# REMEDIAL ACTION POST-CONSTRUCTION MONITORING
# 2006 ANNUAL REPORT
# DUPONT NECCO PARK
# NIAGARA FALLS, NY

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CORPORATE REMEDIATION GROUP
*An Alliance between*
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# LIST OF ACRONYMS

| | |
|---|---|
| ACO | Administrative Consent Order |
| ADQM | Analytical Data Quality Management |
| AO | Administrative Order |
| AOA | Analysis of Alternatives |
| CERCLA | Comprehensive Environmental Response, Compensation and Liability Act (Superfund) |
| CLP | Contract Laboratory Program |
| CMMP | Cap Maintenance and Monitoring Plan |
| CMT | Continuous Molded Tubing |
| CRG | DuPont Corporate Remediation Group |
| DCE | Dichloroethylene |
| DNAPL | dense nonaqueous-phase liquid |
| GWTF | Groundwater treatment facility |
| HCS | Hydraulic controls system |
| HCBD | hexachlorobutadiene |
| HDPE | high-density polyethylene |
| LGMP | Long-Term Groundwater Monitoring Plan |
| MDL | Method detection limit |
| MNA | Monitored natural attenuation |
| NYPA | New York Power Authority |
| NYSDEC | New York State Department of Environmental Conservation |
| O&M | operations and maintenance |
| PCE | tetrachloroethene |
| PDI | pre-design investigation |
| POTW | publicly-owned treatment works |
| PPB | parts per billion |
| PQL | Practical quantitation limit |
| PSM | Process Safety Management |
| QA | Quality Assurance |
| QAPP | Quality Assurance Project Plan |
| QC | Quality Control |
| RAR | Remedial Action Report |
| RAC | Remedial action contractor |
| ROD | Record of Decision |
| RW | Recovery Well |
| SAMP | Sampling, Analysis, and Monitoring Plan |
| SAR | Source Area Report |
| SFR | Subsurface Formation Repair |
| SOP | Standard operating procedure |
| SOW | Statement of Work |

| | |
|---|---|
| STL | Severn Trent Laboratories, Inc. |
| SVOC | Semi-volatile organic compounds |
| TCE | trichloroethylene |
| TOC | Total organic carbon |
| TVOC | Total volatile organic compounds |
| USEPA | United States Environmental Protection Agency |
| USGS | United States Geological Survey |
| VC | Vinyl chloride |
| VOC | volatile organic compound |
| WCC | Woodward Clyde Consultants |

# EXECUTIVE SUMMARY

This second Annual Report for the Necco Park Remedial Action has been prepared pursuant to Administrative Order (AO) Index No. II Comprehensive Environmental Response, Compensation and Liability Act (Superfund) (CERCLA)-98-0215 dated September 28, 1998, and issued by United States Environmental Protection Agency (USEPA). This report describes hydraulic and chemistry monitoring conducted in 2006 as required by the *Long-Term Groundwater Monitoring Plan,* dated April 2005 for the DuPont Necco Park Site located in Niagara Falls, New York.

The Necco Park Remedial Action consists of an upgraded cap over the landfill and a groundwater hydraulic control system (HCS). The HCS includes a network of five groundwater pumping wells and a groundwater treatment facility (GWTF). Construction and startup of the HCS and GWTF was substantially complete on April 5, 2005. Thereafter, the systems have been operated in accordance with the Operations and Maintenance Plan (O&M Plan). System operation uptime for 2006 was 92.2%. Discounting scheduled maintenance shutdowns, system uptime for 2006 was 95.4%. Summaries of system operations and hydraulic head data have been provided to the USEPA and the New York State Department of Environmental Conservation (NYSDEC) previously in the 2006 Quarterly Data Packages. This Annual Report provides a detailed evaluation of system effectiveness with respect to the Performance Standards presented in the Necco Park Statement of Work (SOW).

Hydraulic monitoring data from 2006 show that overall the HCS has maintained hydraulic control of the source area. Improved hydraulic control is needed for the B- and C-Zones in the western portion of the site as a result of well yield reduction at pumping well RW-10. Groundwater sampling results from 2006 show an overall decrease in concentrations of total volatile organic compounds (TVOCs) for all flow zones compared to historical results. The 2006 results were compared to the zone-specific source area limits provided in the 100% design submittal for overburden and bedrock hydraulic controls. The 2006 results for the respective groundwater flow zones indicate a general reduction in the number of wells where solubility criteria are met.

Results of the 2006 monitored natural attenuation (MNA) evaluation are consistent with the 2005 results and previous findings indicating natural attenuation of site constituents is occurring under anaerobic degradation processes. Concentrations of site constituents have decreased in the majority of downgradient wells monitoring the B- through F-Zones. The presence of biochemical reaction products and microbial populations capable of degrading site constituents confirms MNA is providing beneficial groundwater remediation.

Approximately 151 gallons of dense nonaqueous-phase liquid (DNAPL) was recovered in 2006. Approximately 97% of the DNAPL was recovered from B/C-Zone Recovery Well 5 (RW-5). A total of 7,636 gallons of DNAPL has been removed since initiation of the recovery program in 1989.

In accordance with the recommendation of the 2005 report, well rehabilitation of recovery well RW-10 was completed in 2006 to improve well efficiency. Though not a recommendation of the 2005 report, a B-Zone piezometer was installed as part of the RW-10 well rehabilitation effort to monitor the effectiveness of the rehabilitation and to enhance B-Zone monitoring in this portion of the site. Results of the RW-10 rehabilitation were not successful in improving long-term well efficiency. Measures to improve effectiveness of B/C-Zone hydraulic control in this area of the site will be completed in 2007. The installation of two new D/E/F-Zone piezometers clusters was completed in 2007 to enhance the monitoring network for the lower bedrock on the landfill. This work was the result of a recommendation of the 2005 report.

All remaining landfill cap construction activities were completed in 2006. Contract punch list items including overseeding the crown and south slope of landfill, vegetative cover soil replacement south of the acid tank, removing stone check dams and sediment from ditch, and extending gas vents were completed. Now that permanent vegetation is established, landfill cap activities have transitioned from construction to maintenance activities and are conducted in accordance with the Cap Maintenance and Monitoring Plan (CMMP).

# 1.0 PROJECT DESCRIPTION

## 1.1 Site Background

The DuPont Necco Park site is located approximately 1.5 miles north of the Niagara River in a predominantly industrial area of Niagara Falls, New York (see Figure 1-1). Necco Park is a 24-acre inactive industrial waste disposal site that was originally used as a recreational park by the Niagara Electrochemical Company (from which Necco is derived). Necco Park is bounded on three sides by disposal facilities. Immediately north and east of the site lies the Newco solid waste landfill, an active Subtitle D facility owned by Allied Waste. Immediately south of the site are three inactive hazardous waste landfill cells and a wastewater pre-treatment facility owned by CECOS International, Inc. An access road and a CSX right-of-way bound the site to the west. Land in the vicinity of the site is predominately zoned for commercial or industrial use. Major manufacturing facilities are located within one mile of the site. Durez Chemical is located approximately 2,000 feet north of the site. The nearest residential neighborhoods are located approximately 2,000 feet to the south and 2,500 feet to the west.

As part of the initial investigations conducted at the site, an operational history for the site from the mid-1930s to 1977 was developed based on available records and interpretation of historical aerial photographs. During that period, the site received a number of liquid and solid wastes generated from a variety of processes operated at the nearby DuPont Niagara Plant. These wastes included flyash, sodium salts and cell bath residue (i.e., barium, calcium, and sodium chlorides), cell and building rubble, chlorinolysis wastes, and off-grade products. Liquid wastes were generally disposed of in shallow earthen lagoons on the southeastern portion of the site; the remainder of the site functioned primarily as a solid waste landfill.

Documentation of activities at Necco Park prior to 1964 is limited. The following wastes were disposed of in the largest quantities:

- Flyash
- Building demolition and miscellaneous plant debris
- Sodium sludge waste salts, cell bath, and floor sweepings (i.e., barium, calcium, and sodium chloride)
- Sodium cell rubble (i.e., thermal brick, corroded steel)
- Polyvinyl acetate solids and stilling bottoms (i.e., vinyl acetate with high boiling tars)
- Chlorinolysis wastes (i.e., high boiling residues including hexachlorobenzene, hexachlorobutadiene, and hexachloroethane)
- Liming residues [i.e., sludge saturated with trichloroethylene and tetrachloroethene (TCE and PCE)]
- Scrap organic mixtures, off-grade product

- Glycol polymer (Terathane®) scrap (i.e., filter press cloth, filter press sludge)
- Refined adiponitrile wastes (high boiler wastes)

In 1977, Necco Park was identified as a potential source of groundwater contamination, and disposal activities were promptly discontinued.

## 1.2 Regulatory Background

In February 1977, New York State Department of Environmental Conservation (NYSDEC) requested that DuPont take action to investigate and remediate groundwater contamination at Necco Park. The site was closed, and groundwater investigations were initiated in September 1977. In January 1988, DuPont and the USEPA agreed to a Consent Decree that specified additional investigations, reporting requirements, and other legal issues pertaining to the site. In October 1989, DuPont and the USEPA signed an Administrative Order on Consent, which stipulated the completion of investigation activities and an assessment of response action alternatives for the site.

In March 1998, DuPont and the USEPA agreed upon a Statement of Work (SOW), (USEPA, 1998a) defining the scope and performance standards for remedial design and remedial action (RD/RA) activities at the site. On September 18, 1998, a Record of Decision (ROD) was issued by the USEPA for the Source Area Operable Unit (USEPA, 1998b). Details of the ROD contents and requirements are presented in Section 3.6.1.

On September 28, 1998, the USEPA subsequently issued the final Administrative Order (AO), Index No. II CERCLA-98-0215 (USEPA, 1998), requiring DuPont to conduct the RD/RA program at the site. Pursuant to the AO, the work to be performed was to, at a minimum, achieve the requirements of the SOW and be performed in a manner consistent with the AO.

## 1.3 Site Geology and Hydrogeology

Overburden at the site consists of reworked native glacial deposits and fill materials. Fill materials south of the landfill consist primarily of slag with an average thickness of 8 feet. Undisturbed glaciolacustrine silts, sands and clay have been identified beneath the properties adjacent to Necco Park. Overburden thickness at the site ranges from less than 2 feet in the southwest area to greater than 25 feet in the southeast area. A glacial till consisting of a silty to sandy clay with varying amounts of gravel underlies the glaciolacustrine deposits. The till and glaciolacustrine deposits have a characteristically low permeability. The saturated zone within the overburden is referred to as the A-Zone. A discontinuous top-of-clay saturated zone (AT-Zone) is present above the native sediments at some locations. Horizontal flow direction in the A-Zone is across the site from the north to the south. The vertical gradient is generally downward from the A-Zone to the upper bedrock zones [Woodward Clyde Consultants (WCC), 1993].

Bedrock at the site is classified as the Middle Silurian Lockport Formation. The Lockport is subdivided into five principle members: Oak Orchard Member, Eramosa Member, Goat Island Member, and Gasport Member. Underlying the Lockport Formation is the Clinton Group, which includes the DeCew Dolomite and Rochester

Shale as its upper two members. The Rochester shale is a regional aquitard. The Lockport is generally described as a brownish gray to dark gray, fine to medium grained dolomite that contains vugs and carbonaceous partings, stylolites, and poorly preserved fossil remnants (Zenger, 1965).

The geologic makeup of A-Zone overburden materials south of the landfill are such that hydraulic conductivity and transmissivity are low. Glaciolacustrine silts and clays overlie a glacial till consisting of a stiff clay with varying amounts of silt, sand, and gravel. The till and glaciolacustrine clay south of the landfill have characteristically low hydraulic conductivities, ranging from $1 \times 10^{-4}$ to $1 \times 10^{-6}$ cm/sec. The CECOS secure cells utilized the existing low hydraulic conductivity lacustrine clay layer in the design of their cells. The predominant hydraulic gradient in the A-Zone is downward to the more transmissive underlying B-Zone.

The vertical distance between the bottom of the A-Zone and the uppermost bedding plane fracture zone (B-Zone) is approximately three to five feet. Pumping tests conducted as part of the remediation system design found that groundwater pumping from the upper bedrock causes substantial drawdown response in the A-Zone.

A series of water-bearing horizontal bedding plane fracture zones have been identified during previous site investigations. These fracture zones, designated as hydrogeologic zones B- through G-Zones (Johnson, 1964), can be traced horizontally for miles and correspond well with bedding plane fracture zones identified during construction of the New York Power Authority (NYPA) conduits. Pumping tests conducted in these zones indicate groundwater flow beneath the site occurs primarily through these horizontal fracture zones. In general, these zones are characterized by relatively high horizontal hydraulic conductivity and semi-confined response to hydraulic stress. Vertical fractures are most prevalent in the upper 30 feet of the Lockport Formation where stress relief and solutioning have been the most pronounced. The underlying Rochester Shale Formation generally acts as a confining layer and restricts further downward groundwater migration.

Outside the influence of the existing site groundwater recovery wells and grout curtain, groundwater in the upper bedrock (B- and C-Zones) generally flows to the south and groundwater in the lower bedrock (D-, E-, and F-Zones) generally flows to the west and southwest. Groundwater flow in the B- and C-Zones is toward the Falls Street tunnel storm sewer, located approximately 2,400 feet south of the site. Studies of regional groundwater flow in the Niagara Falls area by the United States Geological Survey (USGS) indicate this tunnel acts as a line discharge for the upper Lockport groundwater along its entire length. Groundwater from the D- though G-Zones flows toward the NYPA conduit drain system located approximately 3,700 feet west of the site.

## 1.4 Source Area Remedial Action Documentation and Reporting

The approved remedy includes construction of the Bedrock and Overburden Source Area Hydraulic Controls and the Landfill Cap Upgrade. Completion of the remedy and compliance with the Performance Standards described in the SOW are documented in the Remedial Action Report (RAR). This 2006 Annual Report presents hydraulic and chemical monitoring results from the second year of operation of the hydraulic controls. In addition, the Annual Report includes historical groundwater chemistry results for assessment of trends in groundwater quality. An update of the landfill cap maintenance completed in 2006 is also provided. The primary cap work completed in 2006 included additional seeding to fully establish a vegetative cover.

The following documents are applicable to the Necco Park long-term monitoring program and this report:

- Long Term Groundwater Monitoring Plan (LGMP)
- Cap Maintenance and Monitoring Plan (CMMP)
- Sampling, Analysis, and Monitoring Plan (SAMP)
- Quality Assurance Project Plan (QAPP)
- DNAPL Monitoring and Recovery Plan
- Necco Park Source Area Report

With the exception of the Necco Park Source Area Report, these documents are included in the Necco Park Operations & Maintenance (O&M) Plan [DuPont Corporate Remediation Group (CRG), 2005]. The draft O&M Plan was submitted to USEPA in April 2005. A revised plan, which addresses Agency comments on the April 2005 submittal, was sent to USEPA and NYSDEC in November 2005. DuPont responded to additional EPA comments on the O&M Plan in September 2006. The Necco Park Source Area Report was submitted to the USEPA and NYSDEC in April 2001.

# 2.0 HCS OPERATIONS SUMMARY

The O&M Manual for the hydraulic control system (HCS) is provided as Appendix C in the O&M Plan. The O&M Manual has been prepared in accordance with DuPont Process Safety Management (PSM) guidelines and includes a technology description and standard operating procedures for the groundwater recovery and treatment system. The groundwater O&M Manual, in conjunction with vendor O&M Manuals, describes normal operation and shutdown procedures, emergency shutdown procedures, alarm conditions, and trouble-shooting and preventative maintenance procedures for the treatment system and hydraulic controls.

## 2.1 Operational Summary

Operational information for the HCS is provided in the 2006 Quarterly Data Packages (DuPont CRG 2007, 2006, 2006a, 2006b). A summary of system uptime, system uptime excluding scheduled maintenance downtime, quantity of groundwater treated, and dense nonaqueous-phase liquid (DNAPL) recovery quantities are as follows:

| | HCS Uptime (%) | HCS Uptime [excluding scheduled maintenance downtime] (%) | Groundwater Treated (Gallons) | DNAPL Removed (Gallons) |
|---|---|---|---|---|
| 1Q06 | 99.4 | 99.4 | 3,339,671 | 24 |
| 2Q06 | 97.3 | 97.3 | 3,486,835 | 74 |
| 3Q06 | 88.7 | 90.9 | 3,181,365 | 28 |
| 4QQ6 | 83.4 | 93.8 | 2,787,745 | 25 |
| **2006 Total** | **92.2** | **95.4** | **12,795,616** | **151** |

Due to a data collection error, the total number of gallons pumped from Recovery Well RW-9 and the total flow for the quarter were incorrectly reported. The Honeywell Experion™ PKS operating system was capable of recovering the lost data. The actual total gallons pumped and treated in 1Q06 is 3,339,671 (originally reported in the 1Q06 report as 2,889,134 gallons). The table below summarizes the reported quantities and the correction for each month of the first quarter 2006.

| | Total Pumped and Treated Gallons Reported | Total Gallons Reported from RW-9 | Corrected flow from RW-9 | Corrected Total Gallons Pumped and Treated |
|---|---|---|---|---|
| **Jan-06** | 1,018,781 | 256,216 | 427,774 | 1,190,339 |
| **Feb-06** | 899,701 | 235,334 | 376,090 | 1,040,457 |
| **Mar-06** | 970,652 | 250,801 | 389,024 | 1,108,875 |
| | 2,889,134 | **QUARTERLY TOTAL** | | 3,339,671 |

A summary of monthly groundwater quantities and uptime for each recovery well is provided in Table 2-1.

The groundwater treatment facility (GWTF) has remained fully operational throughout 2006, averaging 92.2% total system uptime through December 31, 2006. GWTF downtime has been minimized by continuously monitoring operating conditions and implementing mechanical and procedural changes to the process equipment and the Honeywell Experion™ PKS operating system. Excluding downtime incurred due to planned maintenance, total system uptime for 2006 was 95.4%.

GWTF downtime was a result of unexpected mechanical and process-related malfunctions, scheduled maintenance, and power failures. The following table summarizes GWTF downtime in 2006:

| Reason | Contributing Downtime % | Comments |
|---|---|---|
| Process Component Malfunction | 4.1% | Unexpected process-related downtime as a result of mechanical component failure. |
| Scheduled Maintenance shutdowns and system upgrades/inspections | 3.2% | Routine inspections, interlock verification, preventative maintenance, and mechanical upgrades to process-related infrastructure. |
| Power service disruption | 0.6% | Primarily due to inclement weather |

Scheduled maintenance shutdowns are based on operating conditions and the necessity to take corrective or preventative action to mitigate the need for future, larger scale maintenance. These shutdowns occur routinely to inspect, repair, and/or upgrade process-related components to ensure long-term operational success. Efforts to minimize downtime during planned maintenance shutdowns are employed. Influent tank capacity is utilized while maintenance occurs to minimize downtime. System enhancements and inspections to the GWTF contributing to operational downtime included the following:

- Enhanced Recirculation Line: The recirculation line is hand-valved at the base of each influent tank and each respective air stripper, allowing for a continuous recirculation of low pH water. This dissolves precipitate within the process lines. The addition of the recirculation line maximizes weekly chemical treating, in addition to increasing overall air stripping efficiency.
- Scheduled Annual Outage: From November 14, 2006 to November 20, 2006, the GWTF was shut down to allow for scheduled annual industrial maintenance and infrastructure inspection. The effluent lines to sewer and all process-related lines, air strippers, and tanks were cleaned with clean higher-pressure city water to remove solids that had accumulated. In addition to this outage, all pumps and process-related infrastructure were inspected and maintained as necessary.
- Acid Tank Inspection: Per Chemical Bulk Storage Regulations, the on-site Hydrochloric Acid was inspected on October 20, 2006.

## 2.2 GWTF Process Sampling

In accordance with the SAMP, quarterly process sampling is conducted to assess the effectiveness of the treatment system in removing volatile organic compounds (VOCs) from groundwater. Two influent samples (one from the B/C-Zone influent tank and one from the D/E/F-Zone influent tank) are collected. One effluent sample is collected from the combined effluent tank. The samples are analyzed for VOCs, semi-volatile organic compounds (SVOCs), total barium, dissolved barium, and sulfate. A summary of results for the process sampling conducted in 2006 is provided in Table 2-2.

In addition to the quarterly process sampling, groundwater samples were collected from the five recovery wells on August 22, 2006. The results were originally submitted in the 3Q06 Quarterly Data Package and are also included in Appendix B of this report.

## 2.3 Process Sampling Summary

A Significant Industrial User (SIU) permit with the Niagara Falls publicly-owned treatment works (POTW) regulates the treated groundwater effluent discharged from the site. Quarterly sampling conducted at the permitted discharge point (MS#1) demonstrates that the GWTF is operating as designed.

In June 2006, a quench line of city (potable) water which supplemented pumping at Recovery Wells 5 and 10 was eliminated, resulting in a significant reduction of potable water use and disposal. On average, flow was reduced by 2,026 gallons daily to MS#1 following the implementation of this change. Throughout 2006, the GWTF remained in compliance and is in good standing with the Niagara Falls POTW regarding the Wastewater Discharge Permit (SIU #64).

## 2.4 Recovery RW-10 Rehabilitation

In accordance with a recommendation of the 2005 Annual Report, measures were taken in 2006 to improve the yield of recovery well RW-10. The yield decreased considerably shortly after start-up of the GWTF in April 2005. Although an effective method for maintaining well yield on former open-bedrock hole pumping wells RW-1 and RW-2, acid addition directly into RW-10 had a limited effect on well yield.

During the week ending August 4, 2006, a more vigorous rehabilitation of RW-10 was conducted. Nothnagle Drilling was contracted to complete both physical (surging) and chemical (sulfamic acid) methods in an attempt to increase yield from the recovery well. The rehabilitation had a short-term effect in increasing well yield, but within weeks the well returned to pre-rehabilitation yield. As discussed in Section 5.1.2, measures will be taken in 2007 to enhance or replace well RW-10.

# 3.0 HCS PERFORMANCE

## 3.1 Hydraulic Head Monitoring

Groundwater hydraulic head measurements are the basis for determining control of groundwater flow in the overburden and bedrock groundwater flow zones by the HCS at Necco Park. Depth-to-water measurements and measuring point elevation data are used to calculate the elevation of groundwater and to generate hydrographs which show groundwater elevation trends in individual monitoring wells. These measurements are also used to generate potentiometric surface-contour maps, which depict groundwater elevation distribution for assessing flow directions and hydraulic gradients. Together, these data presentations are used to determine the extent and effectiveness of hydraulic control effect by the HCS at Necco Park. Potentiometric surface contour maps for the A-Zone through F-Zone include the zone-specific source area limits.

Quarterly groundwater level measurements collected during 2006 were presented in the Quarterly Data Packages (DuPont CRG 2007, 2006, 2006a, 2006b). Potentiometric surface-contour maps for the AT-Zone (top-of-clay), A-Zone (overburden), and bedrock zones B, C, D, E and F were also presented in the 2006 Quarterly Data Packages and are used in this report to assess effectiveness of hydraulic control of the HCS. Monitoring and recovery well locations are shown in Figure 3-1. A list of groundwater monitoring locations is provided in Table 3-1. As noted in Table 3-1, the list of wells used for hydraulic monitoring has been modified to include wells that enhance the monitoring program and eliminates wells that are obsolete or not needed to monitor hydraulic effectiveness of the HCS.

Long-term hydrographs for select wells and piezometers within each water-bearing zone are presented in Figures 3-2 through Figure 3-8. The hydrographs depict long-term groundwater hydraulic responses to startup and operation of the HCS.

Potentiometric surface-contour maps included in this report were selected from maps prepared and presented in the 2006 Quarterly Data Packages. Golden Software's SURFER™ program was used to interpolate water level data, develop potentiometric surface contours, and plot groundwater flow directions. A Kriging algorithm with a linear semi-variogram model and a slope of 1 was used as the standard method to interpolate groundwater elevations between wells, unless otherwise noted.

## 3.2 Hydraulic Control Assessment

### 3.2.1 AT-Zone and A-Zone

As discussed in Section 1.3, the overburden materials comprising the A-Zone are generally characterized by high clay content and low hydraulic conductivity. Groundwater flow in the A-Zone is primarily downward to the more transmissive fractured bedrock. The AT-Zone (also known as the top-of-clay zone) is a thin zone of saturation above the A-Zone. It is not a continuous zone and is absent in the western portion of the site where the overburden thickness diminishes and within portions of the Necco property footprint where excavation/landfilling activities have eliminated any AT/A-Zone distinction.

Figures 3-9 and 3-10 present typical AT-Zone and A-Zone potentiometric surface contours (December 1, 2006) resulting from continuous operation of the HCS.

### Long-Term Response to HCS Operation

Long-term AT and A-Zone baseline (non-pumping) hydraulic conditions were established on April 5, 2005, after the shutdown of the former pumping well network and Interim Treatment System on April 1, 2005 and prior to the startup of the HCS. Calculated AT-Zone and A-Zone long-term drawdowns (expressed as positive numbers) are presented in Tables 3-2 and 3-3, respectively. The tables indicate that the HCS has maintained drawdowns in 2006 in both the AT-Zone and A-Zone.

AT-Zone long-term 2006 drawdowns for selected piezometers ranged between -0.82 and 7.5 feet (see Table 3-2). As can be seen in Table 3-2, a vast majority of the calculated response are consistently positive (i.e. true drawdown). This indicates substantial dewatering of the AT-Zone has been maintained by the continued operation of the HCS. All selected AT-Zone piezometers remained below their pre-startup elevations in 2006 except for 193AT on March 13, 2006 and December 1, 2006. On both occasions, significant precipitation events occurred immediately before the water level monitoring event. A plot of December 1, 2006, AT-Zone drawdowns is presented in Figure 3-11.

A-Zone long term 2006 drawdowns for selected wells ranged between -0.73 and 12.38 feet (see Table 3-3). Once again, as can be seen in Table 3-3, a vast majority of drawdowns are consistently positive. This indicates substantial dewatering of the A-Zone has been maintained by the continued operation of the HCS. Drawdowns for the selected A-Zone piezometers remained below their pre-startup elevations in 2006 except for 150A and 159A. A-Zone locations 150A and 159A are at the limits of expected hydraulic control. A plot of December 1, 2006, A-Zone drawdowns is presented in Figure 3-12.

### AT and A-Zone Hydraulic Control

In both the AT-Zone and A-Zone, rapid responses to the short-term changes in groundwater levels in the HCS recovery wells were observed and presented in the 2005 Annual Report. The magnitude of observed drawdowns and the rapidity of responses provide additional evidence that the AT and A-Zones are vertically dominated flow regimes.

Vertical gradients are generally downward (negative) between both the AT/A-Zones and A/B-Zones as presented in Tables 3-4 and 3-5 and shown in Figures 3-13 and 3-14. The upward gradient at the 185AT/A pair is likely a reflection of slightly overlapping well screens at that location, which is a result of the absence of any appreciable A-Zone thickness below the clay layer. The upward gradient at the 119AT/A pair is likely due to structural effects within the landfill.

### 3.2.2 B and C Bedrock Water-Bearing Zones

Groundwater flow directions in the B-Zone were consistent throughout the 2006 period of HCS operation; however, some decreases in hydraulic heads were observed between 3Q06 and 4Q06 water-level measurements (see Table 3-6 and Figures 3-15 and 3-16).

Hydraulic heads and groundwater flow directions in the C-Zone were consistent throughout the 2006 period of HCS operation. Typical 2006 C-Zone potentiometric contours are presented in Figure 3-17.

#### B-Zone

Groundwater elevation hydrographs along with potentiometric surface-contour maps illustrate the hydraulic effects of the HCS in the B-Zone. RW-4, RW-5, and RW-l0 have induced inward (toward the recovery wells) hydraulic gradients over a large area (see Figures 3-4, 3-15, and 3-16). B-Zone influence attributed to RW-4, RW-5, and RW-10 extends north to 102B, 120B, and 159B; west to 116B, 136B, and 163B; and south to 160B, 168B, and 169B.

The hydraulic depression between RW-5 and RW-10 was not as extensive in 4Q06 as in 3Q06 (collected only three weeks after RW-10 rehabilitation efforts). This is due to the recurrence of efficiency and yield losses at RW-10. A discussion of the well rehabilitation efforts at RW-10 is provided in Section 2.4. Measures to improve B-Zone efficiency at RW-10 in 2007 are discussed in Section 5.1.2.

Net drawdowns from static are presented in Table 3-6 and are calculated from May 4, 2004 static conditions. Drawdowns indicate that with the exception of 137B all reversals are outside the source area (146B, 149B, 151B and 163B). The reversal at 137B is likely a response to loss of efficiency a RW-10.

Improvements in the southward geographic extents of B-Zone drawdown in response to pumping from RW-5 have been observed, as exhibited by head reductions in the vicinity of 168B. The improved extents, as shown in Figures 3-12 and 3-13, indicate that RW-5 has been effective in reducing the head at 168B between August and December 2006, when typically monitoring wells exhibit a general seasonal rise in heads (Table 3-6 and Figure 3-16).

#### C-Zone

Groundwater elevation hydrographs along with potentiometric surface-contour maps illustrate the hydraulic effects of the HCS in the C-Zone. The C-Zone influence attributed to RW-4, RW-5, and RW-10 extends north to 115C, 123C, and 159C, west to 136C and south to 137C and 160C (see Table 3-7 and Figures 3-5 and 3-17).

Similar to the B-Zone, baseline hydraulic heads for comparison are from May 4, 2004. Generally, water levels remained below their baseline for the entire reporting period, with the exception of off site wells (146C and 151C) and the December 1, 2006 water-level round (see Table 3-7). The general rise in groundwater elevations in December 2006 is inexplicable and is postulated to be a function of a relatively warm and wet fall and early winter (i.e., nominal snow cover and high precipitation). This matter will be evaluated further with the first quarterly water level rounds of 2007.

Between the 3Q06 and 4Q06 water-level rounds, the steel casing at monitoring well 112C appears to have failed as indicated by an anomalous water level readings at a time of heavy precipitation (see Figure 3-5). Consequently, the 4Q06 groundwater elevation was not used to generate potentiometric contours. A replacement piezometer will be installed in 2007.

Former B/C-Zone recovery wells RW-1 and RW-2 will no longer be used for hydraulic monitoring because they span multiple zones. The wells will be abandoned in 2007 as they serve no useful purpose.

### 3.2.3 D, E and F Bedrock Water-Bearing Zones

Groundwater elevation hydrographs along with potentiometric surface-contour maps illustrate the effectiveness of the HCS in maintaining hydraulic control in the D, E and F-Zones (see Table 3-8, Figures 3-6 through 3-8 and 3-18 through 3-20).

The D/E/F-Zone monitoring well network was improved in 2006 with the addition of two piezometer clusters (202 and 203) in the northern portion of the site (see Figure 3-19). The piezometers were constructed using Solinst™ three channel Continuous Molded Tubing (CMT) technology.

In general, all D/E/F-Zone groundwater hydraulic heads remained below the May 4, 2004 baseline for the entire reporting period. Hydraulic gradients were toward the recovery wells throughout 2006 indicating the HCS is performing as designed.

### 3.2.4 Additional Hydraulic Monitoring Locations

Seven new piezometers were installed at the site in 2006: 201B, 202D, 202E, 202F, 203D, 203E, and 203F. Piezometer 201B was installed as part of the RW-10 well rehabilitation effort to monitor the effectiveness of the rehabilitation and to enhance B-Zone monitoring in this portion of the site. Well construction logs are provided in Appendix A.

Piezometer clusters 202 and 203 were completed using the Solinst's CMT well casing with three channels in one borehole to monitor the three deeper bedrock flow zones (D-, E-, and F-Zone). The original plan called for the installation of two E-Zone piezometers constructed using conventional methods for collection of E-Zone hydraulic head data on the landfill. Completing the boreholes to include D-Zone and F-Zones piezometers using the CMT system added minimal additional cost while providing four additional hydraulic monitoring points.

## 3.3 Groundwater Chemistry Monitoring

### 3.3.1 Background

Extensive monitoring has been conducted at Necco Park dating back to the early 1980s when groundwater investigations pursuant to the 1986 Consent Decree and the 1989 Administrative Consent Order (ACO) were completed. Pre-Design investigations in the early 2000s enhanced our knowledge of conductivity variations within the flow zones and assisted in the initial estimation of source area extents as introduced in the AOA and negotiated Statement of Work (SOW). Groundwater monitoring will continue per the LGMP to meet the following objectives as defined in the SOW:

- Monitor the effectiveness of the recovery wells in reducing chemical concentrations in the zone-specific source areas.
- Monitor the far-field groundwater chemistry to determine if the recovery system is controlling off-site migration of chemical constituents associated with the Necco Park site.
- Monitor the presence of DNAPL.
- Monitor natural attenuation and intrinsic bioremediation in the source area and far-field.
- Continue to evaluate the effectiveness of the remedial action.

The 2005 Annual Report, the first annual status report following completion of hydraulic control elements of the Necco Park remedy, included an extensive discussion of the first monitoring results and how these results compared to source area criteria introduced in the Analysis of Alternatives (AOA) report. This 2006 report provides an update of groundwater chemistry trends, MNA evaluation, and, as appropriate, an update of source area limits.

The list of wells used for long-term monitoring was prepared and is included in the LGMP. In accordance with the LGMP, chemical monitoring is conducted on a semi-annual basis during the first three years of system operation. Sampling frequency thereafter will be annual. Monitoring completed in 2006 represents the second year of semi-annual sampling. Locations of monitoring wells to be used for long-term monitoring are shown in Figure 3-1. Implementation of the long-term chemistry monitoring is discussed in Section 3.3.3.

### 3.3.2 Discussion of Results

Original source area limits were provided contained in the AOA report. As described in the Final (100%) Design Report for Bedrock and Overburden Source Area Hydraulic Controls, source area limits for the A-Zone, B/C-Zones, and D/E/F-Zones were reassessed using results from 2000 baseline groundwater sampling event. Sample results from the baseline event, in conjunction with historical DNAPL observations, were used to estimate source area limits as provided in the Source Area Report (SAR) (CRG, 2001). Source area limits presented in the report were used to determine Pre-Design Investigation (PDI) groundwater pumping well locations.

For the purposes of remedial design, the 2000 baseline and Phase 2 PDI groundwater sampling results were used to interpolate source area limits. One of the objectives of the Phase 2 PDI was to refine the southeast limits of the B/C-Zone source area based on Phase 1 PDI observations. Because refinement of the B/C-Zone source area required additional groundwater sampling and analysis, DuPont elected to include sampling of the lower bedrock to also refine the D/E/F-Zone source area limits. Pumping tests conducted during the PDIs and subsequent full-scale operation have shown that the HCS will achieve and maintain hydraulic control of flow-zone specific source areas defined in the 100% design submittal.

Results from the 2006 groundwater sampling have been compared to the same historically employed criterion to evaluate source area limits. Consistent with the AOA, any location where DNAPL was observed at least once was included in the source area. Groundwater chemistry data for the 2006 sampling events was also compared to solubility criteria to evaluate spource area extent. Consistent with previous assessments, these included effective solubility for a given compound and one percent of a given compound's pure-phase solubility.

Effective solubility is defined as the theoretical upper-level aqueous concentration of a constituent in groundwater in equilibrium with a mixed DNAPL. Effective solubility is equal to pure-phase solubility of a given constituent multiplied by the mole fraction of that component in DNAPL. Use of effective solubility criteria is believed to be more representative of sites with DNAPL that consist of relatively complex mixtures of organic compounds (Feenstra et al., 1991), such as those are found at Necco Park site. Calculated solubility criteria for DNAPL compounds evaluated during this study are presented in Table 3-9. A comparison of 2005 and 2006 data to the effective solubility and one percent of pure-phase solubility criteria are provided in Tables 3-10 and 3-11, respectively. A discussion of the results by flow zone is provided below.

### A-Zone

The A-Zone source area has been defined as the Necco Park property and a limited area south of the property line. The A-Zone source limits have not changed from those provided with the 100% design submittal. The 2006 sample results indicate no exceedances of the solubility criteria. The 2005 results included an exceedance of the one percent criteria at well location D-11. This well is located directly south of the landfill.

Monthly DNAPL observations conducted at A-Zone well locations in 2006 indicated no DNAPL present at the monitoring locations outside the landfill limits. Well 131A contained a trace amount of DNAPL during the May monitoring event.

Groundwater flow in the A-Zone is predominantly downward. Therefore, hydraulic control of the upper bedrock groundwater flow will capture flow from the A-Zone. Based on the results of the 2006 HCS monitoring, the system is effective in controlling the A-Zone source area.

### B/C-Zone

The B-Zone source limits have not changed from those provided with the 100% design submittal. Results for the B-Zone wells indicated no exceedances of the effective solubility criteria. The 2006 sample results from wells 145C and 168C support the 2005 annual report conclusion of a less extensive C-Zone source area.

Exceedances of the more conservative one percent solubility criteria at well location 172B for hexachlorobutadiene (HCBD) represent the limit of the B-Zone source area. As discussed in Section 3.5, TVOC concentrations continue to decrease at this location. Hydraulic control extends to this location. B/C-Zone wells that exceeded the one percent criteria include 105C, 137C, 139B, 171B, 172B, 136C, and 168C.

DNAPL observations at B and C-Zone well locations in 2006 indicate DNAPL in the upper bedrock is, for the most part, limited to the southeast portion of the site. These wells include 129C, 161B, 161C, RW-5, and former recovery well RW-2. DNAPL was observed once in 2006 at RW-2 compared to every month in 2005. Well 171B, located south of the CECOS Secure Cells, had traces quantities of DNAPL in 2006.

Well 105C, located on the landfill near known disposal areas, reported exceedances of the effective solubility and one percent pure phase solubility for a number of compounds. This well is used to monitor MNA in the source area.

Operation of recovery wells RW-4, RW-5, and RW-10 have achieved and maintained hydraulic control of the B/C-Zone source area. Diminished efficiency continues to be observed in RW-10. DuPont will take measures in 2007 to either enhance or replace recovery well RW-10.

#### D/E/F-Zone

The 2005 and 2006 analytical results from well 146E indicate no exceedances for either solubility criteria. The 2002 sample results for this location reported TCE above the more conservative one percent solubility criterion. As such, previously reported constituent concentrations at this location appear to be more indicative of aqueous constituents than the presence of DNAPL.

Based upon on an exceedance of the more conservative one percent of pure phase solubility criteria for HCBD, the southwest limit of the D/E/F-Zone source area limit lies between well locations 165 and 137, which is consistent with the 2005 results.

Well 105D, located on the landfill near known disposal areas, reported exceedances of the effective solubility and one percent pure phase solubility for a number of compounds. This well is used to monitor MNA in the source area.

Monitoring conducted during 2006 confirms that the operation of recovery wells RW-8 and RW-9 has achieved and maintained hydraulic control of the D/E/F-Zone.

### 3.3.3 Sample Collection and Analysis

In accordance with the LGMP, two groundwater sampling events were conducted in 2006. The first semi-annual sampling event was completed between April 24 and May 15, 2006. The second event was completed between October 23 and November 3, 2006. Severn Trent Laboratories, Inc. (STL) of Amherst, New York completed sampling with oversight by URS Diamond for DuPont CRG. Samples and associated quality assurance/quality control (QA/QC) samples were analyzed by STL located in North Canton, Ohio.

As described in the Necco Park SAMP, groundwater sampling was conducted using USEPA low-flow sampling methodology. Air-driven bladder pumps equipped with disposable Teflon bladders were used for sample collection. The pumps were fitted with dedicated Teflon-line high-density polyethylene (HDPE) tubing. All monitoring wells were purged and sampled at flow rates between 100 and 600 milliliters per minute to reduce potential sample volatilization. Geochemical parameters (pH, temperature, dissolved oxygen, oxidation/reduction potential, specific conductivity, and turbidity) were recorded at 5-minute intervals throughout the entire purging period to determine when stabilization was achieved. Geochemical parameters were considered stable when all parameter values were within 10 percent of the previously recorded value with the exception of plus or minus 0.2 units for pH.

Samples were collected at 46 monitoring well locations during the first semi-annual event and 56 locations during the second semi-annual event. The second round event included wells used for the MNA evaluation. The well locations are listed in Table 3-12. Analytical indicator parameters and MNA parameters are listed in Tables 3-13 and 3-14, respectively. Analytical results for the two sampling events conducted in 2006 are provided as Appendix B. For reporting purposes, the results are discussed as TVOCs. This is consistent with historic reporting where TVOCs are indicator compounds used to assess groundwater contamination and trends over time. Results for the respective flow zones are discussed below.

### 3.3.4 A-Zone

Results from the seven LGMP A-Zone wells indicate TVOC concentrations below 1,000 µg/l. The second round result for well D-11 (734 µg/l) represents the location of the highest reported A-Zone TVOCs. TVOC concentrations for the other A-Zone wells ranged from 0.33 to 507 µg/l. The overall low TVOC concentrations are consistent with the negligible horizontal gradient and the predominant downward gradient from the A-Zone to the B-Zone that has been enhanced by the HCS. A-Zone TVOC concentrations are 1 to 2 orders of magnitude less than nearby B-Zone monitoring locations. The 2006 results are consistent with historical results in that they show no significant off-site horizontal chemical migration in the overburden.

Compared to historical sample results, TVOC results at source area well D-9 and D-13 have decreased by an order of magnitude. Further discussion of groundwater chemistry trends for all flow zones is provided in Section 3.5.

### 3.3.5 B/C-Zone

#### B-Zone

Results from the 14 LGMP B-Zone wells indicate TVOC concentrations generally below 10,000 µg/l. TVOC concentrations at seven of the locations were below 100 µg/l. TVOC concentrations for wells near the B/C-Zone source area limits ranged from 5,000 to 25,000 µg/l. The highest TVOC concentration (68,200 µg/l) was reported for the sample collected at well 139B. This well is used for the MNA program. This well is located very close to the landfill and is well within the area of hydraulic control.

Key source area limit wells 171B and 172B show a continued TVOC decline in 2006. Biogenic daughter compounds including cis-1,2-dichloroethene and vinyl chloride dominate TVOC results at these well locations. The trend towards increased daughter compounds coupled with a near absence of source area constituents is evident at well location 171B based on a comparison of the 2005 to 2006 VOC results.

Compared to historical sample results, TVOC results at source area well 111B have decreased by two orders of magnitude. Far-field well 150B has decreased by an order of magnitude.

#### C-Zone

Results from the ten LGMP C-Zone wells indicate TVOC concentrations generally below 10,000 µg/l. This includes wells within the source area such as 136C. TVOC concentrations at well locations outside the source area limits were less than 100 µg/l and ranged from non-detectable to 57 µg/l.

Compared to historical results, well 145C continues to show a significant decrease in TVOC concentrations. The 2006 sample results indicate a short-term TVOC decrease at source area well 168C based on the second round results. The second round TVOC results of 2,276 µg/l were the lowest since sampling began at this location. The decrease in TVOC is significant considering DNAPL has been observed in this well.

### 3.3.6 D/E/F-Zone

#### D-Zone

Results from the eleven LGMP D-Zone wells indicate TVOC concentrations generally below 3,000 µg/l. This includes wells within the source area such as 139D and 165D. Consistent with 2005 results, biogenic daughter compounds including cis-1,2-dichloroethene and vinyl chloride dominate TVOC results for wells 136D, 145D, 147D, and 165D. With the exception of wells 136D and 145D, TVOC concentrations at well locations outside the source area limits were less than 200 µg/l and ranged from 0.30 µg/l to 169 µg/l. Monitoring has shown hydraulic control from the HCS extends beyond the D/E/F-Zone source area limits.

Compared to historical sample results, TVOC results at source area well 139D have decreased by an order of magnitude. A similar order of magnitude decrease in TVOC concentration was observed at this location in 2006. TVOC results for well 145D, located outside the source area limits, are stable discounting the low TVOC concentration for the 2005 second round event. TVOC concentrations at well 165D indicate a return to historically lower TVOC levels. The short-term TVOC increase is attributed to the elevated concentrations of biogenic daughter compounds.

#### E-Zone

Results from the six LGMP E-Zone wells indicate TVOC concentrations generally below 15,000 µg/l. TVOC results for well 136E, the closest E-Zone well to the landfill, were under 100 µg/l. Biogenic daughter compounds including cis-1,2-dichloroethene and vinyl chloride dominate TVOC results for all the E-Zone wells. With the exception of wells 145E, 146E, and 150E, TVOC concentrations at well locations outside the source area limits were less than 100 µg/l and ranged from 2 to 50 µg/l.

Compared to historical sample results, TVOC results at source area well 136E have decreased by two orders of magnitude. TVOC results for wells 146E and 150E located outside the source area limits, increased by an order of magnitude in 2005. This was not the case in 2006 where TVOC results either remained stable (146E) or decreased (150E). Biogenic daughter compounds including cis-1,2-dichloroethene and vinyl chloride dominate TVOC results at these well locations. As discussed in Section 3.6, the presence of these biogenic daughter compounds is a clear indication that natural attenuation processes are occurring in the far-field.

#### F-Zone

Results from the five LGMP F-Zone wells indicate TVOC concentrations generally below 20,000 µg/l, which is consistent with the 2005 results. Similar to the results from the E-Zone wells TVOC results for all the F-Zone wells are dominated by biogenic daughter compounds cis-1,2-dichloroethene and vinyl chloride. TVOC concentrations at well locations outside the source area limits (147F and 156F) were less than 200 µg/l and ranged from 2 µg/l to 198 µg/l.

Compared to historical sample results, TVOC results at far-field well 156F have decreased by two orders of magnitude. TVOC results at far-field well 147F have decreased by an order of magnitude.

### 3.3.7 G-Zone

Though not included in the SOW as a groundwater flow zone requiring hydraulic control, far-field wells 147G1, 147G2, and 147G3 are included in the long-term chemical monitoring program. TVOC concentrations from these well locations range from approximately 800 µg/l to less than 12,000 µg/l. TVOC results continue to be dominated by biogenic daughter compounds including cis-1,2-dichloroethene and vinyl chloride.

## 3.4 Data Quality Control/Quality Assurance

The 2006 semi-annual groundwater samples were submitted to STL in North Canton, Ohio for all chemical analyses except gas phase hydrocarbons (ethane, ethene, methane, and propane), which were analyzed at STL's Austin, Texas facility.

### 3.4.1 Sample Collection

Samples were collected in accordance with the scope and technical requirements defined in the Necco Park LGMP and QAPP.

#### April 2006 Groundwater Sampling

The samples were collected in accordance with the scope and technical requirements defined in the work plan and QAPP. Samples were submitted in 10 delivery groups received at the laboratories between April 25, 2006 and May 6, 2006. Based on laboratory receipt records, all samples were received in satisfactory condition, and within EPA holding time and temperature requirements. Field QC samples collected during the April 2006 sampling round included three field duplicates, eight equipment blank samples, and 10 trip blanks.

#### October 2006 Groundwater Sampling

The samples were submitted in 10 delivery groups received at the laboratories between October 24, 2006 and November 4, 2006. Based on laboratory receipt records, the samples were received in satisfactory condition and within EPA holding time and temperature requirements. Field QC samples collected during the October 2006 sampling round included four field duplicate pairs, 10 equipment blank samples, and 10 trip blanks. The October 2006 sampling round included collecting samples for gas phase hydrocarbons and the natural attenuation/water quality parameters. Due to a scheduling error with the laboratory, the natural attenuation parameters were not sampled or analyzed for well location 137B. The well was sampled for the routine chemical monitoring parameters.

### In-House Data Evaluation

The quality of the data was evaluated by the DuPont/URS Diamond Analytical Data Quality Management (ADQM) Group, using the analytical results provided in hard-copy data packages submitted by the laboratories in conjunction with an automated data evaluation of the electronic data deliverables. The laboratory data packages presented a review of the QA/QC procedures conducted by the laboratory and identified any issues that may have arisen during sample analyses.

The data packages provided by the laboratories were reviewed and verified by the ADQM Group for usability in accordance with the QAPP requirements and general guidance from USEPA Region II Data Validation Standard Operating Procedures (SOPs) and the USEPA Contract Laboratory Program (CLP) National Functional Guidelines. Quality control checks included in the in-house evaluation include blank and matrix spike recoveries, surrogate recoveries, laboratory control spike recoveries, and the field and laboratory duplicate precision requirements identified in the QAPP. Sample holding times were compared to method-specific criteria. Field and laboratory method blank results were compared to sample results.

The precision between the seven sets of field duplicate pairs was very good. The QAPP-specified goal of < 30% relative percent difference (RPD) was met for all field duplicates with the exception of 2,4,5-trichlorophenol, 2,4,6-trichlorophenol, 3-and-4-methylphenol, and iron in the 146E field duplicate pair collected on October 24, 2006. Other exceptions include 2,4,5-trichlorophenol, sulfide, and total organic carbon (TOC) in the 146F field duplicates collected on November 3, 2006, and trans-1, 2-dichloroethene in the 147D field duplicates collected on October 25, 2006.

A number of the semi-volatile analyses for both sampling rounds were repeated due to non-compliant QC spike recoveries in the initial analysis. In most cases, the samples were re-extracted and re-analyzed outside the 7-day holding time. For those samples where the out-of–hold analysis was reported, the data was qualified with a J flag (detect) or UJ (non-detect) to indicate a possible low bias in the analyte concentration due to the holding time exceedence. Several non-detect results in samples 151B and 151C, both collected on October 26, 2006 were qualified as unusable (R) because the sample preparation holding time was exceeded by more than 14 days. The qualified results have no bearing on source area definition because the qualified results were below the compound-specific criteria.

The non-detects reported for several of the semi-volatile compounds in wells 156D, 156E, 172B, 123D, and the field duplicate of 146E, all collected during the October round, and wells 147G3 and 123D, collected during the April round, were determined to be unusable due to very low surrogate and/or matrix spike recoveries. In most cases, the non-compliant recoveries were due to dilutions required for sample analysis. The qualified results have no bearing on source area definition as the qualified results were below the compound-specific criteria.

Dilutions required as a result of matrix interference and high levels of target compounds also affected a number of other volatile and semi-volatile matrix spike and surrogate recoveries for both rounds of groundwater samples. In all cases, except as noted above, the results were qualified J or UJ but were determined to be usable.

Several of the inorganic target analytes, including chloride, sulfate, alkalinity, nitrate-nitrite, and the metals iron, manganese, and barium, were detected in the equipment blanks and/or laboratory method blanks. The results for the associated well samples that were in the same concentration range as the blanks were qualified with a B flag.

