-84.2	2.1	34.00
	18-May-06	7.25	0.96	11.1	-75.6	--	53.3
	1-Nov-07	7.37	1.51	14.9	-141	8.82	20
	28-Apr-08	7.41	0.16	9.9	-37	9.14	108
	28-Oct-09	7.06	1.61	14.5	-139	0.0	5.17
MW-2B	May-04	7.14	5.95	12.90	-143	2.8	13.0
	Oct-04	7.07	1.14	13.20	-106.6	1.0	11.6
	1-Nov-05	7.01	0.99	12.80	-106.6	0.5	5.2
	18-May-06	7.12	1.01	12.1	-125.5	--	5.0
	1-Nov-07	7.39	1.56	12.68	-276	0.0	12
	28-Apr-08	7.33	0.18	12.00	-280	0.0	116
	28-Oct-09	6.74	1.87	12.55	-343	0.0	21.5
MW-3A	May-04	6.92	nm	10.80	95	6.8	250.00
	Oct-04	6.84	1.28	13.10	-22	7.6	179.00
	3-Nov-05	6.84	1.32	13.30	-27.8	6.5	352.20
	18-May-06	7.07	1.12	10.1	157.3	--	82.2
	31-Oct-07	7.21	1.96	13.34	-120	0.39	500
	24-Apr-08	7.15	0.18	10.90	68	2.21	491
	27-Oct-09	6.96	1.63	13.16	11	0.0	5.24
MW-3B	May-04	7.15	6.83	12.50	-141	1.4	8.0
	Oct-04	7.03	1.55	11.90	-71.4	4.6	nm
	3-Nov-05	6.85	1.12	12.20	-104	1.2	1.7
	18-May-06	7.07	1.10	11.7	-132.1	--	1.4
	31-Oct-07	7.36	1.74	12.31	-216	0.0	6.1
	25-Apr-08	7.12	0.18	12.00	-157	4.2	77.2
	27-Oct-09	6.59	1.32	12.93	-217	0.0	5.4
MW-4A	May-04	7.20	6.84	13.10	-52	1.1	220.00
	Oct-04	7.17	1.45	14.50	-24	6.2	nm
	2-Nov-05	7.06	1.01	14.70	-35.6	0.9	309.00
	17-May-06	7.15	1.06	12.1	-30	--	1248.2
	31-Oct-07	7.72	1.40	14.61	-50	8.04	373.0
	29-Apr-08	7.63	0.14	10.90	-86	0.00	281.0
	3-Nov-09	7.15	1.60	13.65	-40	0.0	1.23
MW-4B	May-04	7.03	6.58	13.50	-102	1.1	10.0
	Oct-04	7.17	1.52	14.00	-31.9	8.6	nm
	2-Nov-05	7.14	1.04	13.80	-45.1	0.5	54.2
	17-May-06	7.16	1.09	13.1	-57.5	--	19.7
	31-Oct-07	7.42	1.66	13.76	-166	0.0	295.0
	29-Apr-08	7.39	0.18	12.50	-209	0.0	184.0
	3-Nov-09	6.60	1.65	13.15	-259	0.0	7.2

Table 4.2 Field Parameter Summary (2004-2010)							
Well ID	Sample Date	pH (pH Units)	Conductivity (mS/cm)	Temperature (^{o}C)	Eh (mV)	DO (mg/L)	Turbidity (NTU)
MW-5A	May-04	7.15	nm	14.70	-34	3.3	28.0
	Oct-04	7.24	3.25	17.20	-2.1	2.1	1084.0
	3-Nov-05	7.07	3.21	17.60	11.3	1.00	148.0
	17-May-06	7.26	3.05	12.9	50.2	--	1090.7
	30-Oct-07	7.59	3.05	15.16	111	7.03	240
	22-Apr-08	7.50	0.28	11.80	-5	5.00	> 1000
	29-Oct-09	7.58	2.07	15.15	62	0.34	25.7
MW-5B	May-04	6.89	nm	14.70	-96	1.3	0.00
	Oct-04	6.94	1.5	15.40	-19.5	3.8	19.50
	3-Nov-05	6.90	1.0	15.70	-52.2	1.8	48.10
	17-May-06	7.01	0.99	13.7	-41.3	--	2.7
	29-Oct-07	7.21	12.2	13.94	-106	0.0	75
	22-Apr-08	7.01	0.2	13.60	-40	6.5	55
	29-Oct-09	6.91	1.7	13.86	-49	0.0	0.66
MW-6	May-04	7.22	5.79	13.30	-128	3.9	42.0
	Oct-04	7.24	1.08	12.90	-80.6	3.7	4.8
	1-Nov-05	7.07	0.96	12.70	-95.6	2.5	54.0
	18-May-06	7.22	0.98	12.1	-122.6	--	26.3
	1-Nov-07	7.45	1.53	12.70	-227	3.68	6.7
	29-Apr-08	7.33	0.17	11.90	-284	0.00	70.9
	30-Oct-09	6.61	1.60	12.79	-330	0.0	2.3
MW-7A	May-04	7.09	5.50	11.40	-135	4.1	300.0
	Oct-04	6.72	1.04	13.90	-56.7	3.5	351.0
	1-Nov-05	7.02	0.91	14.00	-67.2	2.7	451.3
	17-May-06	7.00	0.89	11.3	-46.6	--	1433.6
	1-Nov-07	7.25	1.39	14.20	-99	2.52	450
	28-Apr-08	7.02	0.14	10.10	-78	1.72	199
	30-Oct-09	6.44	1.31	13.78	-338	0.0	11.1
	6-May-10	7.24	1.57	nm	nm	nm	nm
MW-7B	May-04	7.15	5.62	13.10	-92	1.9	7.0
	Oct-04	7.01	1.11	13.10	-55.4	1.3	1.9
	1-Nov-05	7.05	1.03	12.60	-73.7	0.7	0.5
	17-May-06	7.09	0.98	12.4	-83.2	--	0.6
	1-Nov-07	7.36	1.69	12.84	-191	0.0	16
	28-Apr-08	7.19	0.17	11.90	-149	3.8	107
	30-Oct-09	6.56	1.60	13.15	-336	0.0	26.3
	6-May-10	7.42	1.87	nm	nm	nm	nm
MW-8	May-04	7.41	6.20	13.00	-92	2.2	37.0
	Oct-04	7.04	1.58	12.70	-82.1	6.5	nm
	3-Nov-05	6.93	1.12	12.30	-101.5	0.9	2.6
	16-May-06	7.08	1.11	11.8	-224.7	0.4	1.6
	31-Oct-07	7.30	1.75	12.24	-249	0.0	2.2
	25-Apr-08	7.20	0.50	12.20	-168	0.0	77.0
	2-Nov-09	6.64	1.67	11.76	-256	0.0	4.6
MW-10A	May-04	6.80	3.70	13.90	-111	1.0	>1000
	Oct-04	6.70	4.53	16.90	-48.2	9.7	nm
	1-Nov-05	6.74	2.94	16.20	-48.7	2.2	222.70
	17-May-06	7.03	2.74	12.9	-51.5	--	966.8
	29-Oct-07	7.12	38.0	15.35	-94	0.76	220
	22-Apr-08	6.96	0.4	12.82	-41	5.20	610
	29-Oct-09	6.98	4.84	14.80	-113	0.0	5.27
MW-10B	May-04	6.83	1.31	14.60	-84	1.5	4.00
	Oct-04	6.93	1.48	15.80	-33.9	7.1	nm
	1-Nov-05	6.92	1.00	14.60	-53.5	5.9	10.20
	17-May-06	6.98	0.99	13.5	-58.4	--	3.9
	29-Oct-07	7.16	3.67	13.96	-127	0.0	5.5
	22-Apr-08	7.00	0.15	13.00	-57	0.0	57.8
	29-Oct-09	6.92	1.77	13.98	-118	0.0	1.02
	6-May-10	7.25	1.80	nm	nm	nm	nm

Table 4.2 Field Parameter Summary (2004-2010)							
Well ID	Sample Date	pH (pH Units)	Conductivity (mS/cm)	Temperature (^{o}C)	Eh (mV)	DO (mg/L)	Turbidity (NTU)
MW-11A	May-04	6.96	1.85	13.50	-114	2.1	270.00
	Oct-04	7.10	3.11	15.70	-44.6	2.0	566.00
	3-Nov-05	6.92	2.05	16.50	-53.6	3.3	217.20
	16-May-06	7.09	1.39	12.5	-43.7	4.8	953.8
	29-Oct-07	7.18	5.41	18.42	-15	8.02	150
	22-Apr-08	7.14	2.68	57.90	-15	8.02	210
	30-Oct-09	6.95	4.51	15.93	-107	0.0	1.93
MW-11B	May-04	7.06	1.22	13.90	-85	0.9	0.00
	Oct-04	7.10	1.48	14.40	-25.9	1.1	2.40
	3-Nov-05	7.06	1.03	14.70	-55.8	0.6	1.90
	16-May-06	7.12	1.00	13.0	-11.2	0.4	3.0
	29-Oct-07	7.32	2.39	15.42	-173	0.0	320
	22-Apr-08	7.09	0.17	12.92	-58	0.0	12
	30-Oct-09	7.07	1.83	13.99	-193	0.0	0.80
	6-May-10	7.08	1.80	nm	nm	nm	nm
MW-12A	May-04	6.81	nm	15.40	-102	1.1	3.00
	Oct-04	6.99	1.49	15.50	-33.6	1.5	885.00
	2-Nov-05	6.91	0.98	15.30	-51.2	0.6	375.40
	16-May-06	6.83	0.99	13.1	-60.5	0.5	140.3
	29-Oct-07	6.91	3.89	14.15	-105	0.0	80
	22-Apr-08	6.93	0.15	12.40	-19	3.3	-19
	2-Nov-09	7.08	1.64	13.96	-170	0.0	1.86
MW-12B	May-04	7.07	nm	15.50	-109	1.6	0.0
	Oct-04	7.16	1.64	15.20	-30.7	1.7	0.7
	2-Nov-05	7.11	1.10	15.00	-51.8	1.1	0.2
	16-May-06	7.15	1.11	14.0	-68.5	0.5	4.8
	29-Oct-07	7.35	2.39	13.87	-135	0.0	50.1
	21-Apr-08	7.26	0.16	13.30	-61	5.4	37.5
	2-Nov-09	6.63	0.23	14.27	46	0.0	5.1
MW-13A	May-04	6.78	nm	11.40	-24	0.8	500
	Oct-04	6.87	1.57	14.40	0.3	1.4	1190
	2-Nov-05	6.71	1.36	15.00	4.1	1.00	705
	16-May-06	6.86	1.35	10.6	24.2	0.8	1541.0
	30-Oct-07	7.02	2.50	15.51	-57	1.73	650
	23-Apr-08	6.94	0.30	11.20	-6	0.98	> 1000
	29-Oct-09	6.32	1.92	14.26	-66	0.00	38
MW-13B	May-04	6.86	nm	12.70	-94	0.9	0
	Oct-04	6.92	1.08	13.00	-8.1	0.9	12.5
	2-Nov-05	6.83	0.96	12.90	-22.2	0.9	24
	16-May-06	6.99	0.94	12.0	-57.2	0.5	29.5
	30-Oct-07	7.11	2.47	13.22	-95	0.0	35
	23-Apr-08	7.04	0.21	12.50	-64	6.0	133
	29-Oct-09	6.40	1.41	12.91	-136	0.0	35
MW-14A	May-04	6.95	nm	12.00	-126	2.1	>1000
	Oct-04	7.11	1.41	15.20	-57.3	3.0	1240
	2-Nov-05	6.99	0.950	15.60	-66.6	0.9	385
	16-May-06	7.12	0.86	11.3	-58.6	1.4	1150.3
	30-Oct-07	7.24	2.68	16.56	-147	0.09	-5.0
	23-Apr-08	7.06	0.14	14.80	75	7.59	823.0
	29-Oct-09	6.50	0.964	14.42	-120	0.0	75
MW-14B	May-04	6.90	nm	13.00	-101	1.5	46.0
	Oct-04	7.05	1.43	13.50	-35.2	1.2	11.5
	2-Nov-05	7.03	1.00	13.30	-65.7	0.5	5.3
	16-May-06	7.08	1.02	12.1	-119.5	0.4	1.2
	30-Oct-07	7.18	1.88	14.48	-123	0.0	2.4
	24-Apr-08	6.98	0.16	11.80	-85	0.0	55.3
	29-Oct-09	6.68	1.55	13.24	-205	0.0	1.7