All analytes reported between the laboratory method detection limit (MDL) and practical quantitation limit (PQL) were J qualified as estimated concentrations. The semi-volatile analyzed and reported as TIC -1 was also J qualified during the review process.

### 3.4.2 Independent Data Validation

In addition to the in-house evaluation, approximately 10% of the sample locations, plus the associated field and laboratory QC samples, for the April 2006 and October 2006 groundwater sampling rounds were submitted for independent data validation by Environmental Standards, Inc., Valley Forge, Pennsylvania. The wells were selected for validation based on importance to the program (source area limit wells), and include well locations 136D, 145C, 146E, 172B, and D-11. The complete validation reports are included in Appendix C. There were a number of validation qualifiers applied to the samples, however, the only results that were determined by the validator to be unusable were five semi-volatile results in the October 24, 2006 equipment blank sample.

## 3.5 Groundwater Chemistry Trends

An analysis of short-term and long-term groundwater chemistry trends has been completed to assess the effectiveness of the HCS and the former extraction system in reducing organic compound concentrations in groundwater. This analysis utilized TVOC concentration data from monitoring wells to identify chemistry trends in the flow zones units. The evaluation also serves to identify locations where TVOC concentrations exhibit significant changes (generally, changes greater than an order of magnitude). Where applicable, historical TVOC data have been used to assess long-term chemistry trends. TVOC concentration versus time plots for A-Zone overburden and bedrock B- through F-Zone monitoring wells are presented in Appendix D.

In general, operation of the HCS and the former groundwater recovery system, combined with the presence of the Subsurface Formation Repair (SFR), has contributed to an overall trend of declining TVOC concentrations in the A-Zone overburden and bedrock fractures zones. More recently, TVOC concentration decreases at several near source area and far-field wells are significant and coincide strongly with the onset of HCS operations in April 2005. Natural attenuation processes, as discussed in Section 3.6, are also contributing to the reduction in chemical mass in the bedrock fracture zones.

### A-Zone Overburden

Four of the seven wells used to monitor A-Zone chemistry, D-9, D-13, 137A, and 146AR exhibit a decreasing TVOC trend. With the exception of 146AR, these wells are located directly south of the landfill. TVOC results for the remaining A-Zone wells show no discernable trends. TVOC concentrations at these three wells: D-11, 145A, and 150A have been less than 1,000 µg/l since the 2000 baseline sampling event.

The 2006 results are consistent with historical results in that they show that there is not a significant downgradient plume in the overburden.

### B/C-Zone

B-Zone monitoring wells 111B, 150B, 171B, and 172B show a trend of decreasing TVOC concentrations. At source area well location 111B, TVOC concentrations have decreased by an order of magnitude since 1996. A long-term trend of decreasing TVOC is also observed at far-field well 150B, where TVOC concentrations have decreased by two orders of magnitude since 1998. A similar trend of decreasing TVOC concentration is also apparent at far-field well 149B.

Short-term TVOC decreases have occurred at key wells used to define source area limits including 171B and 172B. TVOC concentrations at these monitoring locations have decreased by an order of magnitude between the 2005 and 2006 sampling events. These short-term TVOC decreases coincident with the HCS startup demonstrate the effectiveness of the B/C-Zone extraction wells in hydraulically controlling the source area. Continued monitoring is necessary to determine if these declines persist, but TVOC concentration decreases of this magnitude at locations south of the site illustrate the effectiveness of the HCS.

Similarly, historical C-Zone chemical results indicate a decrease in TVOC at source area well 145C. This well has been historically used to define the C-Zone source area limit. The long-term decreasing TVOC trend may be associated with the long term reduction in off-site migration resulting from hydraulic gradient reversal across the source area limits (as described above for the B-Zone). Following an anonymously high TVOC increase for the 2006 first round event, results returned to a concentration reflective of the post-HCS startup sampling.

A marked decrease in TVOC concentration at well locations 145C and 146C was observed shortly after completion of the Subsurface Formation Repair (SFR) in 1989. The SFR increased the capture zones of the former groundwater recovery wells and reduced off-site chemical migration. Based on the widespread drawdown observed since it began operation, it is expected that the HCS will further enhance the C-Zone capture zone.

Another notable C-Zone trend is the decline in TVOC concentrations for far-field well 151C by an order of magnitude since 2000. From a historical perspective, TVOC concentrations have decreased three orders of magnitude. From a short-term perspective, the TVOC decrease at source area well 168C is also notable and illustrates the effectiveness of the HCS in controlling the C-Zone source area. The 2006 second round results represent an order of magnitude decrease in TVOC concentration compared to all previous sample results. The TVOC decline at well 168C is significant considering the observation of DNAPL in the well shortly after installation in 2002.

TVOC trend plots for the declining B-Zone and C-Zone wells show a direct correlation between HCS startup and decreasing TVOC concentrations. TVOC results for near source area wells including 171B, 172B, 150C and 168C illustrate that the hydraulic effects of the HCS extend to the southeastern portions of the B/C source limits.

### D/E/F-Zone

Historical TVOC results for the D/E/F-Zone indicate an overall pattern of decreasing or stable chemistry trends. TVOC concentrations at far-field wells 147F and 156F have decreased by two orders of magnitude since 1996. The 2006 results support this significant trend of decreasing TVOCs in the far-field. TVOC results for source area well 139D have shown a significant decease since 2000 and show a pattern of continuing TVOC reduction. The 2006 results represent an order of magnitude decrease in TVOC concentration compared to the 2000 results, from 33,900 µg/l to 2,146 µg/l. Results for well 136F show a moderate TVOC increase since 1996, but recent results are predominantly biodegradation daughter compounds whereas earlier results were mainly comprised of source area constituents. From a short-term perspective, TVOC concentrations decreased by an order of magnitude in 2006 at this location.

TVOC trend plots for far-field wells 146E and 146F show an overall decrease in TVOCs. The recent short-term TVOC increases at these locations (post-HCS start-up results) are attributed to the increased concentrations of cis-1,2-dichloroethene and vinyl chloride. A similar short-term TVOC increase was observed at well 165D where an increase in degradation compound concentrations resulted in a higher TVOC value.

TVOC concentration trends for the D/E/F-Zone wells also correlate to the startup of the HCS. As illustrated on the trend plots for wells 136D, 137D, 139D, 145E, 136F, 150F and 156F. TVOC concentrations have apparently decreased at these locations in response to the startup of the HCS. The TVOC decline at far-field well 156F is significant considering its location in the distant far field. Correspondingly, declining TVOC concentrations at far-field well 145E may be a result of the HCS sweeping upgradient, less contaminated groundwater to the system.

### G-Zone

TVOC results for wells 147G1 and 147G2 show no discernable pattern of increase or decrease. Biodegradation daughter compounds dominate TVOCs reported at these two locations. Well 147G3 has shown an increase recently, but the higher TVOC are attributed the presence of degradation compounds. A short-term TVOC decline, based on the 2006 results, is apparent at this location.

## 3.6 Monitoring Natural Attenuation (MNA) Assessment

This section focuses on the natural anaerobic biodegradation of chlorinated solvent compounds in groundwater at the Necco Park Site. Primary constituents of concern are the chlorinated ethene compounds PCE and TCE. Three isomers of dichloroethylene (DCE) are also present in groundwater (cis 1,2 DCE, trans 1,2 DCE, and, 1,1 DCE). In summary, biological reductive dechlorination is known to convert PCE to TCE, and TCE to cis 1,2 DCE. The bacteria *Dehalococcoides ethenogenes* is known to convert all three isomers of DCE to vinyl chloride (VC) and ultimately to the fully dechlorinated, non-toxic ethene. Based on the 2005 and historical sampling results, this bacteria is present in groundwater at the Necco Park site.

### 3.6.1 MNA Background

One of the requirements of the ROD for the Necco Park Source Area Operable Unit is to further characterize groundwater in the far-field area. As defined in the ROD, the far-field is the area of groundwater outside the source area where chemical constituents attributable to the Necco Park site have been found. The far-field aqueous plume is defined as the plume of dissolved constituents' downgradient of the source area. The 2005 report confirmed that concentrations of target constituents (PCE, TCE, and reduced by products) decrease as groundwater flows south and west away from the Necco Park site. Additionally, historical TVOC results showed significant reduction in target constituents over time. These results are consistent with a published reference showing active anaerobic microbial degradation transforming PCE and TCE to cDCE, VC, and ultimately ethene in all zones of the (Lee et al, 1993)

The initial MNA assessment for this site is contained in the 2005 annual report where data on the concentrations of chlorinated solvents in the groundwater and DNA results indicating the presence of a microbial population competent for degrading chlorinated ethenes were presented. The following report on 2006 groundwater conditions at Necco Park is intended as an update to the more comprehensive discussion provided in the 2005 report.

The three recognized lines of evidence for monitored natural attenuation of contaminants are as follows (USEPA, Monitored Natural Attenuation Directive, 1999):

- Reduction of contaminant concentrations over time or distance
- Geochemical data that demonstrate conditions favorable for contaminant destruction
- Microbiological data from field or microcosm studies that directly demonstrate the occurrence of a natural attenuation process and its ability to degrade contaminants of concern.

Based on *Dehalococcoides* analyses conducted and the conditions observed in the groundwater, all three of these lines of evidence are observed at Necco Park.

Details of the Necco Park MNA monitoring program are presented in the *Long Term Groundwater Monitoring Plan* (CRG, 2005a). The MNA monitoring wells were sampled for a full suite of MNA parameters in 2000 and more recently during the 2005 and 2006 semi-annual sampling events. The resultant data are discussed in the following sections for the B/C-Zones and the D/E/F-Zones.

### 3.6.2 B/C Zone Results

The results of the MNA monitoring program for the 13 B/C-Zone wells are shown in the figures in Appendix E. For each of the B/C-Zone wells, the data from the four sampling events are plotted as a function of time so that concentration trends are apparent.

Concentrations are plotted in mili-moles (molar equivalents) so that the relationships between parent compounds and daughter compounds (degradation products) are quantitatively accurate. Observations of data trends, along with select data from the most recent sampling event in parts per billion (ppb), are posted in the figures. A summary of the MNA results in all of the B/C-Zone wells is presented in Table 3-15.

### Downgradient B/C-Zone Wells

As shown in Table 3-15, concentrations of total chlorinated ethenes are decreasing in two of the four downgradient wells (145C and 151C), with a slight increase observed in well 149C and a significant increase observed in 145B. The well with the slightly increasing trend, 149C, has very low concentrations of total chlorinated ethenes consisting primarily of cDCE and VC. Well 145B showed a significant increase in total chlorinated solvents in 2006. However, the contaminant pattern in this well is dominated by cDCE and VC, and shows good ethene production, indicating degradation of PCE and TCE. Although the total chlorinated ethene trend in the downgradient B/C wells is mixed, where increases are observed the presence of ample amounts of dechlorinated ethenes, cDCE and VC indicates that in situ degradation of these compounds continues to be active. Additionally, ethene generation, is moderate to good in all the downgradient wells except for 151 C where chlorinated solvent levels are extremely low (<5 ppb for each Cl-ethene).

A summary of the geochemical parameters for the B/C-Zone wells are provided in Appendix B. Overall, these parameters continue to demonstrate highly reducing conditions favorable to biological reductive dechlorination. Dissolved oxygen is typically below 1 ppm. Redox potential is negative in all source area and downgradient wells, and is typically below -100 millivolts, and as low as -500 millivolts. Sulfide, an indicator of sulfate reducing conditions and methane an indicator of low redox conditions are present in all source area wells and downgradient wells. TOC is present in all wells at concentrations above 1 ppm, with concentrations as high as 3,000 ppm, demonstrating that ample electron donor supply is present to support biological reductive dechlorination. All pH values are neutral to slightly alkaline, also favorable for dechlorinating bacteria. As reported in 2005 quantitative Gene Trak, results support these data by indicating the presence of a native population of microorganisms competent for reductive dechlorination of chlorinated ethenes to ethene.

### Source Area B/C-Zone Wells

Similar to the results for the downgradient wells, the B/C zone source area wells exhibit flat to decreasing trends in total chlorinated ethenes, except for well 139B, which exhibits an increase. Concentration trends in the source area wells are difficult to interpret because they are within the hydraulic capture zone of the pumping system and do not represent consistent flow conditions. Reductions or increases in contaminant concentrations could be the result of pumping or changes in groundwater flow direction or velocity.

Significant concentrations of biodegradation daughter products are present in all the source area wells. VC is present in all of the source area wells at significant concentrations, and ethene production, when analyzed, is evident in all of the source area wells. These data indicate that there is active dechlorination in all the source area wells, even those that showed an increase in total chlorinated ethenes in 2006.

### 3.6.3 D/E/F-Zone Results

The results of the MNA monitoring program for the 14 D/E/F-Zone wells are shown in the figures in Appendix E. A summary of the MNA results in all of the D/E/F-Zone wells is presented in Table 3-16. Note that well 105D was not sampled in 2006.

#### Downgradient D/E/F Zone Wells

As shown in Table 3-16, concentrations of total chlorinated ethenes are decreasing in six of the eight downgradient wells and are essentially flat in two of the eight wells (147D and 148D). This overall downward trend in the downgradient wells indicates that the plume is shrinking in the D/E/F-Zone.

Similar to the trends observed in the B/C-Zone, ample daughter product generation is apparent in the D/E/F-Zone wells. Vinyl chloride is present in seven of the eight downgradient wells. The only well without VC is 148D, has very low TVOC concentrations, below detection limits for all VOCs except cDCE. Ethene, the fully dehalogenated end product, is present in six of the eight wells. The two wells with no detectable ethene, 156D, and 156E, are also very low concentrations of chlorinated ethenes, 3 ppb and 2 ppb, respectively.

A summary of the geochemical parameters for the D/E/F-Zone wells is provided in Appendix B. Similar to the B/C-Zone, these parameters demonstrate highly reducing conditions favorable to biological reductive dechlorination. Dissolved oxygen is in all cases below 1ppm. All redox measurements are negative and typically below –100 millivolts, extending as low as –368 millivolts. Sulfide is present in seven of the eight downgradient wells and in all three source area wells. The only well showing no sulfide, 148D, has very low TVOC concentrations with 0.88 ppb of cis-1, 2 DCE detected. Methane is present in all wells, and TOC is present at ppm levels in all source area and downgradient wells, ranging as high as 240 ppm in well 137D. All pH values are neutral to slightly alkaline, also favorable for dechlorinating bacteria.

As reported in 2005 quantitative Gene Trak, results support these data by indicating the presence of a native population of microorganisms competent for reductive dechlorination of chlorinated ethenes to ethene.

#### Source Area D/E/F-Zone Wells

Decreasing concentration trends are seen in all four D/E/F-Zone source area wells sampled in 2006. Concentrations decreased in well 165D between 2000 and April 2005, followed by an increase in concentrations from April 2005 to November 2005. In 2006 a decreasing trend in TCE, cDCE, and VC was observed while ethene increased. Due to the short-term and recent nature of the increase observed in 2005, it is believed that the increase is related to recent changes in source area groundwater pumping. Concentration trends in the source area wells are difficult to interpret because they are within the hydraulic capture zone of the pumping system and do not represent consistent flow conditions.

Vinyl chloride is present in all of the source area wells at significant concentrations, and ethene production is evident in all of the source area wells at rates ranging from weak to strong.

Significant biodegradation is occurring in the D/E/F-Zone source area, even in high-concentration wells such as 139D, where NAPL has been historically observed, and where some concentrations exceed the effective solubility and one percent pure phase solubility for a number of compounds. The strongest evidence is the presence of significant concentrations of the daughter products VC and ethene. Continuing high concentrations of parent compounds and total chlorinated ethenes are likely the result of continued dissolution of these compounds from sources that are not yet depleted.

## 3.7 DNAPL Monitoring and Recovery

As described in the LGMP and the DNAPL Monitoring and Recovery Plan, monitoring for the occurrence of DNAPL has been conducted routinely at the Necco Park site since the early 1980s. A monitoring and recovery program was instituted in 1989 to remove free-phase DNAPL from monitoring and groundwater recovery wells. The historically established monitoring program was modified based on results of the PDIs. The 2006 monthly DNAPL monitoring results are summarized in Table 3-17.

Consistent with the 2005 observations, the only new recovery well that has accumulated DNAPL is RW-5. This well and the other B/C-Zone recovery wells (RW-4 and RW-10) are equipped with dedicated air-driven pumps for DNAPL recovery. DNAPL recovery is accomplished by groundwater pumping, which entrains DNAPL droplets and draws them into the well where they settle, coalesce, and accumulate.

Approximately 151 gallons of DNAPL was recovered in 2006. Approximately 97% of the DNAPL was recovered from B/C-Zone recovery well RW-5. The only other location where a recoverable quantity of DNAPL was observed was monitoring well 161B. This well is located in the southeast portion of the site in close proximity to recovery well RW-5. Approximately 4 gallons of DNAPL was recovered from this well in January 2006. The total quantity of DNAPL recovered since the program has been in place is approximately 7,636 gallons.

# 4.0 CAP MAINTENANCE

Remaining punch list items for the 2005 landfill cap construction activities were completed in June and August 2006. The punch list items completed by the remedial action contractor (RAC) in 2006 included:

- Raise elevations of gas vents where required.
- Enhance drainage at Acid Tank and pad to prevent precipitation accumulation and erosion in immediate area.
- Replace vegetative cover and cover soil to prevent further erosion along south slope of landfill.
- Remove two south ditch check-dams and ditch sediments.
- Fertilize and overseed crown of landfill to establish dense, permanent vegetative cover.

The last item was completed under two RAC mobilization efforts to take advantage of ideal weather conditions needed to establish a permanent vegetation layer. Monitoring completed under the USEPA-approved winter stabilization plan identified areas where vegetation restoration and erosions controls were needed. Additional efforts to establish a vegetation layer were successful, resulting in the establishment of dense grasses in previously sparsely covered areas of the crown. All work was completed with oversight by the USEPA's consultant.

Now that permanent vegetation is established, landfill cap activities will transition from construction to maintenance activities and will be conducted in accordance with the CMMP.

# 5.0 CONCLUSIONS AND RECOMMENDATIONS

## 5.1 Hydraulic Control Effectiveness

### 5.1.1 Conclusions

Groundwater elevation hydrographs along with potentiometric surface-contour maps, calculated drawdowns, and calculated horizontal hydraulic gradients illustrate the effectiveness of the HCS in creating source area hydraulic control in the AT, A, B, C, D, E and F-Zones at the DuPont Necco Park site:

- AT-Zone: HCS is effective for the entire zone.
- A-Zone: HCS is effective for the entire zone.
- B-Zone: HCS is effective for entire zone; however, due to reduced efficiency of recovery well RW-10, the magnitude of control has been reduced in the western portion of the site during 3Q06 and 4Q06.
- C-Zone: HCS is effective for entire zone; however, due to reduced efficiency of RW-10; the magnitude of control has been reduced in the western portion of the site during 3Q06 and 4Q06.
- D-Zone: HCS is effective for the entire zone.
- E-Zone: HCS is effective for the entire zone.
- F-Zone: HCS is effective for the entire zone.

### 5.1.2 Recommendations

- Well rehabilitation methods conducted at recovery well RW-10 in 2006 improved yield for a brief period, but it is apparent that other measures such as enhancement/replacement of RW-10 is needed and will be completed in 2007. A proposal for RW-10 replacement is in progress and will be sent under separate cover.
- Replacement of compromised well 112C to continue C-Zone hydraulic monitoring in this portion of the site is recommended.
- Closure of former recovery wells RW-1 and RW-2.
- Installation of an A-Zone piezometer south of the CECOS secure cells at existing DuPont well location 168.

## 5.2 Groundwater Chemistry Monitoring

### 5.2.1 Conclusions

The 2006 and historical chemistry monitoring results indicate the following:

- An overall decrease in TVOC concentrations for all groundwater flow zones in the source area and far-field.
- A-Zone chemistry results are consistent with historical results in that they show no significant off-site horizontal chemical migration in the overburden.
- Short-term TVOC decreases have occurred at key B/C-Zone source area limit wells including 171B, 172B, and 168C.
- TVOC concentrations in the D/E/F-Zone are either stable or decreasing. TVOC concentrations at far-field wells 147F and 156F have decreased by two orders of magnitude since 1996.
- Analytical results for 2006 would not significantly change the A-Zone and B/C-Zone source area limits as delineated in the SAR.
- Analytical results for 2006 support the 2005 Annual Report conclusion of a reduced source area limit for the D/E/F-Zone as delineated in the SAR based on the analytical results from well 146E.
- Results from groundwater sampling events completed since the startup of the HCS show the effectiveness of the HCS in controlling zone-specific source areas.

### 5.2.2 Recommendations

The 2007 sampling program represents the last year of semi-annual groundwater sampling. In accordance with the LGMP, groundwater sampling frequency will revert to annually in 2008. An assessment of the 2007 sample results will be conducted to identify potential modifications to the chemical monitoring program, including analytical parameters and number of monitoring locations.

## 5.3 Monitored Natural Attenuation Assessment

### 5.3.1 Conclusions

Data on chlorinated ethenes in Necco Park is consistent with lines of evidence required for natural attenuation of contaminants (USEPA, Monitored Natural Attenuation Directive, 1999). Specifically, the results summarized above and in the 2006 report show the following:

- Contaminants in groundwater decrease along flowpaths from the source area to the downgradient zone.
- Geochemical conditions are indicative of low redox conditions required for reductive dechlorination.

- Microbial populations competent for the reductive dechlorination of chlorinated ethenes are present as evidenced by DNA analyses and the presence of reduced dechlorinated intermediates and ethene.

Overall, the general decreasing trend in total chlorinated solvents in both source area and downgradient wells and the presence of dechlorinated intermediates (cDCE, VC and ethene) strongly supports the interpretation that natural attenuation of chlorinated ethenes continues to occur at this site.

### 5.3.2 Recommendations

Continued MNA sampling to monitor the groundwater chemistry in the far-field and source area will continue at the frequency described in the LGMP. An assessment of the 2007 sample results will be conducted to identify potential modifications to the MNA program.

## 5.4 DNAPL Monitoring and Recovery

### 5.4.1 Conclusions

Results of the 2006 DNAPL monitoring and historical recovery efforts indicate the following:

- DNAPL was observed in only six of the 30 locations used for DNAPL monitoring.
- Observations were limited to B/C-Zone wells RW-2, RW-5, 129C, 161B, 161C, and 171B.
- Of the 151 gallons of DNAPL recovered in 2006, 97% was from recovery well RW-5.
- Approximately 7,636 gallons of DNAPL has been recovered since the recovery program was initiated in 1989.

Observations of DNAPL in 2006 were limited primarily to a few upper bedrock wells located in the southeast portion of the site. Monthly monitoring and removal, where encountered, will continue.

### 5.4.2 Recommendations

Continue DNAPL monitoring and recover DNAPL where encountered.

## 5.5 Landfill Cap

### 5.5.1 Conclusions and Recommendations

With establishment of a continuous vegetative cover the landfill cap construction is complete and will be now be maintained in accordance with the CMMP. All the contract punch list items identified in the 2005 annual report have been completed.

# 6.0 REFERENCES

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# TABLES

**Table 2-1**
**HCS Recovery Well Performance Summary***
**2006**
**DuPont Necco Park**

| | B/C-ZONE | | | | | | D/E/F-ZONE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **RW-4** | | **RW-5** | | **RW-10** | | **RW-8** | | **RW-9** | |
| | **Total Gallons Pumped** | **Uptime** | **Total Gallons Pumped** | **Uptime** | **Total Gallons Pumped** | **Uptime** | **Total Gallons Pumped** | **Uptime** | **Total Gallons Pumped** | **Uptime** |
| JANUARY | 9,134 | 100.00% | 225,619 | 100.00% | 79,489 | 98.39% | 448,323 | 100.00% | 427,774 | 100.00% |
| FEBRUARY | 8,441 | 97.77% | 171,826 | 100.00% | 95,225 | 95.39% | 388,875 | 98.66% | 376,090 | 100.00% |
| MARCH | 12,079 | 100.00% | 196,837 | 100.00% | 83,689 | 100.00% | 427,246 | 100.00% | 389,024 | 100.00% |
| APRIL | 14,406 | 100.00% | 208,408 | 93.89% | 81,988 | 99.86% | 422,107 | 100.00% | 473,177 | 100.00% |
| MAY | 11,537 | 87.16% | 202,581 | 95.43% | 66,141 | 97.04% | 393,507 | 96.10% | 437,650 | 96.10% |
| JUNE | 6,700 | 99.72% | 199,231 | 96.67% | 67,075 | 100.00% | 387,498 | 99.86% | 514,829 | 100.00% |
| JULY | 6,729 | 95.16% | 172,612 | 99.87% | 12,749 | 90.59% | 404,000 | 99.73% | 464,978 | 97.58% |
| AUGUST | 2,993 | 41.13% | 158,517 | 98.66% | 60,669 | 75.54% | 391,328 | 99.06% | 518,572 | 98.79% |
| SEPTEMBER | 5,082 | 96.81% | 179,094 | 94.17% | 54,035 | 76.53% | 315,096 | 83.61% | 434,911 | 83.61% |
| OCTOBER | 7,829 | 100.00% | 175,516 | 78.90% | 33,161 | 50.40% | 401,744 | 99.87% | 563,958 | 99.87% |
| NOVEMBER | 4,298 | 67.22% | 126,463 | 74.17% | 31,599 | 74.03% | 271,688 | 74.58% | 274,141 | 67.78% |
| DECEMBER | 3,130 | 95.43% | 167,584 | 95.43% | 35,759 | 95.43% | 329,936 | 88.84% | 360,939 | 88.84% |
| TOTAL / AVG. | 92,358 | 90.03% | 2,184,288 | 93.93% | 701,579 | 87.77% | 4,581,348 | 95.03% | 5,236,043 | 94.38% |

* Uptime totals include downtime as a result of routine scheduled maintenance.

**Table 2-2**
**GWTF Process Sampling Results**
**2006**
**DuPont Necco Park**
**Niagara Falls, NY**

| Analyte | | B/C INFLUENT | | | | D/E/F INFLUENT | | | | COMBINED EFFLUENT | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2/2/06 | 5/31/06 | 8/22/06 | 12/1/06 | 2/2/06 | 5/31/06 | 8/22/06 | 12/1/06 | 2/2/06 | 5/31/06 | 8/22/06 | 12/1/06 |
| **Field Parameters** | | | | | | | | | | | | | |
| SPECIFIC CONDUCTANCE | umhos/cm | 35640 | 31820 | 32420 | 38,960 | 4753 | 4623 | 4097 | 5002 | 11240 | 9859 | 72223 | 12,750 |
| TEMPERATURE | degrees C | 11.7 | 16 | 17.7 | 11.9 | 12.6 | 13.9 | 13.3 | 11.8 | 13.1 | 15.7 | 16.2 | 12.4 |
| COLOR | ns | grey | grey | grey | black | clear | cloudy white | Sl. Turbid | grey | clear | cloudy white | cloudy | grey |
| ODOR | ns | strong | | | moderate | strong | | | moderate | N/A | | | slight |
| PH | std units | 6.72 | 5.27 | 5.69 | 5.88 | 7.11 | 7.21 | 7.05 | 7.33 | 6.99 | 7.54 | 7.17 | 7.31 |
| REDOX | mv | -204 | -146 | -111 | -128 | -325 | -277 | -230 | -215 | -243 | -178 | -78 | -70 |
| TURBIDITY | ntu | 79.8 | 87.7 | 66.6 | 93.5 | 20.7 | 50.3 | 46.5 | 166 | 11.13 | 188 | 77.3 | 97 |
| **Inorganics** | | | | | | | | | | | | | |
| BARIUM, DISSOLVED | ug/l | 1190000 | 1120000 | 1020000 | 1430000 | 170 J | 480 | 170 J | 190 J | 1200 | 600 | 510 | 1,100 |
| BARIUM, TOTAL | ug/l | 1140000 | 1160000 | 1060000 | 1310000 | 160 J | 140 J | 120 J | 150 J | 92900 | 56500 | 20500 | 88,300 |
| SULFATE | ug/l | 670 J | <2400 UJ | 12300 J | 2,800 J | 710000 J | 746000 J | 824000 | 792,000 J | 269000 J | 420000 | 522000 | 296,000 J |
| **Volatile Organics** | | | | | | | | | | | | | |
| 1,1,2,2-TETRACHLOROETHANE | ug/l | 4200 | 4000 | 5100 | 7,400 | 2000 | 1500 | 1500 | 2200 | 1200 | 990 | 960 | 1,400 |
| 1,1,2-TRICHLOROETHANE | ug/l | 1300 | 1300 | 2600 | 2,600 | 3200 | 2500 | 2700 | 3200 | 610 | 790 | 710 | 1,000 |
| 1,1-DICHLOROETHENE | ug/l | 330 J | 300 J | 530 J | 520 J | 520 | 440 | 520 | 510 | <7.2 | <9.0 | <11 | <9.0 |
| 1,2-DICHLOROETHANE | ug/l | 450 J | 340 J | 850 J | 800 | 200 J | 130 J | 190 J | 210 J | 26 J | 27 J | 28 J | 53 |
| CARBON TETRACHLORIDE | ug/l | 860 | 740 | 1700 | 1,600 | 2200 | 1400 | 1700 | 1700 | <7.6 | <9.5 | <11 | <9.5 |
| CHLOROFORM | ug/l | 7800 | 6900 | 22000 | 16,000 | 7900 | 5300 | 6100 | 6500 | 120 | 180 | 120 | 400 |
| CIS-1,2-DICHLOROETHENE | ug/l | 12000 | 12000 | 17000 | 19,000 | 11000 | 9800 | 11000 | 13000 | 130 | 270 | 170 | 620 |
| TETRACHLOROETHENE | ug/l | 1900 | 1800 | 5300 | 4,200 | 2700 | 1900 | 1900 | 2200 | 46 | 21 J | 19 J | 37 J |
| TRANS-1,2-DICHLOROETHENE | ug/l | 640 | 640 | 850 J | 1,000 | 920 | 770 | 870 | 980 | <6.4 | <8.0 | <9.4 | 16 J |
| TRICHLOROETHENE | ug/l | 7100 | 8000 | 18000 | 14,000 | 14000 | 12000 | 11000 | 12000 | 50 | 110 | 58 J | 240 |
| VINYL CHLORIDE | ug/l | 3200 | 2900 J | 4700 J | 5,600 | 1700 | 1700 | 2600 J | 1900 | <8.4 | <10 | <12 | <10 |
| **Semivolatile Organics** | | | | | | | | | | | | | |
| 2,4,5-TRICHLOROPHENOL | ug/l | <120 | <48 | 120 J | <1,900 | 600 | 440 | 470 J | 550 J | 470 | 310 | 370 J | 400 |
| 2,4,6-TRICHLOROPHENOL | ug/l | <180 | <70 | 47 J | <2,800 | 320 | 190 J | 230 J | 300 J | 230 J | 150 J | 190 J | 200 |
| 3-METHYLPHENOL & 4-METHYLPHENOL | ug/l | 350 J | 340 J | 560 J | 870 J | 26 J | <0.75 | 18 J | 26 J | 97 J | 60 J | 81 J | 31 J |
| HEXACHLOROBENZENE | ug/l | <8.1 | <3.2 | <1.6 UJ | 870 J | <1.6 | <1.6 | <0.81 UJ | <1.3 UJ | 16 J | <1.6 | 7.1 J | 5.1 J |
| HEXACHLOROBUTADIENE | ug/l | 4100 | 1600 | 790 J | 66,000 | 110 J | 48 J | 59 J | 66 J | 1500 | 280 | 570 J | 360 |
| HEXACHLOROETHANE | ug/l | 740 J | 320 J | 450 J | 4,800 J | 27 J | <14 | 18 J | 13 J | 110 J | 19 J | 32 J | 17 J |
| PENTACHLOROPHENOL | ug/l | 270 J | 51 J | 520 J | 2,400 J | 1200 | 790 J | 820 J | 670 J | 1100 J | 540 J | 680 J | 560 |
| PHENOL | ug/l | 230 J | 200 J | 460 J | <1,900 | 46 J | 42 J | 50 J | 66 J | 89 J | 61 J | 96 J | 120 |
| TIC-1 | ug/l | 430099 J | 3100 J | 6800 J | 12,000 J | 63099 J | 950 J | 1100 J | 960 J | 91099 J | 490 J | 670 J | 290 J |
| TOTAL VOLATILES | ug/l | **39780** | **38920** | **78630** | **72,720** | **46340** | **37440** | **40080** | **44400** | **2182** | **2388** | **2065** | **3,766** |

< and ND = Non detect at stated reporting limit
J= Analyte present. Reported value may not be precise.
UJ= Not detected. Reporting limit may not be accurate or precise.
NS= Not sampled
NA= Not applicable

**Table 3-1**
**Hydraulic Monitoring Locations**
**Long-Term Groundwater Monitoring**
**DuPont - Necco Park**

| Well ID | Zone | Monitoring Frequency | Well ID | Zone | Monitoring Frequency | Well ID | Zone | Monitoring Frequency |
|---|---|---|---|---|---|---|---|---|
| *53+* | *A* | - - | 102B | B | Quarterly | 150C | C | Quarterly |
| 111A | A | Quarterly | **111B** | B | Quarterly | 151C | C | Quarterly |
| *117A+* | *A* | - - | 112B | B | Quarterly | 159C | C | Quarterly |
| 119A | A | Quarterly | 115B | B | Quarterly | 160C | C | Quarterly |
| 123A | A | Quarterly | 116B | B | Quarterly | 161C | C | Quarterly |
| 129A | A | Quarterly | 118B | B | Quarterly | 162C | C | Quarterly |
| 131A | A | Quarterly | 119B | B | Quarterly | 168C | C | Quarterly |
| 137A | A | Quarterly | 120B | B | Quarterly | 105D | D | Quarterly |
| *139A+* | *A* | - - | **123B** | B | Quarterly | 111D | D | Quarterly |
| **140A** | A | Quarterly | 129B | B | Quarterly | 115D | D | Quarterly |
| **145A** | A | Quarterly | 130B | B | Quarterly | **123D** | D | Quarterly |
| 146AR | A | Quarterly | 136B | B | Quarterly | 129D | D | Quarterly |
| 150A | A | Quarterly | 137B | B | Quarterly | 130D | D | Quarterly |
| 159A | A | Quarterly | 138B | B | Quarterly | 136D | D | Quarterly |
| 163A | A | Quarterly | 139B | B | Quarterly | *137D+* | *D* | - - |
| 173A | A | Quarterly | 145B | B | Quarterly | 139D | D | Quarterly |
| 174A | A | Quarterly | 146B | B | Quarterly | 145D | D | Quarterly |
| 175A | A | Quarterly | 149B | B | Quarterly | 148D | D | Quarterly |
| 176A | A | Quarterly | 150B | B | Quarterly | 149D | D | Quarterly |
| 178A | A | Quarterly | 151B | B | Quarterly | *158D+* | *D* | - - |
| 179A | A | Quarterly | 159B | B | Quarterly | 159D | D | Quarterly |
| 184A | A | Quarterly | 160B | B | Quarterly | 163D | D | Quarterly |
| 185A | A | Quarterly | 161B | B | Quarterly | 164D | D | Quarterly |
| 186A | A | Quarterly | 163B | B | Quarterly | *165D+* | *D* | - - |
| 187A | A | Quarterly | 167B | B | Quarterly | **202D** | D | Quarterly |
| 188A | A | Quarterly | 168B | B | Quarterly | **203D** | D | Quarterly |
| 189A | A | Quarterly | 169B | B | Quarterly | RW-8 | D/E/F | Quarterly |
| 190A | A | Quarterly | *170B+* | *B* | - - | RW-9 | D/E/F | Quarterly |
| 191A | A | Quarterly | 171B | B | Quarterly | 129E | E | Quarterly |
| 192A | A | Quarterly | 172B | B | Quarterly | 136E | E | Quarterly |
| 193A | A | Quarterly | **201B** | B | Quarterly | **142E** | E | Quarterly |
| 194A | A | Quarterly | BZTW-1 | B | Quarterly | 145E | E | Quarterly |
| D-11 | A | Quarterly | BZTW-2 | B | Quarterly | 146E | E | Quarterly |
| D-9 | A | Quarterly | *BZTW-4+* | *B* | - - | 150E | E | Quarterly |
| RDB-3 | A | Quarterly | D-23 | B | Quarterly | 163E | E | Quarterly |
| RDB-5 | A | Quarterly | D-10 | B/C | Quarterly | 164E | E | Quarterly |
| D-13 | A | Quarterly | D-14 | B/C | Quarterly | 165E | F | Quarterly |
| 119AT | AT | Quarterly | *RW-1+* | *B/C* | - - | **202E** | F | Quarterly |
| 129AT | AT | Quarterly | RW-10 | B/C | Quarterly | **203E** | F | Quarterly |
| 180AT | AT | Quarterly | *RW-2+* | *B/C* | - - | 112F | F | Quarterly |
| 184AT | AT | Quarterly | RW-4 | B/C | Quarterly | **129F** | F | Quarterly |
| 185AT | AT | Quarterly | RW-5 | B/C | Quarterly | 130F | F | Quarterly |
| 186AT | AT | Quarterly | *TRW-6+* | *B/C* | - - | 136F | F | Quarterly |
| 187AT | AT | Quarterly | *TRW-7+* | *B/C* | - - | **142F** | F | Quarterly |
| 188AT | AT | Quarterly | 105C | C | Quarterly | 145F | F | Quarterly |
| 189AT | AT | Quarterly | 112C# | C | Quarterly | 146F | F | Quarterly |
| 190AT | AT | Quarterly | 115C | C | Quarterly | 148F | F | Quarterly |
| 191AT | AT | Quarterly | 123C | C | Quarterly | 150F | F | Quarterly |
| 192AT | AT | Quarterly | 129C | C | Quarterly | 163F | F | Quarterly |
| 193AT | AT | Quarterly | 130C | C | Quarterly | 164F | F | Quarterly |
| 194AT | AT | Quarterly | 136C | C | Quarterly | 165F | F | Quarterly |
| *PZ-195AT+* | *AT* | - - | 137C | C | Quarterly | **202F** | F | Quarterly |
| *PZ-196AT+* | *AT* | - - | 138C | C | Quarterly | **203F** | F | Quarterly |
| *PZ-197AT+* | *AT* | - - | 139C | C | Quarterly | 130G | G | Quarterly |
| *MW-198AT+* | *AT* | - - | 145C | C | Quarterly | **136G** | G | Quarterly |
| *PZ-199AT+* | *AT* | - - | 146C | C | Quarterly | 141G | G | Quarterly |
| *PZ-200AT+* | *AT* | - - | 149C | C | Quarterly | 143G | G | Quarterly |

AT = Top-of-clay

Notes: 1. Wells monitored monthly January to April 2006. Water levels will be recorded quarterly thereafter. 2. Wells shown in **bold,** were added to the program in 2006. 3. Wells in *italics* followed by the + will no longer be used for long-term hydraulic monitoring. # Well 112C will be replaced in 2007.

**Table 3-2**
**Select AT-Zone 2006 Drawdowns**
**Post HCS Startup**
**DuPont Necco Park**

| Well | 04/05/05 | 01/19/06 | 02/27/06 | 03/13/06 | 03/23/06 | 03/31/06 | 04/06/06 | 04/11/06 | 04/21/06 | 08/22/06 | 12/01/06 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 119AT | 0.00 | 2.68 | 2.59 | 2.28 | 2.82 | 2.82 | 2.89 | 2.93 | 2.92 | 3.51 | 2.79 |
| 129AT | 0.00 | 2.53 | 2.58 | 2.67 | 2.68 | 2.77 | 2.81 | 2.85 | 2.89 | 3.49 | 2.88 |
| 180AT | 0.00 | 2.42 | 4.43 | 4.11 | 4.48 | 5.23 | 5.50 | 5.25 | 5.48 | 6.06 | 3.09 |
| 184AT | 0.00 | 1.82 | 3.72 | 3.58 | 3.76 | 4.14 | 4.36 | 4.24 | 4.37 | 4.74 | 2.95 |
| 185AT | 0.00 | 2.15 | 3.79 | 3.68 | 3.82 | 4.34 | 4.19 | 4.35 | 4.54 | 4.96 | 2.98 |
| 186AT | 0.00 | 2.13 | 3.94 | 3.89 | 3.99 | 4.57 | 4.74 | 4.58 | 4.72 | 5.17 | 3.19 |
| 187AT | 0.00 | 2.22 | 4.03 | 3.97 | 4.09 | 4.71 | 4.89 | 4.73 | 4.89 | 5.36 | 3.25 |
| 188AT | 0.00 | 3.53 | 4.52 | 4.31 | 4.55 | 5.29 | 5.53 | 5.30 | 5.47 | 6.03 | 3.20 |
| 189AT | 0.00 | 2.66 | 4.75 | 4.55 | 4.80 | 5.57 | 5.85 | 5.60 | 5.78 | 6.33 | 3.24 |
| 190AT | 0.00 | 2.62 | 4.71 | 4.56 | 4.76 | 5.52 | 5.81 | 5.56 | 5.78 | 6.31 | 3.34 |
| 191AT | 0.00 | 2.53 | 1.60 | 4.37 | 4.67 | 5.45 | 5.75 | 5.48 | 4.69 | 6.25 | 7.54 |
| 192AT | 0.00 | 0.59 | 0.61 | 0.89 | 0.94 | 1.23 | 1.47 | 1.54 | 1.74 | 3.01 | 0.51 |
| 193AT | 0.00 | 0.59 | 2.23 | -0.22 | 2.13 | 2.78 | 3.11 | 2.81 | 3.29 | 5.17 | -0.82 |
| 194AT | 0.00 | 0.75 | 0.76 | 0.90 | 1.01 | 1.16 | 1.46 | 1.67 | 1.48 | 2.48 | 0.55 |

Notes:
1) Drawdowns calculated using April 5, 2005, water level event as baseline.
2) Monitoring well hydraulic heads above baseline (negative values) have been shaded.

**Table 3-3**
**Select A-Zone 2006 Drawdowns**
**Post HCS Startup**
**DuPont Necco Park**

| Well | 4/5/05 | 1/19/06 | 2/27/06 | 3/13/06 | 3/23/06 | 3/31/06 | 4/6/06 | 4/11/06 | 4/21/06 | 8/22/06 | 12/1/06 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 111A | 0.00 | 2.75 | 2.66 | 2.82 | 2.81 | 2.93 | 3.03 | 3.05 | 3.06 | 3.49 | 3.07 |
| 119A | 0.00 | 2.46 | 2.56 | 3.11 | 2.74 | 2.80 | 2.88 | 2.91 | 2.88 | 3.52 | 2.78 |
| 123A | 0.00 | 1.28 | 1.21 | 1.21 | 1.35 | 1.33 | 1.39 | 1.45 | 1.44 | 1.89 | 1.29 |
| 129A | 0.00 | 1.87 | 2.66 | 3.88 | 2.77 | 2.90 | 2.97 | 2.98 | 3.05 | 3.63 | 2.96 |
| 137A | 0.00 | 1.59 | 2.83 | 2.51 | 2.72 | 3.13 | 3.20 | 3.13 | 3.22 | 3.52 | 1.82 |
| 146AR | 0.00 | 0.63 | 1.50 | 0.71 | 1.51 | 1.70 | 1.67 | 1.60 | 1.89 | 2.33 | 0.08 |
| 150A | 0.00 | -0.01 | 0.34 | 0.03 | 0.31 | 0.74 | 0.78 | 0.86 | 1.07 | 1.88 | -0.25 |
| 159A | 0.00 | 1.13 | 0.96 | -0.73 | 1.19 | 1.24 | NA[3] | 1.43 | 1.33 | 1.73 | 0.77 |
| 163A | 0.00 | 0.64 | 1.12 | 0.66 | 1.21 | 1.23 | 1.25 | 1.18 | 1.26 | 1.57 | 1.71 |
| 173A | 0.00 | 1.05 | 2.11 | 1.90 | 2.21 | 2.42 | 2.57 | 2.77 | 2.63 | 3.04 | 1.65 |
| 174A | 0.00 | 1.23 | 2.39 | 2.22 | 2.39 | 2.75 | 2.80 | 2.72 | 2.87 | 3.13 | 1.43 |
| 175A | 0.00 | 0.76 | 0.77 | 0.94 | 0.66 | 1.09 | 1.19 | 1.24 | 1.28 | 1.66 | 0.53 |
| 176A | 0.00 | 1.66 | 3.09 | 2.91 | 3.08 | 3.50 | 3.59 | 3.49 | 3.68 | 3.94 | 2.15 |
| 178A | 0.00 | 1.90 | 3.48 | 3.32 | 3.48 | 3.93 | 4.03 | 3.91 | 4.06 | 4.40 | 2.62 |
| 179A | 0.00 | 1.68 | 2.97 | 2.77 | 2.97 | 3.36 | 3.45 | 3.37 | 3.50 | 3.82 | 1.97 |
| 184A | 0.00 | 2.33 | 1.66 | 2.10 | 2.26 | 2.37 | 2.51 | 1.85 | 2.72 | 2.95 | 0.98 |
| 185A | 0.00 | 2.15 | 3.80 | 3.66 | 3.81 | 4.33 | 3.23 | 4.34 | 4.55 | 4.97 | 3.01 |
| 186A | 0.00 | 8.49 | 8.06 | 7.90 | 8.23 | 7.98 | 8.47 | 8.35 | 8.16 | 9.62 | 8.39 |
| 187A | 0.00 | 7.87 | 8.42 | 8.15 | 8.28 | 8.34 | 8.40 | 8.41 | 8.40 | 8.76 | 8.64 |
| 188A | 0.00 | 11.29 | 11.15 | 11.27 | 11.31 | 11.26 | 11.28 | 11.34 | 11.28 | 11.45 | 12.38 |
| 189A[4] | 0.00 | 11.11 | 10.78 | 10.83 | 10.94 | 10.85 | 11.18 | 11.09 | 11.01 | 11.51 | 11.62 |
| 190A | 0.00 | 7.80 | 7.46 | 7.46 | 7.71 | 7.57 | 7.91 | 7.84 | 7.65 | 8.39 | 8.09 |
| 191A | 0.00 | 4.26 | 4.03 | 3.91 | 4.29 | 4.15 | 4.34 | 4.40 | 4.34 | 4.87 | 4.62 |
| 192A | 0.00 | 4.18 | 3.88 | 3.48 | 4.15 | 4.01 | 4.19 | 4.30 | 4.27 | 4.80 | 3.77 |
| 193A | 0.00 | 1.78 | 1.79 | 1.94 | 1.88 | 1.98 | 1.73 | 1.90 | 1.98 | 2.27 | 0.91 |
| 194A | 0.00 | 3.94 | 3.71 | 3.63 | 4.00 | 3.88 | 4.04 | 4.14 | 4.03 | 4.61 | 3.52 |
| D-11 | 0.00 | 1.88 | 3.38 | 3.17 | 3.36 | 3.80 | 3.90 | 3.80 | 3.99 | 4.35 | 2.53 |
| D-13 | 0.00 | 1.30 | 2.07 | 1.56 | 2.02 | 2.20 | 5.22 | 2.27 | 2.34 | 2.73 | 0.27 |
| D-9 | 0.00 | 3.25 | 3.30 | 3.26 | 3.60 | 3.59 | 3.77 | 3.94 | 3.80 | 4.45 | 3.08 |
| RDB-3 | 0.00 | 0.78 | 1.06 | 0.75 | 1.22 | 1.17 | 1.21 | 1.20 | 1.30 | 1.43 | 0.06 |
| RDB-5 | 0.00 | 0.34 | 0.38 | 0.20 | 0.39 | 0.42 | 0.59 | 0.64 | 1.00 | 1.55 | 0.44 |

Notes:
1) Drawdowns calculated using April 5, 2005 water level event as baseline.
2) Monitoring well hydraulic heads above baseline (negative values) have been shaded.
3) NA = not availible.
4) Baseline elevation was recorded on May 5, 2004.

# Table 3-4
## Typical AT-Zone to A-Zone Vertical Gradients
## DuPont Necco Park

| Well Pair | | A<br>12/01/06 AT-Zone Head | B<br>12/01/06 A-Zone Head | C<br>AT-Zone Mid-Point of Well Screen | D<br>A-Zone Mid-Point of Well Screen | Vertical Gradtient[1,2] (B-A) / (C-D) |
|---|---|---|---|---|---|---|
| 119AT | 119A | 573.78 | 573.96 | 570.92 | 564.73 | 0.03 |
| 129AT | 129A | 573.71 | 573.66 | 567.24 | 563.25 | -0.01 |
| 184AT | 184A | 572.98 | 572.92 | 570.46 | 564.65 | -0.01 |
| 185AT | 185A | 573.06 | 573.46 | 569.24 | 566.50 | 0.15 |
| 186AT | 186A | 573.13 | 564.12 | 569.58 | 561.13 | -1.07 |
| 187AT | 187A | 573.36 | 565.12 | 570.33 | 561.99 | -0.99 |
| 188AT | 188A | 574.5 | 560.49 | 570.43 | 559.21 | -1.25 |
| 189AT | 189A | 574.81 | 562.02 | 569.76 | 559.30 | -1.22 |
| 190AT | 190A | 574.68 | 564.99 | 569.81 | 558.23 | -0.84 |
| 191AT | 191A | 570.48 | 569.15 | 569.48 | 558.20 | -0.12 |
| 192AT | 192A | 573.1 | 570.2 | 569.82 | 556.10 | -0.21 |
| 193AT | 193A | 580.54 | 572.2 | 572.38 | 559.76 | -0.66 |
| 194AT | 194A | 575.65 | 570.16 | 571.12 | 558.80 | -0.45 |

Note:
1) Unitless (ft/ft).
2) Negative values indicate a downward (from AT-Zone to A-Zone) gradient.

**Table 3-5**
**Typical A-Zone to B-Zone Vertical Gradients**
**DuPont Necco Park**

| Well Pair | | A<br>12/01/06<br>A-Zone Head | B<br>12/01/06<br>B-Zone Head | C<br>A-Zone<br>Mid-Point<br>of Well Screen | D<br>B-Zone<br>Fracture<br>Elevation[1] | Vertical<br>Gradtient[2,3]<br>(B-A) / (C-D) |
|---|---|---|---|---|---|---|
| 111A | 111B | 573.95 | 572.20 | 573.94 | 561.80 | -0.14 |
| 119A | 119B | 573.96 | 570.88 | 571.63 | 556.90 | -0.21 |
| 129A | 129B | 573.66 | 571.63 | 570.10 | 557.80 | -0.17 |
| 137A | 137B | 572.90 | 572.13 | 570.10 | 561.30 | -0.09 |
| 145A | 145B | 572.96 | 568.85 | 564.19 | 546.30 | -0.23 |
| 150A | 150B | 572.71 | 571.37 | 564.69 | 553.18 | -0.12 |
| 159A | 159B | 578.33 | 575.23 | 580.62 | 562.90 | -0.17 |

Note:
1) A B-Zone fracture was not observed in the 145B borehole, therefore the midpoint of the open hole was used.
2) Unitless (ft/ft).
3) Negative values indicate a downward (from A-Zone to B-Zone) gradient.