Table 4.2 Field Parameter Summary (2004-2010)							
Well ID	**Sample Date**	**pH** (pH Units)	**Conductivity** (mS/cm)	**Temperature** (^oC)	**Eh** (mV)	**DO** (mg/L)	**Turbidity** (NTU)
MW-15	May-04	7.11	nm	13.10	-94	2.5	25.00
	Oct-04	7.11	1.16	13.70	-37	0.6	7.70
	2-Nov-05	7.08	1.01	14.00	-53.2	0.7	9.40
	16-May-06	7.20	1.01	12.1	-99.2	0.3	1.6
	30-Oct-07	7.43	2.90	14.34	-113	0.0	6.2
	23-Apr-08	7.14	1.44	55.70	nm	nm	2.6
	3-Nov-09	6.60	1.58	14.07	-315	0.0	0.85
MW-16A	May-04	6.33	3.00	13.50	107	3.3	120.0
	Oct-04	6.75	2.92	15.37	139	3.6	281.0
	4-Nov-05	7.28	2.33	14.90	25.1	4.2	21.0
	18-May-06	7.01	2.18	11.5	-32.6	--	175.0
	31-Oct-07	7.19	6.73	15.64	-111	0.0	504.0
	25-Apr-08	6.96	0.35	10.90	102	1.9	98.8
	27-Oct-09	6.52	3.13	15.43	58	1.27	30.1
MW-16B	May-04	6.93	nm	13.10	-112	2.9	5.0
	Oct-04	7.02	1.08	13.10	-51.3	0.8	44.6
	3-Nov-05	6.93	0.97	13.60	-82.2	0.6	13.5
	18-May-06	7.11	0.97	12.6	-99.6	--	8.1
	31-Oct-07	7.31	1.65	14.88	-213	0.0	15
	25-Apr-08	7.10	0.17	12.60	-136	0.0	156
	27-Oct-09	6.57	1.48	13.59	-224	0.0	41.7
MW-17A	May-04	7.06	17.60	11.90	-125	0.7	260.0
	Oct-04	6.95	3.31	16.00	-77.8	1.0	764.0
	2-Nov-05	6.84	3.13	16.60	-55.8	1.2	561.3
	17-May-06	6.83	3.10	12.3	-58.2	--	325.9
	1-Nov-07	7.11	5.45	16.99	-99	1.05	130
	28-Apr-08	7.08	0.48	10.10	-73	0.40	278
	28-Oct-09	6.57	4.59	15.67	-113	0.0	11.7
	6-May-10	6.76	43.00	nm	nm	nm	nm
MW-17B	May-04	7.13	7.85	13.10	-120	3.5	46.0
	Oct-04	7.02	1.63	14.40	-65.1	1.8	53.5
	2-Nov-05	6.87	1.56	14.50	-61.6	0.7	77.3
	17-May-06	6.92	1.67	13.2	-64.2	--	50.8
	1-Nov-07	7.26	2.46	14.59	-127	0.0	60
	28-Apr-08	7.11	0.26	12.40	-86	0.0	265
	28-Oct-09	7.11	3.86	14.90	-203	0.0	42.4
	6-May-10	6.78	4.01	nm	nm	nm	nm
MW-18A	May-04	7.14	nm	12.10	-114	4.0	68.00
	Oct-04	7.22	0.83	15.10	-72.2	1.5	720.00
	2-Nov-05	7.14	0.75	15.90	-67.9	0.7	145.00
	17-May-06	7.20	0.71	12.0	-70.5	--	310.0
	1-Nov-07	7.43	1.18	15.62	-123	0.0	120
	28-Apr-08	7.29	0.12	10.30	-99	0.0	141
	27-Oct-09	7.14	1.26	16.21	-115	0.0	1.32
MW-18B	May-04	6.89	nm	13.70	-118	0.8	6.00
	Oct-04	7.01	1.13	13.60	-57.3	0.7	9.00
	2-Nov-05	6.90	0.98	13.70	-46.1	0.5	5.60
	17-May-06	6.98	1.00	13.2	-51.0	--	6.8
	1-Nov-07	7.27	1.48	13.69	-136	0.0	20
	28-Apr-08	7.00	0.16	12.50	-130	0.0	120
	27-Oct-09	6.92	1.70	14.59	-112	0.0	1.15
MW-19A	May-04	6.67	nm	12.10	-34	4.0	88.0
	Oct-04	6.77	1.76	15.40	-28.2	5.8	75.5
	3-Nov-05	6.69	1.57	15.70	-19.4	2.0	54.4
	18-May-06	6.78	1.44	12.2	12.5	--	85.0
	31-Oct-07	7.32	2.09	16.24	-100	3.64	65
	24-Apr-08	6.84	0.25	15.60	89	6.14	169
	2-Nov-09	6.33	1.80	15.34	-41	0.0	4.2
MW-19B	1-May-04	7.00	nm	13.50	-116	1.5	5.0
	1-Oct-04	7.00	1.14	13.30	-71.6	0.7	12.2
	3-Nov-05	6.90	0.97	14.20	-98.9	0.6	6.5
	18-May-06	7.10	0.89	12.7	-115.3	--	7.9
	31-Oct-07	7.47	1.69	13.77	-210	1.9	689.0
	23-Apr-08	7.12	0.16	13.00	-144	0.0	142.0
	2-Nov-09	6.64	0.97	14.38	-238	0.0	1.9
--	DO data collected on May 17th and 18th, 2006 was deemed unusable due to instrument malfunction						
nm	Not measured						

SECTION 5
SUMMARY AND CONLUSIONS

The following summary and conclusions were developed based on the last five years of work at the site, including the bioremediation pilot tests:

- The requirements of the ROD (NYSDEC, 2000) are being met. Measures to increase the rate of biodegradation of COCs through enhanced bioremediation in the overburden and bedrock have been completed and their effectiveness continues to be monitored.
- In general, there are declining or stabilizing trends in COC concentrations which have developed over time. More than 10 years of groundwater monitoring have shown that natural attenuation (specifically reductive dechlorination) of chlorinated ethenes has occurred at the Site under natural conditions, both in the overburden and bedrock groundwater. COC concentrations in multiple overburden and bedrock wells decreased by an order of magnitude or more between 2000 and 2008, prior to the pilot test substrate injections.
- The results of the pilot tests demonstrate that enhanced *in situ* bioremediation of chlorinated ethenes appears to be a viable treatment option for groundwater.
    - There was a rapid transformation of TCE to degradation products at all injection and performance monitoring wells that were treated with substrate. DCE decreased at all performance monitoring wells within the radius of influence (overburden and bedrock). Increases of VC, where present, were relatively less significant with respect to the overall Site conditions. MW-7A and MW-17B are examples of how the substrate has increased degradation rates of COCs.
    - Generation of ethene indicates that the biodegradation pathway is complete, and that DCE or VC can be effectively degraded, in both the overburden and bedrock systems.
- Sewer water samples have been collected from 2000 to 2009. Historically, low levels (generally 5 µg/L or less) of TCE and DCE have been detected in the sewer water samples. Similar concentrations were found in the upstream sample location compared to the two locations adjacent to the Site.
- Groundwater flow directions have been consistent. Groundwater in the overburden and the bedrock is generally westerly to southwesterly, with some minor variations.

Path Forward:

With NYSDEC concurrence, a program will be developed for (1) monitoring of selected overburden and bedrock groundwater wells, (2) the potential for an additional substrate injection in the overburden, and (3) continuing the effort to implement a deed restriction or suitable alternative document with respect to potential soil vapor intrusion.

- Annual Groundwater Monitoring Program: Atlantic Richfield will provide to NYSDEC a revised list of overburden and bedrock monitoring wells (and revised chemical parameter list) to be monitored once per year. The annual sampling event will continue on the current schedule, with alternating spring and fall events. The results will be reported to the Agency in an annual report. Sewer monitoring will not be part of the new monitoring program, based on historical data.

- Additional Overburden Injections: A work plan will be developed including groundwater monitoring and decision criteria for additional substrate injections in the overburden. Based on the data from the bedrock groundwater monitoring and the interconnection of overburden and bedrock groundwater, additional bedrock injections are not required.

- Administrative Control: Work with NYSDEC and the current property owner to prepare a legal document (e.g. deed restriction) which will notify future Site owners that if the use of the current site building changes, the potential for soil vapor intrusion needs to be evaluated. This document will be used by NYSDEC to support re-classifying the Site from Class 2 (significant threat) to Class 4 (closed, requires continued management).

SECTION 6
REFERENCES

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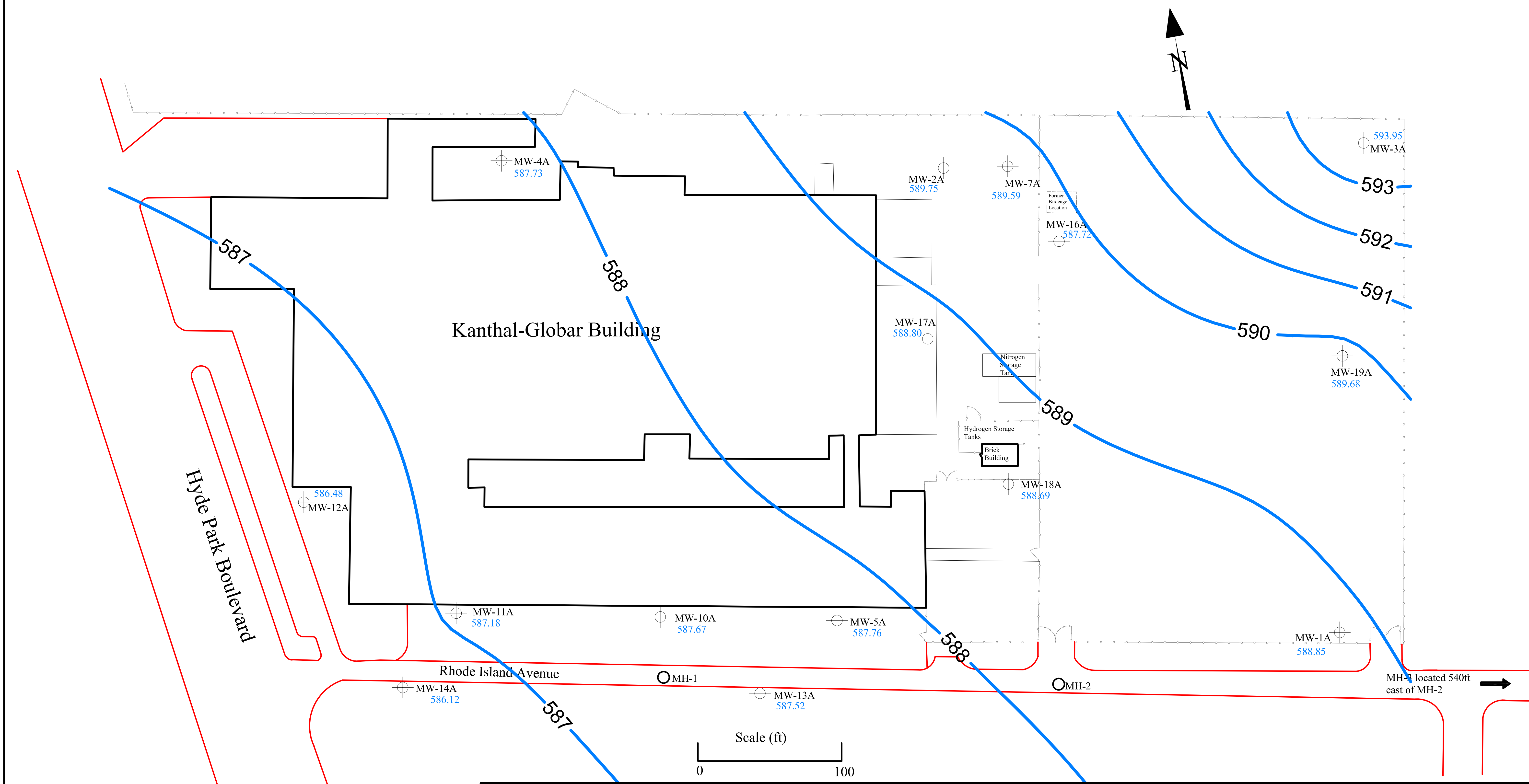
APPENDIX A
GROUNDWATER ELEVATION CONTOUR MAPS (2005 TO 2010)



Legend:

MW-5A Monitoring Well Location | 588.32 Groundwater Elevation (ft.amsl)

MH-1 Manhole / Sewer Sample Location

—587— Contour Elevation (ft above mean sea level)