**Table 3-6**
**Select B-Zone 2006 Drawdowns**
**Post HCS Startup**
**DuPont Necco Park**

| Well[1] | 5/4/2004 | 1/19/06 | 2/27/06 | 3/23/06 | 4/21/06 | 8/22/06 | 12/1/06 |
|---|---|---|---|---|---|---|---|
| 102B | 0.00 | 1.24 | 1.08 | 1.36 | 1.54 | 2.01 | 0.71 |
| 111B | 0.00 | 0.70 | 0.81 | 1.01 | 1.18 | 1.77 | 1.13 |
| 112B | 0.00 | 1.96 | 2.44 | 2.73 | 2.96 | 3.32 | 2.53 |
| 116B | 0.00 | 0.51 | 0.55 | 0.65 | 0.80 | 1.01 | 0.41 |
| 118B | 0.00 | 1.91 | 1.80 | 1.84 | 1.99 | 2.32 | 1.54 |
| 119B | 0.00 | 6.89 | 6.23 | 6.59 | 6.55 | 7.50 | 6.29 |
| 120B | 0.00 | 2.03 | 1.56 | 1.88 | 1.97 | 2.47 | 1.54 |
| 129B | 0.00 | 1.25 | 1.44 | 1.51 | 1.55 | 1.75 | 0.89 |
| 130B | 0.00 | 2.83 | 2.45 | 2.85 | 2.94 | 3.58 | 2.36 |
| 136B | 0.00 | 0.16 | 0.39 | 0.56 | 0.61 | 0.86 | 1.66 |
| 137B | 0.00 | -0.21 | 0.40 | 0.51 | 0.84 | 1.18 | -0.24 |
| 138B | 0.00 | 2.65 | 2.91 | 2.87 | 3.27 | 4.05 | 2.88 |
| 139B | 0.00 | 4.32 | 4.31 | 4.37 | 4.49 | 5.35 | 4.09 |
| 145B | 0.00 | 1.52 | 1.34 | 1.45 | 1.65 | 1.77 | 1.24 |
| 146B | 0.00 | -0.15 | 0.15 | 0.27 | 0.51 | 0.63 | -1.08 |
| 149B | 0.00 | -0.03 | 0.23 | 0.33 | 0.94 | 0.67 | -0.40 |
| 150B | 0.00 | 0.00 | 0.21 | 0.45 | 0.68 | 0.96 | -0.46 |
| 151B | 0.00 | 0.02 | -0.07 | 0.02 | 0.21 | 0.32 | -0.13 |
| 159B | 0.00 | 0.71 | 0.54 | 0.93 | 1.17 | 1.44 | -0.11 |
| 160B | 0.00 | 2.70 | 2.71 | 2.87 | 3.06 | 3.67 | 2.40 |
| 161B | 0.00 | 3.15 | 3.02 | 3.22 | 3.39 | 4.09 | 2.35 |
| 163B | 0.00 | -0.42 | 0.07 | 0.12 | 0.28 | 0.43 | 0.56 |
| 167B | 0.00 | 6.39 | 6.25 | 6.28 | 6.49 | 7.44 | 6.03 |
| 168B | 0.00 | 2.22 | 1.77 | 1.77 | 1.78 | 2.41 | 3.83 |
| 169B | 0.00 | 3.39 | 3.22 | 3.33 | 3.54 | 4.36 | 3.08 |
| 171B | 0.00 | 2.64 | 2.37 | 2.64 | 2.76 | 3.38 | 2.22 |
| 172B | 0.00 | 2.00 | 1.82 | 2.12 | 2.28 | 2.70 | 1.45 |
| D-14 | 0.00 | 1.22 | 1.25 | 1.37 | 1.49 | 1.81 | 0.69 |
| D-23 | 0.00 | 10.79 | 10.39 | 10.36 | 10.12 | 11.11 | 10.73 |
| RW-4 | 0.00 | 22.88 | 23.67 | 23.14 | 19.95 | 26.36 | 27.73 |
| RW-5 | 0.00 | 12.66 | 12.91 | 12.85 | 12.93 | 13.00 | 14.53 |
| RW-10 | 0.00 | 10.91 | 10.84 | 11.01 | 11.00 | 8.70 | 8.84 |

Notes:
1) Drawdowns calculated using May 4, 2004 water level event as baseline.
2) Monitoring well hydraulic heads above baseline (negative values) have been shaded.

**Table 3-7**
**Select C-Zone 2006 Drawdowns**
**Post HCS Startup**
**DuPont Necco Park**

| Well[1] | 5/4/04 | 1/19/06 | 2/27/06 | 3/23/06 | 4/21/06 | 8/22/06 | 12/1/06 |
|---|---|---|---|---|---|---|---|
| 105C | 0.00 | 0.61 | 0.44 | 0.78 | 0.92 | 1.25 | -0.04 |
| 112C | 0.00 | 1.31 | 0.96 | 1.27 | 1.58 | 1.98 | -11.41[3] |
| 115C | 0.00 | 1.27 | 1.24 | 1.57 | 1.76 | 2.08 | 0.62 |
| 129C | 0.00 | 5.06 | 4.31 | 4.12 | 3.87 | 3.92 | 4.12 |
| 130C | 0.00 | 0.20 | 0.07 | 0.30 | 0.49 | 0.79 | -0.67 |
| 136C | 0.00 | 0.26 | 0.28 | 0.31 | 0.64 | 0.80 | 0.57 |
| 137C | 0.00 | 0.25 | 0.21 | 0.46 | 0.52 | 0.80 | -0.27 |
| 138C | 0.00 | 0.12 | 0.06 | 0.28 | 0.40 | 0.74 | -0.29 |
| 139C | 0.00 | 3.04 | 3.38 | 3.41 | 0.91 | 3.61 | 3.76 |
| 145C | 0.00 | 1.39 | 1.51 | 1.58 | 1.67 | 1.94 | 1.42 |
| 146C | 0.00 | -0.34 | -0.02 | -0.07 | 0.23 | 0.33 | -0.39 |
| 149C | 0.00 | 0.23 | 0.25 | 0.64 | 0.69 | 0.80 | -0.36 |
| 150C | 0.00 | -0.70 | -0.56 | -0.46 | -0.21 | -0.03 | -0.22 |
| 151C | 0.00 | 0.21 | 0.10 | 0.43 | 0.41 | 0.62 | 0.73 |
| 159C | 0.00 | 0.45 | 0.25 | 0.63 | 0.80 | 1.03 | -0.50 |
| 160C | 0.00 | 1.45 | 1.73 | 1.86 | 1.73 | 2.20 | 1.73 |
| 161C | 0.00 | 1.88 | 2.18 | 2.20 | 2.06 | 2.60 | 2.21 |
| 162C | 0.00 | 0.23 | 0.35 | 0.37 | 0.76 | 1.38 | 0.58 |
| 168C | 0.00 | 2.11 | 2.12 | 2.29 | 2.31 | 2.86 | 1.90 |
| D-14 | 0.00 | 0.22 | 0.25 | 0.37 | 0.49 | 0.81 | -0.31 |
| RW-4 | 0.00 | 22.88 | 23.67 | 23.14 | 19.95 | 26.36 | 27.73 |
| RW-5 | 0.00 | 12.66 | 12.91 | 12.85 | 12.93 | 13.00 | 14.53 |
| RW-10 | 0.00 | 10.91 | 10.84 | 11.01 | 11.00 | 8.70 | 8.84 |

Notes:
1) Drawdowns calculated using May 4, 2004 water level event as baseline.
2) Monitoring well hydraulic heads above baseline (negative values) have been shaded.
3) Seal for well casing at 112C has failed based on 12/1/06 data.

**Table 3-8**
**Select D, E, and F-Zone 2006 Drawdowns**
**Post HCS Startup**
**DuPont Necco Park**

| Well[1] | 5/4/04 | 1/19/06 | 2/27/06 | 3/23/06 | 4/21/06 | 8/22/06 | 12/1/06 |
|---|---|---|---|---|---|---|---|
| 105D | 0.00 | 6.93 | 6.65 | 7.00 | 6.69 | 6.61 | 6.42 |
| 111D | 0.00 | 7.00 | 6.84 | 7.25 | 6.80 | 6.81 | 6.49 |
| 115D | 0.00 | 6.72 | 6.46 | 6.79 | 6.52 | 6.33 | 6.38 |
| 123D | 0.00 | 2.67 | 2.88 | 3.12 | 2.94 | 3.30 | 2.70 |
| 130D | 0.00 | 6.34 | 6.08 | 6.46 | 6.12 | 6.17 | 5.97 |
| 136D | 0.00 | 6.61 | 6.62 | 6.92 | 6.71 | 6.60 | 6.43 |
| 139D | 0.00 | 1.37 | 1.70 | 1.86 | 1.61 | 2.19 | 1.64 |
| 145D | 0.00 | 1.54 | 1.82 | 1.83 | 1.88 | 2.14 | 2.02 |
| 148D | 0.00 | 2.68 | 3.47 | 3.78 | 4.62 | 4.23 | 3.06 |
| 149D | 0.00 | 5.79 | 4.64 | 5.65 | 4.87 | 4.67 | 4.07 |
| 159D | 0.00 | 7.26 | 6.99 | 7.34 | 7.05 | 6.92 | 6.77 |
| 163D | 0.00 | 5.56 | 5.46 | 5.85 | 5.49 | 5.55 | 4.95 |
| 164D | 0.00 | 6.29 | 5.91 | 6.33 | 5.90 | 5.86 | 6.82 |
| 129E | 0.00 | 1.66 | 2.12 | 2.19 | 2.05 | 2.39 | 2.22 |
| 136E | 0.00 | 8.14 | 6.85 | 7.21 | 6.85 | 6.77 | 6.60 |
| 145E | 0.00 | 1.17 | 1.44 | 1.67 | 1.53 | 2.00 | 1.40 |
| 146E | 0.00 | 7.21 | 6.90 | 7.30 | 6.85 | 6.75 | 6.72 |
| 150E | 0.00 | 5.00 | 4.68 | 4.89 | 4.50 | 4.87 | 4.78 |
| 163E | 0.00 | 5.60 | 5.62 | 6.32 | 6.13 | 6.91 | 7.27 |
| 164E | 0.00 | 7.50 | 7.14 | 7.56 | 7.13 | 7.08 | 7.07 |
| 165E | 0.00 | 7.32 | 7.16 | 7.38 | 7.16 | 7.09 | 7.02 |
| 112F[3] | 0.00 | 1.25 | 3.60 | 1.70 | 1.69 | 2.11 | 1.31 |
| 129F | 0.00 | 1.91 | 2.24 | 2.23 | 2.11 | 2.47 | 2.43 |
| 130F | 0.00 | 6.51 | 6.64 | 6.74 | 6.54 | 6.40 | 6.53 |
| 136F | 0.00 | 7.31 | 6.93 | 7.41 | 6.94 | 6.92 | 6.77 |
| 145F | 0.00 | 1.34 | 1.54 | 1.60 | 1.63 | 1.94 | 1.80 |
| 146F | 0.00 | 6.80 | 6.30 | 6.85 | 6.18 | 6.13 | 6.22 |
| 148F | 0.00 | 2.74 | 1.40 | 2.99 | 0.61 | 0.20 | 0.03 |
| 150F | 0.00 | 4.74 | 4.77 | 4.90 | 4.73 | 4.81 | 4.70 |
| 163F | 0.00 | 7.37 | 7.01 | 7.32 | 7.01 | 6.95 | 6.85 |
| 164F | 0.00 | 7.27 | 7.05 | 7.39 | 7.04 | 7.03 | 4.96 |
| 165F | 0.00 | 7.43 | 7.34 | 7.56 | 7.29 | 7.27 | 7.19 |
| RW-8 | 0.00 | 9.29 | 9.22 | 9.29 | 9.11 | 8.90 | 9.12 |
| RW-9 | 0.00 | 8.00 | 8.01 | 8.10 | 8.05 | 8.00 | 8.00 |

Note:
1) Drawdowns calculated using May 4, 2004, water level event as baseline.
2) Monitoring well hydraulic heads above baseline (negative values) have been shaded.
3) Baseline water elevation collected on May 8, 2005.

**Table 3-9**
**DNAPL Components and Solubility Criteria Values**
**DuPont Necco Park**

| Contaminant | Mole Fraction in DNAPL (%) | Pure-Phase Solubility (ug/l) | One-Percent Pure-Phase solubility (ug/l) | Effective Solubility (ug/l) |
|---|---|---|---|---|
| Hexachlorobutadiene | 59 | 2,000 | 20 | 1,180 |
| Hexachloroethane | 9 | 50,000 | 500 | 4,500 |
| Hexachlorobenzene | 2 | 11 | 0.11 | 0.22 |
| Carbon tetrachloride | 5 | 800,000 | 8,000 | 40,000 |
| Chloroform | 1 | 8,000,000 | 80,000 | 80,000 |
| Tetrachloroethene | 3 | 150,000 | 1,500 | 4,500 |
| 1,1,2,2-tetrachloroethane | 5 | 2,900,000 | 29,000 | 145,000 |
| Trichloroethene | 4 | 1,100,000 | 11,000 | 44,000 |

**Table 3-10**
**2005 & 2006 Annual Sampling**
**Effective Solubility Exceedances for DNAPL Compounds**
**DuPont Necco Park**

| Well ID | Flow Zone | Analyte | Criteria (ppb) | Concentration 2005 1st Event | Concentration 2005 2nd Event | Concentration 2006 1st Event | Concentration 2006 2nd Event |
|---|---|---|---|---|---|---|---|
| 105C | C | Carbon Tetrachloride | 40,000 | N/S | N/S | N/S | 5300 J |
| | | Hexachlorobutadiene | 1,180 | 1,700 | BC | N/S | N/S |
| | | Chloroform | 80,000 | 25,000 | 180,000 | N/S | 120,000 |
| | | Tetrachloroethene | 4,500 | 32,000 | 35,000 | N/S | 36,000 |
| | | Trichloroethene | 43,999 | 280,000 | 190,000 | N/S | 190,000 |
| 105D | D | Carbon Tetrachloride | 40,000 | 150,000 | 83,000 | N/S | 170,000 |
| | | Chloroform | 80,000 | 98,000 | 35,000 | N/S | 80,000 |
| | | Tetrachloroethene | 4,500 | 12,000 | 57,000 | N/S | 11,000 |
| | | Trichloroethene | 43,999 | 120,000 | 51,000 | N/S | 110,000 |
| 137C | C | Tetrachloroethene | 4,500 | 8,500 | 22,000 | N/S | 7,900 |
| 137D | D | Tetrachloroethene | 4,500 | 5,100 | 4,900 | N/S | BC |
| | | Trichloroethene | 44,000 | 64,000 | 76,000 | N/S | BC |
| | | Hexachlorobenzene | 0.22 | 3.0 | 11.0 | N/S | N/S |
| 139D | D | Hexachlorobutadiene | 1,180 | 1,200 | BC | N/S | N/S |
| 171B | B | Hexachlorobutadiene | 1,180 | 2,100 | BC | BC | BC |
| | | Hexachlorobenzene | 0.22 | BC | 4.0 | 31 J | 3.4 J |

BC: Below Criteria
N/S: Not Sampled
Note: Wells 105C and 105D are located on the landfill and are MNA Source Area wells.

**Table 3-11**
**2005 & 2006 Annual Sampling**
**1% of Pure-Phase Solubility Exceedances for DNAPL Compounds**
**DuPont Necco Park**

| Well ID | Flow Zone | Analyte | Criteria (ppb) | Concentration 2005 | | Concentration 2006 | |
|---|---|---|---|---|---|---|---|
| | | | | 1st Event | 2nd Event | 1st Event | 2nd Event |
| 105C | C | Hexachlorobutadiene | 20 | 1,700 | BC | N/S | N/S |
| | | Carbon Tetrachloride | 8,000 | 25,000 | 4,800 | N/S | BC |
| | | Chloroform | 80,000 | 250,000 | 180,000 | N/S | 120,000 |
| | | Tetrachloroethene | 1,500 | 32,000 | 35,000 | N/S | 36,000 |
| | | Trichloroethene | 11,000 | 280,000 | 190,000 | N/S | 190,000 |
| 105D | D | Hexachlorobutadiene | 20 | 95.0 | BC | N/S | N/S |
| | | Carbon Tetrachloride | 8,000 | 150,000 | 83,000 | N/S | 170,000 |
| | | Chloroform | 80,000 | 98,000 | 35,000 | N/S | 80,000 |
| | | Tetrachloroethene | 1,500 | 12,000 | 5,700 | N/S | 11,000 |
| | | 1,1,2,2-Tetrachlorethane | 29,000 | N/S | N/S | N/S | 88,000 |
| | | Trichloroethene | 11,000 | 120,000 | 51,000 | N/S | 110,000 |
| 136C | C | Tetrachloroethene | 1,500 | 4,100 | 3,600 | 3,300 | 3,100 |
| 137C | C | Tetrachloroethene | 1,500 | 8,500 | 22,000 | N/S | 7,900 |
| | | Trichloroethene | 11,000 | BC | 19,000 | N/S | 16,000 |
| 137D | D | Tetrachloroethene | 1,500 | 5,100 | 4,900 | N/S | BC |
| | | Trichloroethene | 11,000 | 64,000 | 76,000 | N/S | 27,000 |
| 139B | B | Tetrachloroethene | 1,500 | N/S | N/S | N/S | 2000 J |
| | | Hexachlorobutadiene | 20 | 78 | BC | N/S | N/S |
| | | 1,1,2,2-Tetrachlorethane | 29000 | N/S | N/S | N/S | 29,000 |
| 139D | D | Hexachlorobenzene | 0.11 | 38.0 | 11.0 | N/S | N/S |
| | | Tetrachloroethene | 1,500 | 1,900 | BC | N/S | BC |
| 165E | E | Hexachlorobutadiene | 20 | 27.0 | BC | 32 J | 46 J |
| 168C | C | Hexachlorobutadiene | 20 | 330 | 64.0 | 54 J | N/S |
| 171B | B | Hexachlorobutadiene | 20 | 2,100 | 130 | BC | BC |
| | | Hexachlorobenzene | 0.1 | BC | 4.0 | 3.1 J | 3.4 J |
| 172B | B | Hexachlorobutadiene | 20 | 140 | 89 | 140 J | 110 |
| | | Tetrachloroethene | 1,500 | 1,800 | BC | BC | BC |
| D-11 | A | Hexachlorobutadiene | 20 | 29 | BC | BC | BC |

BC: Below Criteria

N/S: Not Sampled

Note: Wells 105C and 105D are located on the landfill and are MNA Source Area wells.

# Table 3-12
# Chemical Monitoring Locations
# Long-Term Groundwater Monitoring
# DuPont Necco Park

| MONITORING WELL | ZONE | MONITORING WELL | ZONE |
|---|---|---|---|
| D-11 | A | **105D** | D |
| D-13 | A | 123D | D |
| D-9 | A | 136D | D |
| 137A | A | **137D** | D |
| 145A | A | 145D | D |
| 146AR | A | 148D | D |
| 150A | A | **139D** | D |
| **111B** | B | 147D | D |
| 136B | B | 149D* | D |
| 137B | B | 156D | D |
| **139B** | B | 165D | D |
| **141B** | B | 136E | E |
| 145B* | B | 145E | E |
| 146B | B | 146E | E |
| 149B* | B | 150E | E |
| 150B | B | 156E | E |
| 151B* | B | 165E | E |
| **153B** | B | 136F | F |
| 168B | B | 146F | F |
| 171B | B | 147F | F |
| 172B | B | 150F* | F |
| **105C** | C | 156F | F |
| 136C | C | 147G1 | G1 |
| **137C** | C | 147G2 | G2 |
| **141C*** | C | 147G3 | G3 |
| 145C* | C | | |
| 146C* | C | | |
| 149C | C | | |
| 150C* | C | | |
| 151C | C | | |
| 168C | C | | |

*Well does not meet bedrock zone water bearing criteria ($k<10^{-4}$ cm/sec).

Wells shown in **bold** are used solely for the MNA evaluation and will not be used for Long-term chemistry monitoring.

**Table 3-13**
**Indicator Parameter List**
**Long-Term Groundwater Monitoring**
**DuPont Necco Park**

| INORGANIC AND GENERAL WATER QUALITY PARAMETERS | VOLATILE ORGANIC COMPOUNDS | SEMIVOLATILE ORGANIC COMPOUNDS |
|---|---|---|
| pH* | Vinyl chloride | Hexachloroethane |
| Specific conductivity* | 1,1-dichloroethene | Hexachlorobutadiene |
| Temperature* | Trans-1,2-dichloroethene | Phenol |
| Turbidity* | Cis-1,2-dichloroethene | 2,4,6-trichlorophenol |
| Dissolved oxygen * | Chloroform | 2,4,5-trichlorophenol |
| Redox potential* | Carbon tetrachloride | Pentachlorophenol |
| Chloride | 1,2-dichloroethane | Hexachlorobenzene |
| Dissolved barium | Trichloroethene | 4-methlyphenol |
| | 1,1,2-trichloroethane | TIC-1 |
| | Tetrachloroethene | |
| | 1,1,2,2-tetrachloroethane | |

*Field parameter

# Table 3-14
# Monitored Natural Attenuation Parameters
# DuPont Necco Park

| Field Parameters | Miscellaneous Parameters |
|---|---|
| Specific Conductance | Alkalinity |
| Temperature | Chloride |
| Dissolved Oxygen | Nitrate Nitrogen |
| pH | Sulfate |
| Eh (Redox) | Sulfide as S |
| **Gases** | Total Organic Carbon |
| Ethane | |
| Ethene | |
| Methane | |
| Propane | |
| **Dissolved Metals** | |
| Iron | |
| Manganese | |

## Table 3-15
## MNA B/C Zone Wells
## DuPont Necco Park

**MNA   B/C Zone Wells**

| Well | Location | Last NAPL observation | Conc. Trend 2005 - 2006 | Dominant Cl - ethene species | 2006 Ethene Production | 2005 total Cl-ethenes | 2006 total Cl-ethenes |
|---|---|---|---|---|---|---|---|
| 141B | Upgradient | NA | Clean | NA | NA | 0 | 0 |
| 141C | Upgradient | NA | Flat to Decreasing | VC | Weak | 2 | 1 |
| 111B | Source Area | NA | Decreasing | TCE, cDCE, VC | Good | 758 | 398 |
| 137B | Source Area | NA | Decreasing | TCE, cDCE, VC | ND | 1,114 | 664 |
| 139B | Source Area | 1992 | Increasing | PCE, TCE cDCE, VC | Good | 1,447 | 23,800 |
| 105C | Source Area | 1992 | Flat to Decreasing | PCE, TCE cDCE, tDCE, 1,1 DCE, VC | Good | 260,800 | 260,800 |
| 137C | Source Area | NA | Decreasing | PCE, TCE cDCE, VC | Good | 51,200 | 45,110 |
| 145B | Downgradient | NA | Increasing | TCE, cDCE, VC | Good | 4,400 | 29,850 |
| 145C | Downgradient | NA | Decreasing | cDCE, VC | Moderate | 8,900 | 7,650 |
| 149C | Downgradient | NA | Slight Increase | cDCE, VC | Good | 10 | 16 |
| 151C | Downgradient | NA | Decreasing | cDCE, VC | Weak | 220 | 12 |
| 153B | Sidegradient | NA | Clean | NA | NA | 0 | 0 |

NA = not applicable
ND= no data

# Table 3-16
# MNA D/E/F Zone Wells
# DuPont Necco Park

**MNA D/E/F Zone Wells**

| Well | Location | Last NAPL observation | Conc. Trend 2005 - 2006 | Dominant Cl - ethene Species | 2006 Ethene Production | 2005 total Cl-ethenes | 2006 total Cl-ethenes |
|---|---|---|---|---|---|---|---|
| 137D | Source Area | NA | Decreasing | PCE, TCE , cDCE, VC, tDCE, 1,1,DCE | Weak | 94,500 | 35,470 |
| 139D | Source Area | 1992 | Decreasing | TCE | Weak | 2,690 | 1,843 |
| 165D | Source Area | NA | Decreasing | VC | Good | 1,102 | 597 |
| 136D | Downgradient | NA | Decreasing | TCE, cDCE VC | Good | 1,819 | 1,170 |
| 147D | Downgradient | NA | Flat to decreasing | VC | Weak | 183 | 168 |
| 148D | Downgradient | NA | Flat | cDCE | Weak | 1 | 1 |
| 156D | Downgradient | NA | Decreasing | VC | BDL | 5 | 3 |
| 136E | Downgradient | NA | Decreasing | TCE, cDCE, VC , tDCE | Good | 17 | 16 |
| 146E | Downgradient | NA | Decreasing | cDCE, VC | Good | 17,120 | 15,060 |
| 156E | Downgradient | NA | Decreasing | VC | BDL | 3 | 2 |
| 146F | Downgradient | NA | Decreasing | cDCE, VC | Moderate | 20,470 | 20,310 |
| 149D | Sidegradient | NA | Slight increase | ? | Moderate | 0 | 1 |
| 145E | Sidegradient | NA | Decreasing | cDCE, VC | Weak | 11,750 | 3,010 |
| 150F | Sidegradient | NA | Flat to decreasing | cDCE, VC | Weak | 2,755 | 1,740 |

NA = not applicable
ND= no data

**Table 3-17**
**2006 DNAPL Recovery Summary**
**DuPont Necco Park**

| Well ID | Frequency | 12-Jan | | 21-Feb | | 23-Mar | | 13-Apr | | 5-May | | 12-Jun | | 28-Jun | | 25-Jul | | 21-Aug | | 8-Sep | | 27-Oct | | 21-Nov | | 18-Dec | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | FT | GALS | FT | GALS | FT | GALS | FT | GALS | FT | GALS | FT | GALS | FT | GALS | FT | GALS | FT | GALS | FT | GALS | FT | GALS | FT | GALS | FT | GALS |
| **RW-1** | Monthly | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | na | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | |
| **RW-2** | Monthly | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | na | | TRACE | | TRACE | | 0.0 | | 0.0 | | 0.0 | | 0.0 | |
| **RW-4** | Monthly | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | na | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | |
| **RW-5** | Monthly | **2.0** | **20.0** | 0.0 | | TRACE | | TRACE | | **5.0** | **28.0** | **8.0** | **30.0** | **5.0** | **16.0** | **3.0** | **16.0** | TRACE | | **3.0** | **12.0** | TRACE | | TRACE | | **5.0** | **25** |
| **TRW-6** | Monthly | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | na | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | |
| **TRW-7** | Monthly | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | na | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | |
| **D-23** | Monthly | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | na | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | |
| **VH-123A** | Monthly | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | na | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | |
| **VH-129A** | Monthly | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | na | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | |
| **VH-129C** | Monthly | 0.0 | | TRACE | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | na | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | |
| **VH-160B** | Monthly | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | na | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | |
| **VH-160C** | Monthly | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | na | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | |
| **VH-161B** | Monthly | **1.0** | **4.0** | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | na | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | |
| **VH-161C** | Monthly | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | na | | TRACE | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | |
| **VH-162C** | Monthly | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | na | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | |
| **VH-190A** | Monthly | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | na | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | |
| **VH-167B** | Monthly | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | na | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | |
| **VH-168B** | Monthly | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | na | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | |
| **VH-168C** | Monthly | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | na | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | |
| **VH-169B** | Monthly | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | na | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | |
| **VH-170B** | Monthly | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | na | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | |
| **VH-171B** | Monthly | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | na | | TRACE | | TRACE | | 0.0 | | TRACE | | TRACE | | TRACE | |
| **VH-172B** | Monthly | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | na | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | |
| **VH-131A** | Semi-annually | na | | na | | 0.0 | | na | | TRACE | | 0.0 | | na | | na | | na | | 0.0 | | na | | na | | na | |
| **VH-139A** | Semi-annually | na | | na | | 0.0 | | na | | na | | 0.0 | | na | | na | | na | | 0.0 | | na | | na | | na | |
| **VH-139C** | Semi-annually | na | | na | | 0.0 | | na | | na | | 0.0 | | na | | na | | na | | 0.0 | | na | | na | | na | |
| **CECOS52SR** | Semi-annually | na | | na | | 0.0 | | na | | na | | 0.0 | | na | | na | | na | | 0.0 | | na | | na | | na | |
| **CECOS18SR** | Semi-annually | na | | na | | 0.0 | | na | | na | | 0.0 | | na | | na | | na | | 0.0 | | na | | na | | na | |
| **CECOS-53** | Semi-annually | na | | na | | 0.0 | | na | | na | | 0.0 | | na | | na | | na | | 0.0 | | na | | na | | na | |
| **VH-117A** | Monthly | na | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | na | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | |

na - not applicable/not taken
GALS - gallons purged

# FIGURES


**Corporate Remediation Group**

*An Alliance between DuPont and URS Diamond*

Barley Mill Plaza, Building 27
Wilmington, Delaware 19805

# SITE LOCATION MAP

Necco Park Site
Niagara Falls, New York

| SCALE | DESIGNED | DRAWN | CAD FILE NO. |
|---|---|---|---|
| No Scale | | DEL | Site_Location |
| **DATE** | **CHECKED** | **APPROVED** | **FIGURE** |
| 10/16/03 | KAS | | 1 |


## Legend

- DuPont Monitoring Well
- Allied Waste Monitoring Well
- DuPont Extraction Well
- Former DuPont Extraction Well
- DuPont Peizometer
- Chemical Monitoring Location

NOTE: Wells in bold will be used for the MNA evaluation.

| Peizometer ID Conversions | |
|---|---|
| New ID | Former ID |
| 184A | RDB-12 |
| 185A | 177A |
| 187A | RDB-15 |
| 188A | 166A |
| 189A | 181A |
| 190A | 167A |
| 191A | 182A |
| 192A | 183A |
| 193A | RDB-22 |

WARNING

IT IS VIOLATION OF SECTION 7209, SUBDIVISION 2, OF THE NEW YORK STATE EDUCATION LAW FOR ANY PERSON OTHER THAN WHOSE SEAL APPEARS ON THIS DRAWING, TO ALTER IN ANY WAY AN ITEM ON THIS DRAWING. IF AN ITEM IS ALTERED, THE ALTERING ENGINEER SHALL AFFIX TO TO THE ITEM HIS SEAL AND THE NOTATION "ALTERED BY" FOLLOWED BY HIS SIGNATURE AND THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

N:\18983203.00005\DB\GIS\locations.apr CHEMICAL MONITORING LOCATIONS_2 11/9/2005

**REVISIONS**

| NO. | DATE | DESCRIPTION | NO. | DATE | DESCRIPTION |
|---|---|---|---|---|---|
| 1 | 11/08/05 | REVISION #1 | | | |

DESIGNED BY: SPM
DRAWN BY: CNE
CHECKED BY: XXX
PROJ. ENGR. XXX

URS

Group Consultants
77 Goodell Street, Buffalo, New York 14203
(716)856-5636 - (716)856-2545 fax

JOB No. 18983203.00005

DUPONT
NECCO PARK

NIAGARA FALLS NEW YORK

WELL AND PIEZOMETER LOCATIONS
DUPONT NECCO PARK

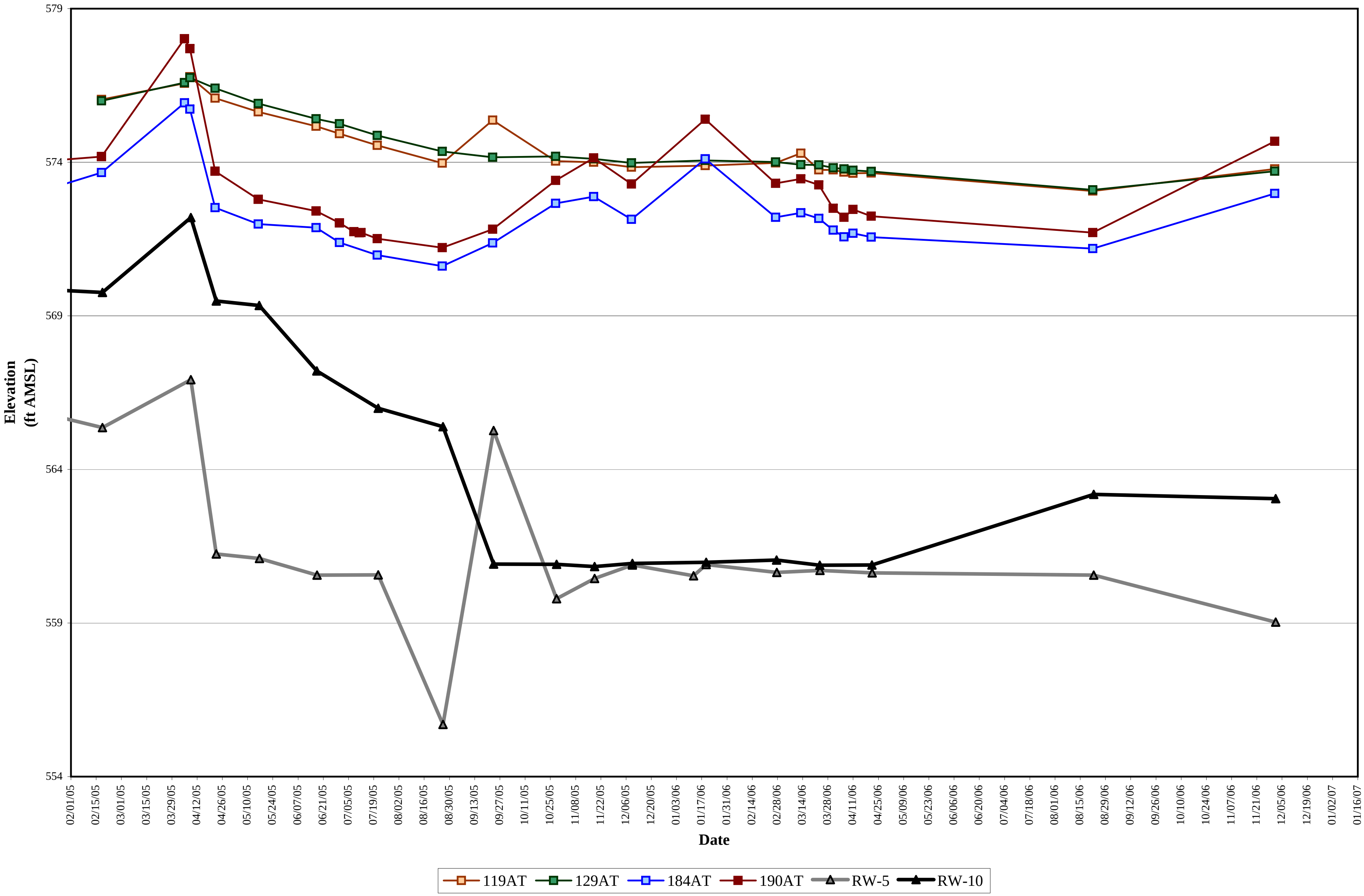
175 0 175 350 Feet

Scale: 1" = 175' - 0'

Date: OCT 2005

FIGURE 3-1

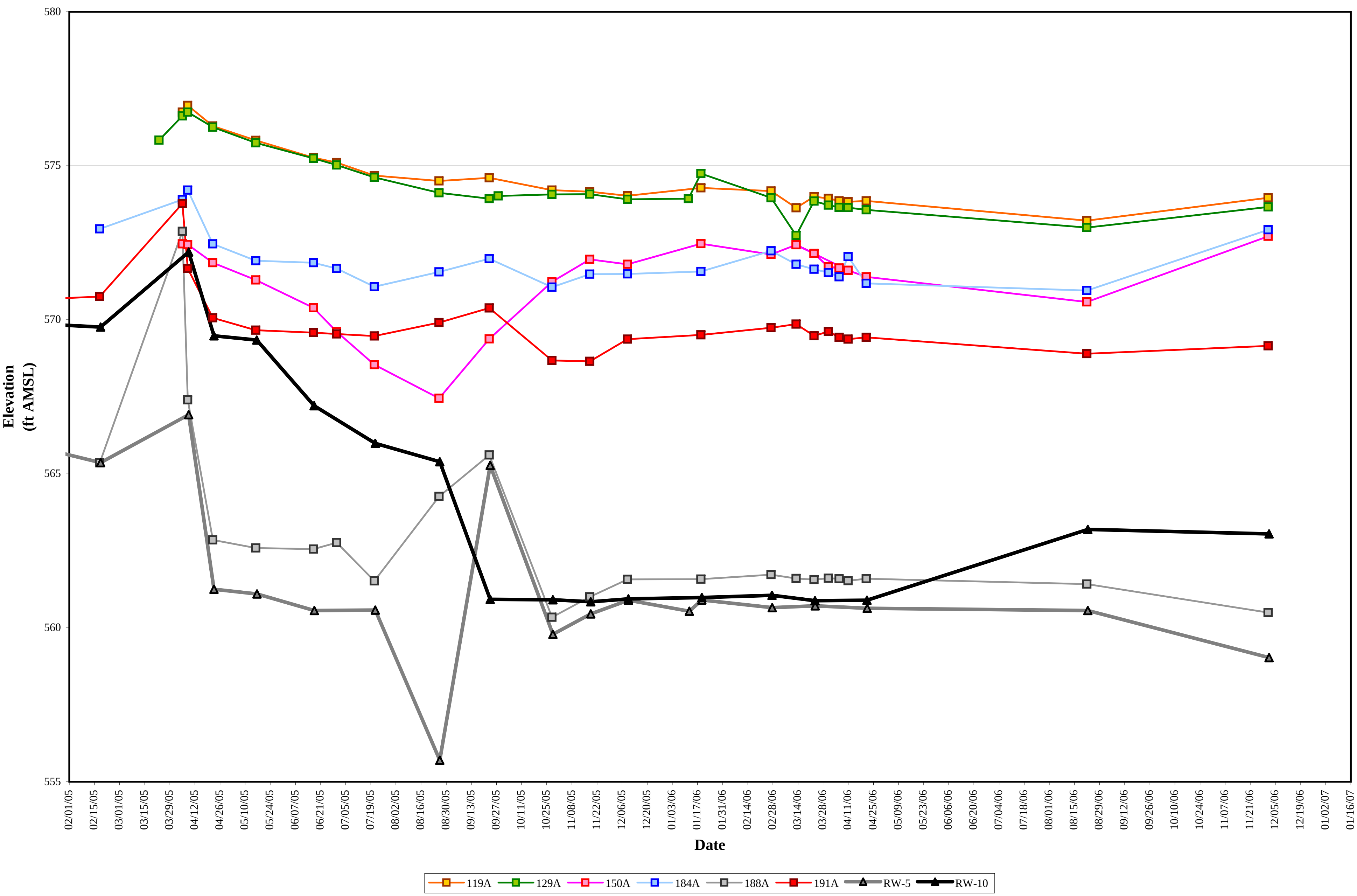
**Figure 3-2**
**Select AT-Zone Monitoring Wells**
**Groundwater Elevations 2005 - 2006**
**DuPont Necco Park**



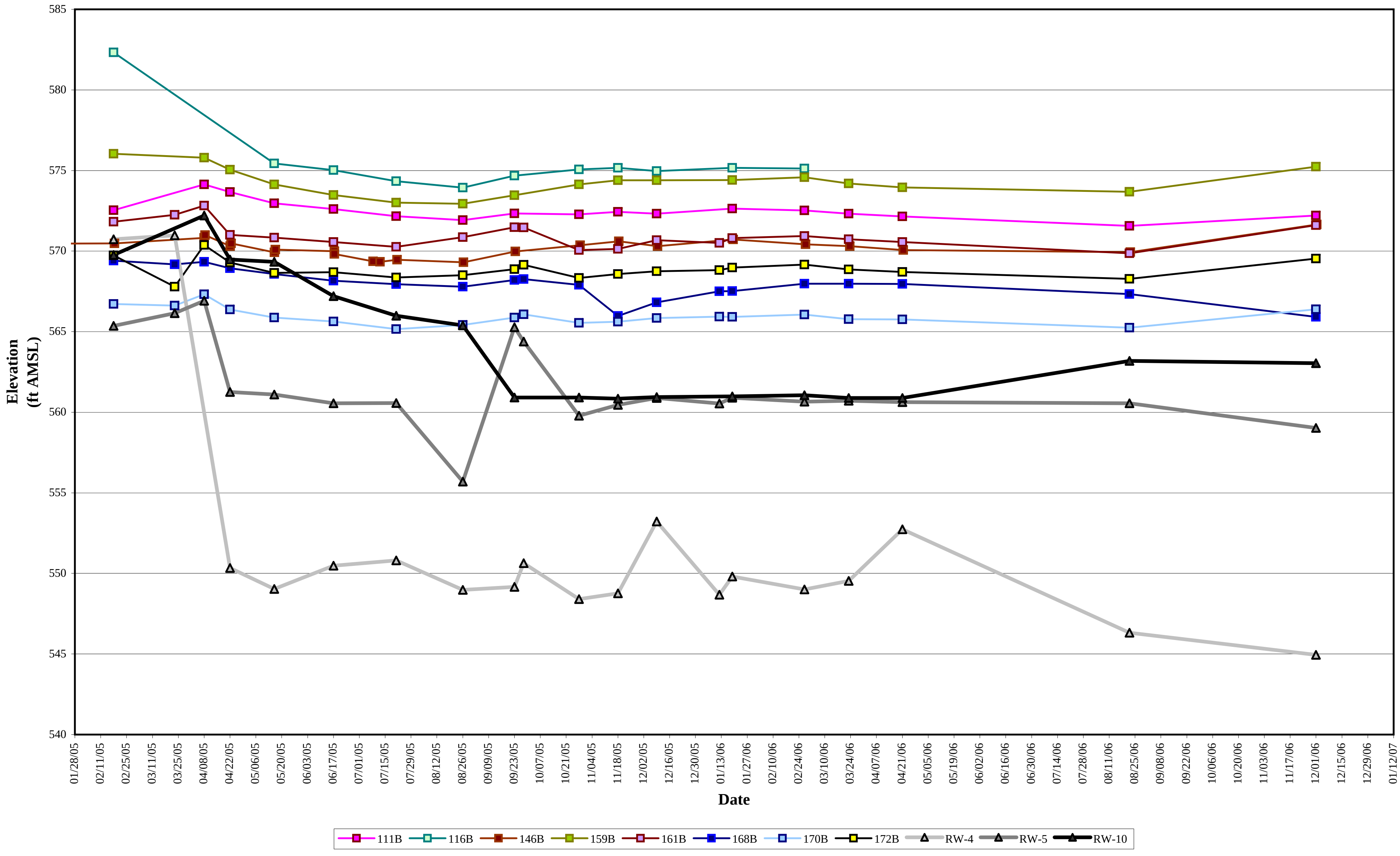

Copy of GW Elevation Trends - A&AT Zones.xls
Select AT(only)-Zone Gph

3/7/2007
1:50 PM

**Figure 3-3**
**Select A-Zone Monitoring Wells**
**Groundwater Elevations 2005 - 2006**
**DuPont Necco Park**



## Figure 3-4
## Select B-Zone Monitoring Wells
## Groundwater Elevations 2005 to 2006
## DuPont Necco Park



# Figure 3-5
## Select C-Zone Monitoring Wells
## Groundwater Elevations 2005 to 2006
## DuPont Necco Park

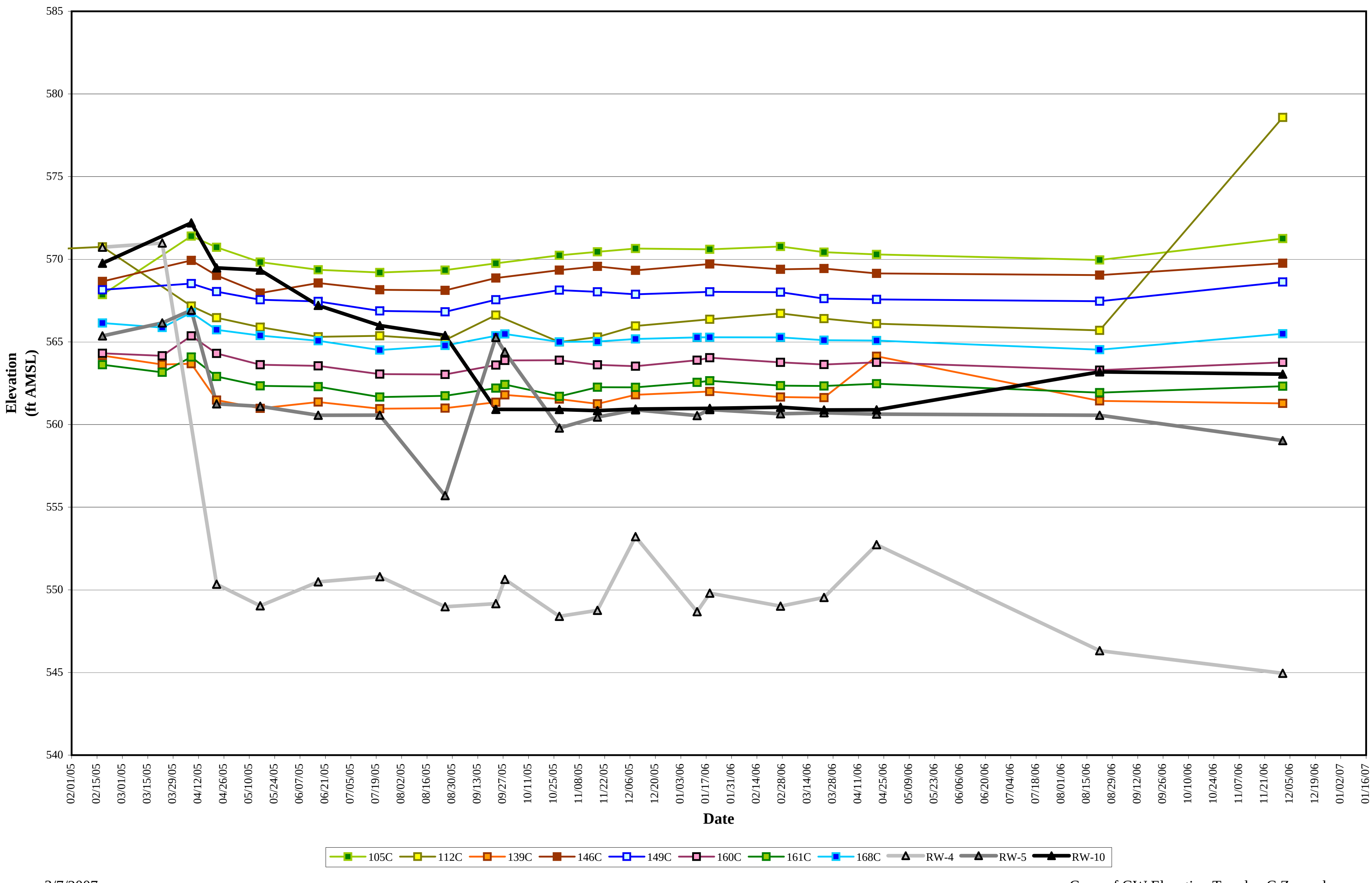
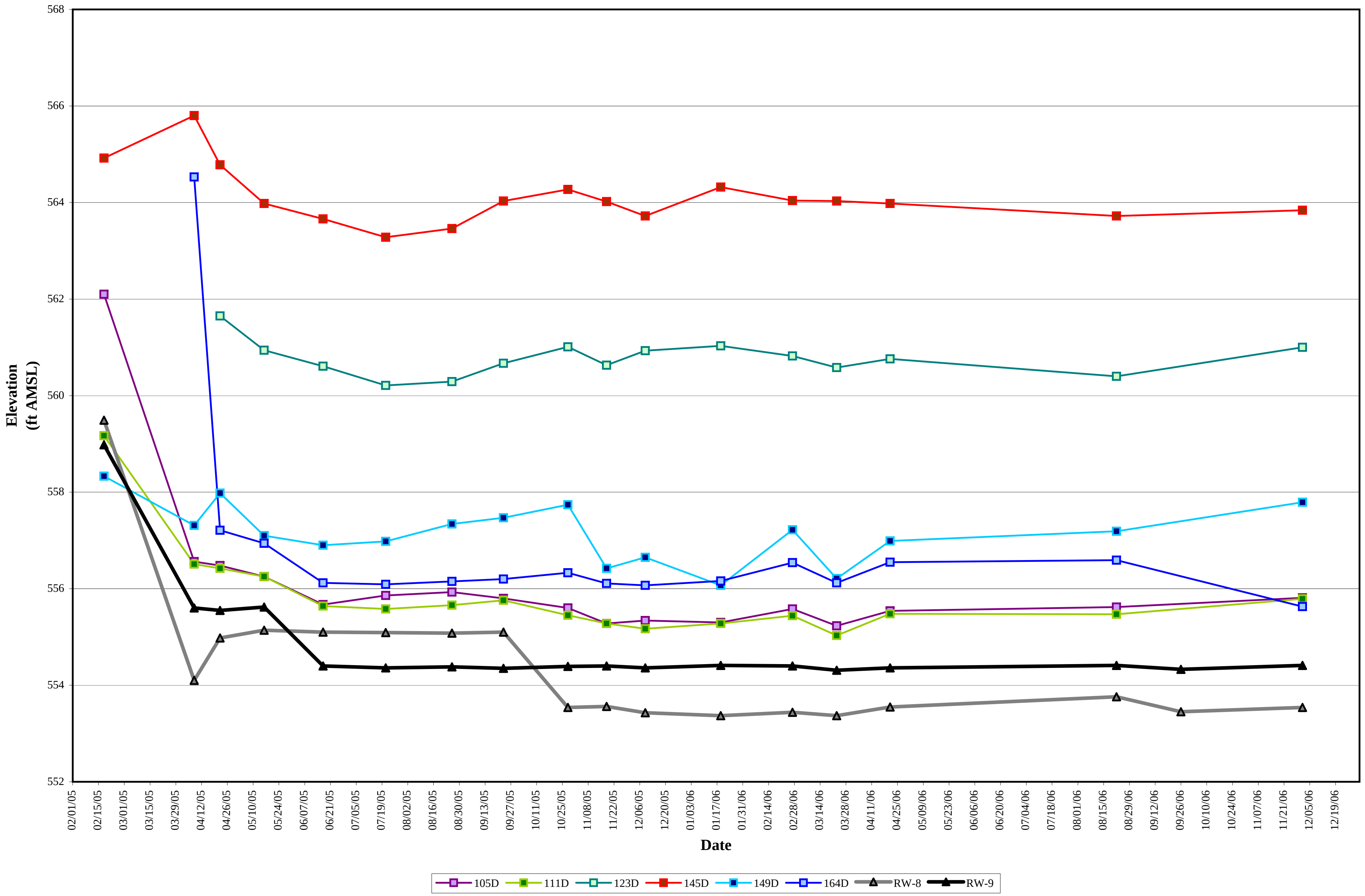


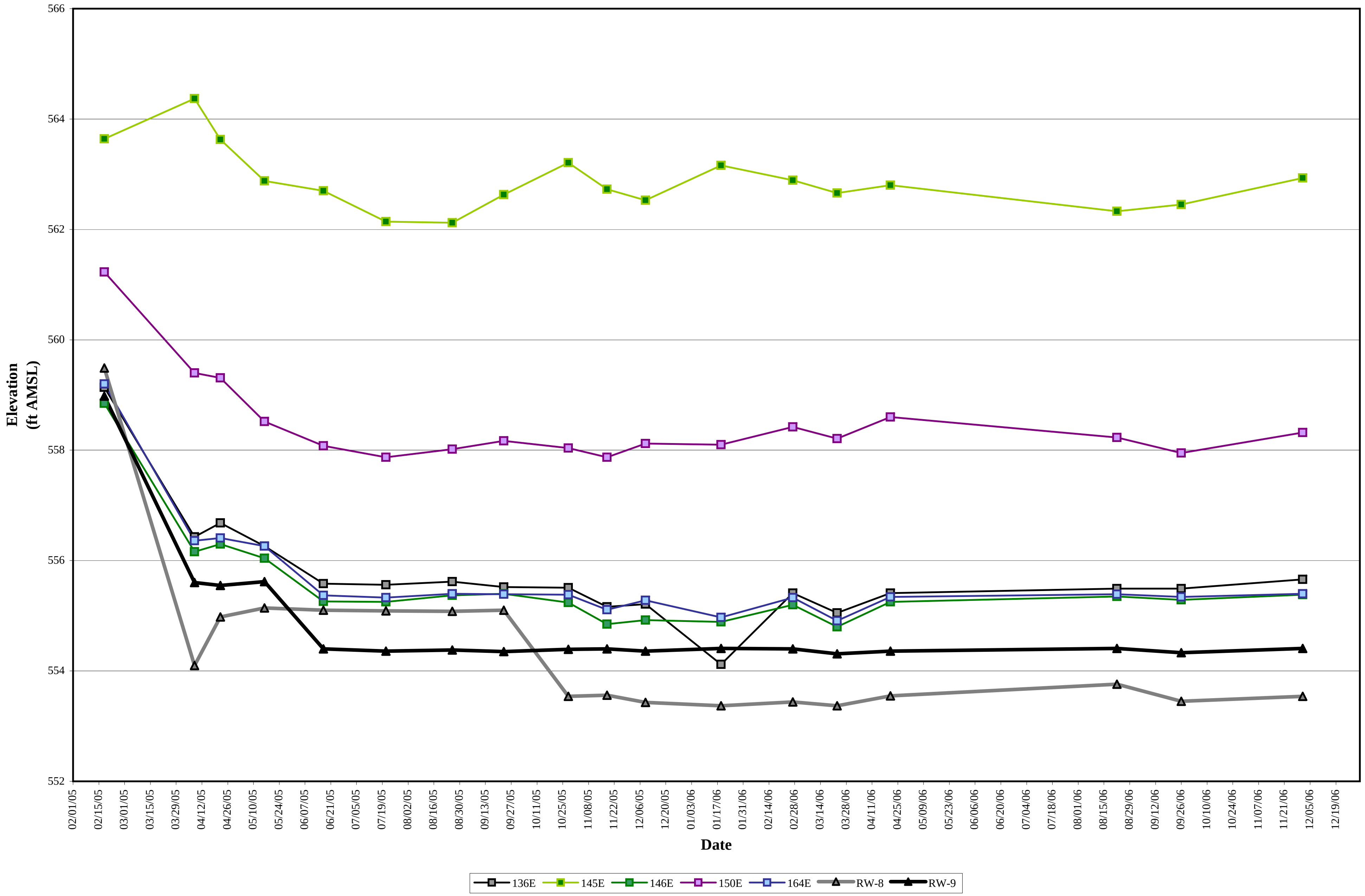
**Figure 3-6**
**Select D-Zone Monitoring Wells**
**Groundwater Elevations 2005 to 2006**
**DuPont Necco Park**




3/7/2007
1:52 PM

Copy of GW Elevation Trends - D Zone.xls
Selected

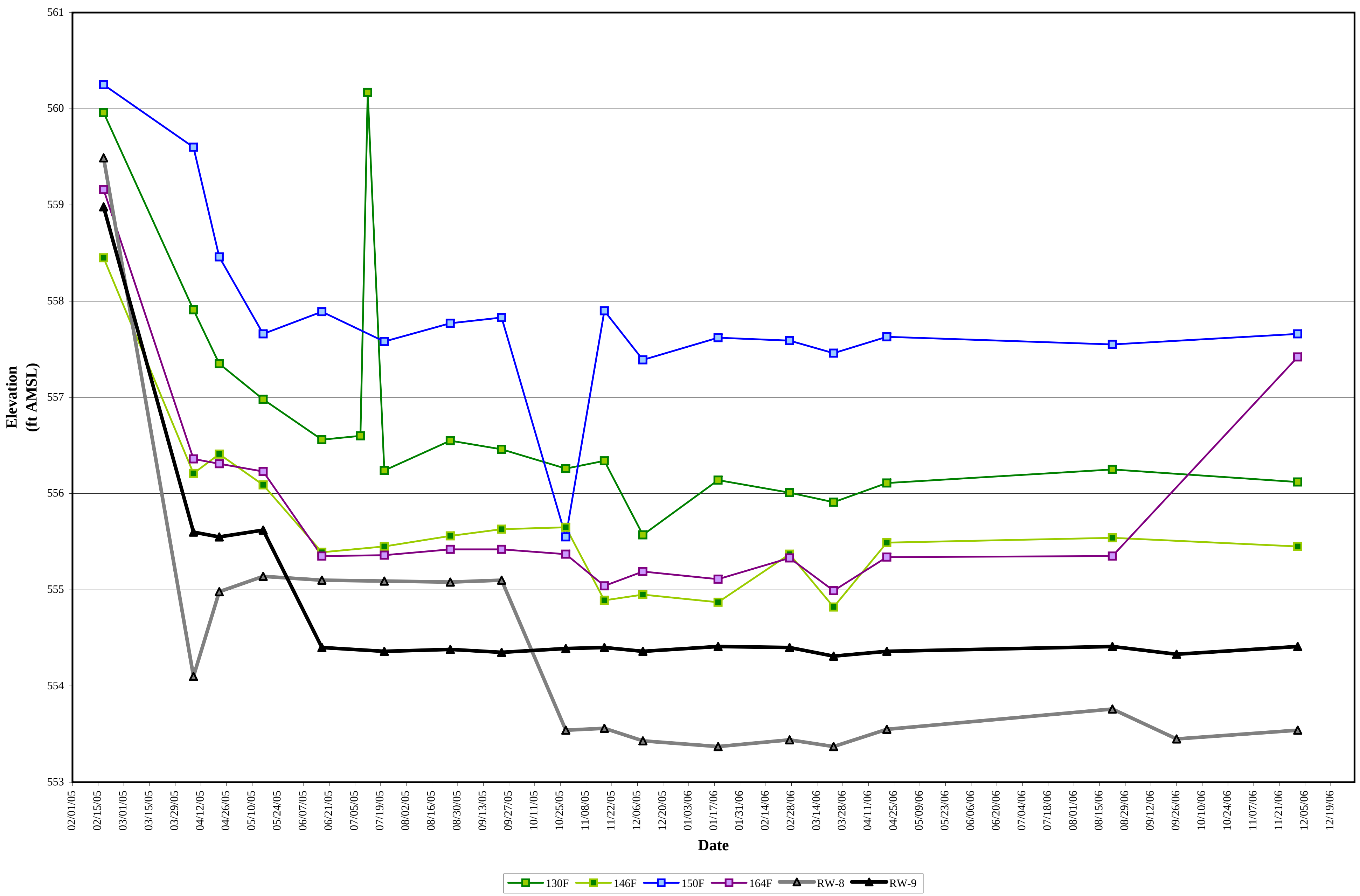
**Figure 3-7**
**Select E-Zone Monitoring Wells**
**Groundwater Elevations 2005 to 2006**
**DuPont Necco Park**

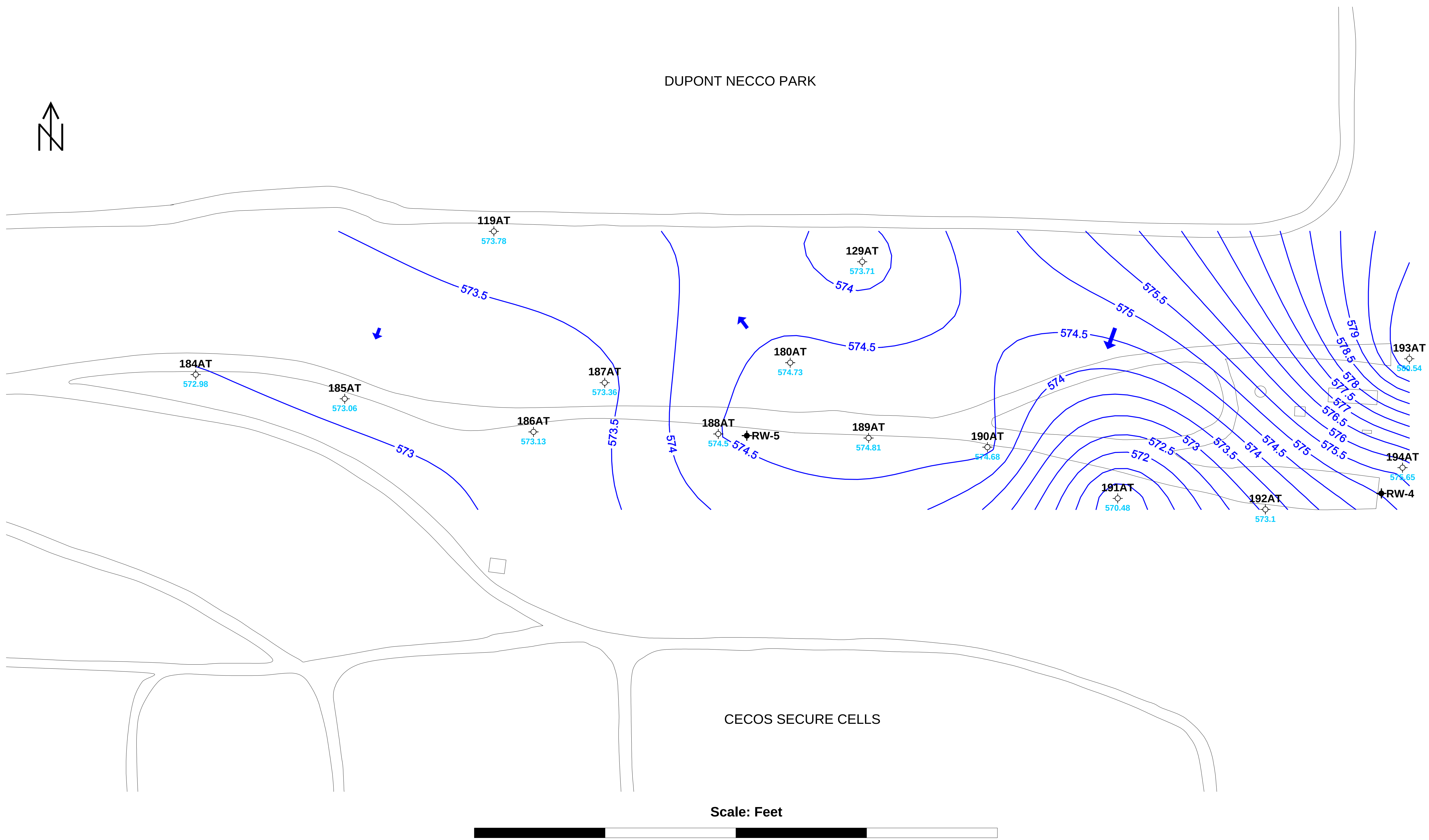



3/7/2007
1:53 PM

Copy of GW Elevation Trends - E Zone.xls
Selected

**Figure 3-8**
**Select F-Zone Monitoring Wells**
**Groundwater Elevations 2005 to 2006**
**DuPont Necco Park**






DUPONT
Corporate Remediation Group
*An Alliance between*
*DuPont and URS Diamond*
Buffalo Avenue & 26th Street
Niagara Falls, NY 14302

## LEGEND

3B Well ID

Monitoring Well

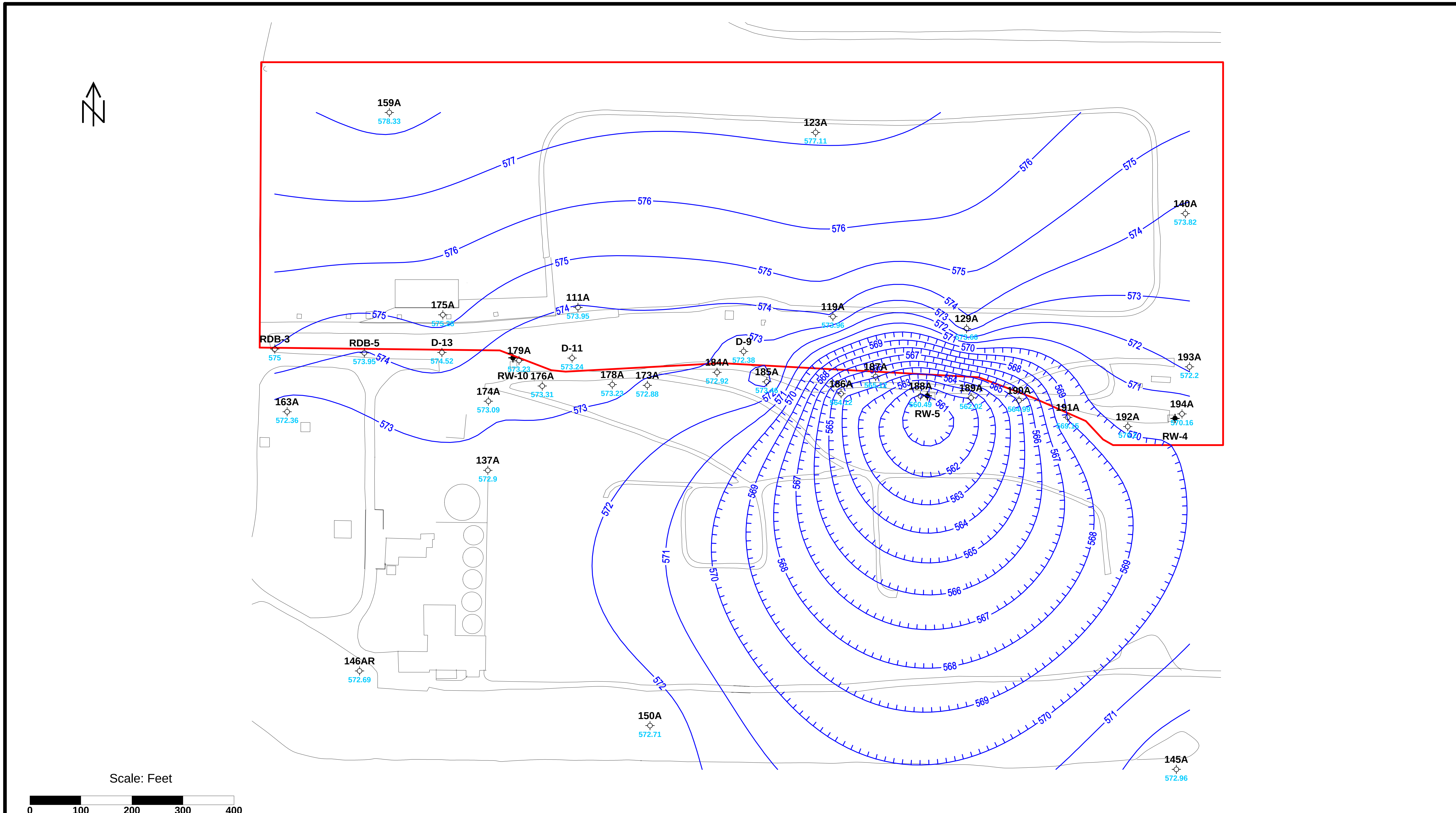
Pumping Well

Potentiometric Contour

Structure

Road

**Figure 3-9**
**AT-Zone Potentiometric Surface Map**
**December 1, 2006**
**DuPont Necco Park**

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*DuPont and URS Diamond*
Buffalo Avenue & 26th Street
Niagara Falls, NY 14302

## LEGEND

3B Well ID

Monitoring Well

Pumping Well

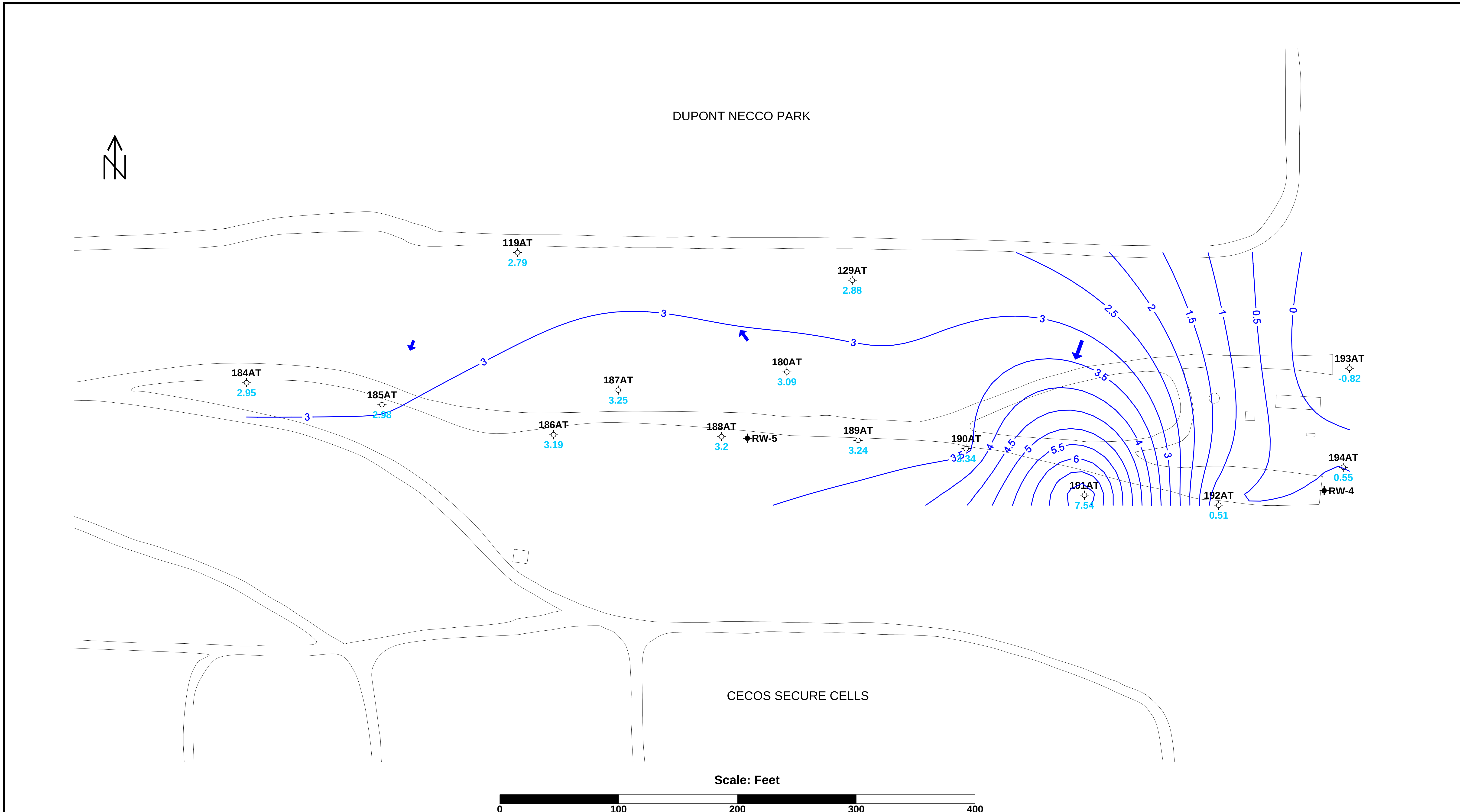
Potentiometric Contour

Structure

Road

Source Area Delineation

**Figure 3-10**
**A-Zone Potentiometric Surface Map**
**December 1, 2006**
**DuPont Necco Park**




Corporate Remediation Group

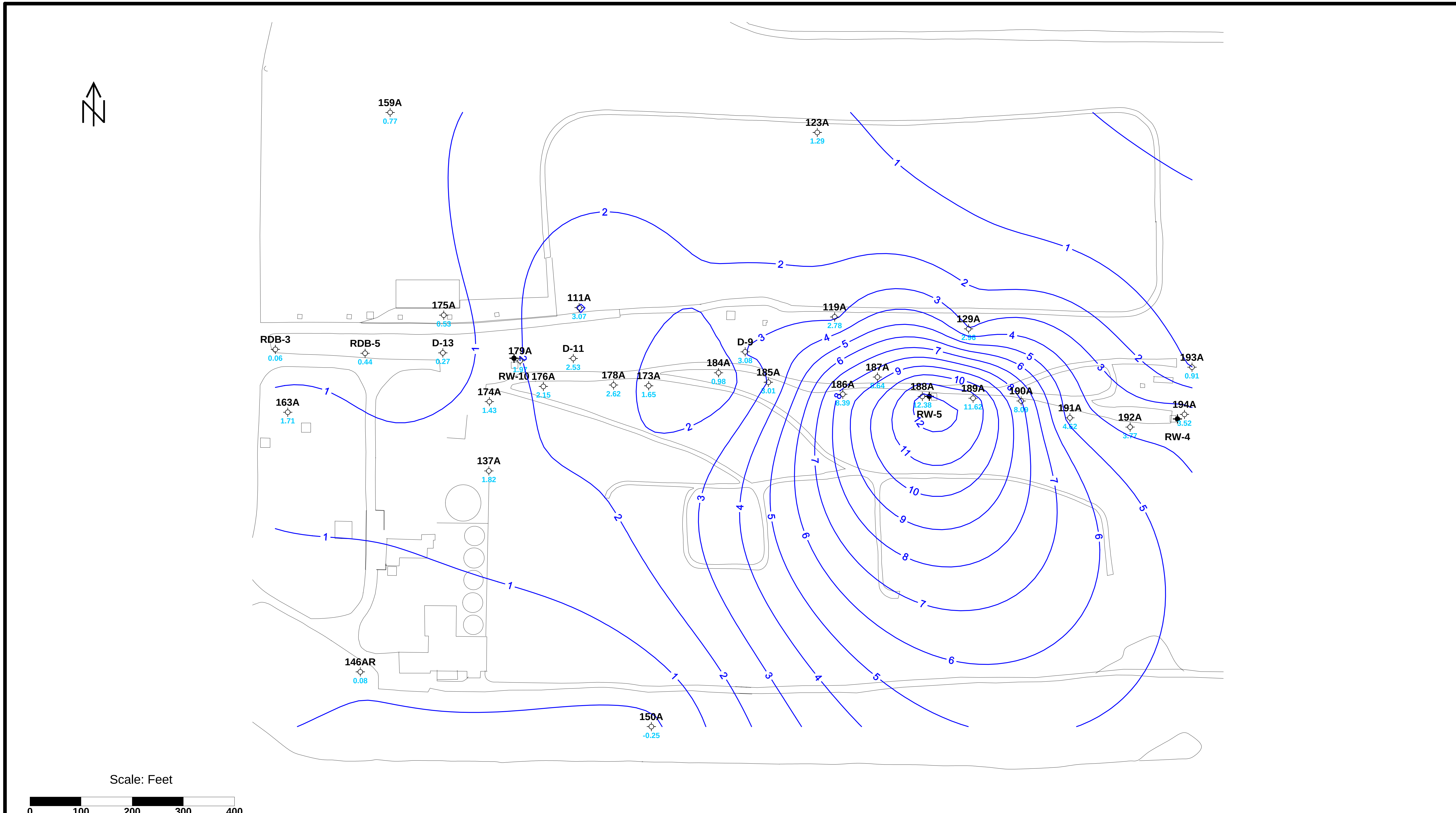
*An Alliance between*
*DuPont and URS Diamond*

Buffalo Avenue & 26th Street
Niagara Falls, NY 14302

## LEGEND

| | | | |
|---|---|---|---|
| 3B | Well ID | | Potentiometric Contour |
| | Monitoring Well | | Structure |
| | Pumping Well | | Road |

**Figure 3-11**
**AT-Zone Drawdown Contour Map**
**April 5, 2005 to December 1, 2006**
**DuPont Necco Park**




**Corporate Remediation Group**

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Buffalo Avenue & 26th Street
Niagara Falls, NY 14302

**LEGEND**

| | | | |
|---|---|---|---|
| 3B | Well ID | | Potentiometric Contour |
| | Monitoring Well | | Structure |
| | Pumping Well | | Road |

**Figure 3-12**
**A-Zone Drawdown Contour Map**
**April 5, 2005 to December 1, 2006**
**DuPont Necco Park**


DUPONT

**Corporate Remediation Group**

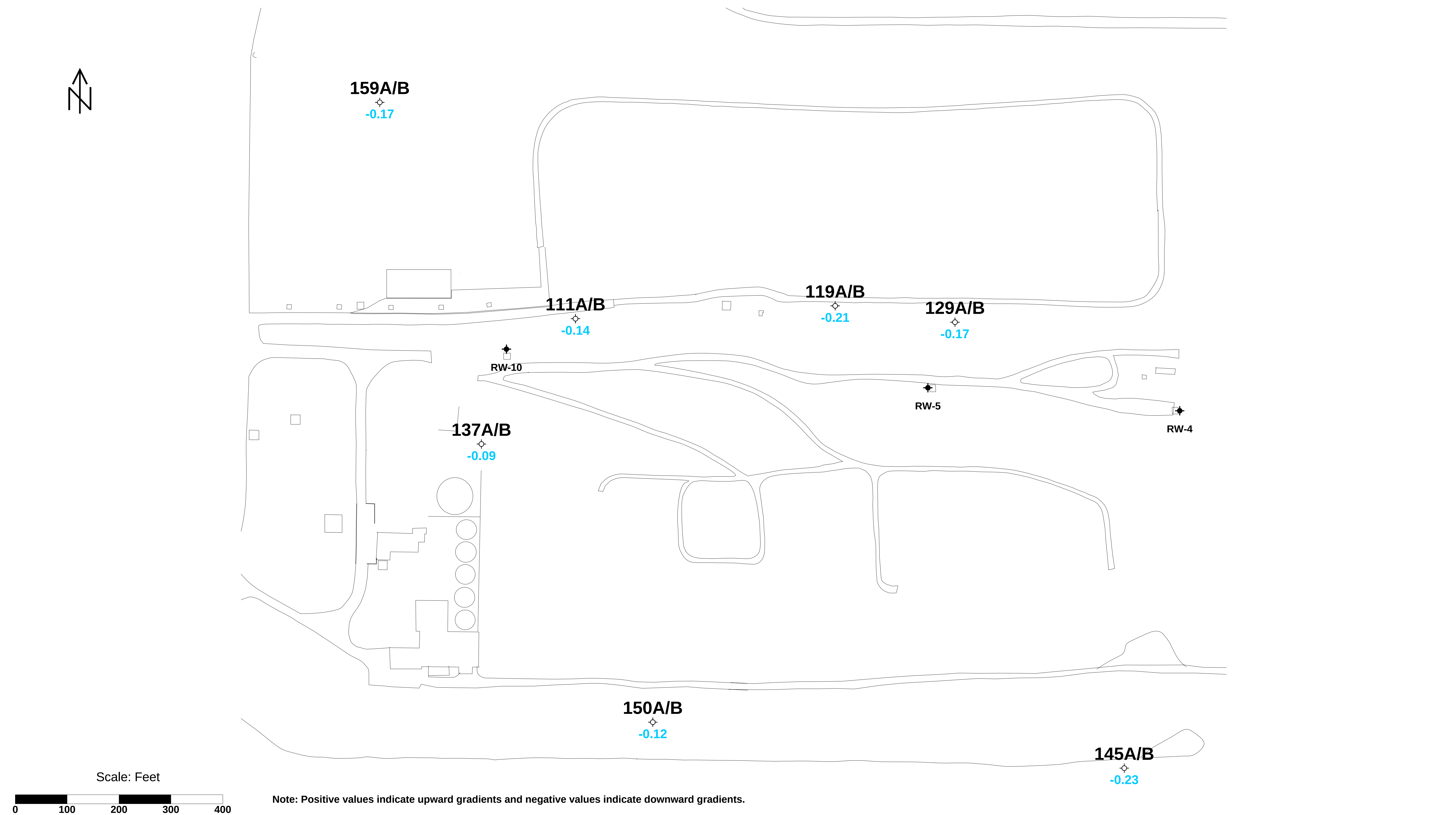
*An Alliance between*
*DuPont and URS Diamond*

Buffalo Avenue & 26th Street
Niagara Falls, NY 14302

**LEGEND**

| | | | |
|---|---|---|---|
| 3B | Well ID | | Potentiometric Contour |
| | Monitoring Well | | Structure |
| | Pumping Well | | Road |

**Figure 3-13**
**AT-Zone to A-Zone Vertical Gradients**
**December 1, 2006**
**DuPont Necco Park**




Note: Positive values indicate upward gradients and negative values indicate downward gradients.

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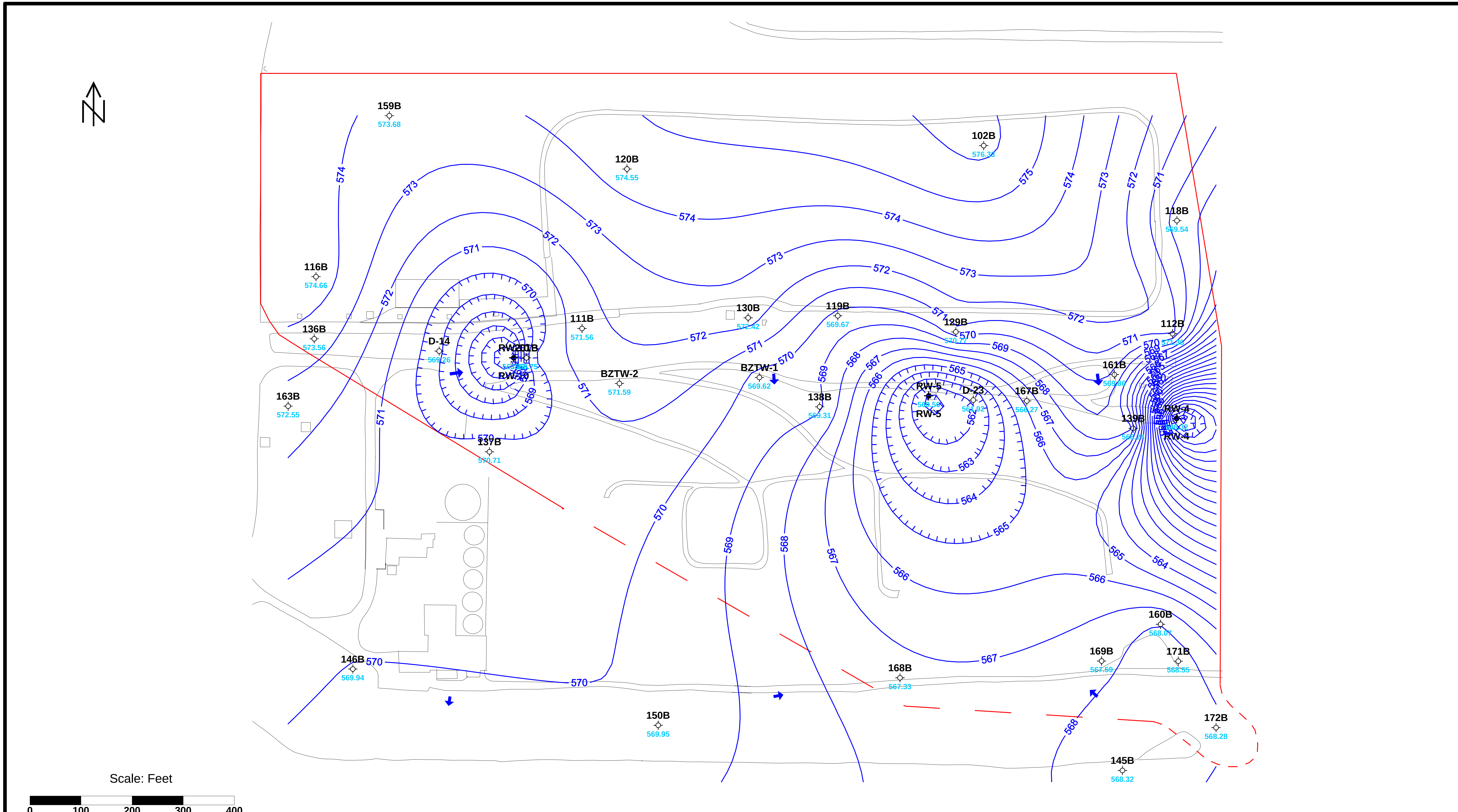
Buffalo Avenue & 26th Street
Niagara Falls, NY 14302

**LEGEND**

| | | | |
|---|---|---|---|
| 3B | Well ID | | Potentiometric Contour |
| ⌖ | Monitoring Well | | Structure |
| ✦ | Pumping Well | | Road |

# Figure 3-14
# A-Zone to B-Zone Vertical Gradients
# December 1, 2006
# DuPont Necco Park




**Corporate Remediation Group**

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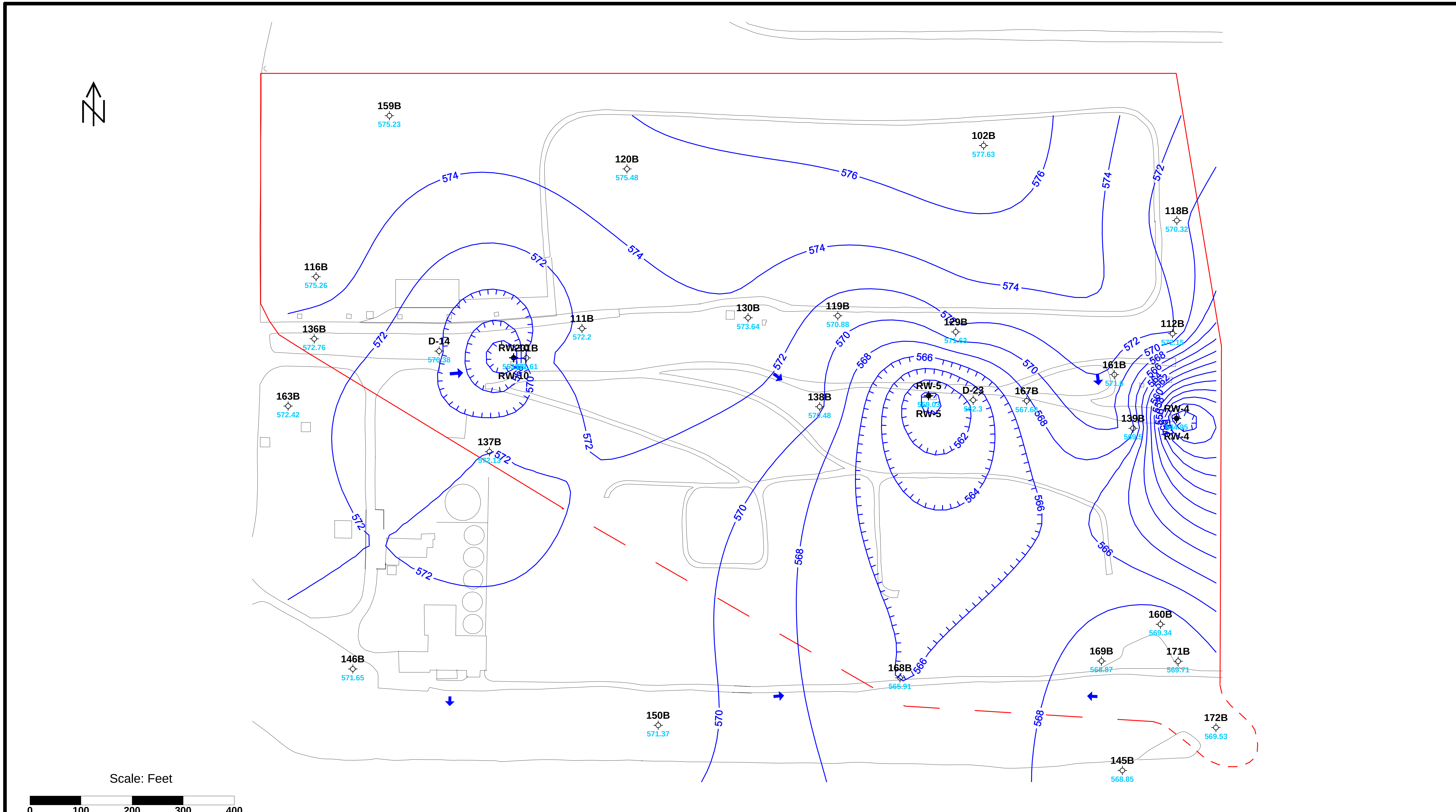
*DuPont and URS Diamond*

Buffalo Avenue & 26th Street
Niagara Falls, NY 14302

## LEGEND

| | | | |
|---|---|---|---|
| 3B | Well ID | Potentiometric Contour | Source Area Delineation |
| | Monitoring Well | Structure | |
| | Pumping Well | Road | |

# Figure 3-15
# B-Zone Potentiometric Surface Map
# August 22, 2006
# DuPont Necco Park




Corporate Remediation Group

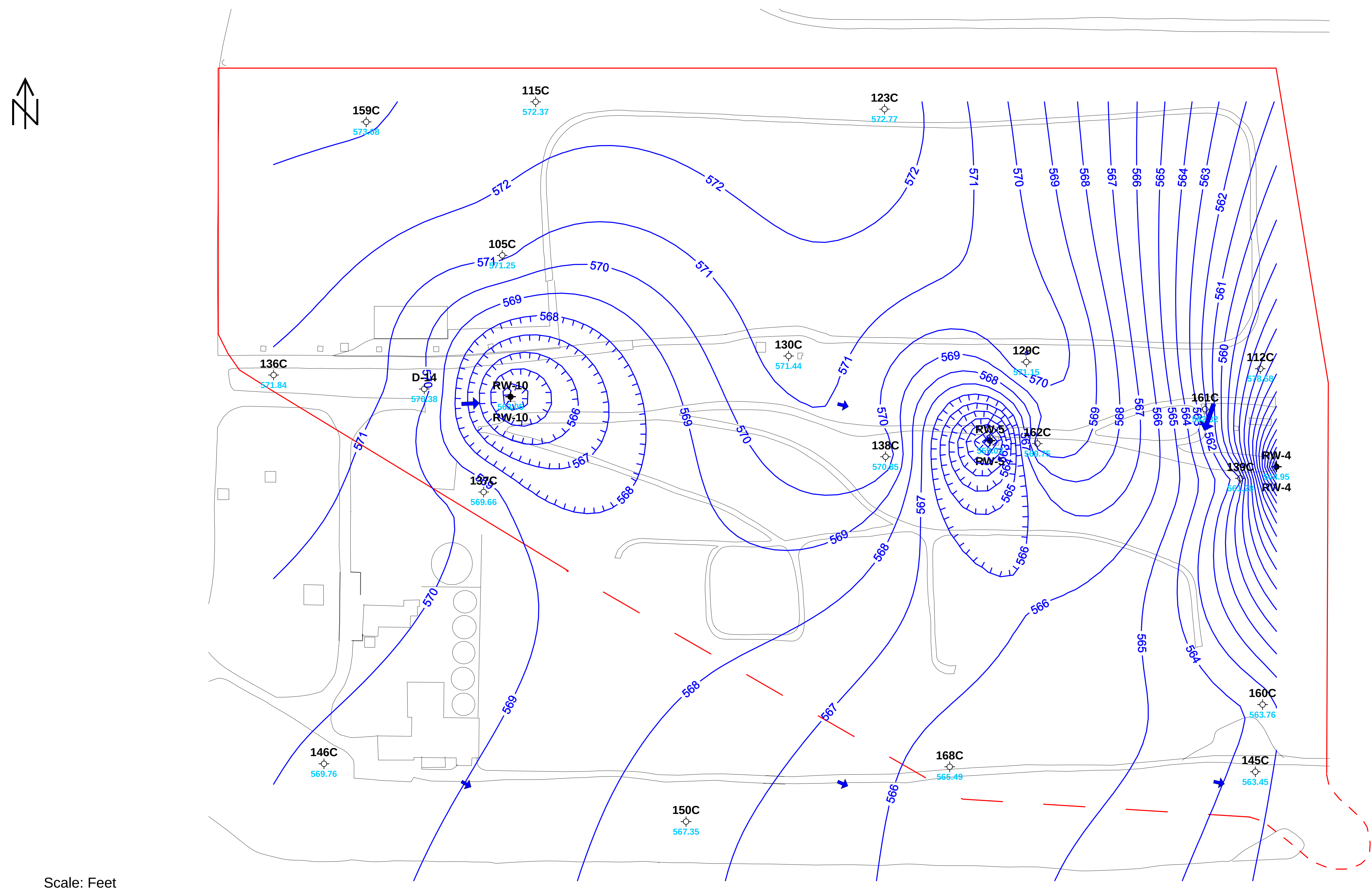
*An Alliance between DuPont and URS Diamond*

Buffalo Avenue & 26th Street
Niagara Falls, NY 14302

**LEGEND**

| | | |
|---|---|---|
| 3B Well ID | Potentiometric Contour | Source Area Delineation |
| Monitoring Well | Structure | |
| Pumping Well | Road | |

**Figure 3-16**
**B-Zone Potentiometric Surface Map**
**December 1, 2006**
**DuPont Necco Park**




Scale: Feet

0 100 200 300 400

**Note: Groundwater elevation data from 112C was not used in the generation of potentiometric contours due to anomalous reading.**

**Corporate Remediation Group**

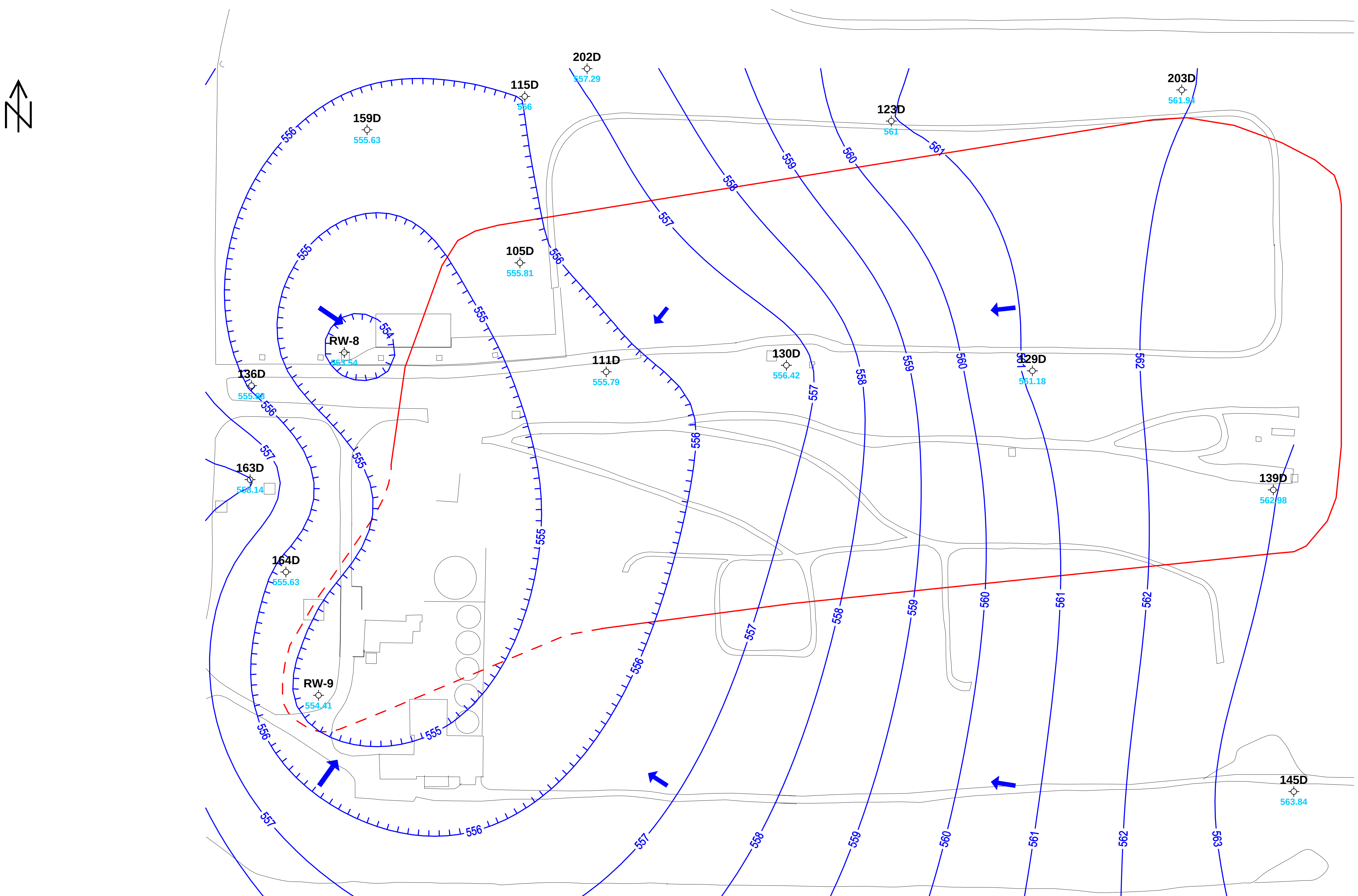
*An Alliance between DuPont and URS Diamond*

**Buffalo Avenue & 26th Street**
**Niagara Falls, NY 14302**

**LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| 3B | Well ID | | Potentiometric Contour | | Source Area Delineation |
| | Monitoring Well | | Structure | | |
| | Pumping Well | | Road | | |

# Figure 3-17
# C-Zone Potentiometric Surface Map
# December 1, 2006
# DuPont Necco Park




Scale: Feet

0 100 200 300 400

**Notes: Potentiometric contours generated without 137D water level due to anomalous head level.**

**Corporate Remediation Group**

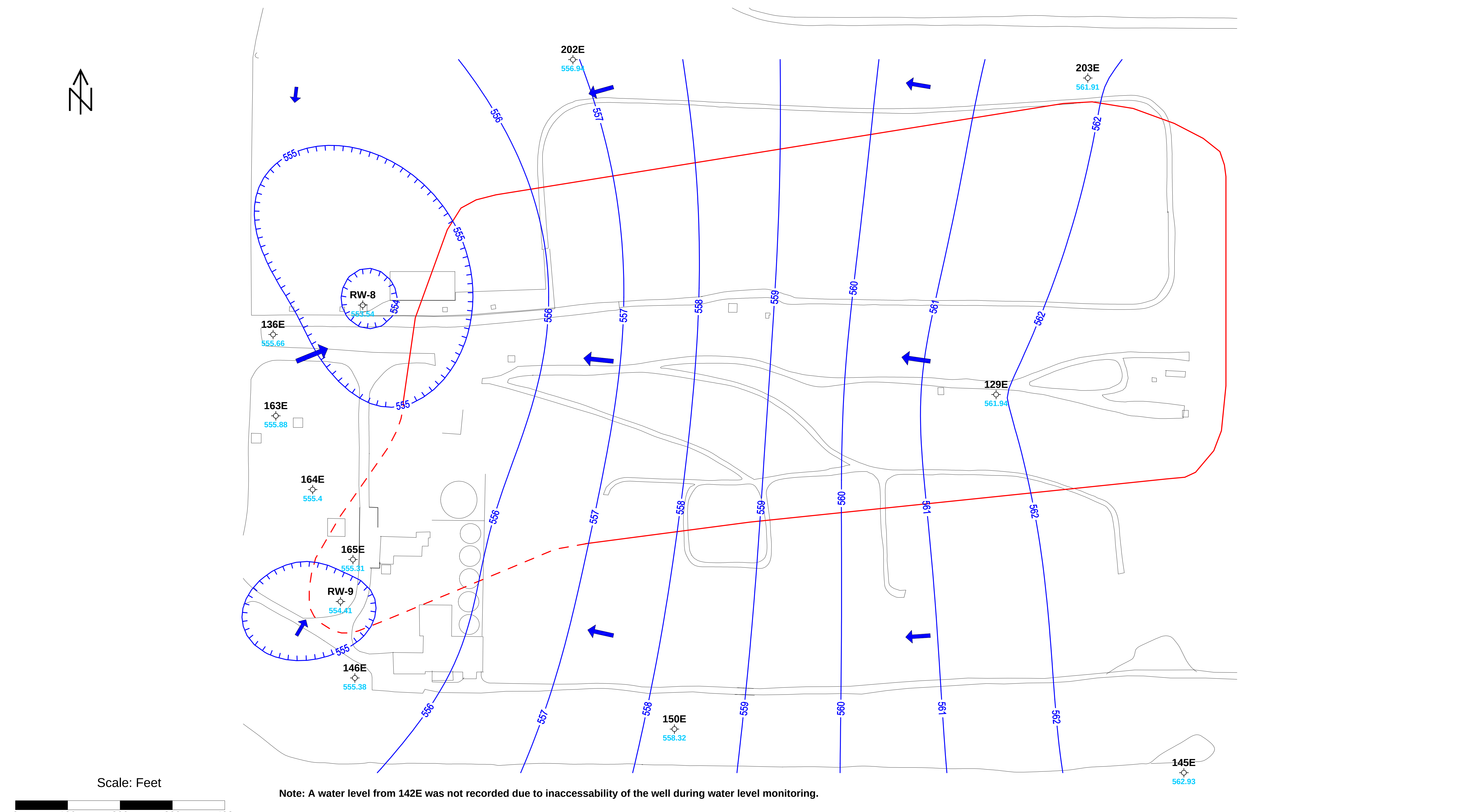
*An Alliance between DuPont and URS Diamond*

**Buffalo Avenue & 26th Street**
**Niagara Falls, NY 14302**

**LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| 3B | Well ID | | Potentiometric Contour | | Source Area Delineation |
| | Monitoring Well | | Structure | | |
| | Pumping Well | | Road | | |

# Figure 3-18
# D-Zone Potentiometric Surface Map
# December 1, 2006
# DuPont Necco Park




Note: A water level from 142E was not recorded due to inaccessability of the well during water level monitoring.