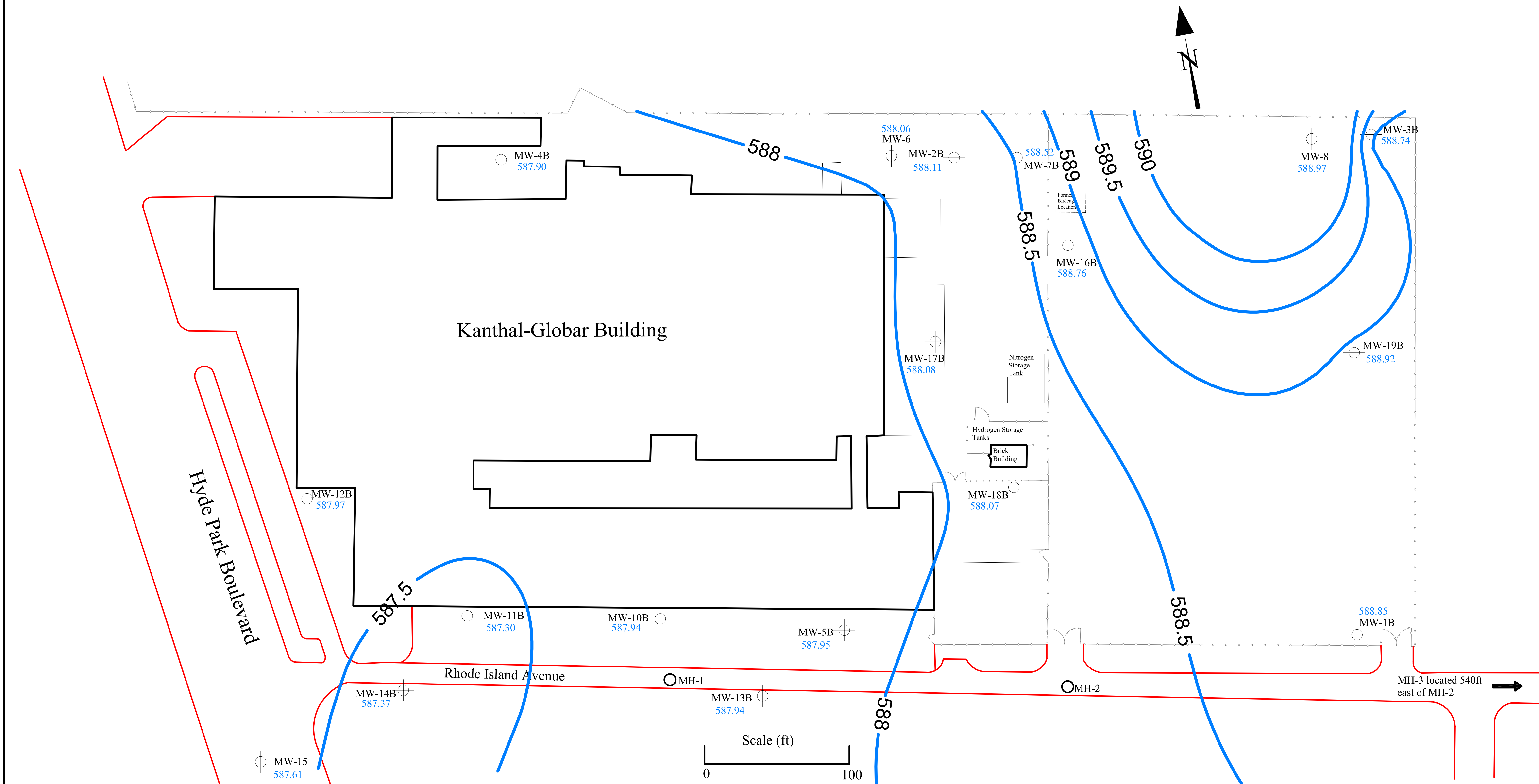
Note: Contour Interval = 1ft

Project Location: 3425 Hyde Park Blvd., Niagara Falls, NY		Date: October 2005	Figure #: 3-1
ACAD File: GW Elev 2005.dwg	Drawn By: GDB	Project #: 01-220-11	

INTERA Engineering Ltd.
1 Raymond Street, Suite 200
Ottawa, Ontario K1R 1A2

Tel: 613-232-2525
Fax: 613-232-7149

Title: Overburden Groundwater Elevations - Oct 31/05

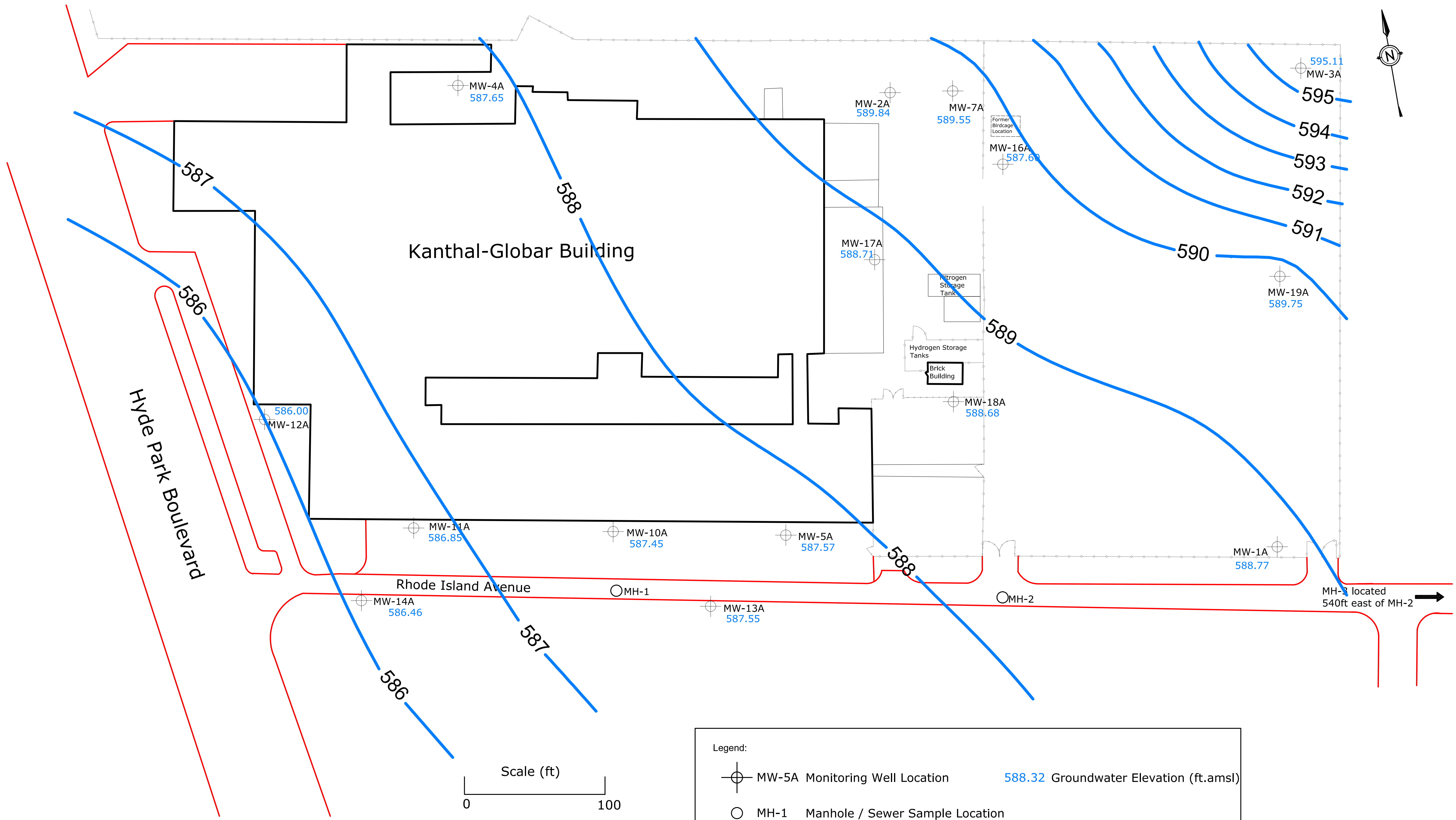


Legend:

MW-5A	Monitoring Well Location	588.32	Groundwater Elevation (ft.amsl)
MH-1	Manhole / Sewer Sample Location		
—587—	Contour Elevation (ft above mean sea level)		

Note: Contour Interval = 0.2ft

Project Location: 3425 Hyde Park Blvd., Niagara Falls, NY		Date: October 2005	Figure #: 3-2
ACAD File: GW Elev 2005.dwg	Drawn By: GDB	Project #: 01-220-11	
INTERA Engineering Ltd. 1 Raymond Street, Suite 200 Ottawa, Ontario K1R 1A2 Tel: 613-232-2525 Fax: 613-232-7149		Title: Bedrock Groundwater Elevations - Oct 31/05	

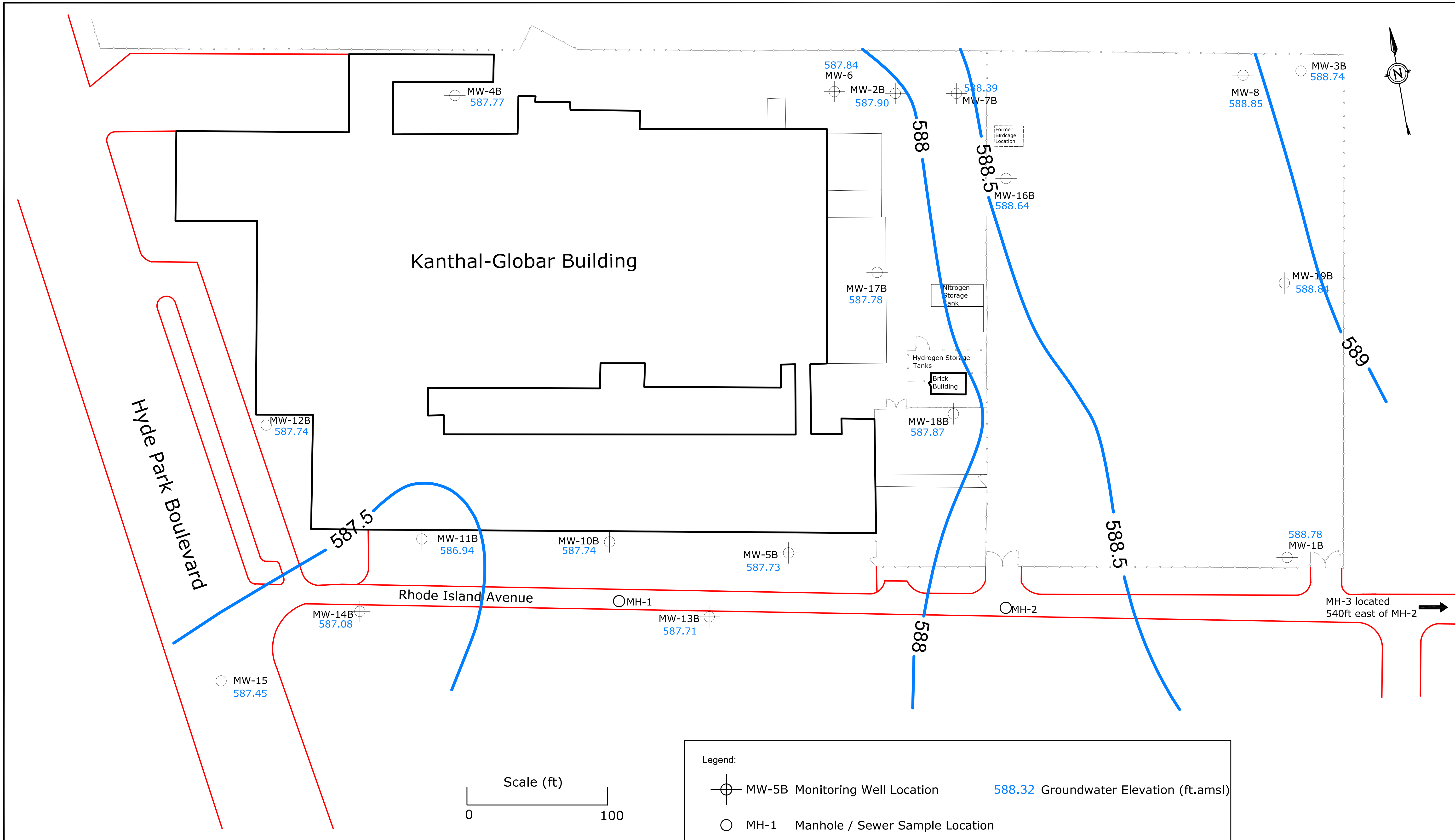


Overburden Groundwater Elevations - May 15, 2006
Former Carborundum Company, Town of Niagara, New York

Prepared by: SNG
Reviewed by: STW
Date: Aug 3, 2006

FIGURE 3.1

Doc. No.: 01-220-13_GW Elev_R0A.dwg



Bedrock Groundwater Elevations - May 15, 2006 Former Carborundum Company, Town of Niagara, New York		Prepared by: SNG Reviewed by: STW
FIGURE 3.2	Doc. No.: 01-220-13_GW Elev_R0A.dwg	Date: Aug 3, 2006

INTERA

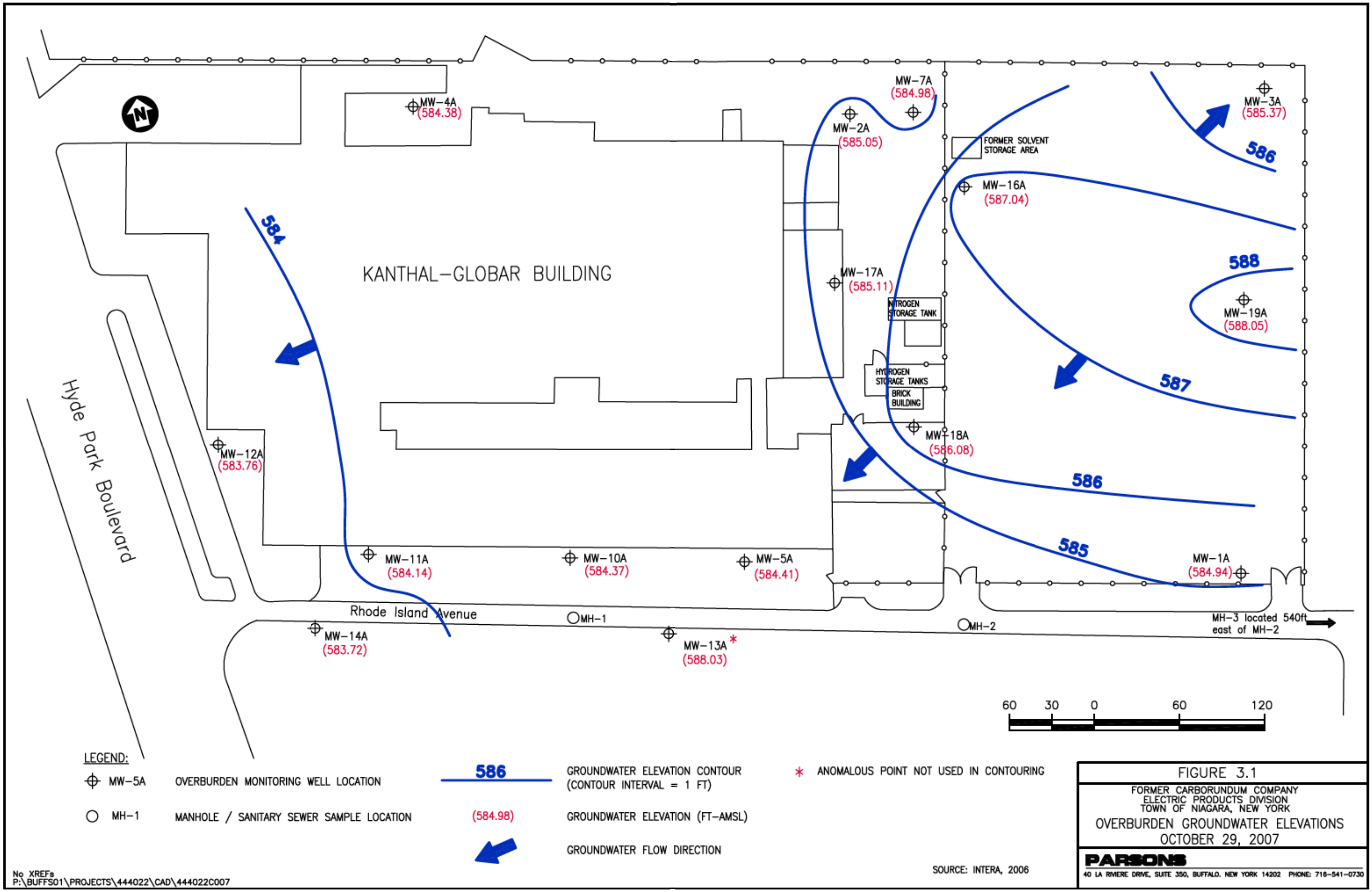
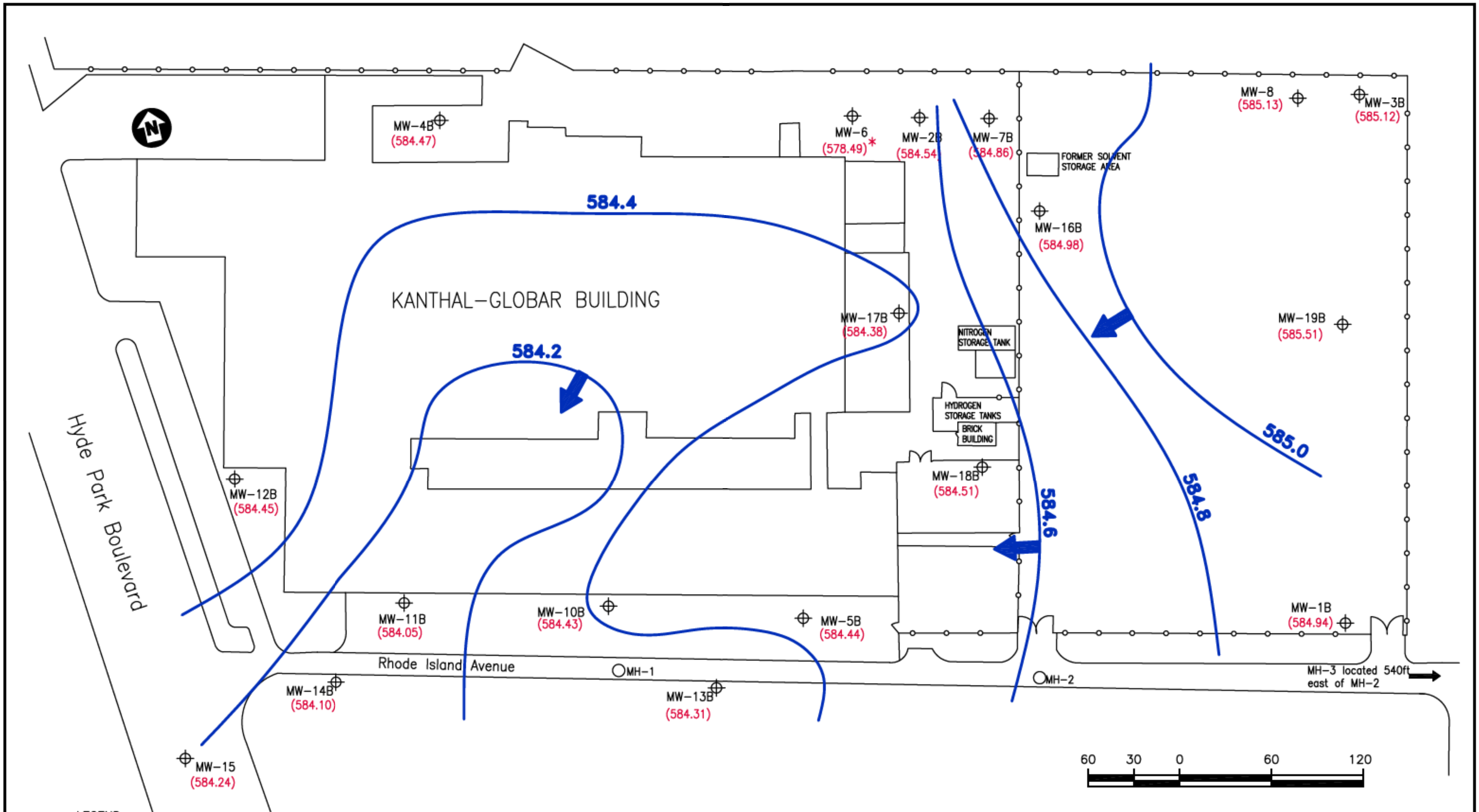


FIGURE 3.1

FORMER CARBORUNDUM COMPANY
ELECTRIC PRODUCTS DIVISION
TOWN OF NIAGARA, NEW YORK

OVERBURDEN GROUNDWATER ELEVATIONS
OCTOBER 29, 2007

PARSONS
40 LA RIVIERE DRIVE, SUITE 350, BUFFALO, NEW YORK 14202 PHONE: 716-541-0730



LEGEND:

⊕ MW–5B	BEDROCK MONITORING WELL LOCATION
○ MH–1	MANHOLE / SANITARY SEWER SAMPLE LOCATION
584.8	POTENTIOMETRIC SURFACE CONTOUR (CONTOUR INTERVAL = 0.2 FT)
(584.51)	GROUNDWATER ELEVATION (FT–AMSL)
	GROUNDWATER FLOW DIRECTION
*	ANOMALOUS POINT NOT USED IN CONTOURING

SOURCE: INTERA, 2006

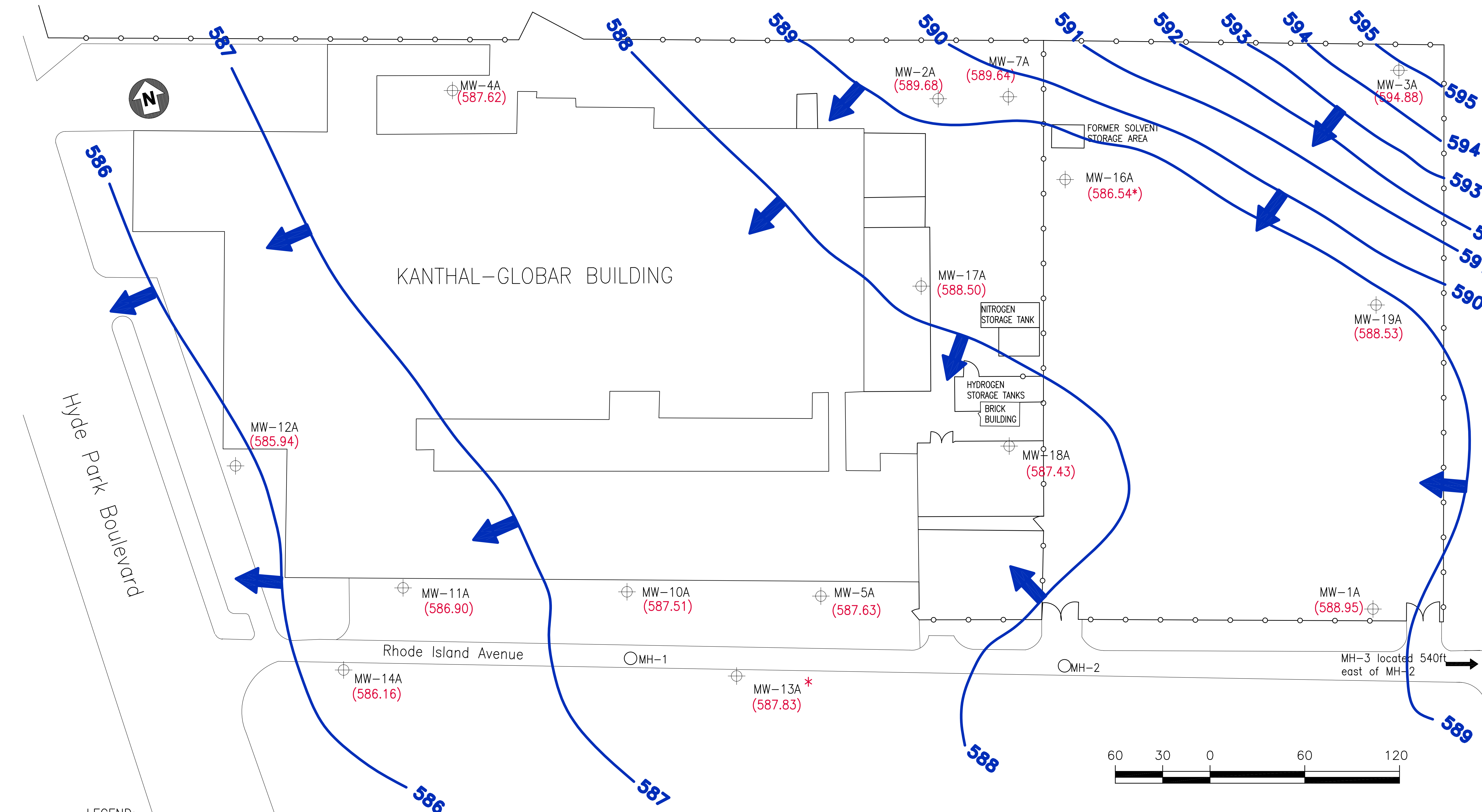
FIGURE 3.2

FORMER CARBORUNDUM COMPANY
ELECTRIC PRODUCTS DIVISION
TOWN OF NIAGARA, NEW YORK

BEDROCK GROUNDWATER ELEVATIONS
OCTOBER 29, 2007

PARSONS
40 LA RIVIERE DRIVE, SUITE 350, BUFFALO, NEW YORK 14202 PHONE: 716–541–0730

No XREFs
P:\BUFFS01\PROJECTS\444022\CAD\444022C008



LEGEND:

MW–5A	OVERBURDEN MONITORING WELL LOCATION	586	GROUNDWATER ELEVATION CONTOUR (CONTOUR INTERVAL = 1 FT)	*	ANOMALOUS POINT NOT USED IN CONTOURING
MH–1	MANHOLE / SANITARY SEWER SAMPLE LOCATION	(587.51)	GROUNDWATER ELEVATION (FT–AMSL)		
			GROUNDWATER FLOW DIRECTION		