**Corporate Remediation Group**

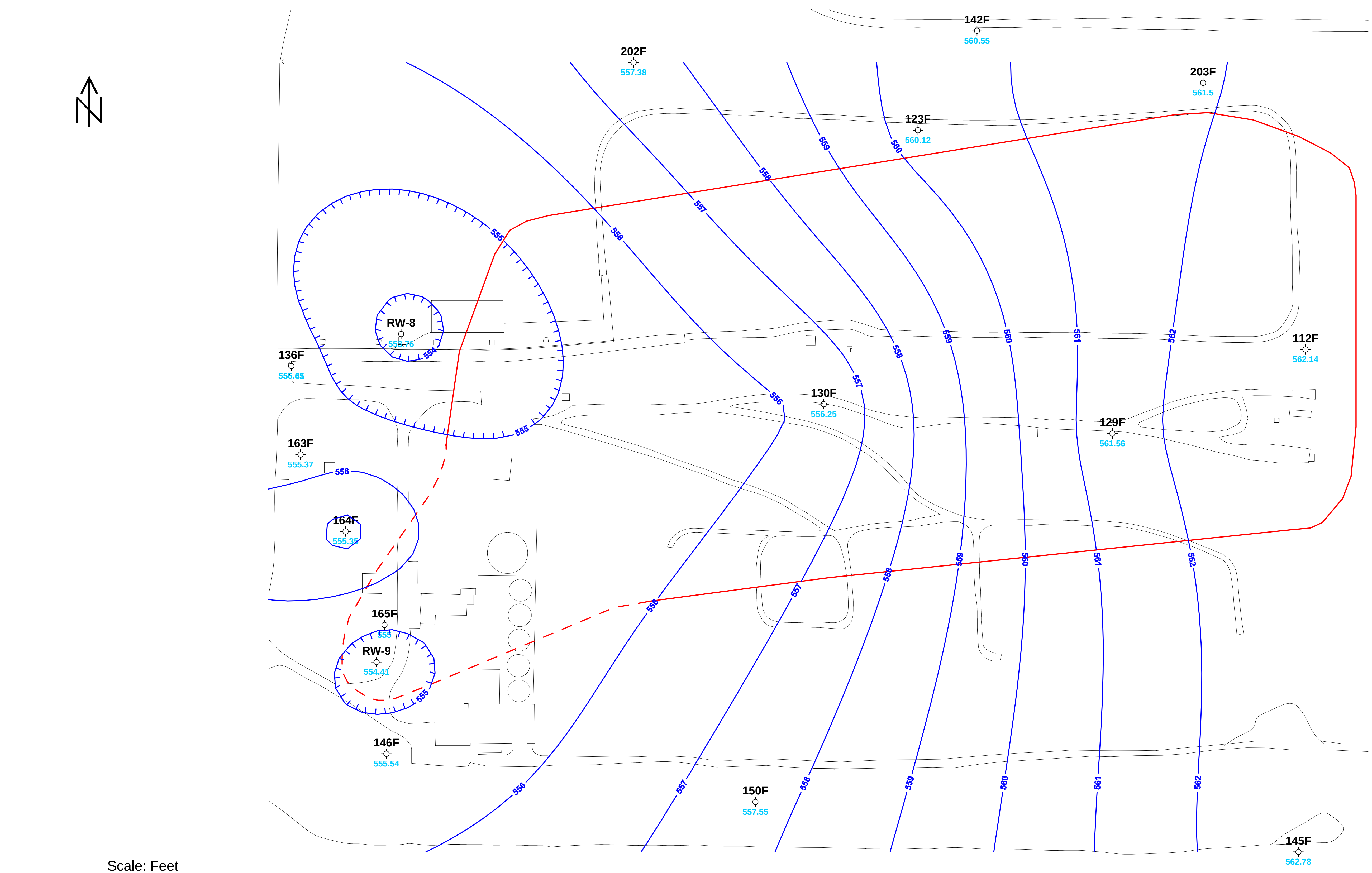
*An Alliance between*
*DuPont and URS Diamond*

**Buffalo Avenue & 26th Street**
**Niagara Falls, NY 14302**

**LEGEND**

| | | | |
|---|---|---|---|
| 3B | Well ID | Potentiometric Contour | Source Area Delineation |
| | Monitoring Well | Structure | |
| | Pumping Well | Road | |

## Figure 3-19
## E-Zone Potentiometric Surface Map
## December 1, 2006
## DuPont Necco Park




Scale: Feet

0 100 200 300 400

Note: A water level from 142F was not recorded due to inaccessability of the well during water level monitoring.

**Corporate Remediation Group**

*An Alliance between DuPont and URS Diamond*

Buffalo Avenue & 26th Street
Niagara Falls, NY 14302

**LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| 3B | Well ID | | Potentiometric Contour | | Source Area Delineation |
| | Monitoring Well | | Structure | | |
| | Pumping Well | | Road | | |

**Figure 3-20**
**F-Zone Potentiometeric Surface Map**
**December 1, 2006**
**DuPont Necco Park**

# APPENDICES

# APPENDIX A

# WELL COMPLETION LOGS

**DuPont Necco Park**
**2006 Annual Report**
**RW-10 Rehabilitation**

**DRILLING SUMMARY**

Geologist:
Dan Sheldon

Drilling Company:
Nothnagle Drilling Co.

Driller:
Steve Lorante

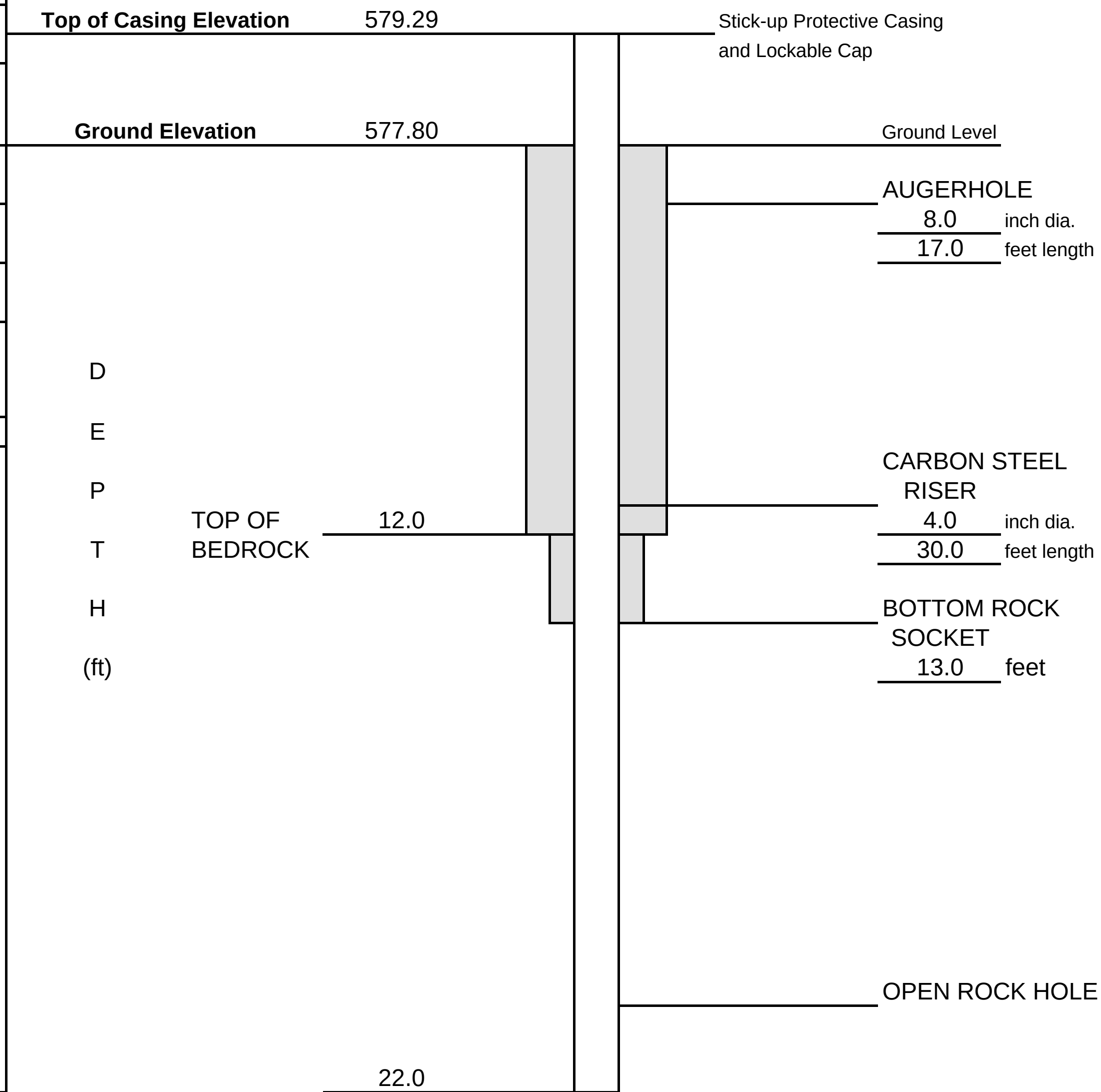
Rig Make/Model:
CME-85

Date:
8/1/06

## GEOLOGIC LOG

| Depth(ft.) | Description* |
|---|---|
| 0.0-8.0' | Fill |
| 8.0-12.0' | Silty Clay |
| 12.0-22.0' | Lockport Group<br>Oak Orchard Member<br>(dolostone)<br><br>-B Zone 16.0-17.0' |

* Overburden description based on RW-10 log.




**Not to Scale**

## WELL DESIGN

| *CASING MATERIAL* | | *SCREEN MATERIAL* | | *FILTER MATERIAL* |
|---|---|---|---|---|
| Surface: | 4-inch steel stick-up | Type: | Open Rock Hole | Type: None Setting: NA |
| Well: | 4-inch ID carbon steel | | | *SEAL MATERIAL*<br>Type: None Setting: NA |
| Monitor: | open rock hole | | | |

*COMMENTS:*

*ROCK CORING*

| | |
|---|---|
| Cored Interval: | 13.0-22.0 |
| Core Diameter: | 3" |
| Rock Hole Diameter: | 4" |

*LEGEND*

Cement/Bentonite Grout (shaded box)

| | | |
|---|---|---|
| **Client: DuPont CRG** | **Location: Necco Park** | **Project No.: 18984677** |
| **URS Diamond** | **BEDROCK MONITORING WELL CONSTRUCTION DETAILS** | **Well Number: 201 B** |

**DuPont Necco Park**
**2006 Annual Report**
**2006 Piezometer Installation**

**DRILLING SUMMARY**

Geologist:
Dan Sheldon

Drilling Company:
Nothnagle Drilling Co.

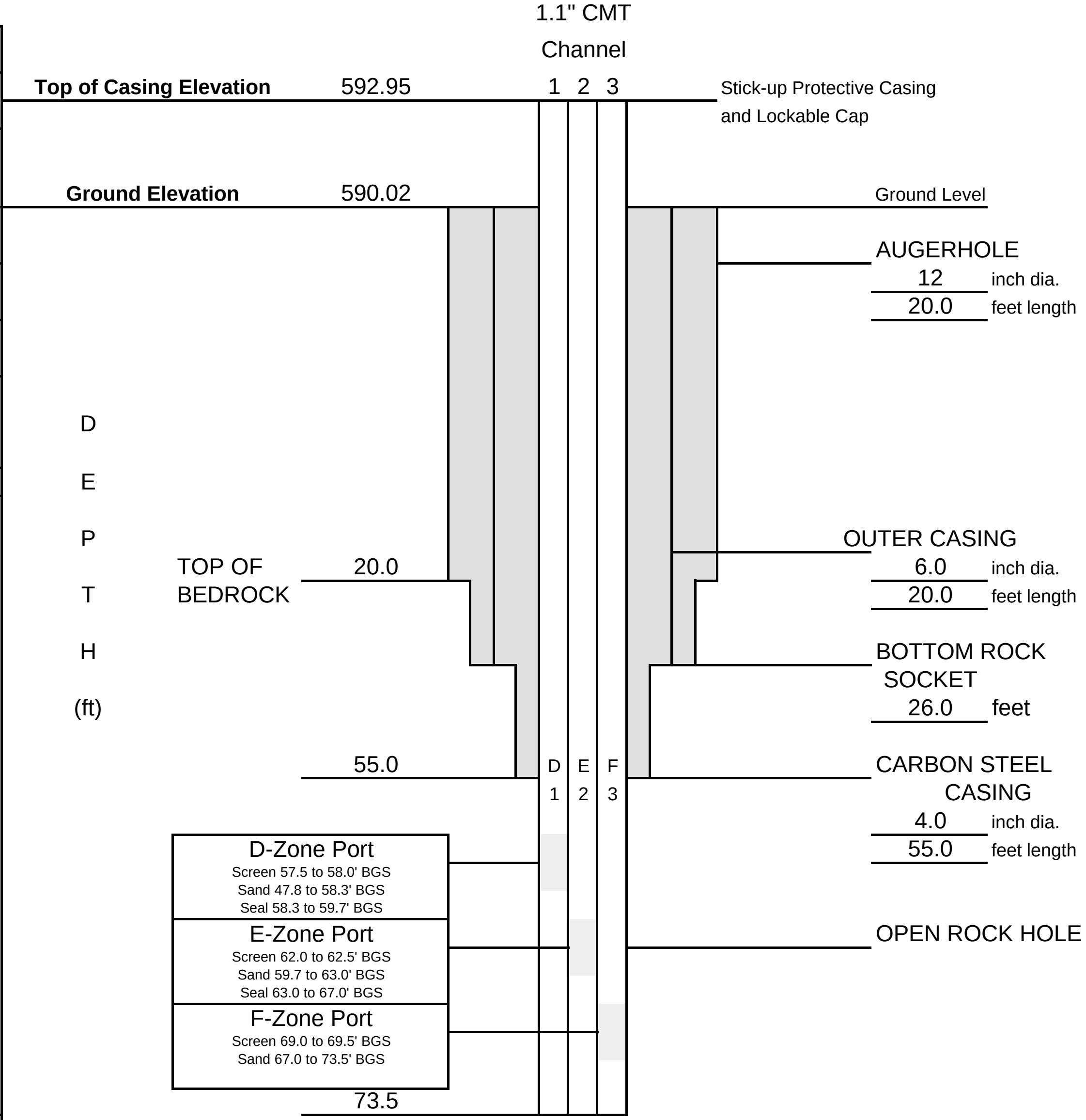
Driller:
Steve Lorante

Rig Make/Model:
CME-85

Date:
9/20/2006

## GEOLOGIC LOG

| Depth(ft.) | Description |
|---|---|
| 0.0 - 20.0 | Fill |
| 20.0 -55.0 | Lockport Dolomite, No Sampling 20.0-55.0 ft. |
| 58.0 - 60.0 | D-Zone fractures no water return |
| 62.0 - 62.5 | E-Zone fractures no water return |
| 68.5 - 69.5 | F-Zone fractures |




## WELL DESIGN

**Not to Scale**

| *CASING MATERIAL* | | *SCREEN MATERIAL* | | *FILTER MATERIAL* |
|---|---|---|---|---|
| Surface: | 4-inch steel stick-up | Type: | Open Rock Hole | Type: Sand #1 Setting: As Indicated |
| Well: | 4-inch ID carbon steel | | | *SEAL MATERIAL* Type: Bentonite Chips Setting: As Indicated |
| Monitor: | Modified open rock hole - CMT 3-Ports | | | |

*COMMENTS:*

CMT piezometers installed on the landfill.

*ROCK CORING*

| | |
|---|---|
| Cored Interval: | 55.0 - 73.5 |
| Core Diameter: | 3" |
| Rock Hole Diameter: | 4" |

*LEGEND*

Cement/Bentonite Grout

CMT Screen

| | | |
|---|---|---|
| **Client:** DuPont CRG | **Location:** Necco Park | **Project No.:** 18984677 |
| **URS Diamond** | **CMT BEDROCK PIEZOMETER CONSTRUCTION DETAILS** | **Well Number:** 202 DEF |

**DRILLING SUMMARY**

Geologist:
Dan Sheldon

Drilling Company:
Nothnagle Drilling Co.

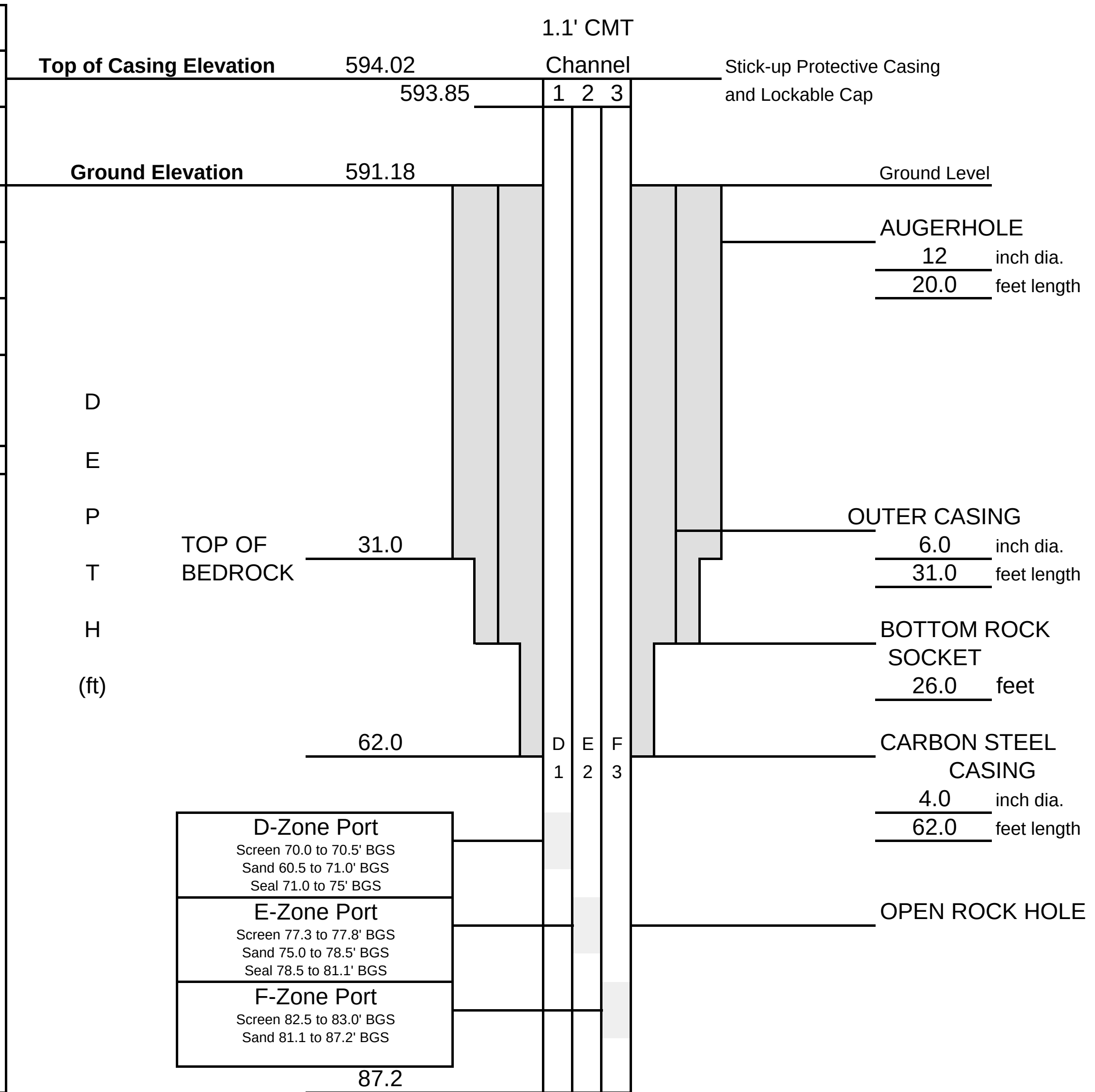
Driller:
Steve Lorante

Rig Make/Model:
CME-85

Date:
9/20/2006

## GEOLOGIC LOG

| Depth(ft.) | Description |
|---|---|
| 0.0 - 31.0 | Fill |
| 31.0 - 67.0 | Lockport Dolomite |
| | No sampling 31.0-62.0 ft. |
| 70.0 - 72.3 | D-Zone fractures |
| | some water loss |
| 75.5 - 76.7 | E-Zone fractures |
| | some water loss |
| 82.5 - 83.0 | F-Zone Fractures |
| | No water return |




## WELL DESIGN

**Not to Scale**

| CASING MATERIAL | | SCREEN MATERIAL | | FILTER MATERIAL |
|---|---|---|---|---|
| Surface: | 4-inch steel stick-up | Type: | Open Rock Hole | Type: Sand #1 — Setting: As indicated |
| Well: | 4-inch ID carbon steel | | | *SEAL MATERIAL* |
| Monitor: | Modified open rock hole - CMT 3-Ports | | | Type: Bentonite Chips — Setting: As indicated |

*COMMENTS:*

CMT piezometers installed on the landfill.

*ROCK CORING*

| | |
|---|---|
| Cored Interval: | 62.0 - 87.0' |
| Core Diameter: | 3" |
| Rock Hole Diameter: | 4" |

*LEGEND*

- Cement/Bentonite Grout
- CMT Screen

| | | |
|---|---|---|
| **Client:** DuPont CRG | **Location:** Necco Park | **Project No.:** 18984677 |
| **URS Diamond** | **CMT BEDROCK PIEZOMETER CONSTRUCTION DETAILS** | **Well Number:** 203 DEF |

# APPENDIX B

# 2006 SEMI-ANNUAL EVENTS & RECOVERY WELL SAMPLING

# APPENDIX B.1

Semi-Annual Sampling Results

# Table B-1
# Summary of 2006 Analytical Results
# DuPont Necco Park

| | | | A-ZONE WELLS | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | D-9 | D-9 | D-11 | D-11 | D-13 | D-13 | 137A | 137A | 145A | 145A | 146AR | 146AR | 150A | 150A | 150A |
| | | | 4/26/06 | 10/26/06 | 5/1/06 | 10/24/06 | 4/26/06 | 10/26/06 | 4/27/06 | 10/31/06 | 5/3/06 | 11/2/06 | 5/5/06 | 11/3/06 | 4/28/06 | 4/28/06 | 10/27/06 |
| **Analyte** | **units** | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 |
| **Volatile Organics** | | | | | | | | | | | | | | | | | |
| 1,1,2,2-TETRACHLOROETHANE | ug/l | T | <0.22 | <0.22 | <0.22 | <1.8 | <0.44 | <0.22 | <0.88 | <1.1 | 1.5 J | <0.22 | <0.22 | <0.22 | <0.22 | <0.22 | <0.22 |
| 1,1,2-TRICHLOROETHANE | ug/l | T | <0.22 | <0.22 | <0.22 | <1.8 | <0.44 | <0.22 | <0.88 | <1.1 | <0.73 | <0.22 | <0.22 | <0.22 | <0.22 | <0.22 | <0.22 |
| 1,1-DICHLOROETHENE | ug/l | T | <0.18 | <0.18 | 6.6 | 58 | 0.72 J | <0.18 | 18 | 18 | <0.60 | <0.18 | 0.23 J | 0.30 J | <0.18 | <0.18 | <0.18 |
| 1,2-DICHLOROETHANE | ug/l | T | 0.81 J | 1.4 | 0.97 J | <1.3 UJ | 2.8 | 1.3 | 4.5 | 5.3 | <0.53 | <0.16 | <0.16 | <0.16 | <0.16 | <0.16 | <0.16 |
| CARBON TETRACHLORIDE | ug/l | T | <0.19 | <0.19 | <0.19 | <1.5 UJ | <0.38 | <0.19 | <0.76 | <0.95 | <0.63 | <0.19 UJ | <0.19 | <0.19 UJ | <0.19 | <0.19 | <0.19 |
| CHLOROFORM | ug/l | T | <0.16 | <0.16 | 1.5 | <1.3 UJ | <0.32 | <0.16 | 1.2 J | 1.0 J | <0.53 | <0.16 | <0.16 | <0.16 | <0.16 | <0.16 | <0.16 |
| CIS-1,2-DICHLOROETHENE | ug/l | T | <0.21 | 0.29 J | 6.5 | 210 | 3.1 | 0.83 J | 130 | 120 | 3.0 J | 0.41 J | <0.21 | <0.21 | 0.33 J | 0.33 J | 0.45 J |
| TETRACHLOROETHENE | ug/l | T | <0.19 | <0.19 | 5.6 | 64 J | 1.5 J | 0.47 J | 72 | 58 | 42 | <0.19 | <0.19 UJ | <0.19 UJ | <0.19 | <0.19 | <0.19 |
| TRANS-1,2-DICHLOROETHENE | ug/l | T | <0.16 | 0.24 J | 1.2 | 12 | 1.5 J | 1.2 | 8.3 | 9.5 | <0.53 | <0.16 | <0.16 | <0.16 | <0.16 | <0.16 | <0.16 |
| TRICHLOROETHENE | ug/l | T | <0.28 | <0.28 | 30 | 250 | 4.9 | 1.4 | 160 | 140 | 100 | <0.28 | <0.28 | <0.28 | <0.28 | <0.28 | <0.28 |
| VINYL CHLORIDE | ug/l | T | <0.21 | 0.40 J | 4.1 | 140 | 7.4 | 0.66 J | 110 | 110 | <0.70 | <0.21 | 0.69 J | 0.94 J | <0.21 | <0.21 | <0.21 |
| **Dissolved Gases** | | | | | | | | | | | | | | | | | |
| ETHANE | ug/l | T | | | | | | | | | | | | | | | |
| ETHENE | ug/l | T | | | | | | | | | | | | | | | |
| METHANE | ug/l | T | | | | | | | | | | | | | | | |
| PROPANE | ug/l | T | | | | | | | | | | | | | | | |
| **Semivolatile Organics** | | | | | | | | | | | | | | | | | |
| 2,4,5-TRICHLOROPHENOL | ug/l | T | <0.96 | <0.96 | <0.96 | <4.8 | <3.8 | <4.8 | <4.8 | <3.8 UJ | <0.96 | <0.96 | 4.1 J | 3.7 J | <0.96 | <0.96 | <0.96 |
| 2,4,6-TRICHLOROPHENOL | ug/l | T | <1.4 | <1.4 | <1.4 | <7.0 | <5.6 | <7.0 | <7.0 | <5.6 UJ | <1.4 | <1.4 | <1.4 UJ | <1.4 | <1.4 | <1.4 | <1.4 |
| 3-METHYLPHENOL & 4-METHYLPHENOL | ug/l | T | <0.75 | <0.75 | 2.4 J | <0.75 | 37 J | 8.1 J | 35 J | 25 J | <0.75 | <0.75 | <0.75 UJ | <0.75 | <0.75 | <0.75 | <0.75 |
| HEXACHLOROBENZENE | ug/l | T | <0.065 | <0.065 | <0.065 | <0.32 | <0.26 | <0.32 | <0.32 | <0.26 UJ | <0.065 | <0.065 | <0.065 UJ | <0.065 | <0.065 | <0.065 | <0.065 |
| HEXACHLOROBUTADIENE | ug/l | T | <0.51 | <0.51 | 2.2 J | 4.2 J | 3.7 J | <2.6 | 3.0 J | 3.1 J | <0.51 | <0.51 | <0.51 UJ | <0.51 | <0.51 | <0.51 | <0.51 |
| HEXACHLOROETHANE | ug/l | T | <0.58 | <0.58 | <0.58 | <2.9 | <2.3 | <2.9 | <2.9 | <2.3 UJ | <0.58 | <0.58 | <0.58 UJ | <0.58 | <0.58 | <0.58 | <0.58 |
| PENTACHLOROPHENOL | ug/l | T | <0.48 | <0.48 | 3.1 J | 10 J | <1.9 | <2.4 | 4.4 J | <1.9 UJ | <0.48 | <0.48 | 4.9 J | 0.84 J | <0.48 | <0.48 | <0.48 |
| PHENOL | ug/l | T | <0.96 | <0.96 | 6.1 J | 45 J | 43 | 12 J | 170 | 120 J | <0.96 | <0.96 | <0.96 UJ | <0.96 | <0.96 | <0.96 | <0.96 |
| TIC 1 | ug/l | T | <NS J | 4.5 J | 19 J | 350 J | 110 J | 57 J | 93 J | 130 J | <NS J | <NS J | 0.56 J | 0.70 J | <NS J | <NS J | <NS J |
| **Inorganics** | | | | | | | | | | | | | | | | | |
| BARIUM, DISSOLVED | ug/l | D | 95 J | 210 | 58 J | 490 | 270 | 700 | 12600 | 13400 | 37 J | 43 J | 18 J | 14 J | 53 J | 51 J | 54 J |
| IRON, DISSOLVED | ug/l | D | | | | | | | | | | | | | | | |
| MANGANESE, DISSOLVED | ug/l | D | | | | | | | | | | | | | | | |
| CHLORIDE | ug/l | T | 662000 | 800000 | 594000 | 2110000 J | 1720000 | 2760000 | 672000 | 823000 | 32300 | 24500 B | 519000 | 446000 | 79000 | 69400 | 80700 |
| NITRATE-NITRITE | ug/l | T | | | | | | | | | | | | | | | |
| SULFATE | ug/l | T | | | | | | | | | | | | | | | |
| TOTAL ALKALINITY | ug/l | T | | | | | | | | | | | | | | | |
| TOTAL ORGANIC CARBON | ug/l | T | | | | | | | | | | | | | | | |
| TOTAL SULFIDE | ug/l | T | | | | | | | | | | | | | | | |
| **Field Parameters** | | | | | | | | | | | | | | | | | |
| SPECIFIC CONDUCTANCE | UMHOS/CM | T | 3300 | 3170 | 2800 | 10220 | 6380 | 7600 | 8240 | 8730 | 1640 | 1590 | 1970 | 1880 | 1890 | 1890 | 1930 |
| TEMPERATURE | DEGREES C | T | 10.3 | 12.5 | 11.9 | 12.2 | 9.7 | 12.6 | 9.3 | 13.7 | 9.8 | 11.1 | 13.3 | 11.7 | 10.6 | 10.6 | 12.8 |
| COLOR | NS | T | ORANGE | ORANGE | CLEAR | CLEAR | CLEAR | CLEAR | CLEAR | CLEAR | ORANGE | CLEAR | CLEAR | YELLOW | CLEAR | CLEAR | YELLOW |
| WATER LEVEL | Feet | T | 8.86 | 7.37 | 6.58 | 3.23 | 6.64 | 5.69 | 7.62 | 6.13 | 4.23 | 3.31 | 6.62 | 5.73 | 4.61 | 4.61 | 4.01 |
| DISSOLVED OXYGEN | ug/l | T | 770 | 1160 | 390 | 140 | 1740 | 520 | 420 | 80 | 390 | 160 | 210 | 110 | 610 | 610 | 510 |
| ODOR | NS | T | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE |
| PH | STD UNITS | T | 8.09 | 6.86 | 8.16 | 8.92 | 8.44 | 7.41 | 8.01 | 10.16 | 7.43 | 7.15 | 7.58 | 7.55 | 7.38 | 7.38 | 7.21 |
| REDOX | MV | T | -150 | -55 | -83 | -165 | -166 | -43 | -96 | -128 | -212 | 43 | 38 | 47 | -124 | -124 | -23 |
| TURBIDITY | NTU | T | 40.2 | 50.9 | 6.39 | 1.64 | 1.41 | 3.86 | 3.58 | 5.08 | 5.06 | 9.96 | 15.7 | 84.9 | 10.09 | 10.09 | 19.22 |
| **Total Volatiles** | ug/l | T | 1 | 2 | 56 | 734 | 22 | 6 | 504 | 462 | 147 | 0 | 1 | 1 | 0 | 0 | 0 |

D - Disolved T - Total

< and ND = Non detect at stated reporting limit

# Table B-1
# Summary of 2006 Analytical Results
# DuPont Necco Park

| | | | B-ZONE WELLS | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 111B | 136B | 136B | 137B | 137B | 139B | 141B | 145B | 145B | 146B | 146B | 149B | 149B | 150B | 150B |
| | | | 11/1/06 | 5/4/06 | 11/1/06 | 4/27/06 | 10/31/06 | 11/2/06 | 10/26/06 | 5/3/06 | 11/2/06 | 5/5/06 | 11/3/06 | 5/2/06 | 10/30/06 | 4/28/06 | 10/27/06 |
| **Analyte** | **units** | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| **Volatile Organics** | | | | | | | | | | | | | | | | | |
| 1,1,2,2-TETRACHLOROETHANE | ug/l | T | <5.5 UJ | <7.3 | <5.5 UJ | <1.8 | <2.2 | 29000 | <3.7 | <160 | 110 J | <0.22 | <0.22 | <0.22 | <0.22 | <1.5 | <0.22 |
| 1,1,2-TRICHLOROETHANE | ug/l | T | 20 J | <7.3 | <5.5 UJ | <1.8 | <2.2 | 1400 J | <3.7 | 400 J | 460 J | <0.22 | <0.22 | <0.22 | <0.22 | <1.5 | <0.22 |
| 1,1-DICHLOROETHENE | ug/l | T | 50 | <6.0 | <4.5 | 21 | 22 | <450 | <3.0 | 880 | 470 J | 5.2 | 7.6 | <0.18 | 0.28 J | <1.2 | 0.30 J |
| 1,2-DICHLOROETHANE | ug/l | T | 130 | <5.3 | <4.0 | 6.0 J | 6.2 J | <400 | <2.7 | <110 | <80 | <0.16 | <0.16 | <0.16 | <0.16 | <1.1 | <0.16 |
| CARBON TETRACHLORIDE | ug/l | T | <4.8 | <6.3 | <4.8 | <1.6 | <1.9 | <480 UJ | <3.2 | <140 | <95 UJ | <0.19 | <0.19 UJ | <0.19 | <0.19 | <1.3 | <0.19 |
| CHLOROFORM | ug/l | T | 130 | <5.3 | <4.0 | 1.4 J | <1.6 | 14000 | <2.7 | 710 | 590 | <0.16 | <0.16 | <0.16 | <0.16 | <1.1 | <0.16 |
| CIS-1,2-DICHLOROETHENE | ug/l | T | 100 | 750 | 720 | 200 | 180 | 9800 | <3.5 | 18000 | 18000 | 32 | 32 | 1 | 3.3 | 19 | 11 |
| TETRACHLOROETHENE | ug/l | T | 13 J | 270 | 220 J | 95 | 91 | 2000 J | <3.2 | 160 J | 180 J | <0.19 UJ | 0.33 J | <0.19 | <0.19 | 1.9 J | 2.1 |
| TRANS-1,2-DICHLOROETHENE | ug/l | T | 7.4 J | 43 | 35 | 12 | 11 | 1400 J | <2.7 | 1300 | 1300 | 2.4 | 3.4 | 0.23 J | 0.49 J | 4.8 J | 3 |
| TRICHLOROETHENE | ug/l | T | 140 | 57 | 62 | 240 | 210 | 6200 | <4.7 | 8500 | 6000 | 2.5 | 2.8 | 0.36 J | 0.59 J | 7.5 | 1.3 |
| VINYL CHLORIDE | ug/l | T | 88 | 29 J | 26 | 150 | 150 | 4400 | <3.5 | 4300 | 3900 | 9.9 | 20 | 1.3 | 5.9 | 17 J | 6.8 |
| **Dissolved Gases** | | | | | | | | | | | | | | | | | |
| ETHANE | ug/l | T | 17 | | | | | 66 | 42 | | 62 | | | | | | |
| ETHENE | ug/l | T | 3100 | | | | | 1600 | 56 | | 2900 | | | | | | |
| METHANE | ug/l | T | 3900 | | | | | 5800 | 1100 | | 9000 | | | | | | |
| PROPANE | ug/l | T | 0.55 | | | | | 5.8 | 9.7 | | 7.5 | | | | | | |
| **Semivolatile Organics** | | | | | | | | | | | | | | | | | |
| 2,4,5-TRICHLOROPHENOL | ug/l | T | | 920 | 810 | 5.5 J | 2.7 J | | | <9.6 | <4.8 | 34 | 37 | <0.96 | <0.96 | <32 | <4.8 |
| 2,4,6-TRICHLOROPHENOL | ug/l | T | | 110 J | 110 J | <7.0 | <3.5 UJ | | | <14 | <7.0 | 5.6 J | 5.7 J | <1.4 | <1.4 | <47 | <7.0 |
| 3-METHYLPHENOL & 4-METHYLPHENOL | ug/l | T | | <0.75 | <0.75 | 46 J | 31 J | | | 57 J | 63 J | 9.5 J | 10 J | <0.75 | 1.2 J | 86 J | 47 J |
| HEXACHLOROBENZENE | ug/l | T | | <1.6 | <2.6 | <0.32 | <0.16 UJ | | | <0.65 | <0.32 | <0.065 | <0.13 | <0.065 | <0.065 | <2.2 | <0.32 |
| HEXACHLOROBUTADIENE | ug/l | T | | <13 | <20 | 3.0 J | 2.3 J | | | <5.1 | <2.6 | <0.51 | <1.0 | <0.51 | <0.51 | <17 | <2.6 |
| HEXACHLOROETHANE | ug/l | T | | <14 | <23 | <2.9 | <1.4 UJ | | | <5.8 | <2.9 | <0.58 | <1.2 | <0.58 | <0.58 | <19 | <2.9 |
| PENTACHLOROPHENOL | ug/l | T | | 920 J | 870 J | 4.9 J | 4.0 J | | | <4.8 | <2.4 | 48 J | 38 J | <0.48 | <0.48 | <16 | <2.4 |
| PHENOL | ug/l | T | | <24 | <38 | 160 | 95 J | | | 21 J | 15 J | <0.96 | <1.9 | <0.96 | <0.96 | 73 J | 27 J |
| TIC 1 | ug/l | T | | 35 J | <NS J | 100 J | 66 J | | | 1500 J | 560 J | 6.0 J | 9.0 J | 12 J | 1399 J | 70 J | 3.1 J |
| **Inorganics** | | | | | | | | | | | | | | | | | |
| BARIUM, DISSOLVED | ug/l | D | | 83 J | 70 B | 11000 | 8200 | | | 130 J | 77 J | 19 J | 25 J | 77 J | 71 J | 32100 | 80900 |
| IRON, DISSOLVED | ug/l | D | 27300 | | | | | 406000 | 48 B | | <32 | | | | | | |
| MANGANESE, DISSOLVED | ug/l | D | 620 | | | | | 11300 | 1.6 B | | 66 | | | | | | |
| CHLORIDE | ug/l | T | 4460000 B | 188000 | 198000 B | 842000 | 987000 | 8210000 | 1410000 | 10700000 | 8700000 | 344000 | 308000 | 259000 | 274000 | 2450000 | 3790000 |
| NITRATE-NITRITE | ug/l | T | 80 B | | | | | 80 B | 50 B | | 60 B | | | | | | |
| SULFATE | ug/l | T | 3200 B | | | | | 5800 B | 401000 | | 712000 B | | | | | | |
| TOTAL ALKALINITY | ug/l | T | 790000 J | | | | | 58000 B | 130000 J | | 160000 B | | | | | | |
| TOTAL ORGANIC CARBON | ug/l | T | 1100000 | | | | | 150000 | 17000 | | 68000 | | | | | | |
| TOTAL SULFIDE | ug/l | T | 9700 J | | | | | 37000 | 5200 | | 45000 | | | | | | |
| **Field Parameters** | | | | | | | | | | | | | | | | | |
| SPECIFIC CONDUCTANCE | UMHOS/CM | T | 14820 | 2290 | 1960 | 9180 | 8260 | 15100 | 4460 | 24700 | 22000 | 1570 | 1490 | 1710 | 1830 | 7510 | 10890 |
| TEMPERATURE | DEGREES C | T | 12.2 | 13.1 | 13.9 | 10 | 13.2 | 12.6 | 11.7 | 12.5 | 10.7 | 10.4 | 12.6 | 13.4 | 14 | 11 | 11.3 |
| COLOR | NS | T | YELLOW | CLEAR | CLEAR | CLEAR | CLEAR | GREY | CLEAR | CLEAR | CLEAR | CLEAR | CLEAR | CLEAR | CLEAR | CLEAR | CLEAR |
| WATER LEVEL | Feet | T | 13.07 | 8.12 | 7.87 | 7.49 | 6.22 | 15.94 | 3.44 | 7.2 | 6.43 | 6.97 | 6.52 | 4.07 | 3.56 | 6.09 | 4.77 |
| DISSOLVED OXYGEN | ug/l | T | 90 | 90 | 680 | 600 | 50 | 220 | 70 | 100 | 80 | 130 | 50 | 710 | 60 | 200 | 130 |
| ODOR | NS | T | SLIGHT | NONE | NONE | NONE | NONE | MODERATE | NONE | NONE | SLIGHT | NONE | NONE | NONE | NONE | SLIGHT | SLIGHT |
| PH | STD UNITS | T | 6.9 | 7.9 | 7.33 | 8.2 | 8.95 | 7.04 | 7.48 | 7.73 | 7.31 | 8.07 | 8.17 | 7.96 | 8.12 | 7.32 | 6.98 |
| REDOX | MV | T | -204 | -96 | -280 | -110 | -151 | -220 | -88 | -444 | -225 | -455 | -144 | 8 | -289 | -360 | -370 |
| TURBIDITY | NTU | T | 32.6 | 6.42 | 12.51 | 2.58 | 2.51 | 18.54 | 9.52 | 5.29 | 7.09 | 0.94 | 2.87 | 4.37 | 8.14 | 2.73 | 6.42 |
| **Total Volatiles** | ug/l | T | 678 | 1,149 | 1,063 | 725 | 670 | 68,200 | - | 34,250 | 31,010 | 52 | 66 | 3 | 11 | 50 | 25 |

D - Disolved T - Total

< and ND = Non detect at stated reporting limit

# Table B-1
# Summary of 2006 Analytical Results
# DuPont Necco Park

| | | | B-ZONE WELLS (continued) | | | | | | | | | C-ZONE WELLS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 151B | 151B | 153B | 168B | 168B | 171B | 171B | 172B | 172B | 105C | 136C | 136C | 137C | 141C |
| | | | 4/26/06 | 10/26/06 | 10/30/06 | 5/3/06 | 11/3/06 | 5/4/06 | 11/1/06 | 5/1/06 | 10/24/06 | 10/31/06 | 5/4/06 | 11/1/06 | 10/31/06 | 10/26/06 |
| **Analyte** | **units** | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| **Volatile Organics** | | | | | | | | | | | | | | | | |
| 1,1,2,2-TETRACHLOROETHANE | ug/l | T | <0.22 | <0.22 | <0.22 | <140 | 160 J | <6.3 | 6.6 J | 2200 | 1600 | 1700 J | <22 | <24 UJ | 520 J | <0.22 |
| 1,1,2-TRICHLOROETHANE | ug/l | T | <0.22 | <0.22 | <0.22 | 330 J | 1200 | 24 J | <5.5 UJ | 110 | 82 | 17000 | <22 | <24 UJ | 770 | <0.22 |
| 1,1-DICHLOROETHENE | ug/l | T | <0.18 | 0.24 J | <0.18 | 110 J | 200 J | 14 J | 8.2 J | 25 J | 18 J | 3200 J | <18 | <20 | 650 | <0.18 |
| 1,2-DICHLOROETHANE | ug/l | T | <0.16 | <0.16 | <0.16 | 250 J | 390 J | <4.6 | <4.0 | <18 | <9.4 UJ | 1800 J | <16 | <18 | 340 J | <0.16 |
| CARBON TETRACHLORIDE | ug/l | T | <0.19 | <0.19 | <0.19 | <120 | <140 | <5.4 | <4.8 | 54 J | 63 J | 5300 J | <19 | <21 | 160 J | <0.19 |
| CHLOROFORM | ug/l | T | <0.16 | <0.16 | <0.16 | <100 | 330 J | 27 J | <4.0 | 290 | 240 J | 120000 | <16 | <18 | 5000 | <0.16 |
| CIS-1,2-DICHLOROETHENE | ug/l | T | <0.21 | 0.64 J | <0.21 | 17000 | 19000 | 790 | 450 | 2000 | 1900 | 23000 | 66 J | 80 J | 15000 | <0.21 |
| TETRACHLOROETHENE | ug/l | T | <0.19 | <0.19 | <0.19 | <120 | <140 | <5.4 | 8.0 J | 710 | 660 J | 36000 | 3300 | 3100 J | 7900 | <0.19 |
| TRANS-1,2-DICHLOROETHENE | ug/l | T | <0.16 | 0.40 J | <0.16 | <100 | 270 J | 140 | 79 | 260 | 190 | 6500 J | <16 | <18 | 560 J | <0.16 |
| TRICHLOROETHENE | ug/l | T | <0.28 | 0.45 J | <0.28 | <180 | <200 | 20 J | 11 J | 550 | 600 | 190000 | 920 | 980 | 16000 | <0.28 |
| VINYL CHLORIDE | ug/l | T | <0.21 | 0.51 J | <0.21 | 6100 | 5900 | 880 | 920 | 270 | 290 | 2100 J | <21 | <23 | 5000 | <0.21 |
| **Dissolved Gases** | | | | | | | | | | | | | | | | |
| ETHANE | ug/l | T | | 4 | 1.2 | | | | | | | 63 | | | 170 | 0.52 |
| ETHENE | ug/l | T | | 1.4 | <0.057 | | | | | | | 1300 | | | 1300 | 0.69 |
| METHANE | ug/l | T | | 140 | 3.3 | | | | | | | 1500 | | | 7200 | 23 |
| PROPANE | ug/l | T | | 1.7 | 0.23 J | | | | | | | 7.9 | | | 2.7 | 0.33 J |
| **Semivolatile Organics** | | | | | | | | | | | | | | | | |
| 2,4,5-TRICHLOROPHENOL | ug/l | T | <0.96 | <0.96 R | | <6.4 | <6.4 | <4.8 | <0.96 | 6.7 J | <3.8 R | | 1000 J | 1300 J | | |
| 2,4,6-TRICHLOROPHENOL | ug/l | T | <1.4 | <1.4 R | | <9.3 | <9.3 | <7.0 | <1.4 | <5.6 | <5.6 R | | 1900 J | 2700 J | | |
| 3-METHYLPHENOL & 4-METHYLPHENOL | ug/l | T | <0.75 | <0.75 R | | 160 | 150 | 3.8 J | <0.75 | <0.75 | <0.75 R | | <0.75 | <0.75 | | |
| HEXACHLOROBENZENE | ug/l | T | <0.065 | <0.065 R | | <0.43 | <0.43 | 3.1 J | 3.4 J | <0.26 | <0.26 | | <26 | <52 | | |
| HEXACHLOROBUTADIENE | ug/l | T | <0.51 | <0.51 R | | <3.4 | <3.4 | 18 J | 25 | 140 | 110 | | <200 | <410 | | |
| HEXACHLOROETHANE | ug/l | T | <0.58 | <0.58 R | | <3.9 | <3.9 | <2.9 | <0.58 | 23 J | 21 J | | <230 | <460 | | |
| PENTACHLOROPHENOL | ug/l | T | <0.48 | <0.48 R | | <3.2 | <3.2 | <2.4 | <0.48 | <1.9 | <1.9 R | | 21000 | 39000 J | | |
| PHENOL | ug/l | T | <0.96 | 2.5 J | | 170 | 180 | <4.8 | <0.96 | <3.8 | <3.8 R | | <380 | <770 | | |
| TIC 1 | ug/l | T | 2.3 J | 6.6 J | | 2500 J | 3300 J | 980 J | 240 J | 85 J | 38 J | | <NS J | 130 J | | |
| **Inorganics** | | | | | | | | | | | | | | | | |
| BARIUM, DISSOLVED | ug/l | D | 440 | 450 | | 500 | 500 | 41 J | 47 B | 31 J | 30 J | | 57 J | 60 B | | |
| IRON, DISSOLVED | ug/l | D | | 57 B | 2100 | | | | | | | 2000 | | | 370 | <32 |
| MANGANESE, DISSOLVED | ug/l | D | | .42 B | 140 | | | | | | | 47 | | | 44 | 81 J |
| CHLORIDE | ug/l | T | 220000 J | 302000 J | 17200 | 19700000 | 15900000 | 6590000 | 4970000 | 3540000 | 2720000 J | 6800000 | 188000 | 197000 B | 1730000 | 238000 J |
| NITRATE-NITRITE | ug/l | T | | 700 J | 90 B | | | | | | | 100 B | | | 70 B | 400 J |
| SULFATE | ug/l | T | | 4300 J | 73600 | | | | | | | 393000 | | | 43400 | 386000 |
| TOTAL ALKALINITY | ug/l | T | | 740000 J | 170000 J | | | | | | | 1400000 J | | | 140000 J | 43000 J |
| TOTAL ORGANIC CARBON | ug/l | T | | 2000 | 2000 | | | | | | | 2100000 | | | 140000 | 5000 |
| TOTAL SULFIDE | ug/l | T | | <740 | <740 | | | | | | | 1600 | | | 26000 | <740 |
| **Field Parameters** | | | | | | | | | | | | | | | | |
| SPECIFIC CONDUCTANCE | UMHOS/CM | T | 4920 | 4890 | 568 | 39600 | 37500 | 17100 | 14500 | 10170 | 8900 | 18400 | 2380 | 2210 | 4735 | 1560 |
| TEMPERATURE | DEGREES C | T | 14.7 | 15.9 | 13.7 | 13.4 | 9.9 | 13.7 | 13 | 14 | 11.7 | 12.1 | 11.4 | 13.9 | 12.4 | 11.9 |
| COLOR | NS | T | CLEAR | CLEAR | CLEAR | GREY | GREY | CLEAR | CLEAR | GREY | BLACK | YELLOW | CLEAR | CLEAR | GREY | YELLOW |
| WATER LEVEL | Feet | T | 8.25 | 7.98 | 5.63 | 11.08 | 11.36 | 11.02 | 10.36 | 8.47 | 6.86 | 23.95 | 10.34 | 9.78 | 8.73 | 14.27 |
| DISSOLVED OXYGEN | ug/l | T | 580 | 490 | 70 | 90 | 80 | 170 | 100 | 170 | 310 | 910 | 1110 | 60 | 30 | 110 |
| ODOR | NS | T | NONE | NONE | NONE | SLIGHT | SLIGHT | MODERATE | SLIGHT | SLIGHT | NONE | SLIGHT | NONE | NONE | SLIGHT | NONE |
| PH | STD UNITS | T | 8.05 | 8.73 | 7.69 | 6.82 | 6.85 | 7.23 | 6.64 | 6.84 | 6.68 | 7.18 | 8.17 | 7.84 | 7.4 | 7.52 |
| REDOX | MV | T | -136 | -70 | -249 | -285 | -249 | -91 | -203 | -269 | -279 | -269 | -47 | -385 | -487 | -10 |
| TURBIDITY | NTU | T | 3.42 | 21.1 | 47.2 | 6.24 | 16.61 | 2.52 | 4.58 | 81.9 | 11.77 | 81.7 | 8.61 | 0.93 | 24.2 | 42.3 |
| **Total Volatiles** | ug/l | T | - | 2 | - | 23,790 | 27,450 | 1,895 | 1,483 | 6,469 | 5,643 | 406,600 | 4,286 | 4,160 | 51,900 | - |