SOURCE: INTERA, 2006

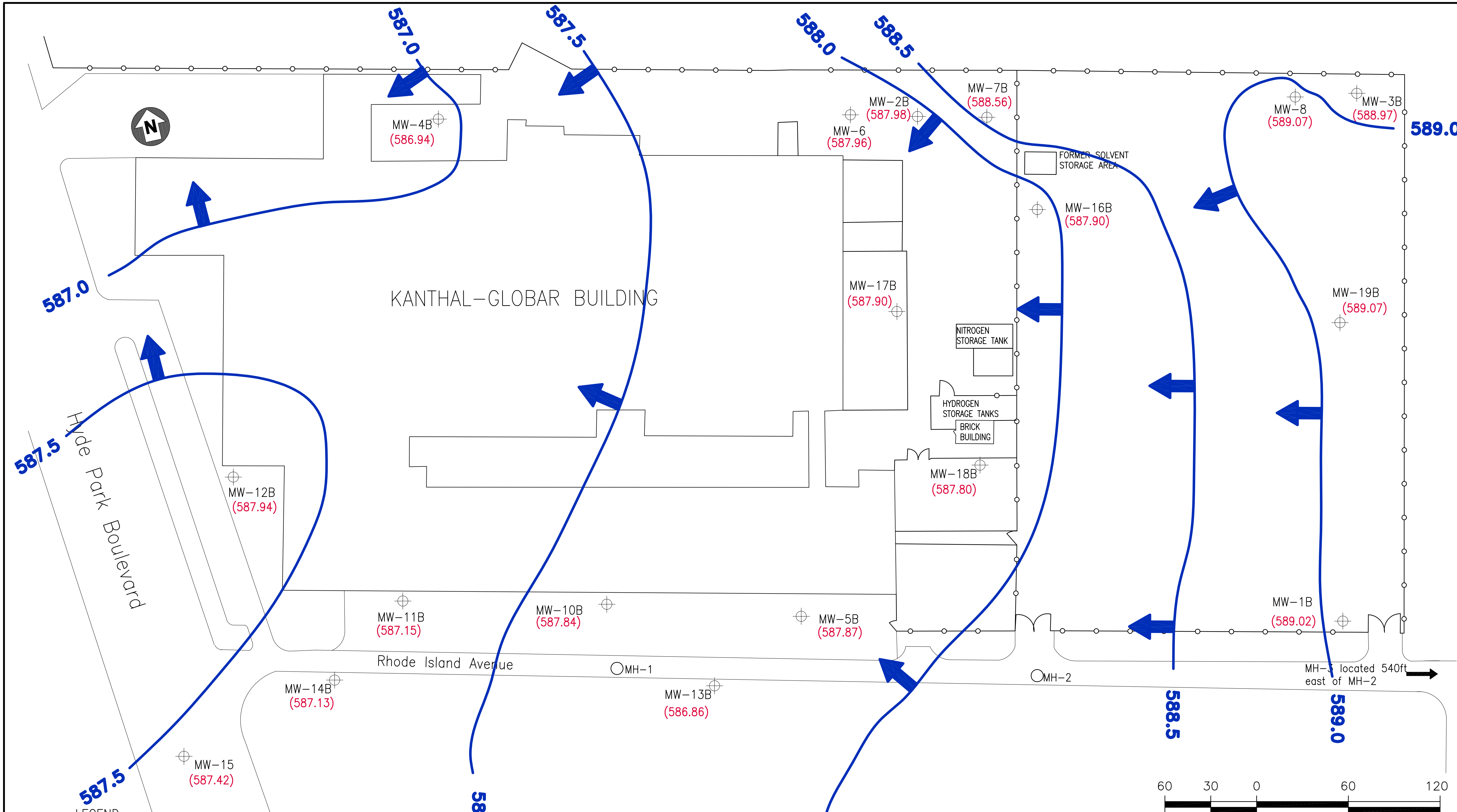
FIGURE 3.1

FORMER CARBORUNDUM COMPANY
ELECTRIC PRODUCTS DIVISION
TOWN OF NIAGARA, NEW YORK

OVERBURDEN GROUNDWATER ELEVATIONS
APRIL 28, 2008

PARSONS
40 LA RIVIERE DRIVE, SUITE 350, BUFFALO. NEW YORK 14202 PHONE: 716–541–0730

FILE NAME: P:\BP PROGRAM\444022 BP-HYDE PARK\CAD\444022C007(6-11-08).DWG
PLOT DATE: 6/11/2008 2:11 PM PLOTTED BY: WINTERS, CHRIS



LEGEND:

MW-5B	BEDROCK MONITORING WELL LOCATION
MH-1	MANHOLE / SANITARY SEWER SAMPLE LOCATION
588.0	POTENTIOMETRIC SURFACE CONTOUR (CONTOUR INTERVAL = 0.2 FT)
(587.86)	GROUNDWATER ELEVATION (FT-AMSL)
	GROUNDWATER FLOW DIRECTION

SOURCE: INTERA, 2006

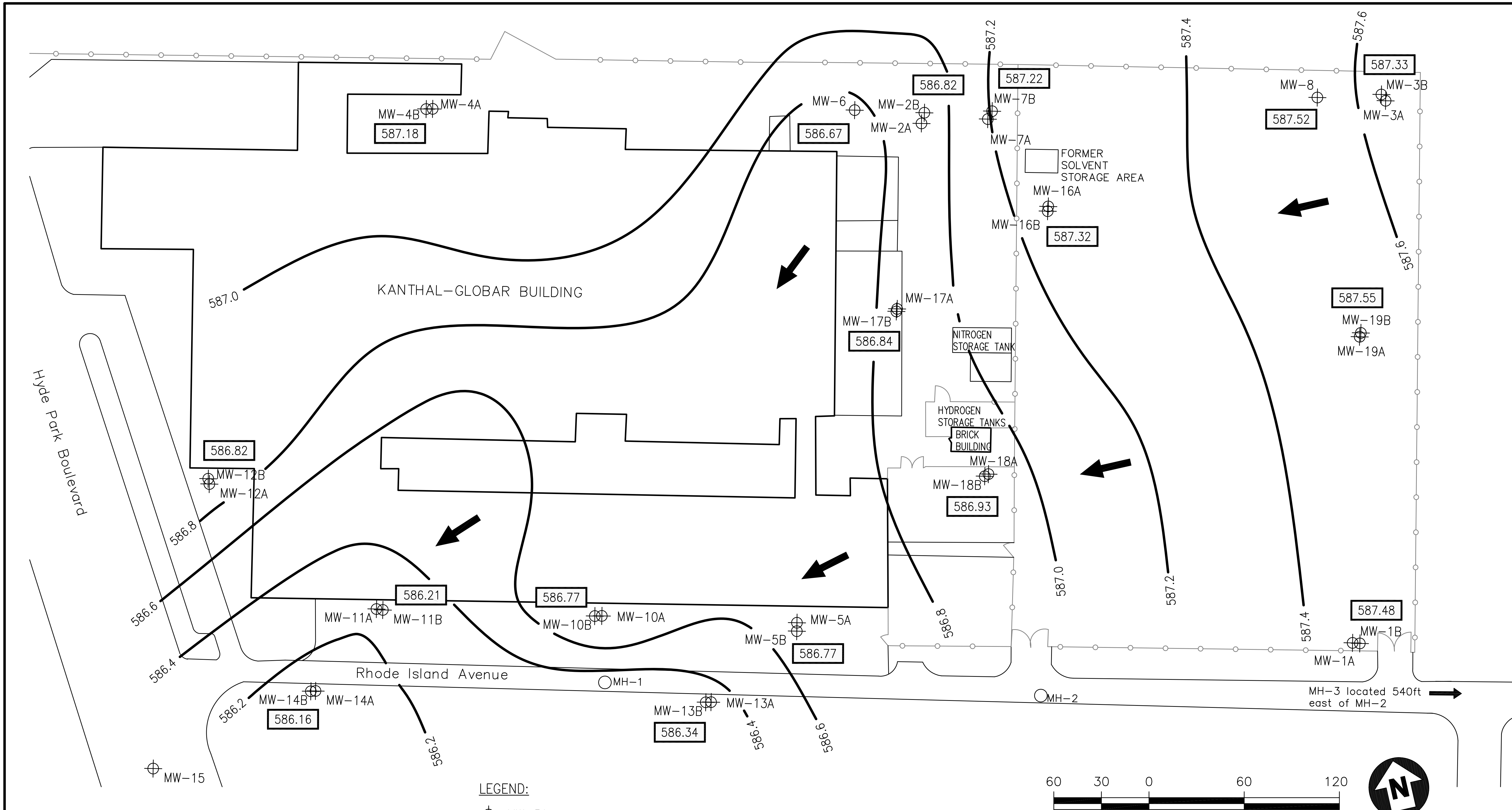
FIGURE 3.2

FORMER CARBORUNDUM COMPANY
ELECTRIC PRODUCTS DIVISION
TOWN OF NIAGARA, NEW YORK

BEDROCK GROUNDWATER ELEVATIONS
APRIL 28, 2008

PARSONS
40 LA RIVIERE DRIVE, SUITE 350, BUFFALO, NEW YORK 14202 PHONE: 716-541-0730

FILE NAME: P:\BP PROGRAM\444022 BP-HYDE PARK\CAD\444022C007(6-11-08).DWG
PLOT DATE: 6/11/2008 2:14 PM PLOTTED BY: WINTERS, CHRIS



LEGEND:

MW–5A / MW–5B	MONITORING WELL LOCATION (A=OVERBURDEN, B=BEDROCK)
MH–1	MANHOLE / SANITARY SEWER SAMPLE LOCATION
587.36	GROUNDWATER ELEVATION (FT–AMSL)
587	EQUIPOTENTIAL CONTOUR LINE (0.2 FT. CONTOUR INTERVAL)
	APPROXIMATE GROUNDWATER FLOW DIRECTION

HORIZONTAL DATUM: NAD83/96 NEW YORK STATE PLANE COORDINATE SYSTEM WEST ZONE.
VERTICAL DATUM NAVD 88 DATUM

SOURCE: INTERA, 2006

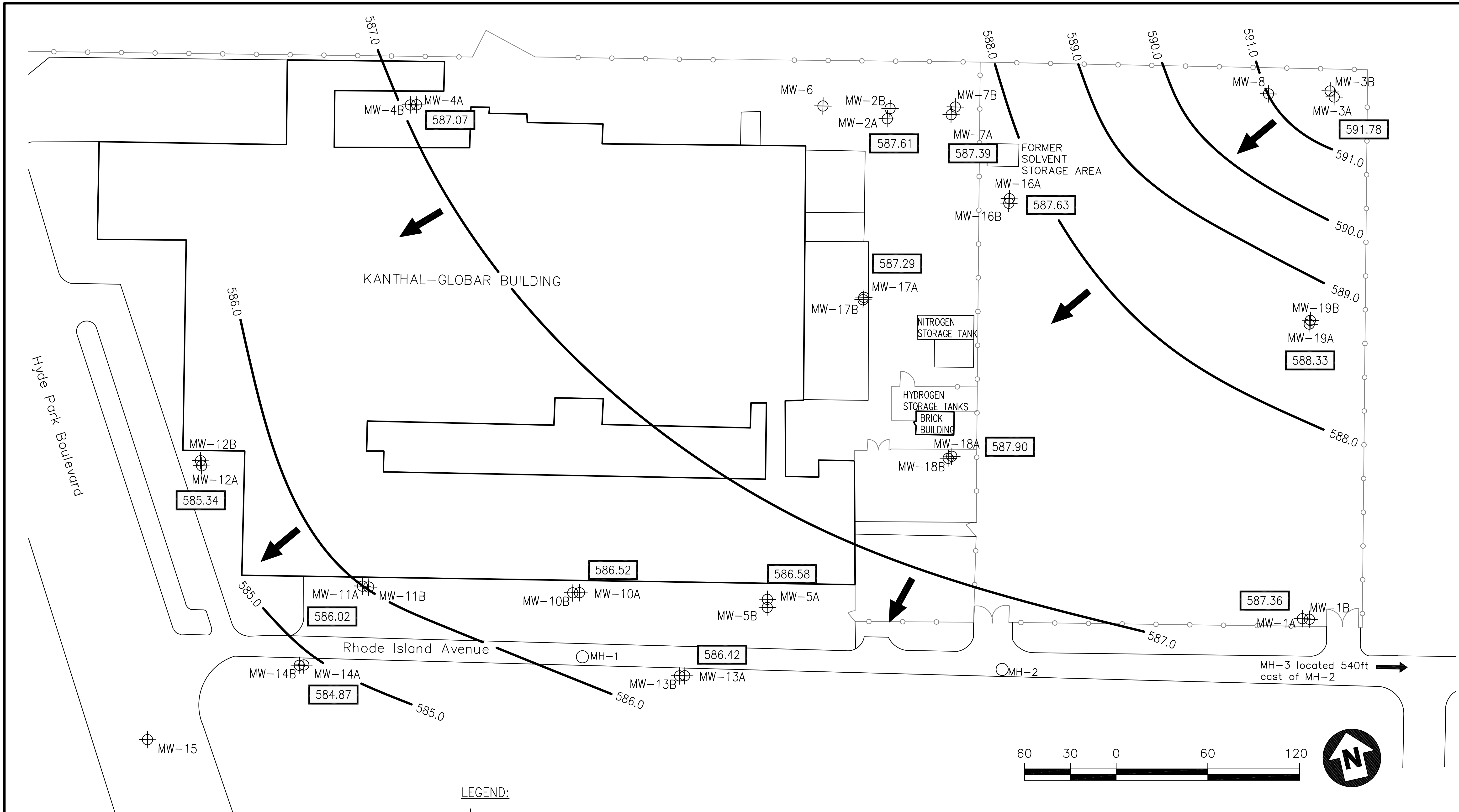
FIGURE 3.2

FORMER CARBORUNDUM COMPANY
ELECTRIC PRODUCTS DIVISION
TOWN OF NIAGARA, NEW YORK

BEDROCK GROUNDWATER ELEVATIONS
OCTOBER 26, 2009

PARSONS
40 LA RIVIERE DRIVE, SUITE 350, BUFFALO, NEW YORK 14202 PHONE: 716–541–0730

\buffs01\p:\hyde park\445335\CAD\BP(HydePark)–02.dwg 1/27/10



LEGEND:

MW–5A / MW–5B — MONITORING WELL LOCATION (A=OVERBURDEN, B=BEDROCK)

MH–1 — MANHOLE / SANITARY SEWER SAMPLE LOCATION

587.36 — GROUNDWATER ELEVATION (FT–AMSL)

587 — EQUIPOTENTIAL CONTOUR LINE (0.2 FT. CONTOUR INTERVAL)

APPROXIMATE GROUNDWATER FLOW DIRECTION

HORIZONTAL DATUM: NAD83/96 NEW YORK STATE PLANE COORDINATE SYSTEM WEST ZONE.
VERTICAL DATUM NAVD 88 DATUM

SOURCE: INTERA, 2006

\buffs01\p:\hyde park\445335\CAD\BP(HydePark)–02.dwg 1/27/10

FIGURE 3.1

FORMER CARBORUNDUM COMPANY
ELECTRIC PRODUCTS DIVISION
TOWN OF NIAGARA, NEW YORK

OVERBURDEN GROUNDWATER ELEVATIONS
OCTOBER 26, 2009

PARSONS
40 LA RIVIERE DRIVE, SUITE 350, BUFFALO, NEW YORK 14202 PHONE: 716–541–0730

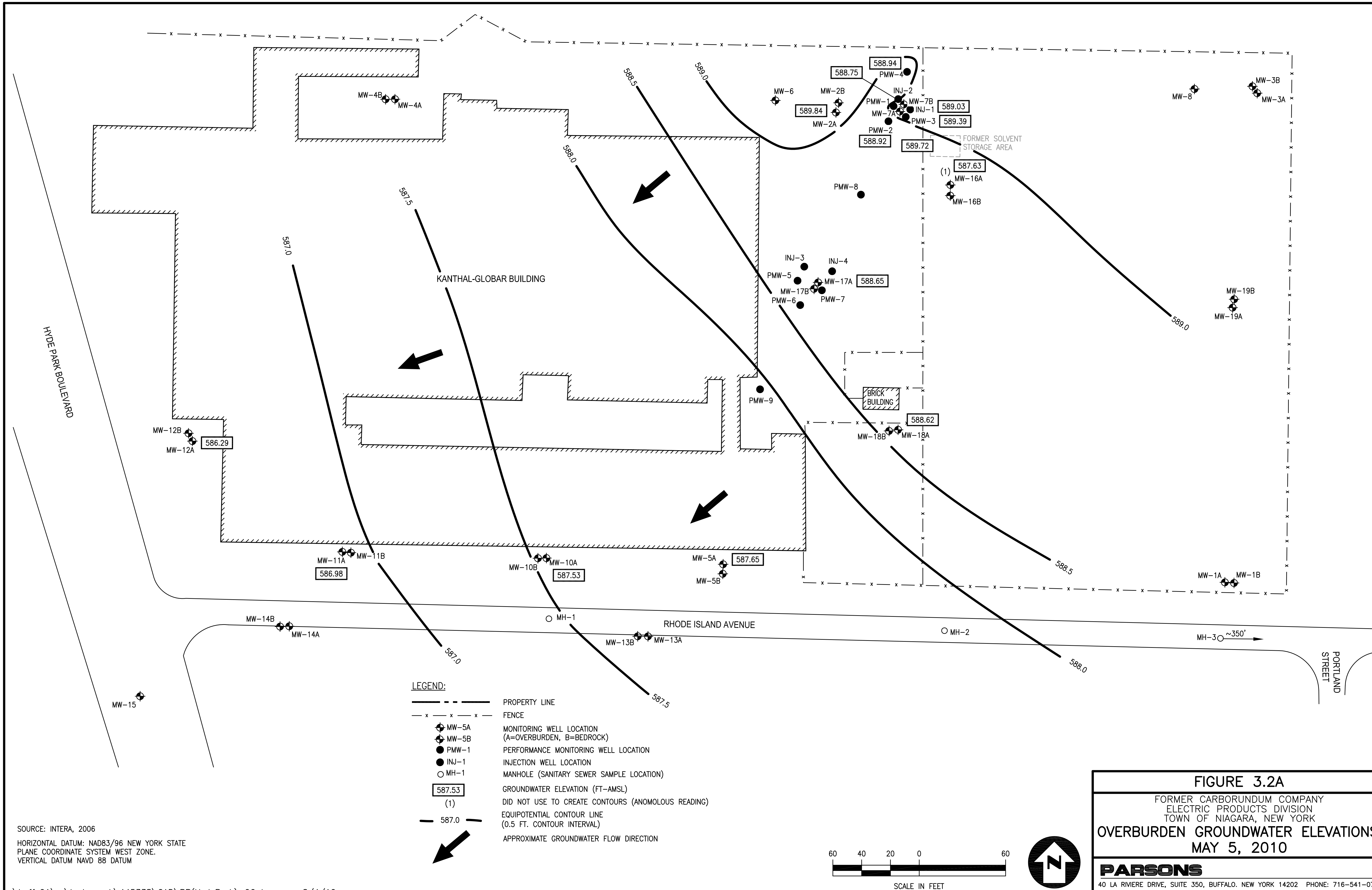


FIGURE 3.2A

FORMER CARBORUNDUM COMPANY
ELECTRIC PRODUCTS DIVISION
TOWN OF NIAGARA, NEW YORK

OVERBURDEN GROUNDWATER ELEVATIONS
MAY 5, 2010

PARSONS
40 LA RIVIERE DRIVE, SUITE 350, BUFFALO, NEW YORK 14202 PHONE: 716-541-0730

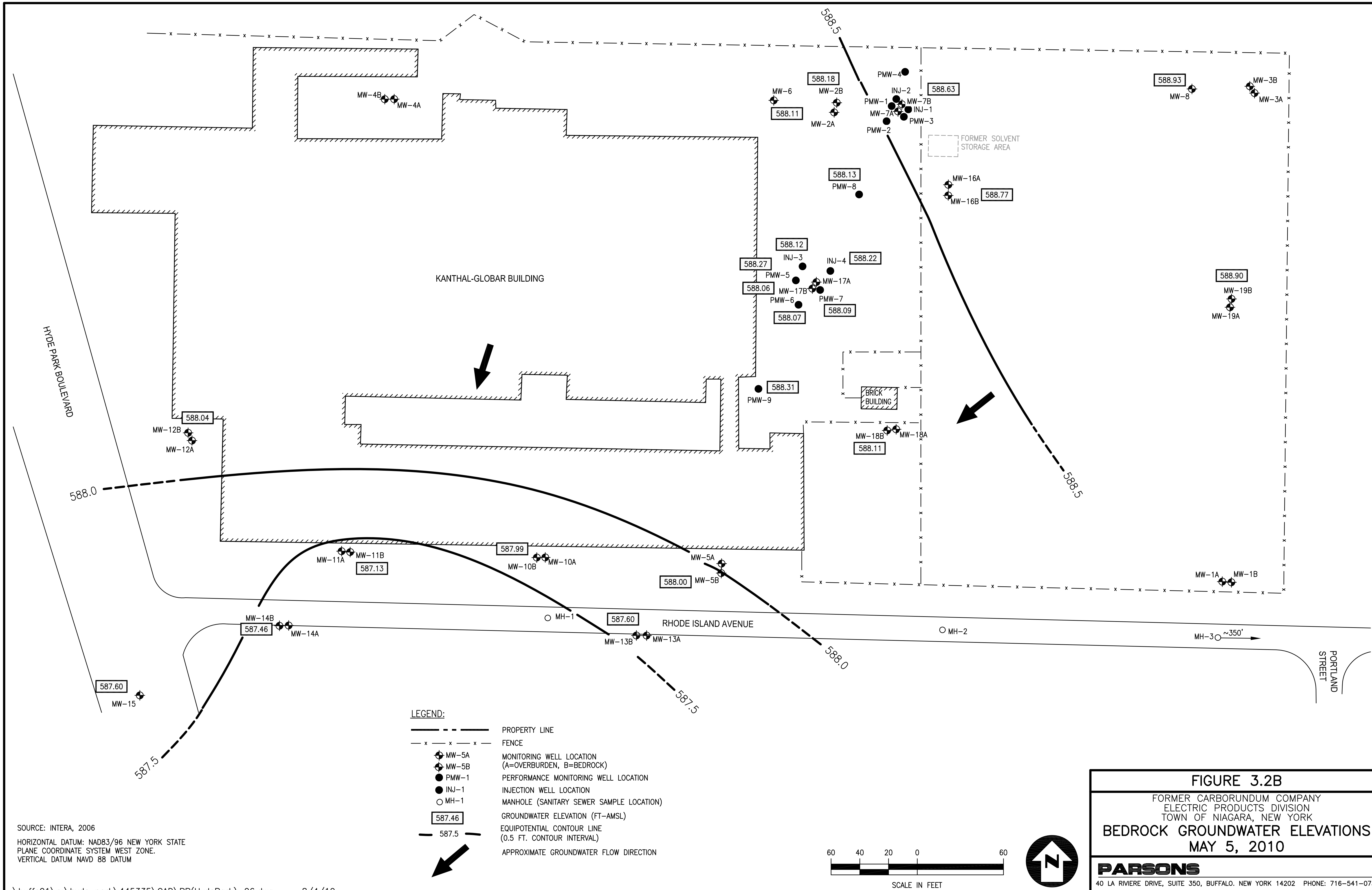


FIGURE 3.2B

FORMER CARBORUNDUM COMPANY
ELECTRIC PRODUCTS DIVISION
TOWN OF NIAGARA, NEW YORK

BEDROCK GROUNDWATER ELEVATIONS
MAY 5, 2010

APPENDIX B
ANALYTICAL RESULTS (1999 TO 2010)

Appendix B
Analytical Results for Trichloroethene (ug/L)
1999 through 2010
Former Carborundum Company, Hyde Park Facility