D - Disolved T - Total

# Table B-1
# Summary of 2006 Analytical Results
# DuPont Necco Park

| | | | C-ZONE WELLS (continued) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 145C<br>5/1/06<br>1 | 145C<br>10/24/06<br>1 | 146C<br>5/5/06<br>1 | 146C<br>11/3/06<br>1 | 149C<br>5/2/06<br>1 | 149C<br>10/30/06<br>1 | 150C<br>4/28/06<br>1 | 150C<br>10/27/06<br>1 | 151C<br>4/26/06<br>1 | 151C<br>4/26/06<br>2 | 151C<br>10/26/06<br>1 | 168C<br>5/3/06<br>1 | 168C<br>11/3/06<br>1 |
| **Analyte** | **units** | | | | | | | | | | | | | | |
| **Volatile Organics** | | | | | | | | | | | | | | | |
| 1,1,2,2-TETRACHLOROETHANE | ug/l | T | 600 | 93 J | <0.22 | <0.22 | <0.22 | <0.22 | <0.44 | <0.22 | <0.44 | <0.44 | <0.22 | 2600 | 140 |
| 1,1,2-TRICHLOROETHANE | ug/l | T | 3400 | 850 | <0.22 | <0.22 | <0.22 | <0.22 | <0.44 | <0.22 | <0.44 | <0.44 | <0.22 | 2800 | 200 |
| 1,1-DICHLOROETHENE | ug/l | T | 560 | 160 J | 0.32 J | 0.36 J | <0.18 | 0.61 J | 11 | 4 | <0.36 | <0.36 | <0.18 | 360 | 34 J |
| 1,2-DICHLOROETHANE | ug/l | T | 360 | 120 J | <0.16 | <0.16 | <0.16 | <0.16 | <0.32 | <0.16 | <0.32 | <0.32 | <0.16 | 71 J | 24 J |
| CARBON TETRACHLORIDE | ug/l | T | <63 | <38 UJ | <0.19 | <0.19 UJ | <0.19 | <0.19 | <0.38 | <0.19 | <0.38 | <0.38 | <0.19 | 930 | 35 J |
| CHLOROFORM | ug/l | T | 2500 | 470 J | <0.16 | <0.16 | <0.16 | <0.16 | 0.39 J | <0.16 | <0.32 | <0.32 | 0.26 J | 3400 | 200 |
| CIS-1,2-DICHLOROETHENE | ug/l | T | 12000 | 4500 | 2.4 | 2.8 | 0.84 J | 6.1 | 69 | 19 | 3.8 | 4 | 2 | 1500 | 780 |
| TETRACHLOROETHENE | ug/l | T | <63 | <38 UJ | <0.19 | 0.25 J | <0.19 | <0.19 | 11 | 2.4 | <0.38 | <0.38 | <0.19 | 500 | 34 J |
| TRANS-1,2-DICHLOROETHENE | ug/l | T | 1300 | 400 | 0.80 J | 0.54 J | <0.16 | 0.95 J | 10 | 3.4 | 5.2 | 5.8 | 4.4 | 330 | 29 J |
| TRICHLOROETHENE | ug/l | T | 2600 | 590 | 1.5 | 1.5 | 0.42 J | <0.28 | 42 | 12 | 1.6 J | 1.6 J | 0.77 J | 3900 | 230 |
| VINYL CHLORIDE | ug/l | T | 3300 | 2000 | 3.5 | 6.8 | 1.3 | 8.7 J | 47 | 16 | 9.3 | 10 | 4.7 | 410 | 570 |
| **Dissolved Gases** | | | | | | | | | | | | | | | |
| ETHANE | ug/l | T | | 120 | | | | 11 | | | | | 120 | | |
| ETHENE | ug/l | T | | 420 | | | | 130 | | | | | <0.057 | | |
| METHANE | ug/l | T | | 4700 | | | | 4000 | | | | | 4600 | | |
| PROPANE | ug/l | T | | 7.9 | | | | 0.76 | | | | | 3.6 | | |
| **Semivolatile Organics** | | | | | | | | | | | | | | | |
| 2,4,5-TRICHLOROPHENOL | ug/l | T | <19 | <9.6 | <0.96 | <0.96 | <0.96 UJ | <0.96 | <0.96 | 3.5 J | <0.96 | <0.96 | <0.96 R | <19 | <19 |
| 2,4,6-TRICHLOROPHENOL | ug/l | T | <28 | <14 | <1.4 | <1.4 | <1.4 UJ | <1.4 | <1.4 | <1.4 | <1.4 | <1.4 | <1.4 R | <28 | <28 |
| 3-METHYLPHENOL & 4-METHYLPHENOL | ug/l | T | <0.75 | 83 J | <0.75 | <0.75 | <0.75 UJ | 2.5 J | 1.5 J | <0.75 | <0.75 | <0.75 | <0.75 R | 16 J | 8.6 J |
| HEXACHLOROBENZENE | ug/l | T | <1.3 | <0.65 | <0.065 | <0.065 | <0.065 UJ | <0.065 | <0.065 | <0.065 | <0.065 | <0.065 | <0.065 R | <1.3 | <1.3 |
| HEXACHLOROBUTADIENE | ug/l | T | <10 | <5.1 | <0.51 | 0.65 J | <0.51 UJ | <0.51 | 1.3 J | 0.96 J | <0.51 | <0.51 | <0.51 R | 54 J | <10 |
| HEXACHLOROETHANE | ug/l | T | <12 | <5.8 | <0.58 | <0.58 | <0.58 UJ | <0.58 | <0.58 | <0.58 | <0.58 | <0.58 | <0.58 R | <12 | <12 |
| PENTACHLOROPHENOL | ug/l | T | <9.6 | <4.8 | <0.48 | <0.48 | <0.48 UJ | <0.48 | <0.48 | <0.48 | <0.48 | <0.48 | <0.48 R | <9.6 | <9.6 |
| PHENOL | ug/l | T | 420 | 270 | <0.96 | 1.0 J | <0.96 UJ | <0.96 | 10 | 5.2 J | <0.96 | <0.96 | <0.96 R | 120 J | 49 J |
| TIC 1 | ug/l | T | 3600 J | 4500 J | 2.2 J | 6.7 J | 0.98 J | 10 J | 93 J | 37 J | 25 J | 23 J | 19 J | 4700 J | 770 J |
| **Inorganics** | | | | | | | | | | | | | | | |
| BARIUM, DISSOLVED | ug/l | D | 2000 | 1600 | 20 J | 28 J | 23 J | 60 J | 46 J | 130 J | 24 J | 27 J | 16 J | 320 | 150 J |
| IRON, DISSOLVED | ug/l | D | | 1090000 | | | | <32 | | | | | 440 J | | |
| MANGANESE, DISSOLVED | ug/l | D | | 39000 | | | | 7.3 J | | | | | 57 J | | |
| CHLORIDE | ug/l | T | 83200000 J | 92900000 | 197000 | 205000 | 273000 | 344000 | 1140000 | 808000 | 2030000 J | 2080000 J | 1690000 J | 28900000 | 12900000 |
| NITRATE-NITRITE | ug/l | T | | <20 | | | | 40 B | | | | | 40 B | | |
| SULFATE | ug/l | T | | 1330000 | | | | 358000 | | | | | 1620000 | | |
| TOTAL ALKALINITY | ug/l | T | | 120000 J | | | | 55000 J | | | | | 140000 J | | |
| TOTAL ORGANIC CARBON | ug/l | T | | 45000 | | | | 10000 | | | | | 8000 | | |
| TOTAL SULFIDE | ug/l | T | | 3700 J | | | | 38000 J | | | | | 55000 | | |
| **Field Parameters** | | | | | | | | | | | | | | | |
| SPECIFIC CONDUCTANCE | UMHOS/CM | T | 10000 | 10000 | 1510 | 1179 | 1176 | 1620 | 5130 | 4120 | 1096 | 1096 | 6980 | 56500 | 31100 |
| TEMPERATURE | DEGREES C | T | 19.8 | 11.5 | 13.3 | 10.7 | 14.5 | 13.4 | 12.9 | 11.4 | 14.6 | 14.6 | 15.2 | 13.7 | 10.5 |
| COLOR | NS | T | GREY | GREY | GREY | CLEAR | BROWN | BROWN | CLEAR | CLEAR | GREY | GREY | CLEAR | GREY | GREY |
| WATER LEVEL | Feet | T | 13.32 | 12.08 | 7.08 | 6.86 | 6.19 | 5.49 | 9.17 | 8.39 | 8.13 | 8.13 | 7.79 | 14.02 | 13.92 |
| DISSOLVED OXYGEN | ug/l | T | 160 | 40 | 100 | 250 | 140 | 50 | 210 | 120 | 990 | 990 | 60 | 300 | 60 |
| ODOR | NS | T | SLIGHT | MODERATE | NONE | NONE | NONE | NONE | SLIGHT | NONE | SLIGHT | SLIGHT | SLIGHT | MODERATE | MODERATE |
| PH | STD UNITS | T | 6.51 | 7.01 | 8.07 | 7.58 | 7.93 | 7.87 | 7.63 | 7.49 | 8.22 | 8.22 | 7.44 | 6.87 | 7 |
| REDOX | MV | T | -244 | -339 | -333 | -98 | -8 | -393 | -432 | -459 | -109 | -109 | -254 | -342 | -284 |
| TURBIDITY | NTU | T | 8.13 | 13.53 | 31.9 | 5.87 | 37.9 | 7.13 | 4.26 | 15.73 | 17.8 | 17.8 | 5.11 | 2.07 | 9.65 |
| **Total Volatiles** | ug/l | T | 26,620 | 9,183 | 9 | 12 | 3 | 16 | 190 | 57 | 20 | 21 | 12 | 16,801 | 2,276 |

D - Disolved T - Total

# Table B-1
# Summary of 2006 Analytical Results
# DuPont Necco Park

| | | | D-ZONE WELLS | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 105D | 123D | 123D | 136D | 136D | 137D | 139D | 145D | 145D | 147D | 147D | 147D | 148D | 148D |
| | | | 10/31/06 | 4/26/06 | 10/23/06 | 5/1/06 | 10/24/06 | 10/31/06 | 11/2/06 | 5/4/06 | 11/2/06 | 4/25/06 | 10/25/06 | 10/25/06 | 4/27/06 | 10/25/06 |
| **Analyte** | **units** | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 |
| **Volatile Organics** | | | | | | | | | | | | | | | | |
| 1,1,2,2-TETRACHLOROETHANE | ug/l | T | 88000 | <0.73 | <0.22 | <5.5 | <6.3 UJ | <160 UJ | 120 | <11 | <24 | <1.5 | <1.1 | <1.1 | <0.22 | <0.22 |
| 1,1,2-TRICHLOROETHANE | ug/l | T | 170000 | <0.73 | <0.22 | 34 | 22 J | 2400 J | 33 J | 160 | 81 J | <1.5 | <1.1 | <1.1 | <0.22 | <0.22 |
| 1,1-DICHLOROETHENE | ug/l | T | <1100 | <0.60 | 0.33 J | 28 | 16 J | 880 | <18 | 15 J | 23 J | <1.2 | <0.90 | <0.90 | <0.18 | <0.18 |
| 1,2-DICHLOROETHANE | ug/l | T | 9900 | <0.53 | <0.16 | 16 J | 35 | <110 | <16 | 14 J | <18 | <1.1 | <0.80 | <0.80 | <0.16 | <0.16 |
| CARBON TETRACHLORIDE | ug/l | T | 170000 | <0.63 | <0.19 | <4.8 | <5.4 | <140 | <19 UJ | <9.5 | <21 UJ | <1.3 | <0.95 | <0.95 | <0.19 | <0.19 |
| CHLOROFORM | ug/l | T | 80000 | <0.53 | <0.16 | 120 | 71 | 17000 | 150 | 64 | 20 J | <1.1 | <0.80 | <0.80 | <0.16 | <0.16 |
| CIS-1,2-DICHLOROETHENE | ug/l | T | 8800 | 3.4 | 1.8 | 880 J | 650 | 4800 | 46 J | 1200 | 940 | 120 J | 120 | 110 | 1 | 1.2 |
| TETRACHLOROETHENE | ug/l | T | 11000 | 1.2 J | 1.1 J | 5.0 J | <5.4 | 1400 J | 63 J | <9.5 | <21 | <1.3 UJ | <0.95 | <0.95 | <0.19 | <0.19 |
| TRANS-1,2-DICHLOROETHENE | ug/l | T | 2400 J | <0.53 | 0.23 J | 14 J | 14 J | 720 | <16 | 170 | 54 J | 2.5 J | 2.5 J | 8.3 | <0.16 | <0.16 |
| TRICHLOROETHENE | ug/l | T | 110000 | <0.93 | 0.82 J | 280 | 210 | 27000 | 1700 | 43 J | <31 | <1.9 | <1.4 | <1.4 | <0.28 | <0.28 |
| VINYL CHLORIDE | ug/l | T | 3500 J | 0.84 J | <0.21 | 280 J | 280 J | 670 J | 34 J | 510 | 1000 | 39 | 46 | 39 | <0.21 | <0.21 |
| **Dissolved Gases** | | | | | | | | | | | | | | | | |
| ETHANE | ug/l | T | 11 | | | | 20 | 40 | 6.6 | | | | 0.73 | 0.62 | | 27 |
| ETHENE | ug/l | T | 560 | | | | 760 | 170 | 21 | | | | 3.1 | 3.1 | | 3.1 |
| METHANE | ug/l | T | 680 | | | | 750 | 800 | 670 | | | | 130 | 120 | | 360 |
| PROPANE | ug/l | T | 1.3 | | | | 3.1 | 5.2 | 0.48 J | | | | 0.15 J | 0.16 J | | 8.4 |
| **Semivolatile Organics** | | | | | | | | | | | | | | | | |
| 2,4,5-TRICHLOROPHENOL | ug/l | T | | <38 | <38 R | 54 J | 29 | | | <19 | <48 | <0.96 | <0.96 | <0.96 | <0.96 | <0.96 |
| 2,4,6-TRICHLOROPHENOL | ug/l | T | | <56 | <56 R | 9.4 J | 6.6 J | | | <28 | <70 | <1.4 | <1.4 | <1.4 | <1.4 | <1.4 |
| 3-METHYLPHENOL & 4-METHYLPHENOL | ug/l | T | | 72 J | <0.75 | <0.75 | <0.75 | | | 23 J | 23 J | <0.75 | <0.75 | <0.75 | 5.2 J | 5.9 J |
| HEXACHLOROBENZENE | ug/l | T | | <2.6 R | <2.6 | <0.26 | <0.13 | | | <1.3 | <3.2 | <0.065 | <0.065 | <0.065 | <0.065 | <0.065 |
| HEXACHLOROBUTADIENE | ug/l | T | | <20 | <20 R | <2.0 | <1.0 | | | <10 | <26 | <0.51 | <0.51 | <0.51 | <0.51 | <0.51 |
| HEXACHLOROETHANE | ug/l | T | | <23 | <23 R | <2.3 | <1.2 | | | <12 | <29 | <0.58 | <0.58 | <0.58 | <0.58 | <0.58 |
| PENTACHLOROPHENOL | ug/l | T | | <19 | <19 R | 12 J | 13 J | | | <9.6 | <24 | <0.48 | <0.48 | <0.48 | <0.48 | <0.48 |
| PHENOL | ug/l | T | | 1700 | 1400 | <3.8 | <1.9 | | | 150 J | 140 J | <0.96 | <0.96 | <0.96 | 1.0 J | 2.2 J |
| TIC 1 | ug/l | T | | <NS J | <NS J | 12 J | 20 J | | | 750 J | 3400 J | <NS J | <NS J | <NS J | <NS J | <NS J |
| **Inorganics** | | | | | | | | | | | | | | | | |
| BARIUM, DISSOLVED | ug/l | D | | 18 J | 17 J | 91 J | 120 J | | | 1200 | 1900 | 15 J | 18 J | 18 J | 41 J | 37 J |
| IRON, DISSOLVED | ug/l | D | 14000 | | | | 93 J | 6700 | 790 | | | | 660 J | 650 J | | 33 B |
| MANGANESE, DISSOLVED | ug/l | D | 720 | | | | 190 | 1300 | 290 | | | | 38 J | 37 J | | 6.8 J |
| CHLORIDE | ug/l | T | 5840000 | 155000 J | 170000 J | 287000 | 279000 J | 972000 | 833000 B | 39200000 | 29400000 | 26700 | 32700 | 31800 | 81100 | 93600 |
| NITRATE-NITRITE | ug/l | T | 80 B | | | | <20 | 100 B | 60 B | | | | <20 | 60 B | | 1400 J |
| SULFATE | ug/l | T | 652000 | | | | 296000 | 632000 | 1320000 B | | | | 1150000 | 1150000 | | 415000 |
| TOTAL ALKALINITY | ug/l | T | 740000 J | | | | 230000 J | 230000 J | 260000 B | | | | 210000 J | 200000 J | | 34000 J |
| TOTAL ORGANIC CARBON | ug/l | T | 1400000 | | | | 9000 | 130000 | 6000 | | | | 1000 | 800 J | | 3000 |
| TOTAL SULFIDE | ug/l | T | 6300 | | | | 21000 J | 21000 | 19000 | | | | 1200 J | 1100 J | | <740 |
| **Field Parameters** | | | | | | | | | | | | | | | | |
| SPECIFIC CONDUCTANCE | UMHOS/CM | T | 16600 | | 3130 | | 1160 | 6160 | 4730 | 65100 | 64200 | 2030 | 1990 | 1990 | 1520 | 1149 |
| TEMPERATURE | DEGREES C | T | 11.8 | | 10.1 | | 11.8 | 13.7 | 11.5 | 14.9 | 11 | 10.5 | 12.2 | 12.2 | 9.7 | 12.7 |
| COLOR | NS | T | GREY | | CLEAR | | CLEAR | BLACK | CLEAR | BLACK TINT | BLACK | CLEAR | CLEAR | CLEAR | YELLOW | CLEAR |
| WATER LEVEL | Feet | T | 37.89 | | 35.82 | | 23.3 | 12.56 | 22.12 | 11.98 | 11.04 | 25.82 | 25.92 | 25.92 | 9.07 | 5.94 |
| DISSOLVED OXYGEN | ug/l | T | 170 | | 630 | | 160 | 90 | 200 | 110 | 50 | 1280 | 440 | 440 | 910 | 530 |
| ODOR | NS | T | MODERATE | | NONE | | NONE | MODERATE | SLIGHT | STRONG | STRONG | NONE | NONE | NONE | NONE | SLIGHT |
| PH | STD UNITS | T | 6.74 | | 7.77 | | 8.34 | 6.74 | 7.08 | 6.73 | 6.64 | 7.6 | 7.15 | 7.15 | 7.9 | 7.66 |
| REDOX | MV | T | -199 | | -265 | | -230 | -380 | -327 | -370 | -414 | -57 | -40 | -40 | 6 | -290 |
| TURBIDITY | NTU | T | 10.87 | | 5.87 | | 9.56 | 9.55 | 3.44 | 10.7 | 11.31 | 2.8 | 2.42 | 2.42 | 19.9 | 32.1 |
| **Total Volatiles** | ug/l | T | 653,600 | 5 | 4 | 1,657 | 1,298 | 54,870 | 2,146 | 2,176 | 2,118 | 162 | 169 | 157 | 1 | 1 |

D - Disolved T - Total

< and ND = Non detect at stated reporting limit

# Table B-1
# Summary of 2006 Analytical Results
# DuPont Necco Park

| | | | D-ZONE WELLS (continued) | | | | | | E-ZONE WELLS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 149D | 149D | 156D | 156D | 165D | 165D | 136E | 136E | 145E | 145E |
| | | | 5/2/06 | 10/30/06 | 4/24/06 | 10/23/06 | 5/2/06 | 10/30/06 | 5/4/06 | 11/1/06 | 5/3/06 | 11/2/06 |
| **Analyte** | **units** | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| **Volatile Organics** | | | | | | | | | | | | |
| 1,1,2,2-TETRACHLOROETHANE | ug/l | T | <0.22 | <0.22 | <0.22 | <0.22 | <11 | <8.8 | <0.22 | <0.22 | <92 | <44 |
| 1,1,2-TRICHLOROETHANE | ug/l | T | <0.22 | <0.22 | <0.22 | <0.22 | 99 | 44 | 0.23 J | 0.68 J | <92 | <44 |
| 1,1-DICHLOROETHENE | ug/l | T | <0.18 | <0.18 | <0.18 | <0.18 | 22 J | <7.2 | <0.18 | <0.18 | <75 | <36 |
| 1,2-DICHLOROETHANE | ug/l | T | <0.16 | <0.16 | <0.16 | <0.16 | 52 | 35 J | 17 | 31 | <67 | <32 |
| CARBON TETRACHLORIDE | ug/l | T | <0.19 | <0.19 | <0.19 | <0.19 | <9.5 | <7.6 | <0.19 | 0.30 J | <79 | <38 UJ |
| CHLOROFORM | ug/l | T | <0.16 | <0.16 | <0.16 | <0.16 | 13 J | <6.4 | 1.2 | 1.9 | 91 J | <32 |
| CIS-1,2-DICHLOROETHENE | ug/l | T | 0.30 J | 0.49 J | 0.53 J | 0.60 J | 160 | 22 J | 3 | 3 | 10000 | 2800 |
| TETRACHLOROETHENE | ug/l | T | <0.19 | <0.19 | <0.19 | <0.19 | <9.5 | <7.6 | <0.19 | <0.19 UJ | 130 J | <38 |
| TRANS-1,2-DICHLOROETHENE | ug/l | T | <0.16 | <0.16 | 0.58 J | 0.56 J | 48 J | 25 J | 2.2 | 3.8 | 1400 | <32 |
| TRICHLOROETHENE | ug/l | T | <0.28 | <0.28 | 0.57 J | 0.37 J | 20 J | <11 | 3 | 3.8 | <120 | <56 |
| VINYL CHLORIDE | ug/l | T | <0.21 | 0.80 J | 1.2 | 1.7 | 1200 | 550 | 4.4 | 5.2 J | 2800 | 210 |
| **Dissolved Gases** | | | | | | | | | | | | |
| ETHANE | ug/l | T | | 13 | | 3.4 | | 21 | | 13 | | 39 |
| ETHENE | ug/l | T | | 1.9 | | <0.057 | | 730 | | 1100 | | 140 |
| METHANE | ug/l | T | | 1900 | | 550 | | 680 | | 490 | | 470 |
| PROPANE | ug/l | T | | 0.59 | | 0.41 J | | 2.2 | | 2.3 | | 3.5 |
| **Semivolatile Organics** | | | | | | | | | | | | |
| 2,4,5-TRICHLOROPHENOL | ug/l | T | <0.96 | <0.96 | <0.96 UJ | <2.4 R | 150 | 90 | <0.96 | <0.96 | <3.8 | <3.8 |
| 2,4,6-TRICHLOROPHENOL | ug/l | T | <1.4 | <1.4 | <1.4 UJ | <3.5 R | <7.0 | <7.0 | <1.4 | <1.4 | <5.6 | <5.6 |
| 3-METHYLPHENOL & 4-METHYLPHENOL | ug/l | T | <0.75 | <0.75 | <0.75 UJ | <0.75 R | 13 J | 17 J | <0.75 | <0.75 | 4.5 J | 11 J |
| HEXACHLOROBENZENE | ug/l | T | <0.065 | <0.065 | <0.065 UJ | <0.16 | <0.32 | <0.32 | <0.065 | <0.065 | <0.26 | <0.26 |
| HEXACHLOROBUTADIENE | ug/l | T | <0.51 | <0.51 | <0.51 UJ | <1.3 | <2.6 | <2.6 | <0.51 | <0.51 | <2.0 | <2.0 |
| HEXACHLOROETHANE | ug/l | T | <0.58 | <0.58 | <0.58 UJ | <1.4 | <2.9 | <2.9 | <0.58 | <0.58 | <2.3 | <2.3 |
| PENTACHLOROPHENOL | ug/l | T | <0.48 | <0.48 | <0.48 UJ | <1.2 R | <2.4 | <2.4 | <0.48 | <0.48 | <1.9 | <1.9 |
| PHENOL | ug/l | T | <0.96 | <0.96 | <0.96 UJ | <2.4 R | 25 J | 8.5 J | <0.96 | <0.96 | <3.8 | <3.8 |
| TIC 1 | ug/l | T | <NS J | 2.5 J | <NS J | <NS J | 280 J | 200 J | 6.5 J | 12 J | 350 J | 290 J |
| **Inorganics** | | | | | | | | | | | | |
| BARIUM, DISSOLVED | ug/l | D | 35 J | 43 B | 28 J | 31 J | 140 J | 150 J | 95 J | 120 B | 91 J | 270 |
| IRON, DISSOLVED | ug/l | D | | <32 | | 750 | | 47 J | | 37 J | | 87 J |
| MANGANESE, DISSOLVED | ug/l | D | | 36 | | 88 | | 120 | | 160 | | 730 |
| CHLORIDE | ug/l | T | 442000 | 204000 | 230000 J | 178000 J | 641000 | 458000 | 255000 | 252000 B | 6470000 | 5790000 B |
| NITRATE-NITRITE | ug/l | T | | 80 B | | <20 | | 80 B | | 70 B | | 300 B |
| SULFATE | ug/l | T | | 631000 | | 671000 | | 100000 | | 270000 B | | 158000 B |
| TOTAL ALKALINITY | ug/l | T | | 45000 J | | 310000 J | | 43000 J | | 250000 B | | 72000 B |
| TOTAL ORGANIC CARBON | ug/l | T | | 4000 | | 3000 | | 14000 | | 11000 | | 15000 |
| TOTAL SULFIDE | ug/l | T | | 24000 J | | 21000 | | 2100 J | | 26000 J | | 1100 B |
| **Field Parameters** | | | | | | | | | | | | |
| SPECIFIC CONDUCTANCE | UMHOS/CM | T | 2360 | 2000 | 2150 | 2040 | 2550 | 1710 | 742 | 1660 | 15900 | 14970 |
| TEMPERATURE | DEGREES C | T | 15.3 | 14.1 | 11.3 | 10.8 | 12.7 | 13 | 13.6 | 12.5 | 14.6 | 10.8 |
| COLOR | NS | T | CLEAR | CLEAR | GREY | BLACK | CLEAR | CLEAR | CLEAR | CLEAR | CLEAR | CLEAR |
| WATER LEVEL | Feet | T | 15.93 | 15.43 | 38.57 | 38.8 | 12.94 | 13.03 | 24.21 | 24.04 | 13.39 | 12.65 |
| DISSOLVED OXYGEN | ug/l | T | 160 | 120 | 1750 | 320 | 400 | 870 | 190 | 60 | 200 | 160 |
| ODOR | NS | T | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE |
| PH | STD UNITS | T | 7.91 | 7.71 | 6.89 | 7.39 | 7.45 | 7.51 | 7.63 | 7.15 | 7.35 | 7.43 |
| REDOX | MV | T | -326 | -388 | -62 | -63 | 61 | 58 | -88 | -401 | -237 | 25 |
| TURBIDITY | NTU | T | 41.7 | 36.9 | 8.43 | 15.18 | 19.1 | 20.6 | 11.5 | 1.04 | 14.2 | 1.71 |
| **Total Volatiles** | ug/l | T | 0 | 1 | 3 | 3 | 1,614 | 676 | 31 | 50 | 14,421 | 3,010 |

D - Disolved T - Total

< and ND = Non detect at stated reporting limit

# Table B-1
# Summary of 2006 Analytical Results
# DuPont Necco Park

| | | | E-ZONE WELLS (continued) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 146E | 146E | 146E | 146E | 150E | 150E | 156E | 156E | 165E | 165E |
| | | | 5/1/06 | 5/1/06 | 10/24/06 | 10/24/06 | 4/28/06 | 10/27/06 | 4/24/06 | 10/23/06 | 5/2/06 | 10/30/06 |
| **Analyte** | **units** | | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 |
| **Volatile Organics** | | | | | | | | | | | | |
| 1,1,2,2-TETRACHLOROETHANE | ug/l | T | 170 J | 170 J | 97 J | 100 J | <5.5 | <5.5 | <0.22 | <0.22 | 200 J | 1400 |
| 1,1,2-TRICHLOROETHANE | ug/l | T | 140 J | 150 J | 84 J | 95 J | <5.5 | <5.5 | <0.22 | <0.22 | 510 | 1500 |
| 1,1-DICHLOROETHENE | ug/l | T | 200 J | 200 J | 180 J | 170 J | 5.1 J | <4.5 | <0.18 | <0.18 | 190 J | 330 J |
| 1,2-DICHLOROETHANE | ug/l | T | <40 | <40 | <53 UJ | <53 UJ | <4.0 | <4.0 | <0.16 | <0.16 | 120 J | 230 J |
| CARBON TETRACHLORIDE | ug/l | T | <48 | <48 | <63 UJ | <63 UJ | <4.8 | <4.8 | <0.19 | <0.19 | <48 | 260 J |
| CHLOROFORM | ug/l | T | 100 J | 100 J | 70 J | 68 J | 5.3 J | <4.0 | <0.16 | <0.16 | 230 J | 2000 |
| CIS-1,2-DICHLOROETHENE | ug/l | T | 10000 | 9900 | 8000 | 7800 | 640 | 340 | 0.27 J | 0.31 J | 8900 | 18000 |
| TETRACHLOROETHENE | ug/l | T | <48 | <48 | <63 UJ | <63 UJ | 17 J | <4.8 | <0.19 | <0.19 | 73 J | 490 J |
| TRANS-1,2-DICHLOROETHENE | ug/l | T | 390 | 370 | 330 | 330 | 11 J | 5.9 J | 0.20 J | 0.18 J | 220 J | 450 J |
| TRICHLOROETHENE | ug/l | T | 210 J | 210 J | 150 J | 130 J | 39 | <7.0 | 0.34 J | 0.32 J | 610 | 5900 |
| VINYL CHLORIDE | ug/l | T | 6100 | 5400 | 6400 | 6300 | 480 | 230 | 0.76 J | 0.99 J | 1900 | 3000 |
| **Dissolved Gases** | | | | | | | | | | | | |
| ETHANE | ug/l | T | | | 11 | 9.8 | | | | 4.4 | | |
| ETHENE | ug/l | T | | | 720 | 760 | | | | <0.057 | | |
| METHANE | ug/l | T | | | 1400 | 1500 | | | | 650 | | |
| PROPANE | ug/l | T | | | 1.6 | 1.6 | | | | 0.51 | | |
| **Semivolatile Organics** | | | | | | | | | | | | |
| 2,4,5-TRICHLOROPHENOL | ug/l | T | 120 J | 110 J | 87 | 40 J | <19 | <19 | <0.96 UJ | <0.96 R | 890 | 760 |
| 2,4,6-TRICHLOROPHENOL | ug/l | T | 28 J | 26 J | 18 J | 5.8 J | <28 | <28 | <1.4 UJ | <1.4 R | 96 J | 150 J |
| 3-METHYLPHENOL & 4-METHYLPHENOL | ug/l | T | 26 J | 31 J | 19 J | 6.7 J | 28 J | <0.75 | <0.75 UJ | <0.75 R | 24 J | 29 J |
| HEXACHLOROBENZENE | ug/l | T | <1.3 | <0.32 UJ | <0.26 | <0.13 | <1.3 | <1.3 | <0.065 UJ | <0.065 R | <1.3 | <2.6 |
| HEXACHLOROBUTADIENE | ug/l | T | <10 | 6.1 J | 3.4 J | 2.6 J | <10 | <10 | <0.51 UJ | <0.51 R | 32 J | 46 J |
| HEXACHLOROETHANE | ug/l | T | <12 | <2.9 UJ | <2.3 | <1.2 | <12 | <12 | <0.58 UJ | <0.58 R | <12 | <23 |
| PENTACHLOROPHENOL | ug/l | T | <9.6 | <2.4 UJ | <1.9 | <0.96 R | 31 J | <9.6 | <0.48 UJ | <0.48 R | 47 J | 80 J |
| PHENOL | ug/l | T | 21 J | 22 J | 9.1 J | <1.9 R | 510 | 310 | <0.96 UJ | <0.96 R | 43 J | <38 |
| TIC 1 | ug/l | T | 410 J | 440 J | 320 J | 230 J | 7900 J | 250 J | 0.20 J | <NS J | 760 J | 670 J |
| **Inorganics** | | | | | | | | | | | | |
| BARIUM, DISSOLVED | ug/l | D | 85 J | 85 J | 100 J | 98 J | 88 J | 94 J | 21 J | 31 J | 750 | 400 J |
| IRON, DISSOLVED | ug/l | D | | | 78 J | 120 | | | | 720 | | |
| MANGANESE, DISSOLVED | ug/l | D | | | 200 | 200 | | | | 100 | | |
| CHLORIDE | ug/l | T | 1000000 | 1060000 | 728000 J | 704000 J | 7110000 | 4970000 | 245000 J | 204000 J | 565000 | 883000 |
| NITRATE-NITRITE | ug/l | T | | | <20 | <20 | | | | <20 | | |
| SULFATE | ug/l | T | | | 939000 | 896000 | | | | 672000 | | |
| TOTAL ALKALINITY | ug/l | T | | | 320000 J | 310000 J | | | | 280000 J | | |
| TOTAL ORGANIC CARBON | ug/l | T | | | 19000 | 21000 | | | | 3000 | | |
| TOTAL SULFIDE | ug/l | T | | | 91000 J | 85000 J | | | | 25000 | | |
| **Field Parameters** | | | | | | | | | | | | |
| SPECIFIC CONDUCTANCE | UMHOS/CM | T | | | 3930 | 3930 | 16300 | 17200 | 1640 | 1900 | 2100 | 2720 |
| TEMPERATURE | DEGREES C | T | | | 11.5 | 11.5 | 16.7 | 10.5 | 11.88 | 11.4 | 12.1 | 12 |
| COLOR | NS | T | | | GREY | GREY | BLACK TINT | BLACK | GREY | GREY | CLEAR | GREY |
| WATER LEVEL | Feet | T | | | 20.51 | 20.51 | 18.92 | 16.78 | 38.44 | 39.07 | 22.4 | 22.21 |
| DISSOLVED OXYGEN | ug/l | T | | | 260 | 260 | 370 | 160 | 940 | 120 | 170 | 120 |
| ODOR | NS | T | | | MODERATE | MODERATE | STRONG | STRONG | NONE | NONE | NONE | NONE |
| PH | STD UNITS | T | | | 7.8 | 7.8 | 6.42 | 7.02 | 7.4 | 7.63 | 7.44 | 7.4 |
| REDOX | MV | T | | | -383 | -383 | -388 | -429 | -94 | -96 | -270 | -227 |
| TURBIDITY | NTU | T | | | 3.61 | 3.61 | 91.3 | 17.9 | 17.3 | 29.1 | 19.3 | 11.72 |
| **Total Volatiles** | ug/l | T | 17,310 | 16,500 | 15,311 | 14,993 | 1,197 | 576 | 2 | 2 | 12,953 | 33,560 |

D - Disolved T - Total

# Table B-1
# Summary of 2006 Analytical Results
# DuPont Necco Park

| | | | F-ZONE WELLS | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 136F | 136F | 146F | 146F | 146F | 147F | 147F | 150F | 150F | 156F | 156F | 156F |
| | | | 5/4/06 | 11/1/06 | 5/5/06 | 11/3/06 | 11/3/06 | 4/25/06 | 10/25/06 | 4/28/06 | 10/27/06 | 4/24/06 | 10/23/06 | 10/23/06 |
| **Analyte** | **units** | | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 |
| **Volatile Organics** | | | | | | | | | | | | | | |
| 1,1,2,2-TETRACHLOROETHANE | ug/l | T | <11 | <4.9 UJ | <73 | <92 | <92 | <0.22 | <0.22 | <8.8 | <14 | <0.73 | <1.1 | <1.1 |
| 1,1,2-TRICHLOROETHANE | ug/l | T | 27 J | <4.9 UJ | 230 J | 140 J | 110 J | <0.22 | <0.22 | <8.8 | <14 | <0.73 | <1.1 | <1.1 |
| 1,1-DICHLOROETHENE | ug/l | T | <9.0 | 5.5 J | 380 | 440 | 430 | <0.18 | <0.18 | 19 J | <11 | <0.60 | <0.90 | <0.90 |
| 1,2-DICHLOROETHANE | ug/l | T | 11 J | 9.2 J | <53 | <67 | <67 | <0.16 | <0.16 | <6.4 | <10 | 2.0 J | 2.3 J | 1.9 J |
| CARBON TETRACHLORIDE | ug/l | T | <9.5 | <4.2 | <63 | <79 | <79 | <0.19 | <0.19 | <7.6 | <12 | <0.63 | <0.95 | <0.95 |
| CHLOROFORM | ug/l | T | 16 J | 4.2 J | 370 | <67 | <67 | <0.16 | <0.16 | <6.4 | <10 | <0.53 | 0.86 J | 1.0 J |
| CIS-1,2-DICHLOROETHENE | ug/l | T | 160 | 160 | 9800 | 11000 J | 11000 | 0.81 J | 0.77 J | 1400 | 1200 J | 12 | 15 | 15 |
| TETRACHLOROETHENE | ug/l | T | <9.5 | <4.2 UJ | <63 | <79 | <79 | <0.19 | <0.19 | <7.6 | <12 | <0.63 | <0.95 | <0.95 |
| TRANS-1,2-DICHLOROETHENE | ug/l | T | 89 | 30 | 890 | 650 | 610 | <0.16 | <0.16 | <6.4 | <10 | 32 | 44 | 39 |
| TRICHLOROETHENE | ug/l | T | 26 J | <6.2 | 470 | 120 J | <120 | <0.28 | <0.28 | <11 | <18 | 3.8 | 6.2 | 6.2 |
| VINYL CHLORIDE | ug/l | T | 1700 | 730 | 9900 J | 8100 J | 7900 | 1.6 | 1.4 | 530 | 540 J | 68 | 130 | 110 |
| **Dissolved Gases** | | | | | | | | | | | | | | |
| ETHANE | ug/l | T | | | | 87 | 89 | | | | 110 | | | |
| ETHENE | ug/l | T | | | | 860 | 910 | | | | 72 | | | |
| METHANE | ug/l | T | | | | 2300 | 2300 | | | | 5400 | | | |
| PROPANE | ug/l | T | | | | 5.9 | 6 | | | | 1.6 | | | |
| **Semivolatile Organics** | | | | | | | | | | | | | | |
| 2,4,5-TRICHLOROPHENOL | ug/l | T | 6.4 J | 7.5 J | 10 J | 240 | 140 | <0.96 | <0.96 | <19 | <19 | 10 J | <2.4 | <2.4 |
| 2,4,6-TRICHLOROPHENOL | ug/l | T | <5.6 | <3.5 | <7.0 | <9.3 | 20 J | <1.4 | <1.4 | <28 | <28 | <1.4 UJ | <3.5 | <3.5 |
| 3-METHYLPHENOL & 4-METHYLPHENOL | ug/l | T | 3.4 J | 2.0 J | 57 J | 54 J | 60 J | <0.75 | <0.75 | 39 J | 32 J | 0.75 J | <0.75 | <0.75 |
| HEXACHLOROBENZENE | ug/l | T | <0.26 | <0.16 | <0.32 | <0.43 | <0.43 | <0.065 | <0.065 | <1.3 | <1.3 | <0.065 UJ | <0.16 | <0.16 |
| HEXACHLOROBUTADIENE | ug/l | T | <2.0 | <1.3 | <2.6 | <3.4 | <3.4 | <0.51 | <0.51 | <10 | <10 | <0.51 UJ | <1.3 | <1.3 |
| HEXACHLOROETHANE | ug/l | T | <2.3 | <1.4 | <2.9 | <3.9 | <3.9 | <0.58 | <0.58 | <12 | <12 | <0.58 UJ | <1.4 | <1.4 |
| PENTACHLOROPHENOL | ug/l | T | <1.9 | <1.2 | <2.4 | <3.2 | <3.2 | <0.48 | <0.48 | <9.6 | <9.6 | <0.48 UJ | <1.2 | <1.2 |
| PHENOL | ug/l | T | <3.8 | <2.4 | 110 | 140 | 210 | <0.96 | <0.96 | 400 | 410 | <0.96 UJ | <2.4 | <2.4 |
| TIC 1 | ug/l | T | 57 J | 48 J | 150 J | 400 J | 320 J | <NS J | <NS J | 2200 J | 650 J | 2.7 J | 1.2 J | 1.7 J |
| **Inorganics** | | | | | | | | | | | | | | |
| BARIUM, DISSOLVED | ug/l | D | 49 J | 58 B | 46 J | 65 J | 66 J | 31 J | 32 J | 250 | 230 | 13 J | 12 J | 14 J |
| IRON, DISSOLVED | ug/l | D | | | | 130 | 170 | | | | 204000 | | | |
| MANGANESE, DISSOLVED | ug/l | D | | | | 1300 | 1300 | | | | 3700 | | | |
| CHLORIDE | ug/l | T | 304000 | 277000 B | 2230000 | 2370000 | 2440000 | 148000 J | 164000 | 14600000 | 10800000 | 291000 J | 262000 J | 259000 J |
| NITRATE-NITRITE | ug/l | T | | | | <20 | <20 | | | | 40 B | | | |
| SULFATE | ug/l | T | | | | 738000 J | 745000 J | | | | 686000 J | | | |
| TOTAL ALKALINITY | ug/l | T | | | | 490000 J | 520000 J | | | | 380000 J | | | |
| TOTAL ORGANIC CARBON | ug/l | T | | | | 51000 | 37000 | | | | 250000 | | | |
| TOTAL SULFIDE | ug/l | T | | | | 20000 | 28000 | | | | 23000 J | | | |
| **Field Parameters** | | | | | | | | | | | | | | |
| SPECIFIC CONDUCTANCE | UMHOS/CM | T | 1710 | 1344 | 6780 | 5380 | 5380 | 2980 | 2870 | 29500 | 28900 | 2160 | 2500 | 2500 |
| TEMPERATURE | DEGREES C | T | 13.4 | 12.3 | 12.5 | 10.9 | 10.9 | 9.7 | 12.2 | 13.1 | 10.8 | 11.9 | 11.3 | 11.3 |
| COLOR | NS | T | CLEAR | CLEAR | GREY | CLEAR | CLEAR | CLEAR | GREY | CLEAR | BLACK | GREY | GREY | GREY |
| WATER LEVEL | Feet | T | 25.07 | 24.39 | 20.88 | 21.2 | 21.2 | 21.45 | 21.04 | 18.83 | 18.06 | 37.95 | 38.63 | 38.63 |
| DISSOLVED OXYGEN | ug/l | T | 220 | 90 | 200 | 150 | 150 | 520 | 200 | 460 | 130 | 2030 | 530 | 530 |
| ODOR | NS | T | NONE | NONE | SLIGHT | NONE | NONE | NONE | NONE | SLIGHT | STRONG | SLIGHT | NONE | NONE |
| PH | STD UNITS | T | 7.48 | 7.21 | 7.36 | 7.38 | 7.38 | 7.68 | 7.18 | 7.18 | 6.82 | 7.48 | 7.63 | 7.63 |
| REDOX | MV | T | -155 | -107 | -281 | -182 | -182 | -21 | -23 | -247 | -289 | -128 | -151 | -151 |
| TURBIDITY | NTU | T | 5.37 | 5.31 | 29.5 | 1.97 | 1.97 | 13.3 | 5.12 | 1.57 | 3.66 | 7.19 | 3.06 | 3.06 |
| **Total Volatiles** | ug/l | T | 2,029 | 939 | 22,040 | 20,450 | 20,050 | 2 | 2 | 1,949 | 1,740 | 118 | 198 | 173 |

D - Disolved    T - Total

< and ND = Non detect at stated reporting limit

# Table B-1
# Summary of 2006 Analytical Results
# DuPont Necco Park

| | | | G-ZONE WELLS | | | | | |
|---|---|---|---|---|---|---|---|---|
| Analyte | units | | 147G1 4/25/06 1 | 147G1 10/25/06 1 | 147G2 4/25/06 1 | 147G2 10/25/06 1 | 147G3 4/25/06 1 | 147G3 10/25/06 1 |
| **Volatile Organics** | | | | | | | | |
| 1,1,2,2-TETRACHLOROETHANE | ug/l | T | 25 | 25 J | 89 J | <22 | 210 J | 120 J |
| 1,1,2-TRICHLOROETHANE | ug/l | T | 9.6 J | <22 | <44 | <22 | 80 J | 71 J |
| 1,1-DICHLOROETHENE | ug/l | T | <4.5 | <18 | 68 J | <18 | 100 J | <45 |
| 1,2-DICHLOROETHANE | ug/l | T | 37 | 94 J | 520 | 290 | 320 | 200 J |
| CARBON TETRACHLORIDE | ug/l | T | <4.8 | <19 | <38 | <19 | <38 | <48 |
| CHLOROFORM | ug/l | T | 5.5 J | 19 J | 39 J | <16 | 41 J | 65 J |
| CIS-1,2-DICHLOROETHENE | ug/l | T | 77 J | 360 | 1600 | 92 J | 2400 | 1500 |
| TETRACHLOROETHENE | ug/l | T | <4.8 UJ | <19 | <38 | <19 | <38 | <48 |
| TRANS-1,2-DICHLOROETHENE | ug/l | T | 120 | 420 | 700 | 200 | 550 | 470 |
| TRICHLOROETHENE | ug/l | T | 7.1 J | <28 | <56 | <28 | <56 | <70 |
| VINYL CHLORIDE | ug/l | T | 480 | 3000 | 7800 | 2700 | 7800 | 6700 |
| **Dissolved Gases** | | | | | | | | |
| ETHANE | ug/l | T | | | | | | |
| ETHENE | ug/l | T | | | | | | |
| METHANE | ug/l | T | | | | | | |
| PROPANE | ug/l | T | | | | | | |
| **Semivolatile Organics** | | | | | | | | |
| 2,4,5-TRICHLOROPHENOL | ug/l | T | 2.3 J | <3.8 | <3.8 | 8.3 J | <3.8 R | <3.8 |
| 2,4,6-TRICHLOROPHENOL | ug/l | T | <1.4 | <5.6 | <5.6 | <5.6 | <5.6 R | <5.6 |
| 3-METHYLPHENOL & 4-METHYLPHENOL | ug/l | T | <0.75 | <0.75 | <0.75 | <0.75 | <0.75 R | <0.75 |
| HEXACHLOROBENZENE | ug/l | T | <0.065 | <0.26 | <0.26 | <0.26 | <0.26 | <0.26 |
| HEXACHLOROBUTADIENE | ug/l | T | <0.51 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 |
| HEXACHLOROETHANE | ug/l | T | <0.58 | <2.3 | <2.3 | <2.3 | <2.3 | <2.3 |
| PENTACHLOROPHENOL | ug/l | T | 1.0 J | <1.9 | <1.9 | 6.3 J | <1.9 R | 6.6 J |
| PHENOL | ug/l | T | <0.96 | <3.8 | <3.8 | <3.8 | <3.8 R | <3.8 |
| TIC 1 | ug/l | T | 11 J | 53 J | 180 J | 200 J | 120 J | 170 J |
| **Inorganics** | | | | | | | | |
| BARIUM, DISSOLVED | ug/l | D | 21 J | 46 J | 22 J | 14 J | 22 J | 20 J |
| IRON, DISSOLVED | ug/l | D | | | | | | |
| MANGANESE, DISSOLVED | ug/l | D | | | | | | |
| CHLORIDE | ug/l | T | 301000 J | 1320000 | 1910000 J | 1420000 | 2460000 J | 2470000 |
| NITRATE-NITRITE | ug/l | T | | | | | | |
| SULFATE | ug/l | T | | | | | | |
| TOTAL ALKALINITY | ug/l | T | | | | | | |
| TOTAL ORGANIC CARBON | ug/l | T | | | | | | |
| TOTAL SULFIDE | ug/l | T | | | | | | |
| **Field Parameters** | | | | | | | | |
| SPECIFIC CONDUCTANCE | UMHOS/CM | T | 2900 | 6230 | 7340 | 4040 | 8440 | 8510 |
| TEMPERATURE | DEGREES C | T | 9.9 | 12.1 | 11 | 12.9 | 11.2 | 13.3 |
| COLOR | NS | T | GREY | GREY | BLACK TINT | CLEAR | BLACK TINT | BLACK |
| WATER LEVEL | Feet | T | 24.06 | 24.3 | 23.59 | 23.48 | 23.54 | 23.69 |
| DISSOLVED OXYGEN | ug/l | T | 540 | 120 | 970 | 140 | 470 | 150 |
| ODOR | NS | T | SLIGHT | SLIGHT | MODERATE | NONE | MODERATE | MODERATE |
| PH | STD UNITS | T | 7.58 | 6.96 | 7.45 | 7.23 | 7.34 | 6.91 |
| REDOX | MV | T | -164 | -63 | -294 | -41 | -324 | -382 |
| TURBIDITY | NTU | T | 5.52 | 12.24 | 17.6 | 33.6 | 4.71 | 18.32 |
| **Total Volatiles** | ug/l | T | 761 | 3,918 | 10,816 | 3,282 | 11,501 | 9,126 |

D - Disolved T - Total

# APPENDIX B.2

Recovery Well Sampling Results

# Table B-2
# Recovery Well Sampling Results from 3Q06
# DuPont Necco Park

| Analyte | Sample ID / Date / units | RW-4 8/22/06 | RW-4 8/22/06 Duplicate | RW-5 8/22/06 | RW-8 8/22/06 | RW-9 8/22/06 | RW-10 8/22/06 | EQBLK 8/22/06 | TBLK 8/22/06 |
|---|---|---|---|---|---|---|---|---|---|
| **Field Parameters** | | | | | | | | | |
| SPECIFIC CONDUCTANCE (FIELD) | UMHOS/CM | 7509 | NS | 4484 | 3776 | 4300 | 9744 | N/A | N/A |
| TEMPERATURE (FIELD) | DEGREES C | 20.1 | NS | 15 | 12.5 | 12.8 | 17.3 | N/A | N/A |
| COLOR QUALITATIVE (FIELD) | NS | TURBID YELLOW | NS | GREY | CLEAR | CLEAR | GREY | N/A | N/A |
| PH (FIELD) | STD UNITS | 7.29 | NS | 6.43 | 6.97 | 7.07 | 7.65 | N/A | N/A |
| REDOX (FIELD) | MV | -301 | NS | -154 | -249 | -260 | -244 | N/A | N/A |
| TURBIDITY QUANTITATIVE (FIELD) | NTU | 141 | NS | 4.08 | 2.65 | 2.02 | 51.1 | N/A | N/A |
| **Volatile Organics** | | | | | | | | | |
| 1,1,2,2-TETRACHLOROETHANE | ug/l | 8400 | 930 | 5600 | 1400 | 1500 | 3100 | <0.22 | <0.22 |
| 1,1,2-TRICHLOROETHANE | ug/l | 410 J | 44 J | 2200 | 2700 | 2600 | 3200 | <0.22 | <0.22 |
| 1,1-DICHLOROETHENE | ug/l | <90 | <11 | 650 J | 400 | 600 | 1200 J | <0.18 | <0.18 |
| 1,2-DICHLOROETHANE | ug/l | <80 | <10 | 740 J | 210 J | 140 J | 1200 J | <0.16 | <0.16 |
| CARBON TETRACHLORIDE | ug/l | 2000 | 210 | 1600 | 2700 | 1100 | 2700 | <0.19 | <0.19 |
| CHLOROFORM | ug/l | 4400 | 460 | 9700 | 8300 | 4100 | 49000 | <0.16 | <0.16 |
| CIS-1,2 DICHLOROETHENE | ug/l | 390 J | 42 J | 25000 | 8100 | 13000 | 9900 | <0.21 | <0.21 |
| TETRACHLOROETHYLENE | ug/l | 1500 | 160 | 2700 | 3200 | 1500 | 15000 | <0.19 | <0.19 |
| TRANS-1,2-DICHLOROETHENE | ug/l | 100 J | 10 J | 1500 | 720 | 960 | 450 J | <0.16 | <0.16 |
| TRICHLOROETHENE | ug/l | 2300 | 240 | 11000 | 13000 | 9900 | 40000 | <0.28 | <0.28 |
| VINYL CHLORIDE | ug/l | 210 J | 21 J | 9600 | 1500 | 3300 | 2000 | <0.21 | <0.21 |
| **Semivolatile Organics** | | | | | | | | | |
| 2,4,5-TRICHLOROPHENOL | ug/l | <120 UJ | <96 UJ | <38 UJ | 700 J | 250 J | 390 J | <0.96 UJ | NS |
| 2,4,6-TRICHLOROPHENOL | ug/l | <180 UJ | <140 UJ | <56 UJ | 420 J | 76 J | 150 J | <1.4 UJ | NS |
| 3- AND 4- METHYLPHENOL | ug/l | <0.75 UJ | <0.75 UJ | 520 J | 19 J | 26 J | 710 J | <0.75 UJ | NS |
| HEXACHLOROBENZENE | ug/l | <8.1 UJ | <6.5 UJ | <2.6 UJ | <1.3 UJ | <0.43 UJ | <2.6 UJ | <0.065 UJ | NS |
| HEXACHLOROBUTADIENE | ug/l | 3800 J | 3200 J | 1100 J | 110 J | 9.7 J | 480 J | <0.51 UJ | NS |
| HEXACHLOROETHANE | ug/l | 520 J | 610 J | 520 J | 31 J | <3.9 UJ | 46 J | <0.58 UJ | NS |
| PENTACHLOROPHENOL | ug/l | <60 UJ | <48 UJ | 89 J | 1600 J | 31 J | 1600 J | <0.48 UJ | NS |
| PHENOL | ug/l | <120 UJ | <96 UJ | 330 J | 22 J | 72 J | 1000 J | <0.96 UJ | NS |
| TIC01 | ug/l | 350 J | 290 J | 5900 J | 990 J | 1000 J | 8700 J | <NS J | NS |
| **Inorganics** | | | | | | | | | |
| BARIUM, DISSOLVED | ug/l | 410 | 390 | 1820000 | 380 | 150 J | 1400 | <3.2 | NS |
| CHLORIDE | ug/l | 2460000 | 2450000 | 26100000 | 780000 | 582000 | 3270000 | 2200 J | NS |
| **Total Volatiles** | ug/l | 19710 | 2117 | 70290 | 42230 | 38700 | 127750 | 0 | 0 |

< and ND = Non detect at stated reporting limit
J = Estimated concentration
UJ= Analyte not detected. Reporting limit is estimated

# APPENDIX C
# DATA VALIDATION SUMMARY LABORATORY REPORTS

**- Provided on CD only - no Hardcopy attached -**

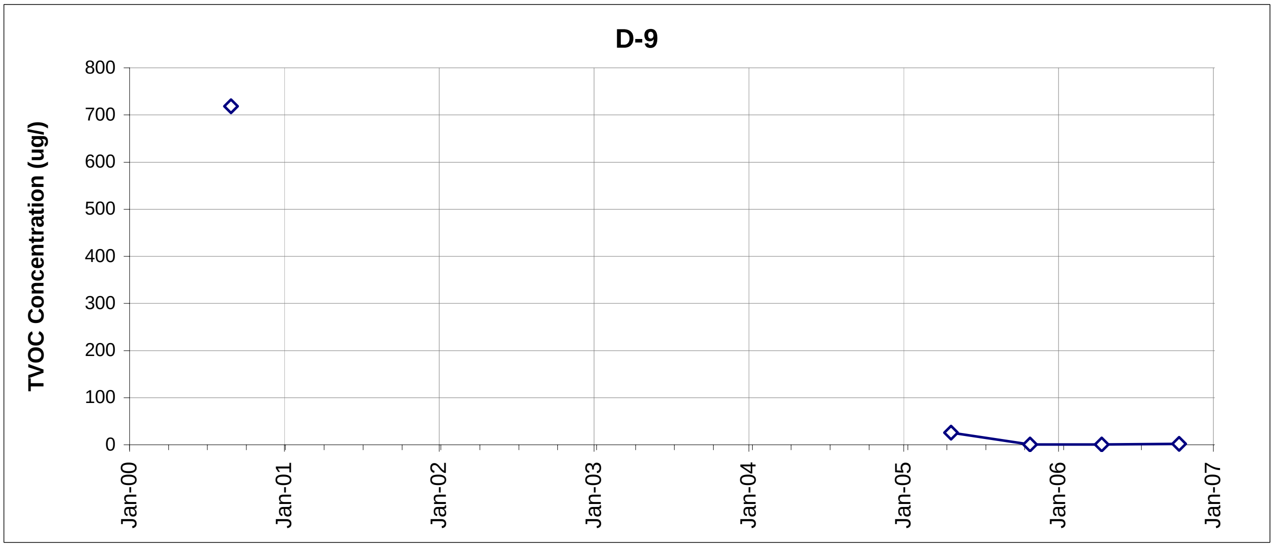
# APPENDIX D

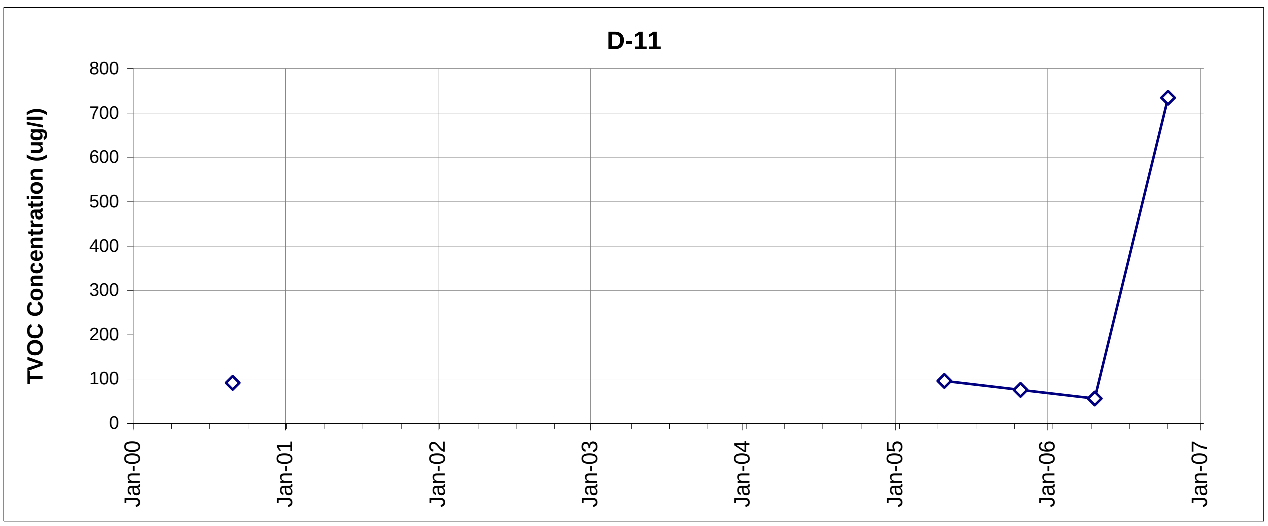
# TVOC CONCENTRATION TREND PLOTS

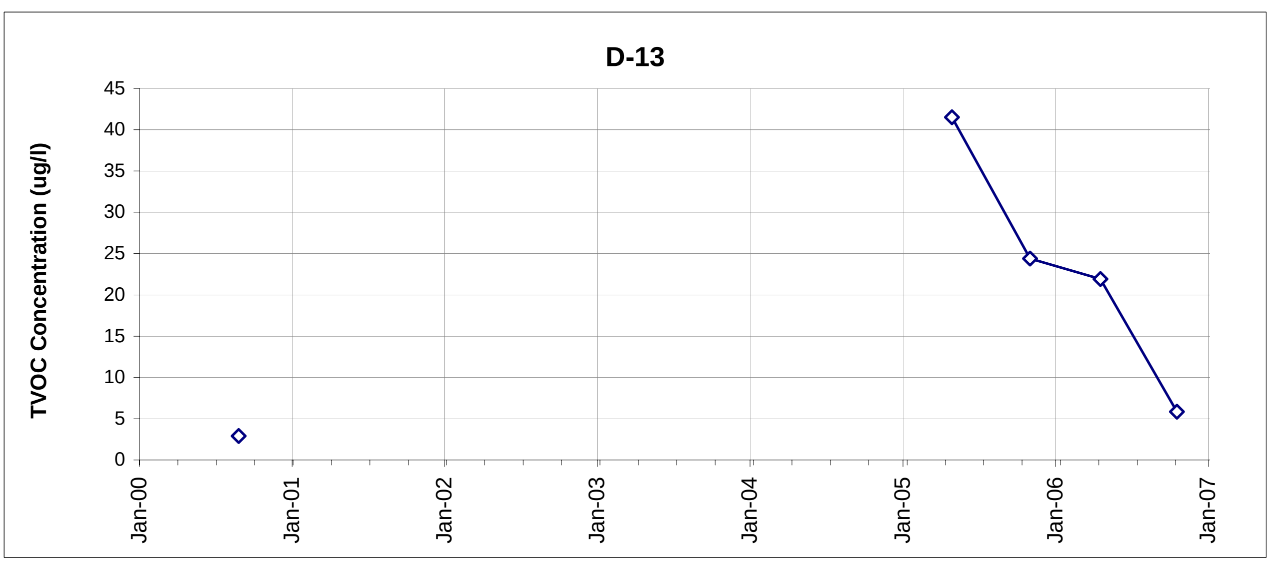
# APPENDIX D.1

TVOC Graphs A-Zone Wells

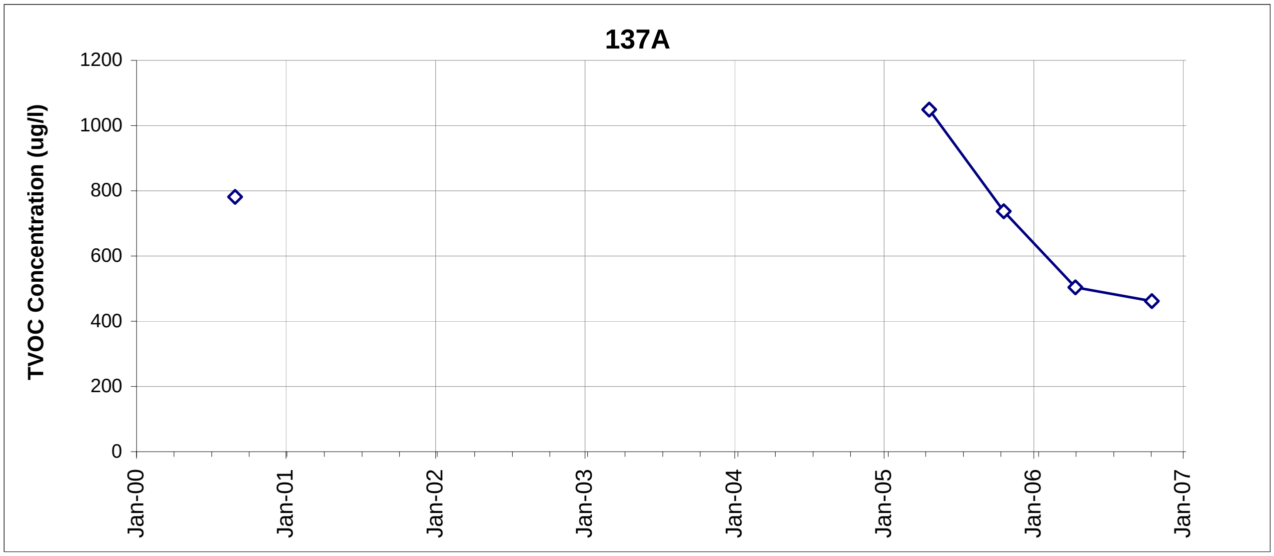
## Appendix D: TVOC Concentration Trend Plots
## A-Zone Wells
## Necco Park

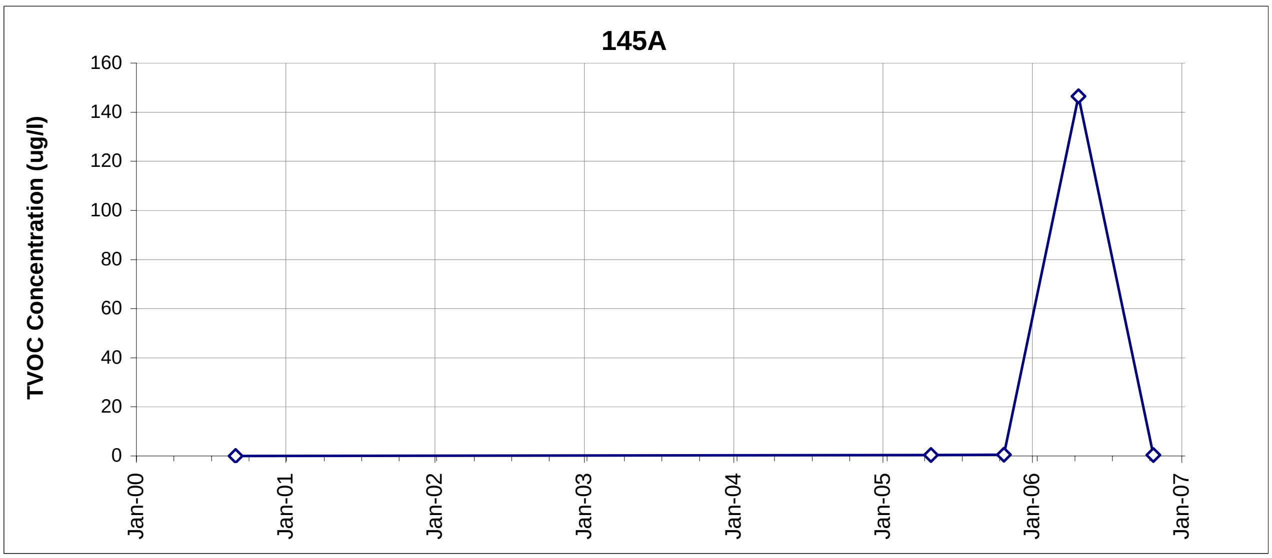


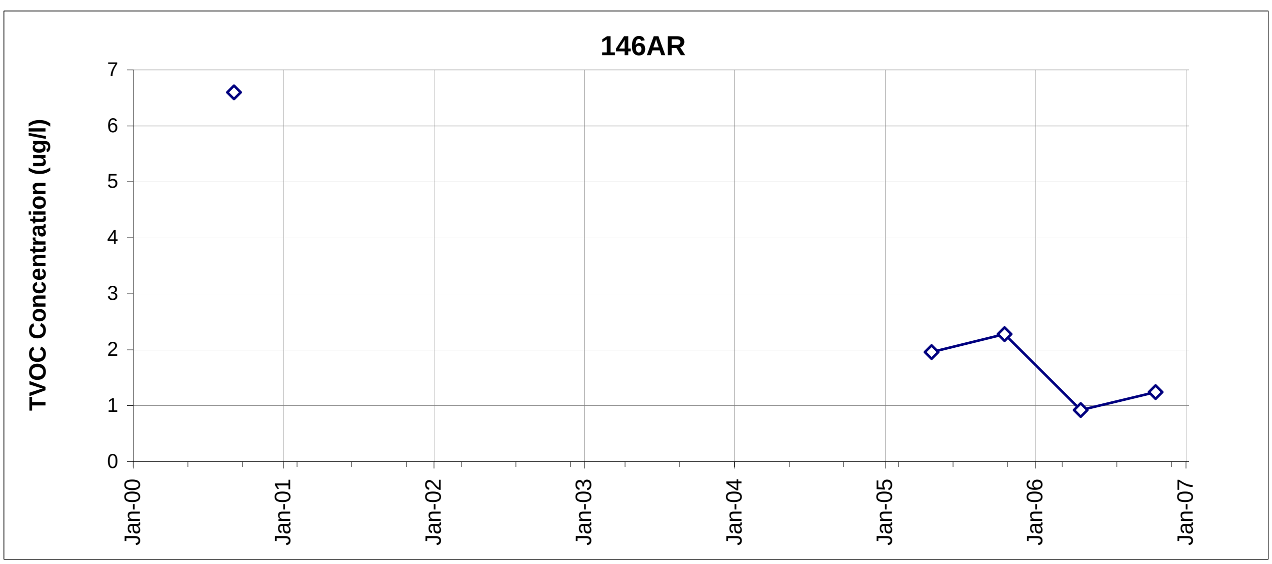



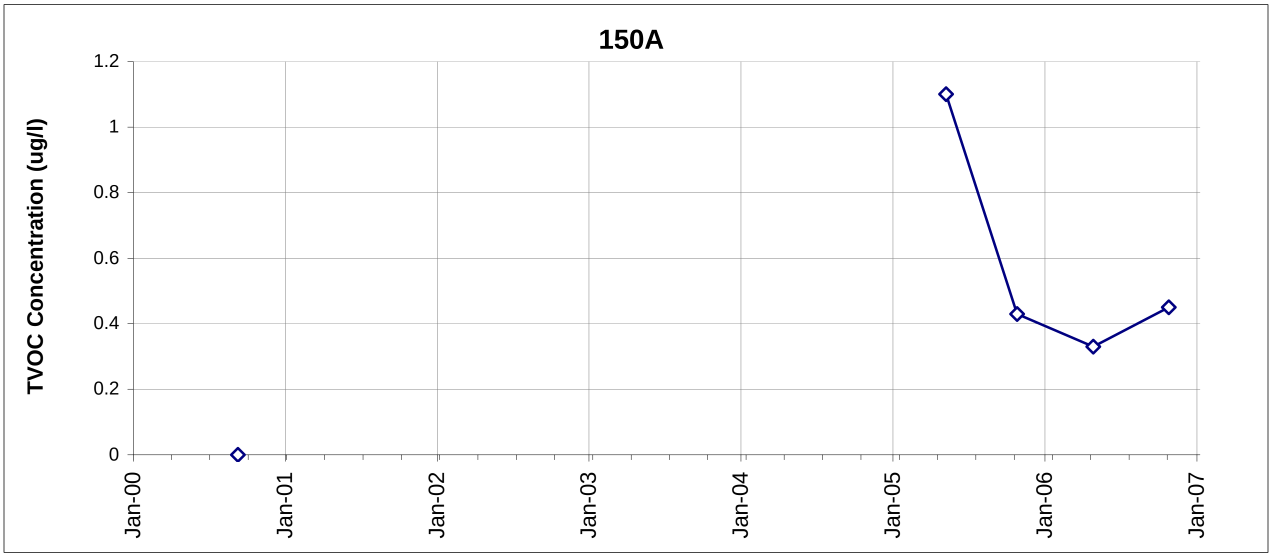
## Appendix D: TVOC Concentration Trend Plots
## A-Zone Wells
## Necco Park



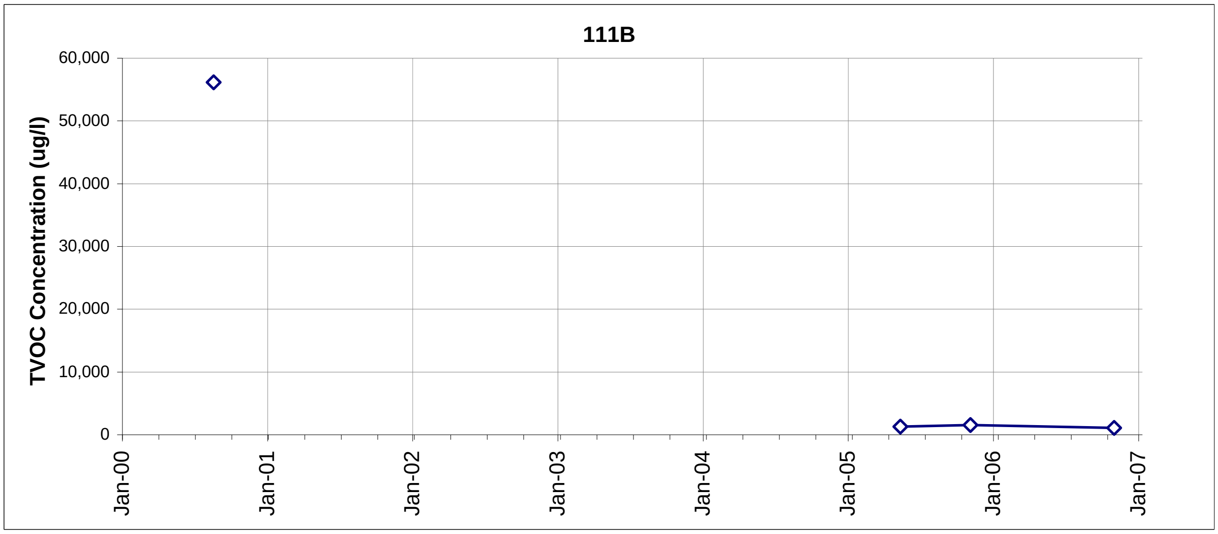
**Appendix D: TVOC Concentration Trend Plots**
**A-Zone Wells**
**Necco Park**

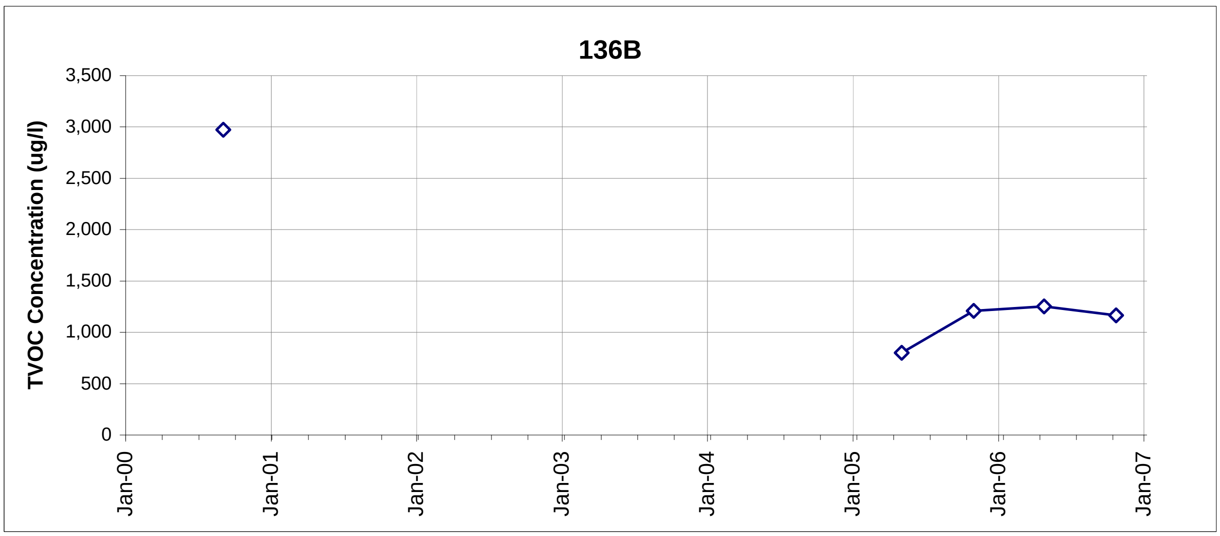


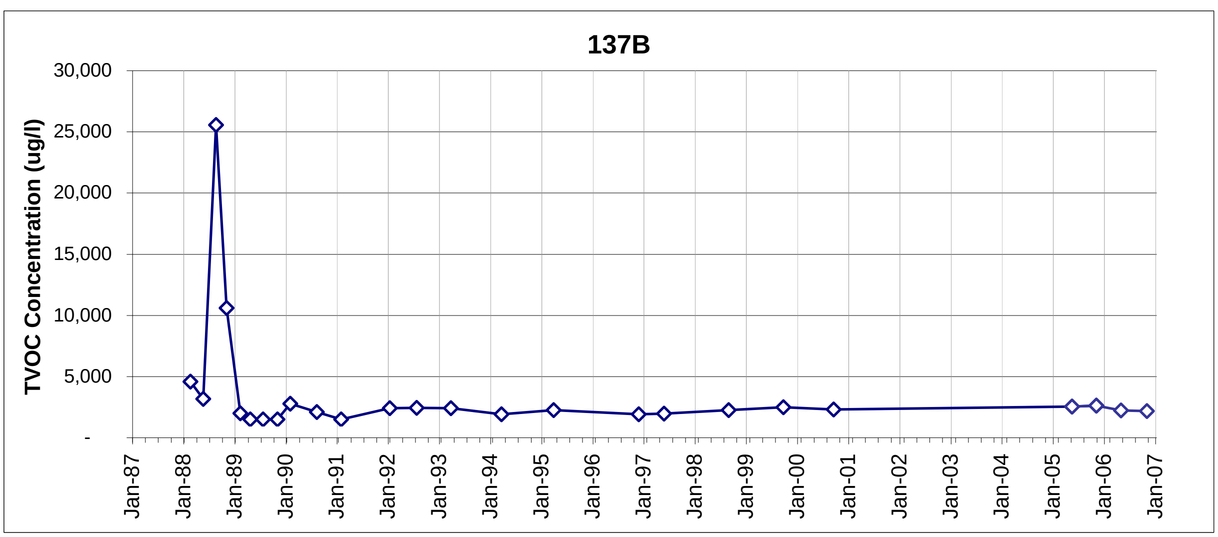
# APPENDIX D.2

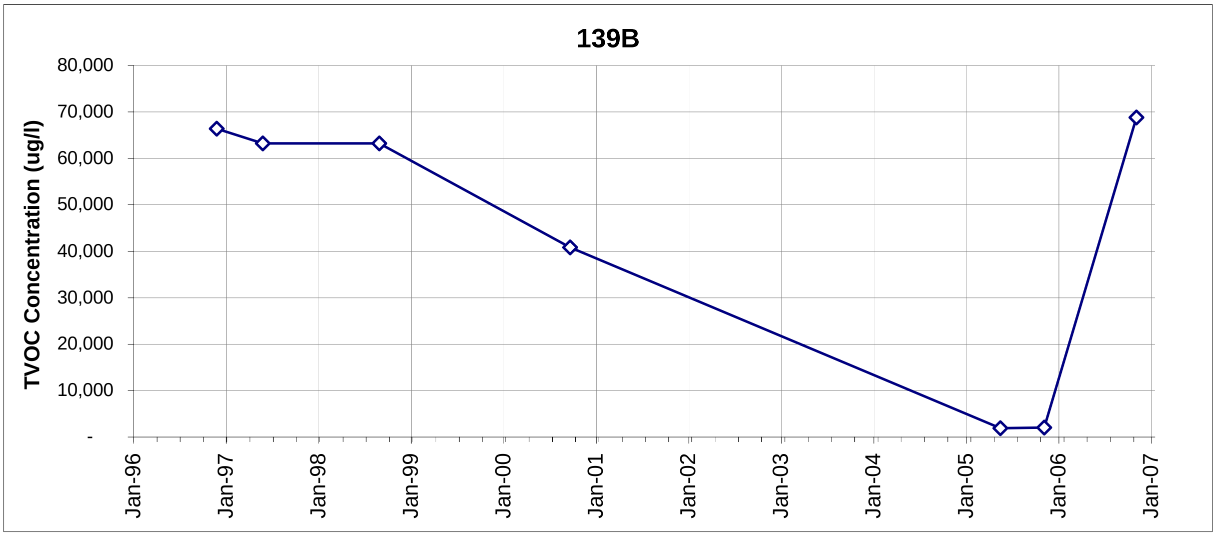
TVOC Graphs B-Zone Wells

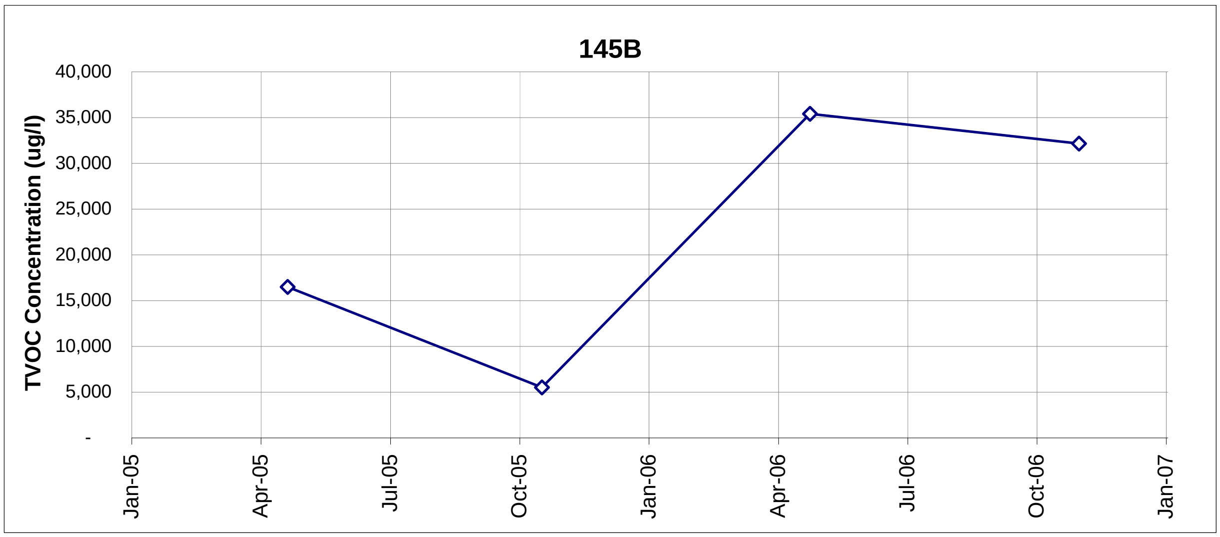
## Appendix D: TVOC Concentration Trend Plots
## B-Zone Wells
## Necco Park

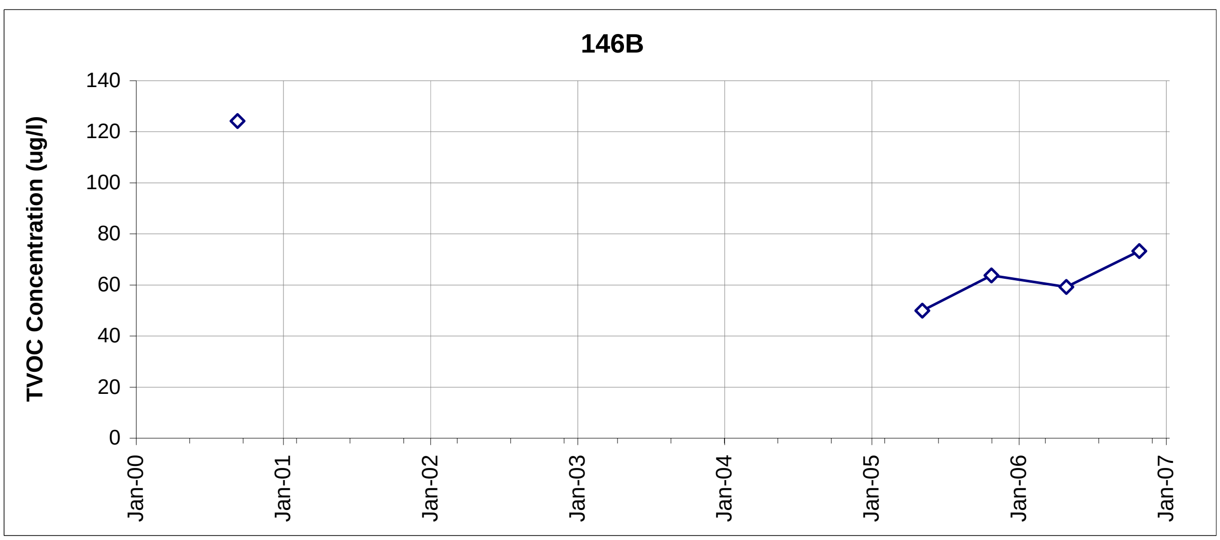


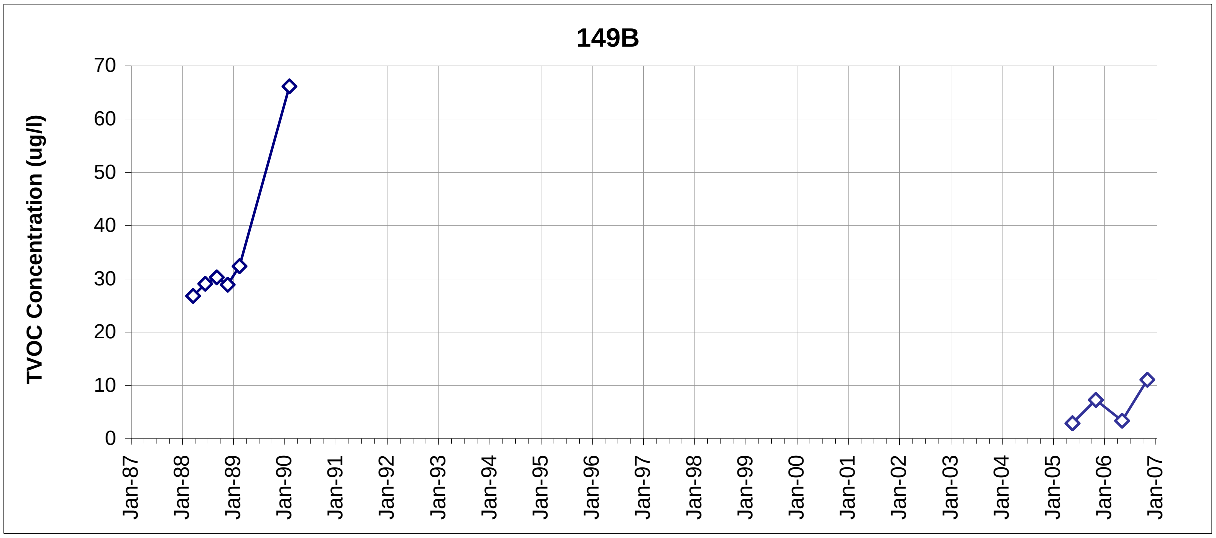



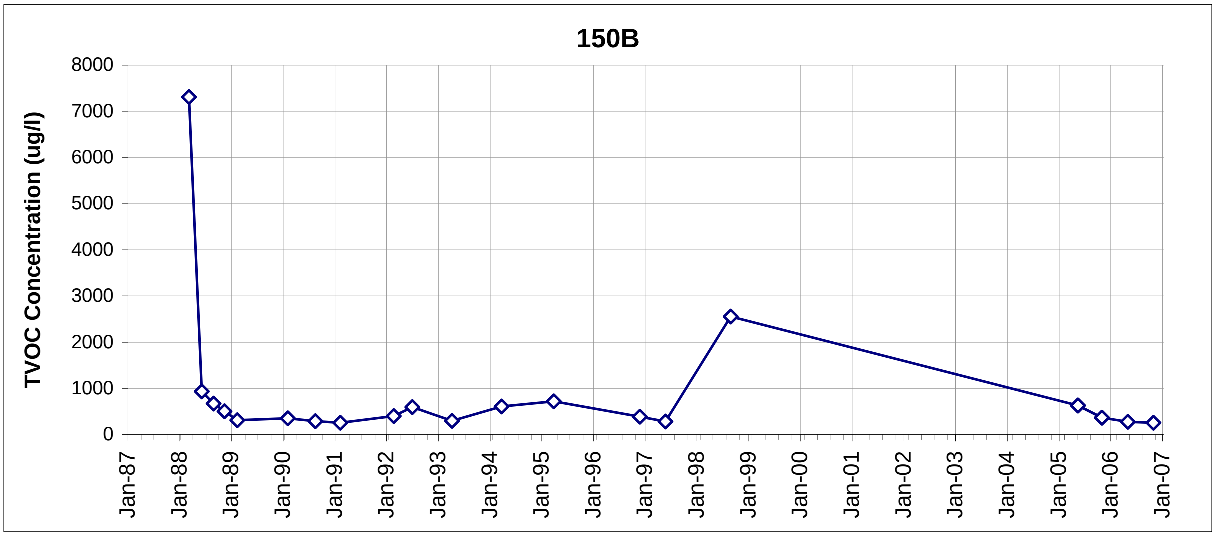

139B
TVOC Concentration (ug/l)
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
-
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07

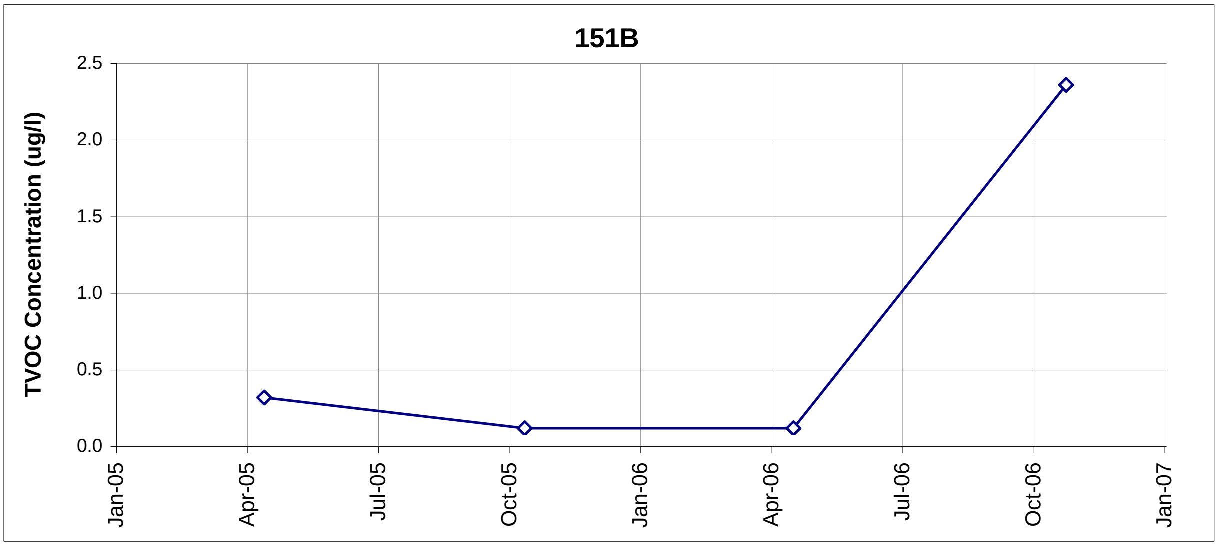

145B
TVOC Concentration (ug/l)
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
-
Jan-05
Apr-05
Jul-05
Oct-05
Jan-06
Apr-06
Jul-06
Oct-06
Jan-07


146B
TVOC Concentration (ug/l)
140
120
100
80
60
40
20
0
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07

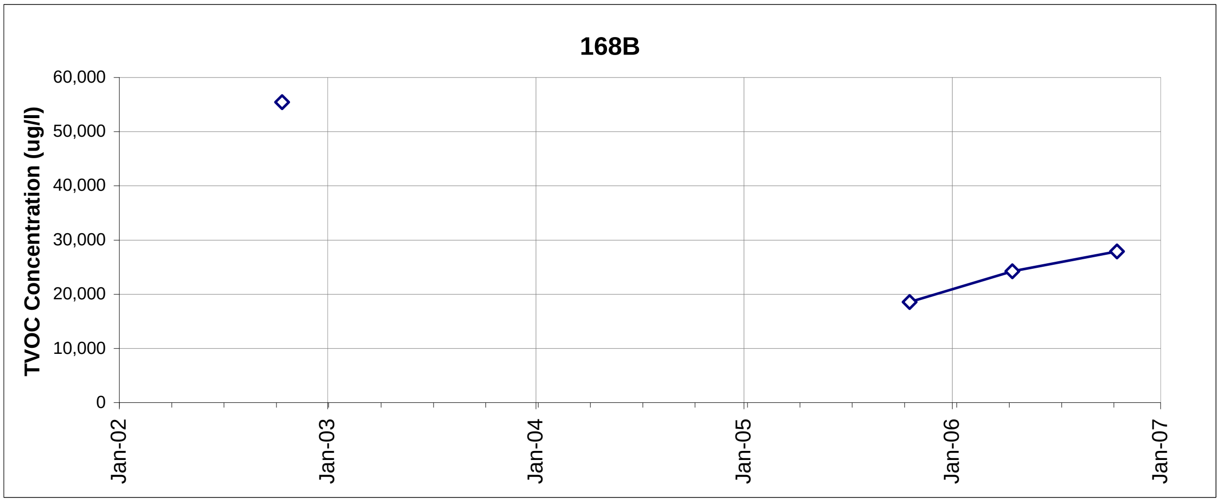
**Appendix D: TVOC Concentration Trend Plots**
**B-Zone Wells**
**Necco Park**

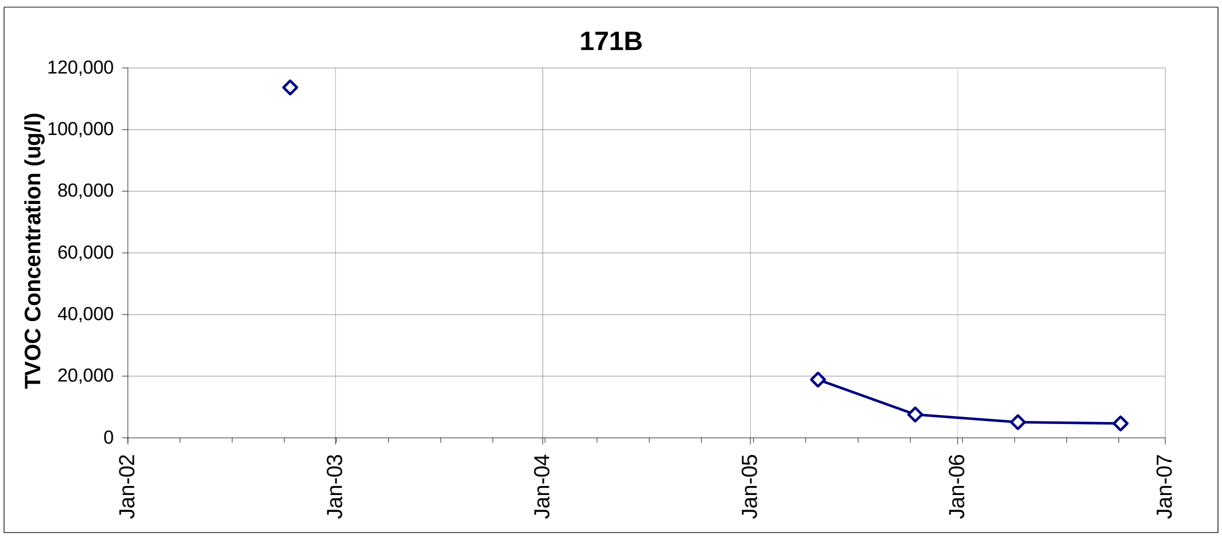


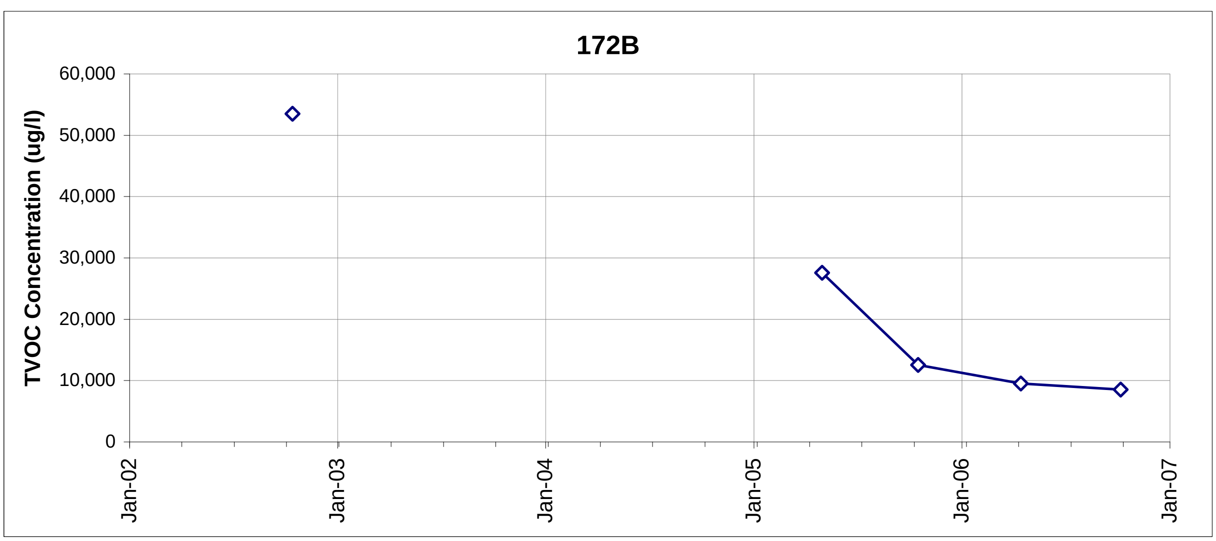



**Appendix D: TVOC Concentration Trend Plots**
**B-Zone Wells**
**Necco Park**



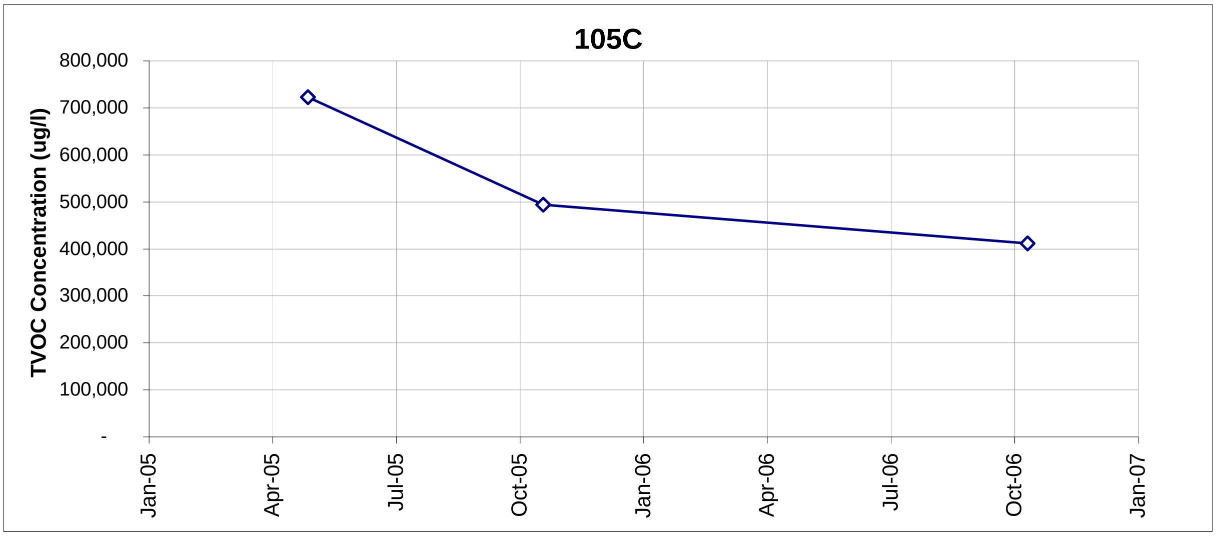



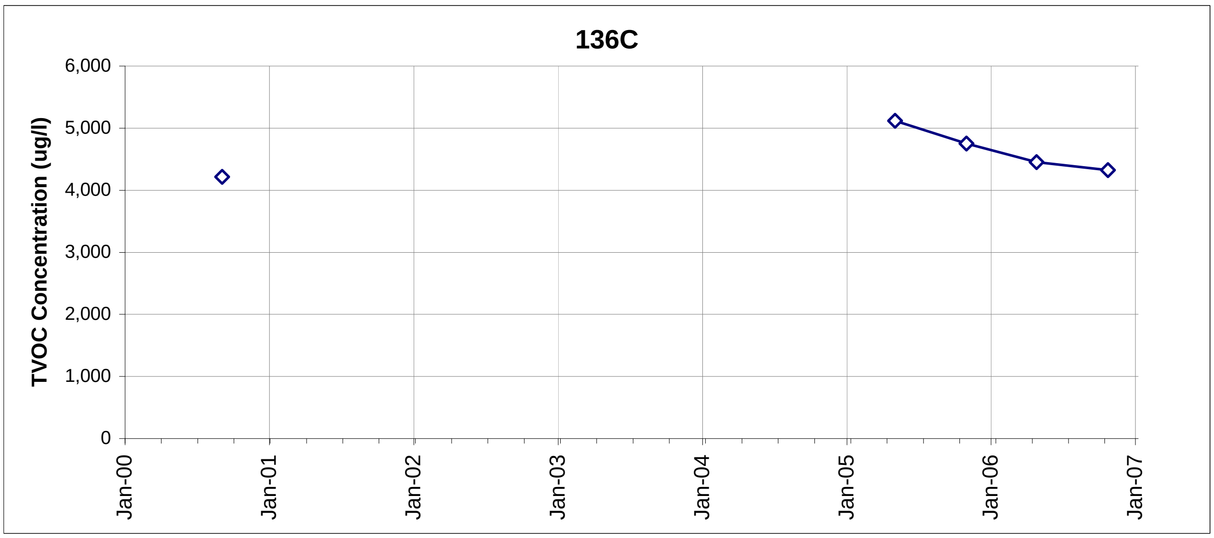



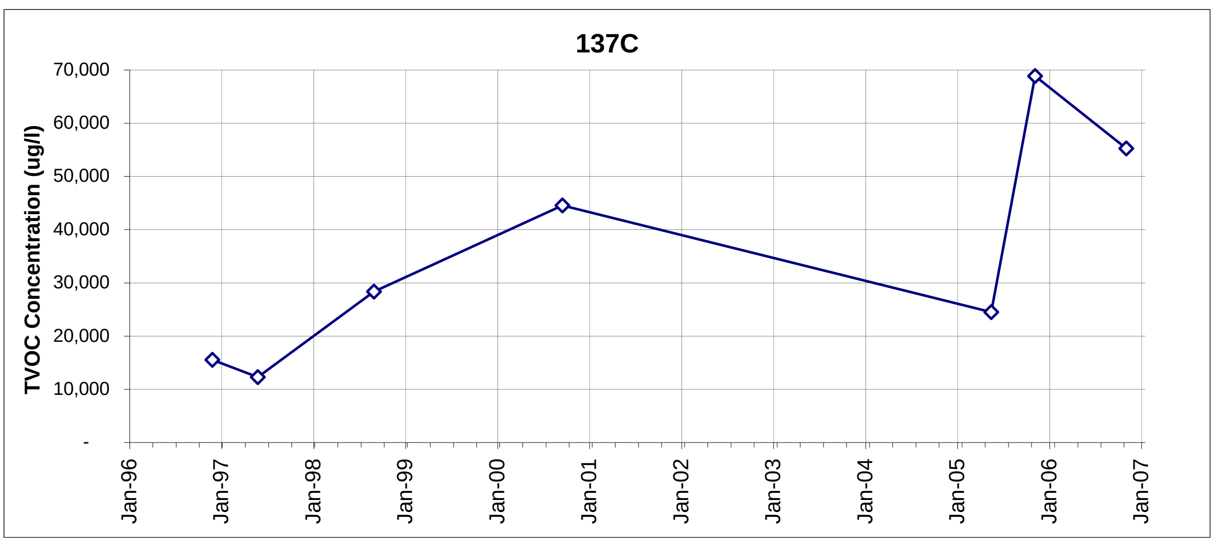
## APPENDIX D.3

TVOC Graphs C-Zone Wells

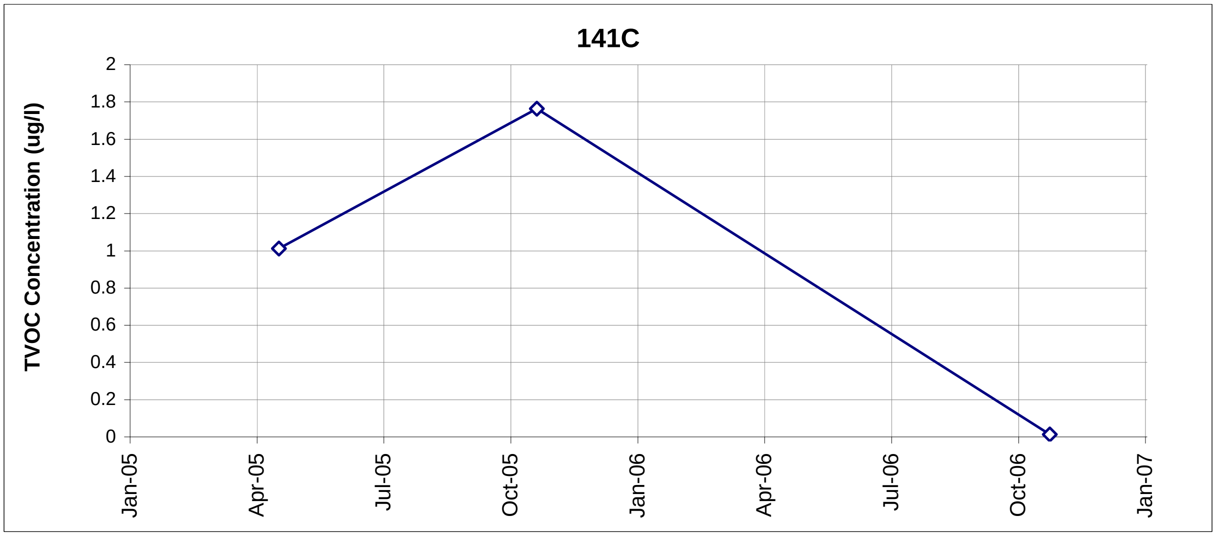
**Appendix D: TVOC Concentration Trend Plots**
**C-Zone Wells**
**Necco Park**