Monitoring Well	Sample Date																		
	Aug-92	May-96	Nov-97	Oct-99	Oct-00	May-01	Nov-01	May-02	Oct-02	May-03	Nov-03	May-04	Oct-04	Nov-05	May-06	Oct-07	Apr-08	Oct-09	May-10
OVERBURDEN MONITORING WELLS																			
MW-1A	<10	--	<5	<5	<5	<5	<5	<5	<5	<5	<5J	<5	<5	<5	<5	<5	<5	<5	--
MW-2A	<10	--	<5	<5	<5	<5	3.4J	0.61J	4.0J	<5	<5J	<5	<5	<5	<5	0.91 J	<5	<5	<5
MW-3A	4	--	<5	<5	0.43 J	0.84BJ	0.82J	3.6J	0.58J	1.5J	0.75J	1.3 J	0.46 J	<5	1.1 J	<5	0.21 J	<5	--
MW-4A	3	--	<5	4J	2.8 J	3.4BJ	4DJ	8.1J	6.3J	9.55*	11J	23 J	30 J	37	53 D*	34	34	130	94
MW-5A	<200	--	<5	0.8J	1.3 J	<5*	<5D	<25	0.69J	0.48J	0.65J	0.7 J	0.88 J	0.89 J	10	0.59 J	0.47 J	<5	<5
MW-7A	--	8700	1400	170 J	1200	1800	2000D	1400	1100	610D	600J	730	530*	475 D*	410 D	36	210	1.8J	<5
MW-10A	--	<250	<5	<5	<5	<5	<5*	<185*	<120	<120*	<120J	<120	<120	0.63 J	<40	<5	<5	<5	<5
MW-11A	--	<10	<5	<5	<5	<5	<5*	<5*	0.23J	<5	<5J *	<5	<5	<5	<5	<5	<5	<5	<5
MW-12A	--	<50	<5	<5	2.6 J	<5	<5	1.3J	0.31J*	<40	<25J	0.39 J	0.40 J	0.54 J	<10	<5	0.35 J	<5	<5
MW-13A	--	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5J	<5	<5	<5	<5	<5	<5	<5	--
MW-14A	--	<10	<5	<5	<5	<5	<5D	<5	<5	<5	<5J	<5	<5	<5	<5	<5	<5	<5	--
MW-16A	--	--	--	--	NS	4.2DJ	1.9DJ	1.2J	0.77J	<10	<20J	0.70 J	<10	0.56 J	0.52 J	0.39 J	0.39 J	<5	<5
MW-17A	--	--	--	--	115	58	73D	54	62	42J	49J	38* J	57	48	28	38	29	22	15
MW-18A	--	--	--	--	36	30	37	40	53*	22D	47.5DJ *	43	67	52	43	22	25	25	25
MW-19A	--	--	--	--	1.7 J	1.3J	2.2J	1.1J	0.99J	0.61J	0.52J	0.40 J	0.26 J	<5	<5	<5	<5	<5	--
BEDROCK MONITORING WELLS																			
MW-1B	<10	--	<5	<5	<5	<5	<5	<5	<5	<5	<5J	<5	<5	<5	<5	<5	<5	<5	--
MW-2B	670	--	6	5.5	0.44 J	1.1BJ	0.82DJ	<10	<25	<5	<20J	<20	<20	<5	<5	<5	<5	<5	<5
MW-3B	<10	--	<5	<5	<5	<5	2.7J*	<5*	<5	<5	<5J	<5	<5	<5	<5	<5	<5	<5	--
MW-4B	5	--	<5	0.9J	3.2 J	0.99BJ	3.8J	1.4J	0.585J*	<5	0.73J *	0.35 J	0.41 J	0.63 J	<5	<5	<5	<5	<5
MW-5B	71	--	5	8	2.6 J	2.4BJ	2.6DJ	1.3J	1.6J	0.99J	<25J	1.0* J	<25	1.5 J	0.72 J	0.76 J	0.51 J	<5	1.1 J
MW-6	--	<100	<5	<5	<5	<5	<5D	0.23J	<50	<5	<50J	<50	<25	<5	<10	<5	<5	<5	<5
MW-7B	--	<100	<5	<5	<5	0.5J	<5D	<5	<10	<5	<10J	<10	<5	<5	<5	<5	<5	<5	--
MW-8	--	<10	<5	<5	<5	<5*	<5	<5	<5	<5	<5J	<5	<5	<5	<5	<5	<5	<5	<5
MW-10B	--	90	28	120	68	<6.4	63D	13J	13J	4.5J*	3.3J	3.0 J	<50	1.25 J*	<20	0.7 J	0.7 J	<5	<5
MW-11B	--	<50	<5	<5	<5	<5	<5	<25	<5	<50	<5	<50	<25	<5	<10 D*	<5	<5	<5	<5
MW-12B	--	18	<5	<5	<5	<5	<5	<50	<25	<20	<20J	<5	<20	<5	<10	<5	<5	<5	<5
MW-13B	--	48	36	22	12	7.9D	12D	7.6J	9.1	2.8J	5J	3.1 J	1.2 J	1.4 J	<10	0.78 J	0.74 J	<5	<5
MW-14B	--	<50	<5	<5	<5	<5	<5	<5	<50	<25	<5J	<5*	<5	<5	<10	<5	<5	<5	<5
MW-15	--	--	<10	<5	<5	<5	<5D	<25	<5	<100	<25J	<25	<50	<5	<5	<5	<5	<5	<5
MW-16B	--	--	--	--	0.97 J	<5	<5D	<10	<25	<50	0.63J	0.65 J	<50	<5	<20	<5	0.25 J	<5	<5
MW-17B	--	--	--	--	22	4.2DJ*	18D	23J	20J	19J	12J	12 J	12 J**	11*	6.05 J*	4 J	4.6 J	3.1J	--
MW-18B	--	--	--	--	7.7	<5	<5D	<100	<50	<5	<50J	<50	<17.5*	<5	<10	<5	<5	<5	<5
MW-19B	--	--	--	--	2.4 J	1.0DJ	0.28J	0.35J	<5	<5	<5J	<10	<5	<5	<5	<5	<5	<5	<5
MANHOLES																			
MH-1	--	--	--	--	<5	3.6BJ	0.59J	<5	<25*	5.0	4.5J	3.5 J	1.5 J*	5.3 J*	4.8 J	<5	3.5 J	1.8J	--
MH-2	--	--	--	--	<5	3.3BJ	0.82J	<5	<25	5.1	4.2J *	4.3 J	<50	3.1 J	4.6 J	<5	3.6 J	1.5J	--
MH-3	--	--	--	--	<5	5.8B*	0.74J*	<5*	1.4J	7.65*	5.7J	5.8*	2.6 J	8.1 J	8.45 J*	<5	4.4 J	1.8J	--

Units: ug/L
J indicates an estimated value
B indicates the analyte was found in an associated blank.
D indicates sample was diluted
NS indicates that MW-16B could not be sampled due to insufficient water volume in the well
NYSDEC (1991) (TOGS 1.1.1) Standard for TCE is 5ug/L
* indicates reported concentration is average value of sample and duplicate sample concentrations
** indicates reported concentration of duplicate, sample is non-detect with an MDL of 200 ug/L

Appendix B
Analytical Results for Cis- +Trans-1,2-Dichloroethene (ug/L)
1999 through 2010
Former Carborundum Company, Hyde Park Facility

Monitoring	Sample Date																		
Well	Aug-92	May-96	Nov-97	Oct-99	Oct-00	May-01	Nov-01	May-02	Oct-02	May-03	Nov-03	May-04	Oct-04	Nov-05	May-06	Oct-07	Apr-08	Oct-09	May-10
OVERBURDEN MONITORING WELLS																			
MW-1A	14	--	<5	<5	2.4 J	0.78J	0.96J	0.75J	0.61J	0.45J	0.59J	0.80 J	2.0 J	1.4 J	<5	<5	<5	<5	--
MW-2A	<10	--	<5	<5	1.2 J	0.46J	1.7J	0.28J	14	0.63J	0.38J	<5	<5	<5	<5	9.8	0.38	<5	<5
MW-3A	<10	--	<5	1J	1.5 J	1.7J	1.4J	3J	1.1J	1.3J	0.78J	1.6 J	<5	0.90 J	1.6 J	0.9	0.71	<5	--
MW-4A	230	--	49	30	74	140	110D	390D	160	170D*	250J	370	240	250 D	425 D*	203.2	203.1	115.7	254.9
MW-5A	1900	--	110	14	320	116DJ*	220D	110	32	300D	16J	210 D	580 D	300 D	150 D	2.6	37.35	5.9	110.97
MW-7A	--	1200	5206	2900	4800	2200	3400D	2600	2100	1800D	2000DJ	2200	1650 D*	1950 D*	2100 D	580	1706.1	210	65
MW-10A	--	690	1212	1200	1200	790DJ	865D*	950*	990	655*	640J	760	620	660 D	540	312	400	409.4	397.6
MW-11A	--	<10	<5	<5	1.3 J	<5J	2.67J*	<5*	0.34J	<5	<5J *	<5	<5	<5	<5	<5	<5	<5	<5
MW-12A	--	430	120	130	540	270J	340	510D	260D*	170	200DJ	210 D	230 D	200 D	190	151.3	131	64	16
MW-13A	--	<10	<5	<5	<5	<5J	0.26J	<5	<5	<5	<5J	<5	<5	<5	<5	<5	<5	<5	--
MW-14A	--	<10	<5	<5	1.6 J	0.69J	250D	2J	12	0.82J	4.0J	2.1 J	2.3 J	2.3 J	1.7 J	1.6	1.5	1.4J	--
MW-16A	--	--	--	--	NS	77D	81D	47D	42	26	33J	26	20	21	14	12	9	8.2	10
MW-17A	--	--	--	--	230	260	260D	320	300	280	380DJ	350*	380 D	320 D	230	161.9	201.5	181.6J	211.4
MW-18A	--	--	--	--	47	30	33	34	33*	26	29.5J *	33	40	37	36	25.46	31.44	171.5J	51
MW-19A	--	--	--	--	33	4.1J	10	4.3J	5.8	3.2J	4.3J	4.0 J	4.0 J	5.2	4.3 J	4.2	3.2	3.7J	--
BEDROCK MONITORING WELLS																			
MW-1B	10	--	<5	6	4.7 J	1.1J	11	1.3	16	1.3J	2.2J	1.50 J	5.4	5.5	1.4 J	11	1.2	1.3J	--
MW-2B	2300	--	450	325	260	64	140D	110	150	87D	120J	86	85	90	62	48	41	9.1	3.7 J
MW-3B	18	--	5	4J	4.8 J	3.5J	1.96J*	3.55J*	3.4J	2.6J	2.7J	3.3 J	2.1 J	2.7 J	2.6 J	1.9	2.1	1.5J	--
MW-4B	130	--	45	33	39	30	29	33	18*	20	22J *	25	14	17	12	23	12	9.7	2.8 J
MW-5B	520	--	270	530	420	140J	170D	150	140	110D	110J	120*	110	87	74	61.66	58.5	39	36
MW-6	--	1000	595	480	560	360	300D	350D	250	220D	220J	230	220 D	210 D	170	130.52	150.39	85	39
MW-7B	--	370	110	89	84	40	46D	34	35	23	24J	26	21	18	14	11	10	7.3	--
MW-8	--	<10	6	5	5.55	4.4J*	4.4J	3.8J	3.2J	3.0J	3.4J	2.8 J	2.8 J	3.2 J	3.1 J	2.2	2.5	2.1J	2.3 J
MW-10B	--	1900	921	2100	1800	3200J	1100D	400	520	260*	320J	300	260	320 D*	220	221.9	191.4	373.8J	222 J
MW-11B	--	390	705	385	590	460J	320D	340D	190D	230	250DJ	280	150	140 D	120 D*	141	100.77	56	1.9 J
MW-12B	--	250	250	380	210	200J	170D	220	160	92	130J	160 D	120	150 D	110	111	141.6	2.6J	11
MW-13B	--	810	410	330	310	210DJ	220D	190	160D	120D	140DJ	130	140 D	110 D	110	83.1	68.53	88	46
MW-14B	--	310	765	330	300	280DJ	8.2	130D	200	170	150DJ	170*	130 D	130	130	56.42	120.85	64	16
MW-15	--	--	640	460	400	410DJ	390D	440D	340D	440	330DJ	310 D	400 D	340 D	300 D	171.7	191.5	57.1J	5.9
MW-16B	--	--	--	--	130	140	92D	55	290D	290	210DJ	290 D	250	320 D	310	210.88	281.4	511.8J	81
MW-17B	--	--	--	--	1000	505D*	740D	840	710	720	820	860	955*	985 D*	855 D*	443.4	638.5	282.2J	--
MW-18B	--	--	--	--	690	420	550D	370	290	270D	240J	240	190 D*	170	160	160.9	120.73	62	69
MW-19B	--	--	--	--	41	25D	14	66D	8.6	33	24 J	52	1.8 J	21	52	12	24	68	2.1 J
MANHOLES																			
MH-1	--	--	--	--	4.7 J	6.6	4.4J	<5	4.7J*	5.6	5.8J	2.5 J	3.2 J*	11.1 J*	5.7 J	0.45	5.8	2.1J	--
MH-2	--	--	--	--	<5	5.9	7.8 J	<5	4.4J	5.1	5.15J*	2.8 J	<50	8.8 J	5.5 J	<5	5.4	1.7J	--
MH-3	--	--	--	--	2 J	9.4*	5.8*	<5*	7.8J	7.5*	6.9J	4.0* J	<50	18 J	9.45 J*	0.69	6.9	1.8J	--

Units: ug/L
J indicates an estimated value
D indicates sample was diluted
NS indicates that MW-16B could not be sampled due to insufficient water volume in the well
NYSDEC (1991) (TOGS 1.1.1) Standard for DCE is 5ug/L
* indicates reported concentration is average value of sample and duplicate sample concentrations

Appendix B
Analytical Results for 1,1-Dichloroethane (ug/L)
1999 through 2010
Former Carborundum Company, Hyde Park Facility

Monitoring Well	Sample Date																		
	Aug-92	May-96	Nov-97	Oct-99	Oct-00	May-01	Nov-01	May-02	Oct-02	May-03	Nov-03	May-04	Oct-04	Nov-05	May-06	Oct-07	Apr-08	Oct-09	May-10
OVERBURDEN MONITORING WELLS																			
MW-1A	2	--	<5	<5	<5 J	0.29J	<5	<5	<5	<5	<5	<5 J	<5	<5	<5	<5	<5	<5	--
MW-2A	3	--	12	29	13 J	21	19	19	14	11	19	13 J	19	25	19	7.1	14	26	18
MW-3A	<10	--	<0.7	<5	<5	<5	<5	<5	<5	<5	<5	<5 J	<5	<5	<5	<5	<5	<5	--
MW-4A	2	--	<0.7	2J	4.6 J	5.4	6.2D	8.8J	7.8J	12*	15J	23 J	19 J	17	22*	12	15	17	21
MW-5A	<200	--	<5	<5	2.1 J	<5*	<5D	<25J	<5	1.1J	<5	0.96 J	2.8 J	1.4 J	0.82 J	<5	<5	<5	<5
MW-7A	--	<100	1500	690	1000	390	510D	430J	300J	280DJ	290	390 J	215 J*	345 D*	350 D	80	220	49	33
MW-10A	--	<250	18	22	25	11D	13.5D*	15J*	15J	<120*	10J	11 J	<120	11	7 J	4.5 J	5.8	6.4	5.7
MW-11A	--	<10	<5	<5	<5	<5	<5*	<5*J	<5	<5	<5 *	<5 J	<5	<5	<5	<5	<5	<5	<5
MW-12A	--	<50	<5	2J	5.9	2.2J	4.2J	3.1 J	3.7J*	<40	3.3J	3.3 J	3.4 J	3.4 J	3.2 J	3.2 J	2.2 J	2.7J	1.6 J
MW-13A	--	<10	<5	<5	<5	<5	<5	<5J	<5	<5	<5	<5 J	<5	<5	<5	<5	<5	<5	--
MW-14A	--	<10	<5	<5	<5	<5	<5D	<5	<5	<5	<5	<5 J	<5	<5	<5	<5	<5	<5	--
MW-16A	--	--	--	--	NS	<5	<5D	<5J	<10	<10	<20	<5 J	<10	<5	<5	<5	<5	<5	<5
MW-17A	--	--	--	--	59	75	75D	66	59	38J	48J	37 J	45	36	23	19	20	30	20
MW-18A	--	--	--	--	5.6	4.9J	6	5.5	5.3J*	3.8J	4.95J *	5.2 J	7.3 J	6.1	5.1	4.1 J	3.8 J	4.7J	4.2 J
MW-19A	--	--	--	--	<5	<5	<5	<5	<5	<5	<5	<5 J	<5	<5	<5	<5	<5	<5	--
BEDROCK MONITORING WELLS																			
MW-1B	3	--	<5	1J	1.5 J	1.70J	0.91J	1.3J	0.62J	0.87J	1.0J	1.2 J	<5	0.76 J	0.96 J	<5	0.71 J	5	--
MW-2B	<10	--	<5	0.5J	<5 J	2	<5	<10	<25	<5	<20	<20 J	<20	<5	<5	<5	<5	<5	<5
MW-3B	<10	--	<0.7	<5	<5	<5	<5*	<5*	<5	<5	<5	<5 J	<5	<5	<5	<5	<5	<5	--
MW-4B	<10	--	2	3J	3.2 J	2.5J	2.6J	2.8J	1.75J*	1.8J	2.05J *	2.1 J	1.6 J	1.8 J	1.3 J	1.4 J	<5	<5	<5
MW-5B	3	--	<5	1J	1.1 J	<5	<5D	<25J	<25	<5	<25	0.61 J*	<25	0.65 J	<5	0.38 J	<5	<5	<5
MW-6	--	<100	<5	<5	0.28 J	<5	<5D	<5	<50	<5	<50	<50 J	<25	<5	<10	<5	<5	<5	<5
MW-7B	--	<100	<5	<5	<5	<5	<5D	<5	<10	<5	<10	<10 J	<5	<5	<5	<5	<5	<5	--
MW-8	--	<10	<5	<5	<5	<5*	<5	<5	<5	<5	<5	<5 J	<5	<5	<5	<5	<5	<5	<5
MW-10B	--	<250	<5	3J	1.2 J	46	<5D	<100	<100	<50*	<50	<50 J	<50	0.84 J*	<20	0.69 J	0.54 J	<5	<5
MW-11B	--	<50	<5	0.7J	3.5 J	<5	<5D	1.4 J	0.45J	<50	1.6J	<50 J	<25	<5	<5*	0.39 J	<5	<5	1.3 J
MW-12B	--	<50	<5	2J	2.3 J	<5	<5D	<50	1.3J	<20	1.8J	1.5 J	<20	1.8 J	1.6 J	1.8 J	1.6 J	<5	<5
MW-13B	--	<100	<10	1J	0.91 J	<5	<5D	<50J	0.83J	0.58J	0.68J	<20 J	0.56 J	0.77 J	<10	0.61 J	0.48 J	<5	<5
MW-14B	--	<50	<5	0.8J	0.61 J	<5J	<5	0.62 J	<50	<25	0.38J	0.41 J*	<5	<5	<10	0.6 J	0.41 J	<5	<5
MW-15	--	--	<10	1J	0.95 J	<5	<5D	1.7J	1.1J	<100	<25	<25 J	<50	2 J	1.6 J	0.66 J	0.58 J	2J	<5
MW-16B	--	--	--	--	<5	<5	<5D	<10J	<25	<50	<10	<10 J	<50	<5	<20	<5	0.22 J	<5	<5
MW-17B	--	--	--	--	5.4	<5*	20D	40J	39J	28J	27J	26 J	26.5 J*	25.5*	22 DJ*	9.3	17.0	26.0	<5
MW-18B	--	--	--	--	<5	<5	<5D	<100	<50	<5	<50	<50 J	<17.5*	<5	<10	<5	<5	<5	<5
MW-19B	--	--	--	--	<5	<5	<5	<5	<5	<5	<5	<10 J	<5	<5	<5	<5	<5	<5	<5
MANHOLES																			
MH-1	--	--	--	--	<5 J	<5	<5	<5	<25*	<5	<5	<5 J	<5*	<50*	<25	<5	<5	<5	--
MH-2	--	--	--	--	<5 J	<5	<5 J	<5	<25	<5	<5 *	<5 J	<50	<20	<25	<5	<5	<5	--
MH-3	--	--	--	--	<5 J	<5 *	<5*	<5*	<25	<5*	<5	<5 J*	<50	<20	<25*	<5	<5	<5	--

Units: ug/L
J indicates an estimated value
D indicates sample was diluted
NS indicates that MW-16B could not be sampled due to insufficient water volume in the well
NYSDEC (1991) (TOGS 1.1.1) Standard for DCA is 5ug/L
* indicates reported concentration is average value of sample and duplicate sample concentrations

Appendix B
Analytical Results for Vinyl Chloride (ug/L)
1999 through 2010
Former Carborundum Company, Hyde Park Facility

Monitoring Well	Sample Date																		
	Aug-92	**May-96**	**Nov-97**	**Oct-99**	**Oct-00**	**May-01**	**Nov-01**	**May-02**	**Oct-02**	**May-03**	**Nov-03**	**May-04**	**Oct-04**	**Nov-05**	**May-06**	**Oct-07**	**Apr-08**	**Oct-09**	**May-10**
OVERBURDEN MONITORING WELLS																			
MW-1A	2J	--	<2	<10	0.44 J	1.4J	0.75J	1.1J	0.74J	0.73J	1.0J	0.74 J	3.0	1.7 J	0.63 J	<2	<2	<2	--
MW-2A	<10	--	<2	<10	<2	<2	<2	<2	5.5	<2	<2	<2	<2	0.52 J	<2.0	1.9 J	<2	1.3J	1.2 J
MW-3A	<10	--	<2	<10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	<2	<2	<2	--
MW-4A	13	--	32	47	45	24	40D	31	54	31*	46	34	48	57	33.5 D*	56	53	41	45
MW-5A	1300	--	14	1J	42	17DJ*	45D	15	7	120D	4.1	67 D	260 D	110 D	48 D	<2	16	1.8J	84
MW-7A	--	<1000	11	86	220	100	140D	170J	130J	120DJ	180	170 J	125*	205 D*	60 D	60	130	150	50
MW-10A	--	38	65	73	86	80DJ	95D*	160	240	115*	100	110	120	150 D	120	67	97	140	140
MW-11A	--	<10	<2	<10	<2	0.39J	<2*	0.34J*	<2	<2	<2 *	0.82 J	0.59 J	0.95 J	1.3 J	<2	0.7 J	<2	3.2 J
MW-12A	--	13	14	16	49	27J	51	34	49.5D*	26	41	33	38 D	34	27	39	23	38	16
MW-13A	--	<10	<2	<10	<2	<2J	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	<2	<2	<2	--
MW-14A	--	<10	<2	<10	0.37 J	<2J	59D	0.46J	4.6	<2	2.2	2.7	3.8	4.6	2.2	2.4	1.6 J	2.7J	--
MW-16A	--	--	--	--	NS	35DJ	48D	39	44	52	120	35	35	180 D	88	160	53	75	180
MW-17A	--	--	--	--	18	14	19D	19J	16J	20	27	21*	34	28	19	12	28	25	27
MW-18A	--	--	--	--	4.4	0.98J	8.3	2.3	3.1J*	1.6J	4.5 *	1.6 J	3.2 J	3.1	2.1	6.7	2.1 J	7	2.6 J
MW-19A	--	--	--	--	<2	<2	<2	0.3J	0.66J	0.78J	1.0J	0.69 J	<2	1.6 J	1.4 J	4	1.2 J	2.8J	--
BEDROCK MONITORING WELLS																			
MW-1B	<10	--	<2	2J	3.8	2	3	1.4J	19	1.3J	2.6	1.50 J	5.1	5.1	1.7 J	16	1.9 J	1.7J	--
MW-2B	66	--	59	46	92	15	60D	70D	100	60D	86	60	81	90	62	59	62	16	7.6
MW-3B	5	--	<2	2J	2.3	1.8J	2.6*	2.45	2.1	1.7J	2	1.90 J	2.6	2.6	2.0	2.2	2.2	2.9J	--
MW-4B	26	--	22	23	35	37	27	35	25*	18	23.5 *	20	19	17	14	11	13	9.5	12
MW-5B	75	--	33	61	45	13J	37D	38	54	44D	55	45.5*	59	58	44	49	57	37	39
MW-6	--	<100	68	68	91	72	55D	97D	72	84D	96	81	100	130 D	84	82	100	69	48
MW-7B	--	<100	23	40	39	23	33D	44D	44	6.2D	42	50	36	46	43	31	45	24	--
MW-8	--	<10	<2	2J	1.9 J	2.75*	2.5	2.6	2.0	1.9J	2.5	1.8 J	2.3	1.9 J	1.6 J	1.8 J	2.6	2.6J	2.2 J
MW-10B	--	120	52	210J	95	410J	100D	45	84	54*	82	1.8 J	80	115 D*	73	130	80	150	83
MW-11B	--	<50	56	69	81	88J	85D	80	79D	80	110D	1.8 J	66	80	66.5 D*	80	64	48	7.4
MW-12B	--	16	53	73	77	86J	100D	100	100	39	110	1.8 J	96	85	78	76	70	<2	<2
MW-13B	--	<100	31	35	40	27D	37D	33	36D	90D	81D	1.8 J	62 D	60	44	59	65	68	47
MW-14B	--	<50	65	63	110	50DJ	1.5J	48D	120	68	87D	1.8 J	99 D	98 D	86	49	90	86	33
MW-15	--	--	68	79	120	58DJ	93D	98	100D	110	100	1.8 J	130	120 D	97 D	86	93	82	17
MW-16B	--	--	--	--	35	22	34D	6	89	54	52	1.8 J	60	75	70	63	86	130	48
MW-17B	--	--	--	--	69	41D*	76D	94	81	92	100	1.8 J	125*	115 D*	69 D*	64	82	69	--
MW-18B	--	--	--	--	90	60	91D	88	100	140D	170	1.8 J	185 D*	180 D	170	140	180	220	190
MW-19B	--	--	--	--	6.3	2.2D	4.4	9.7	1.8J	5.9	7.9	1.8 J	<2	5.3	7.7	3.4	5.8	7.2	2.1 J
MANHOLES																			
MH-1	--	--	--	--	<2	<2	<2	<2	<10*	<2	<2	<2	<2*	<20*	<10	<2	<2	<2	--
MH-2	--	--	--	--	<2	<2	<2 J	<2	<10	<2	<2*	<2	<20	<8	<10	<2	<2	<2	--
MH-3	--	--	--	--	<2	<2*	<2*	<2*	1.2J	<2*	<2	<2*	<20	<8	<10*	<2	0.46 J	<2	--

Units: ug/L
J indicates an estimated value
D indicates sample was diluted
NS indicates that MW-16B could not be sampled due to insufficient water volume in the well
NYSDEC (1991) (6NYCRR Part 703) Standard for Vinyl Chloride is 2ug/L
* indicates reported concentration is average value of sample and duplicate sample concentrations