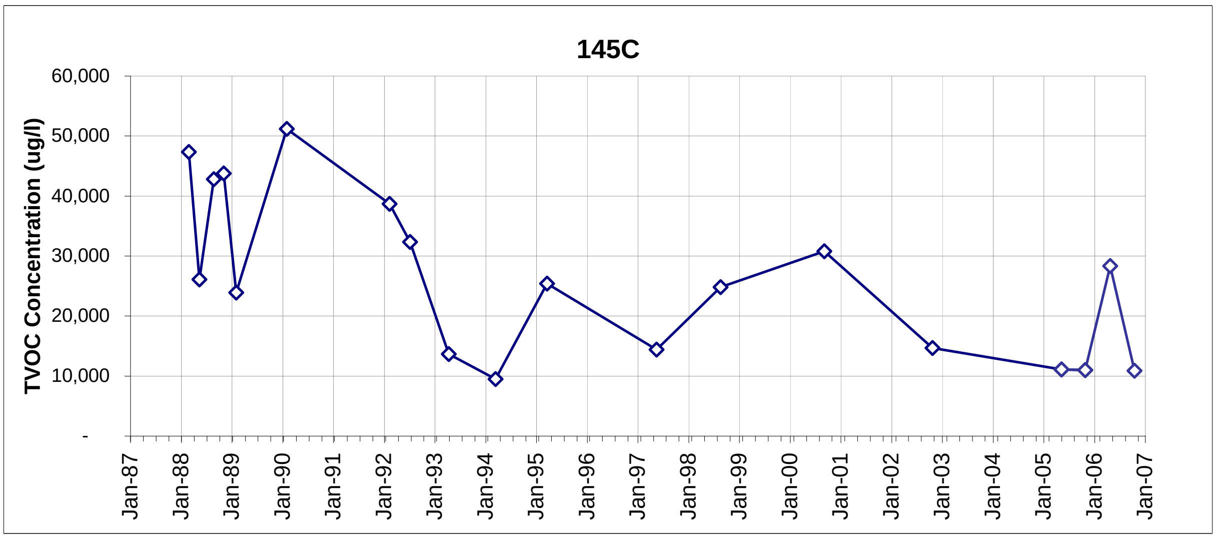


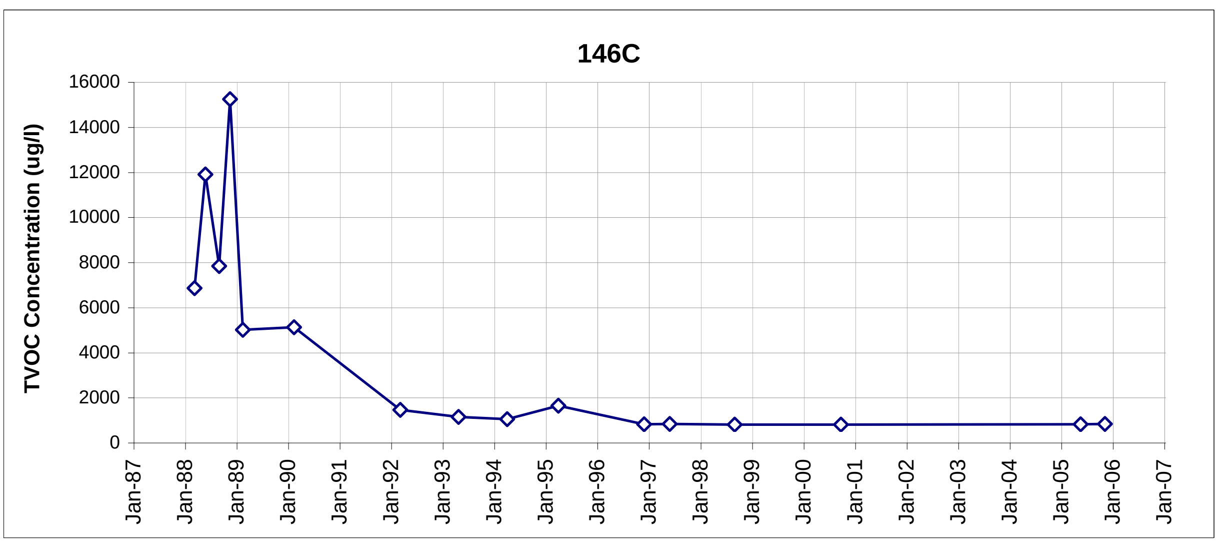



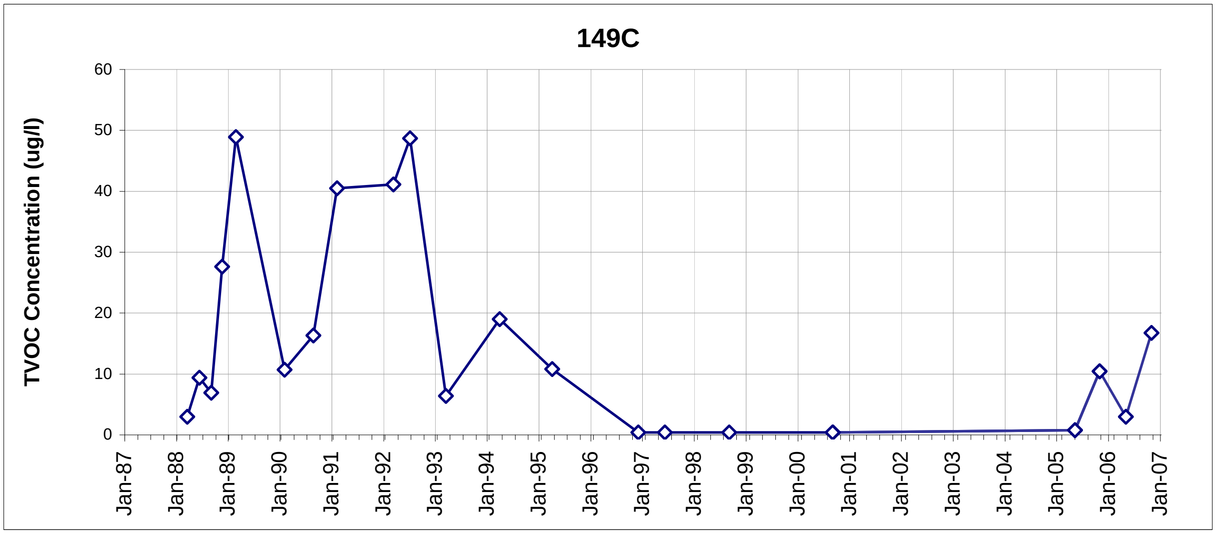
## Appendix D: TVOC Concentration Trend Plots
## C-Zone Wells
## Necco Park

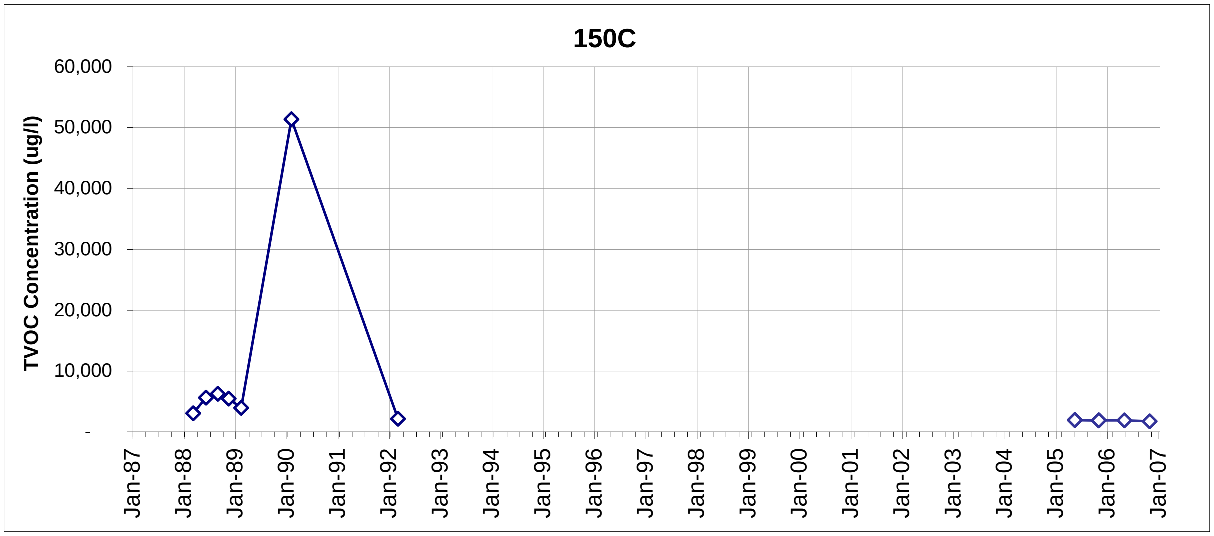


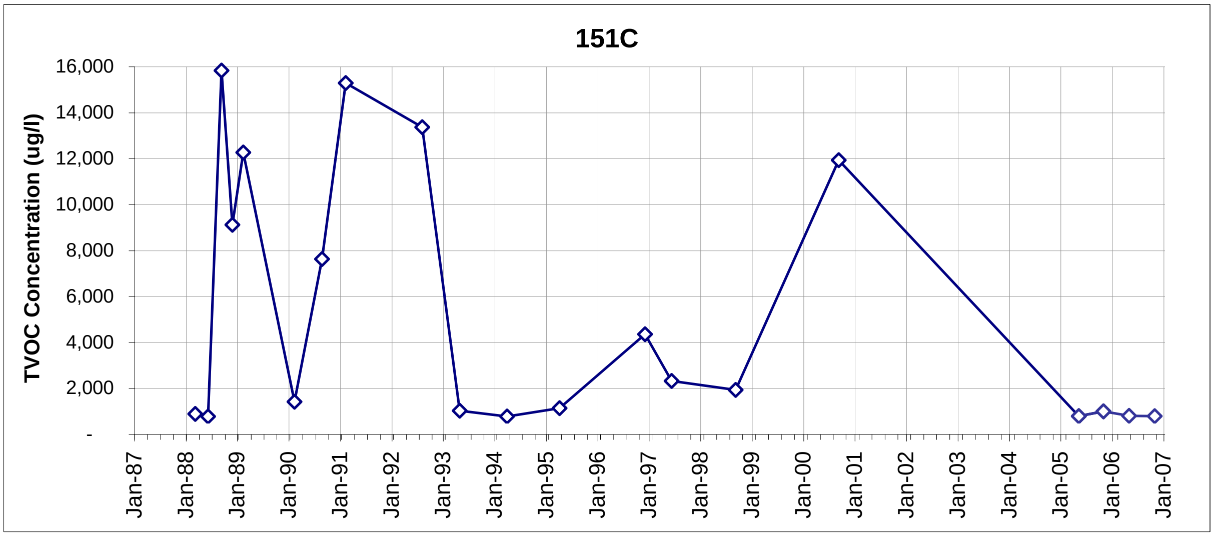



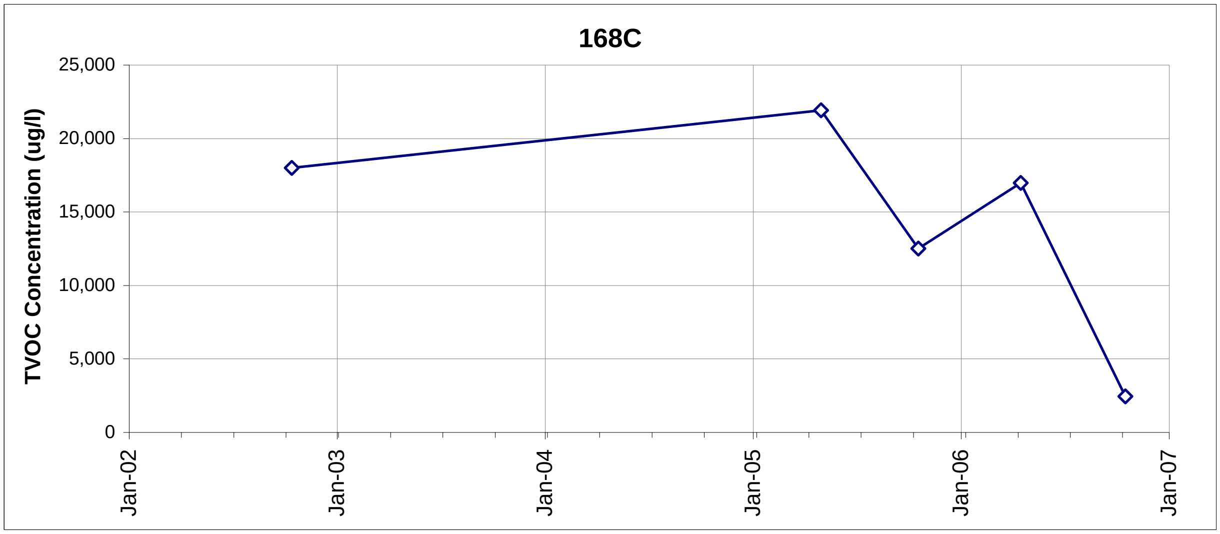
## Appendix D: TVOC Concentration Trend Plots
## C-Zone Wells
## Necco Park



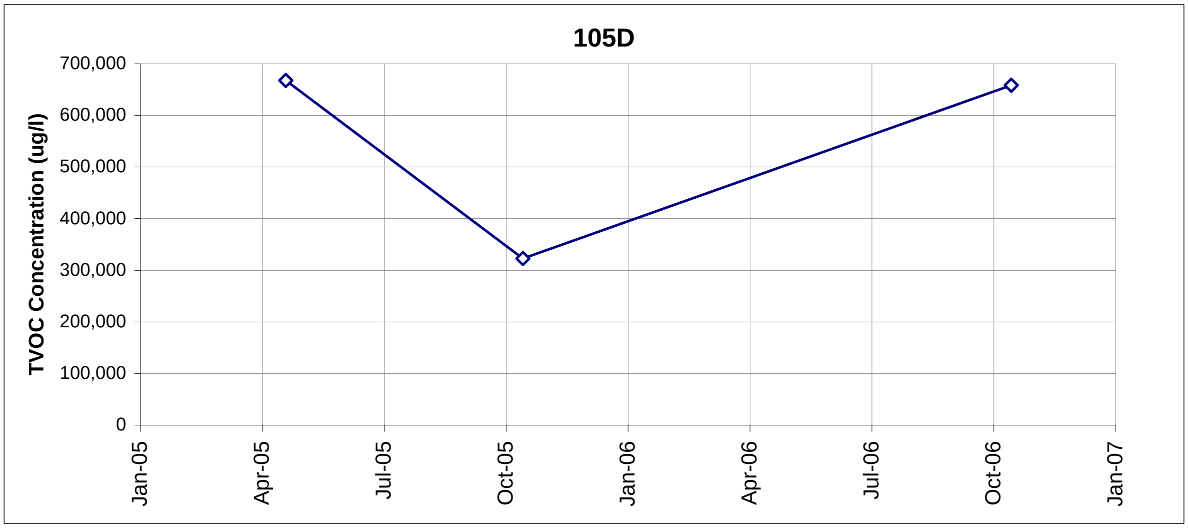
## Appendix D: TVOC Concentration Trend Plots
## C-Zone Wells
## Necco Park

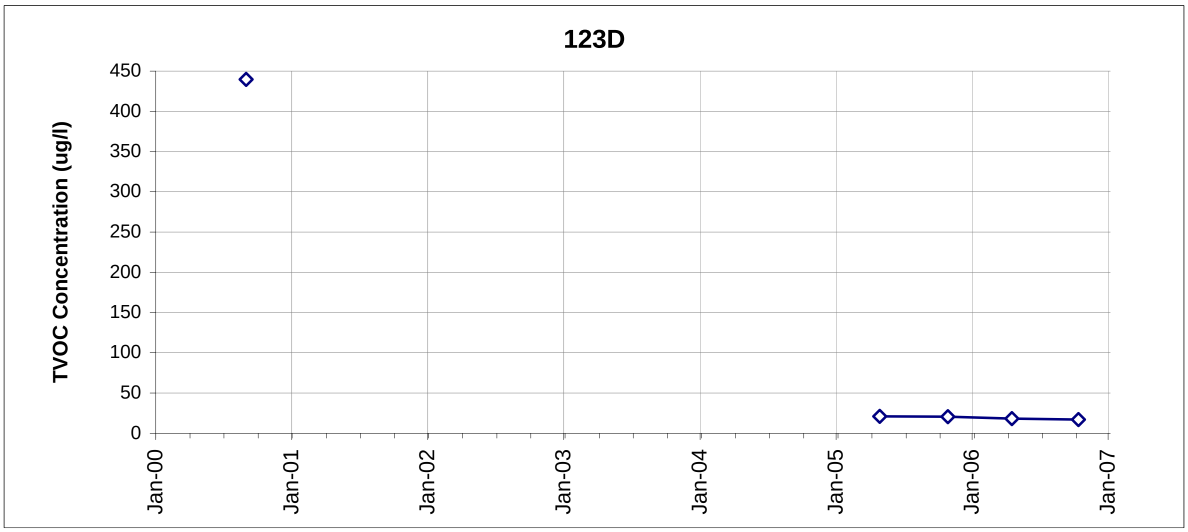


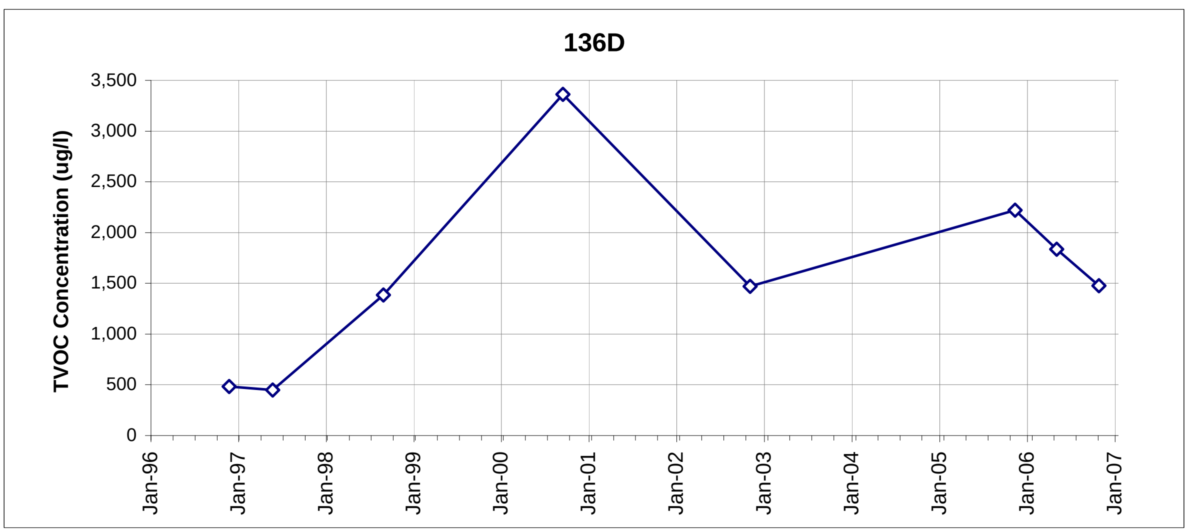
# APPENDIX D.4

TVOC Graphs D-Zone Wells

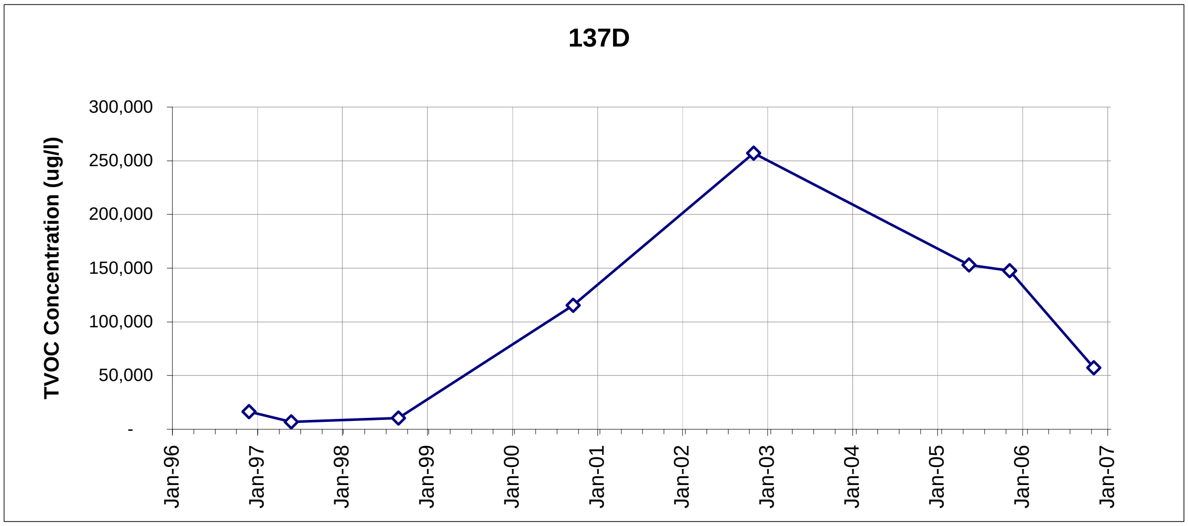
**Appendix D: TVOC Concentration Trend Plots**
**D-Zone Wells**
**Necco Park**

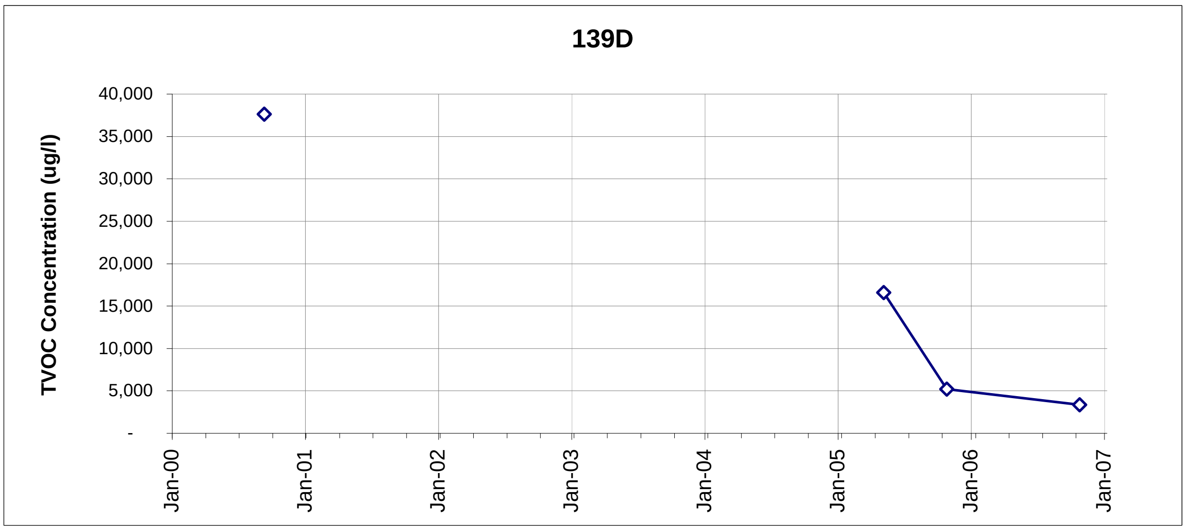


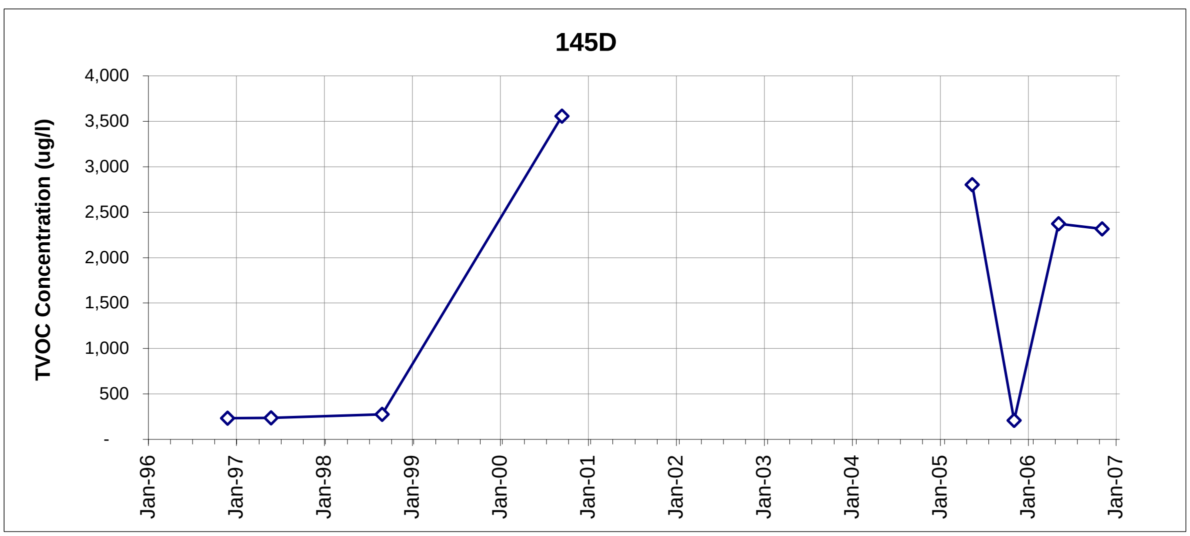



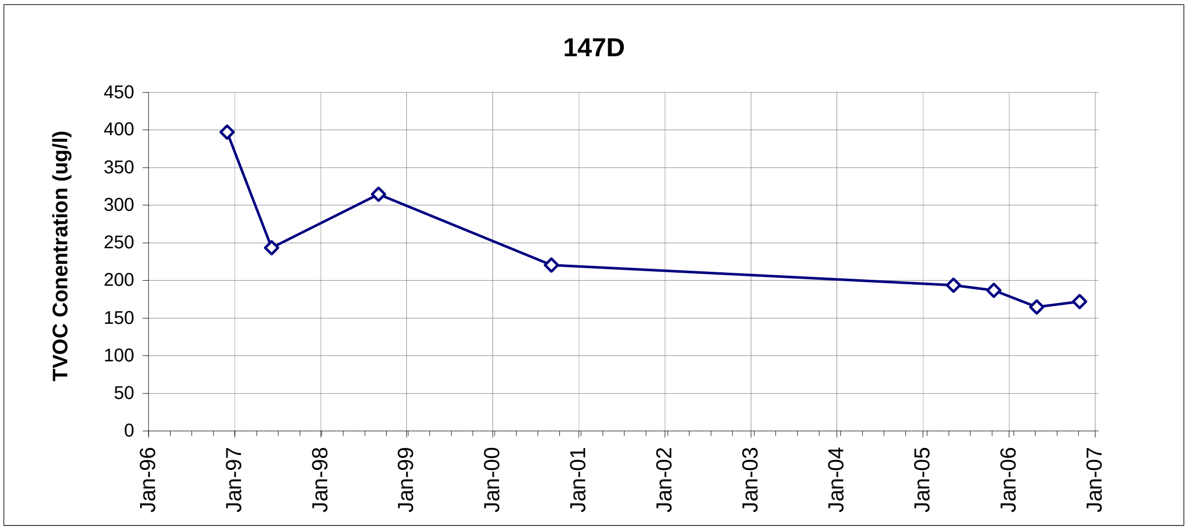
**Appendix D: TVOC Concentration Trend Plots**
**D-Zone Wells**
**Necco Park**

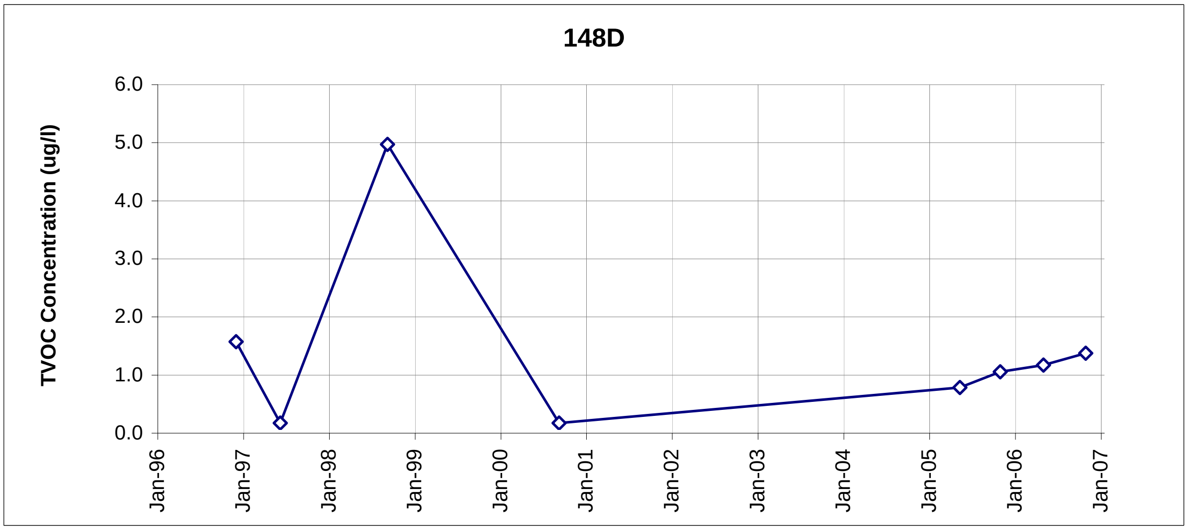


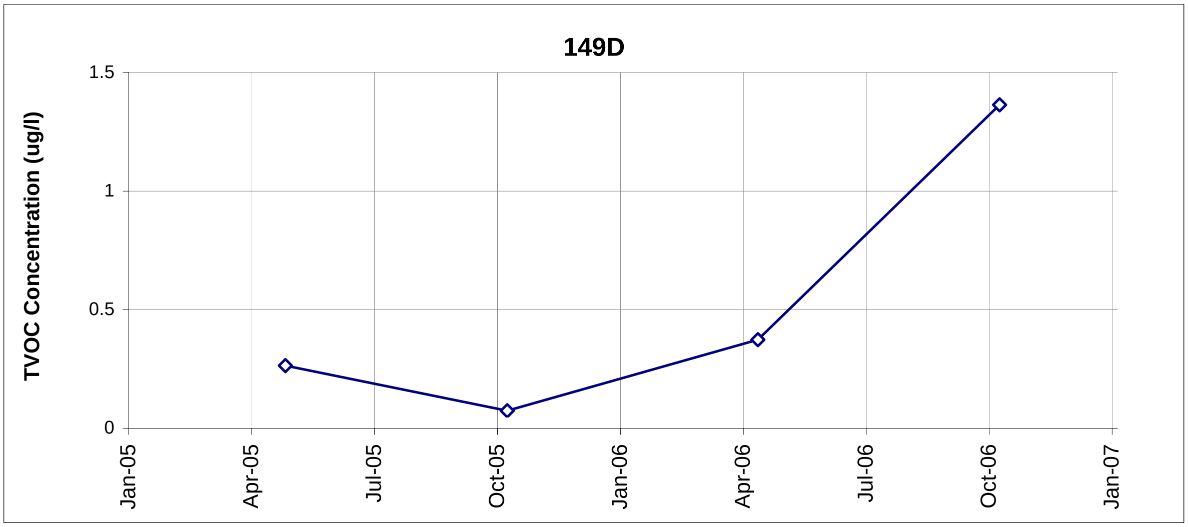



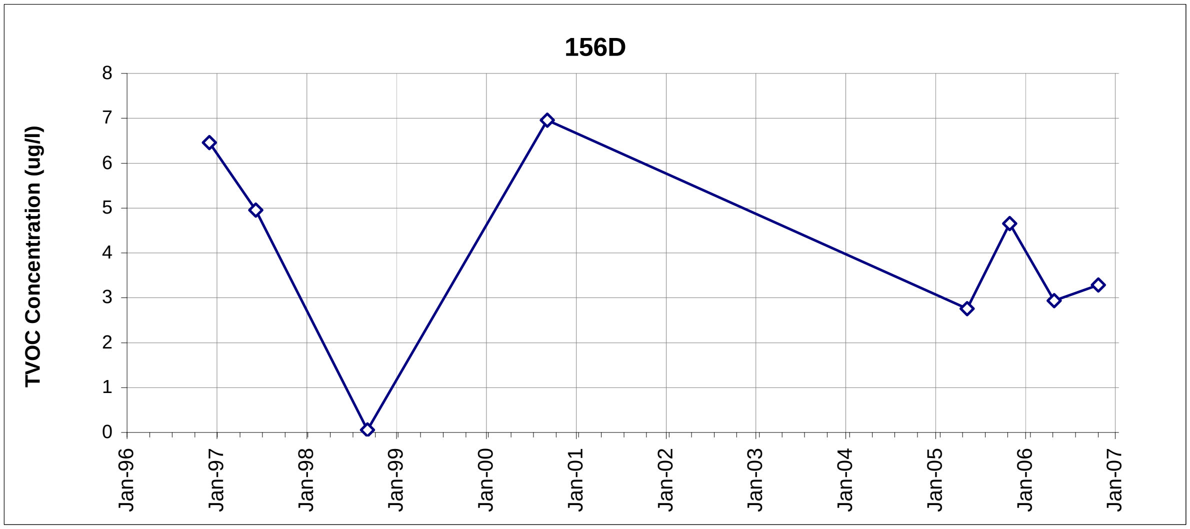
**Appendix D: TVOC Concentration Trend Plots**
**D-Zone Wells**
**Necco Park**

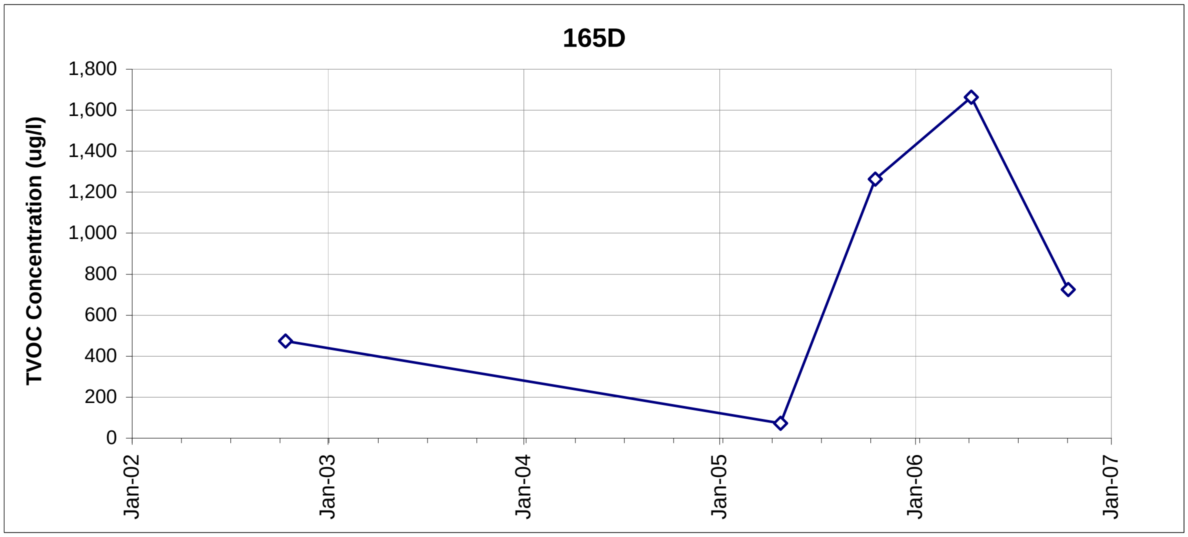


**Appendix D: TVOC Concentration Trend Plots**
**D-Zone Wells**
**Necco Park**

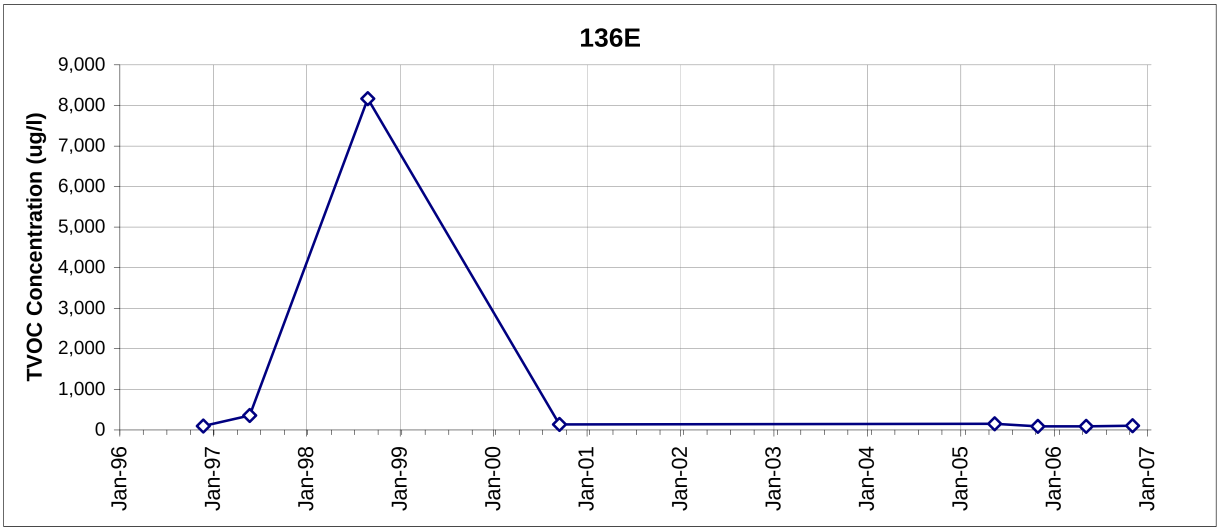


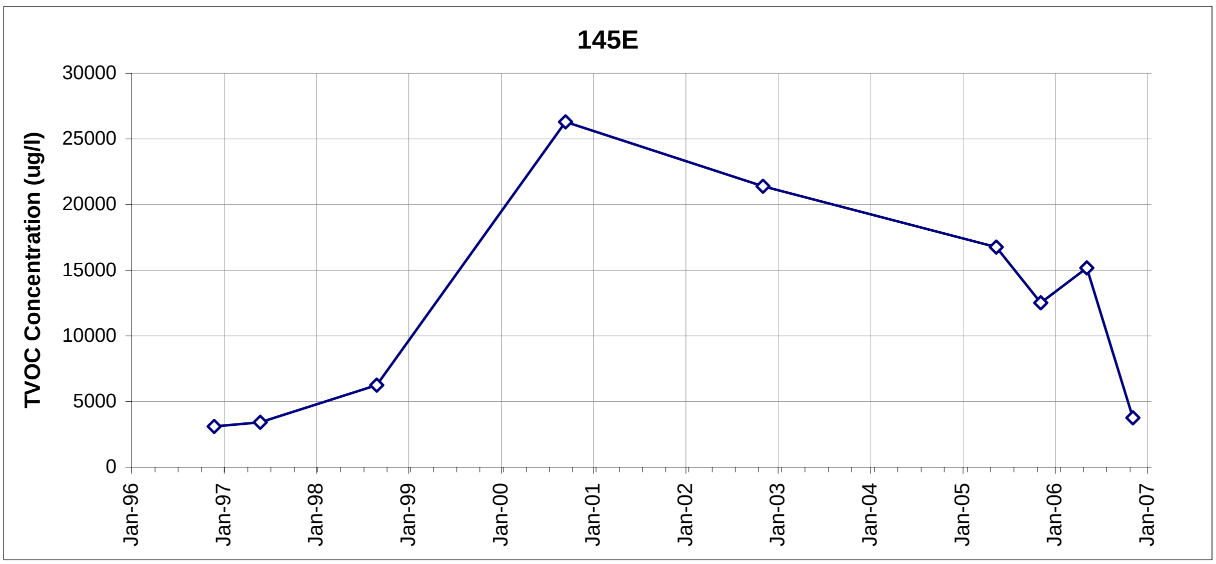



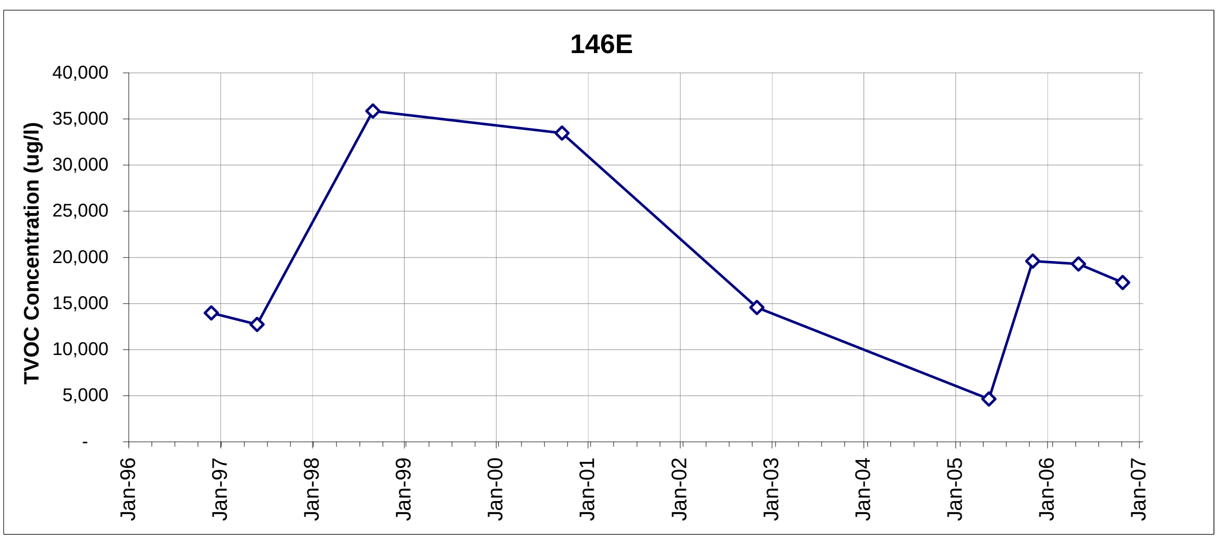
## APPENDIX D.5

TVOC Graphs E-Zone Wells

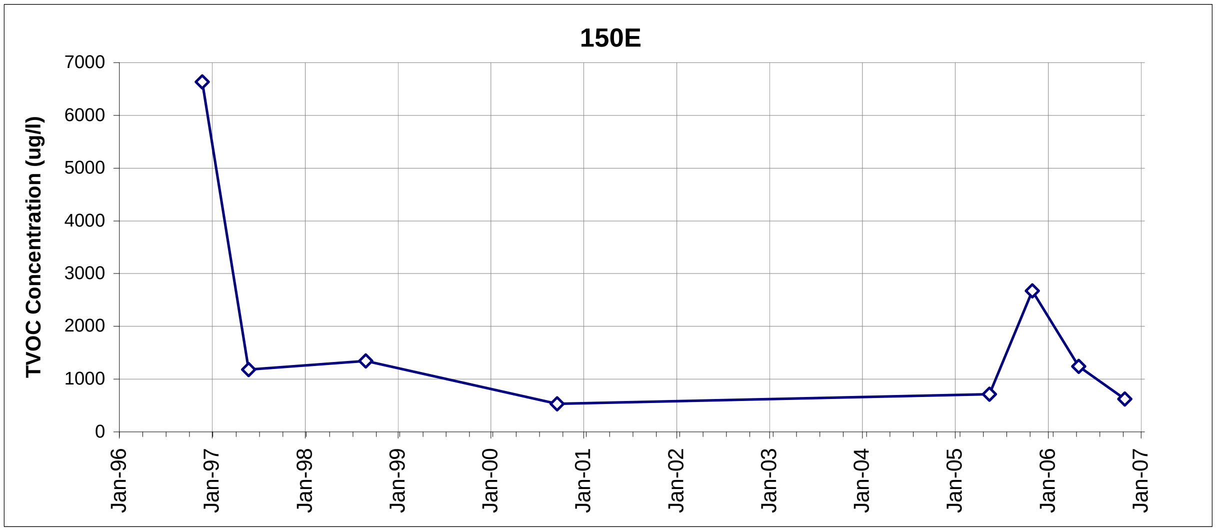
**Appendix D: TVOC Concentration Trend Plots**
**E-Zone Wells**
**Necco Park**

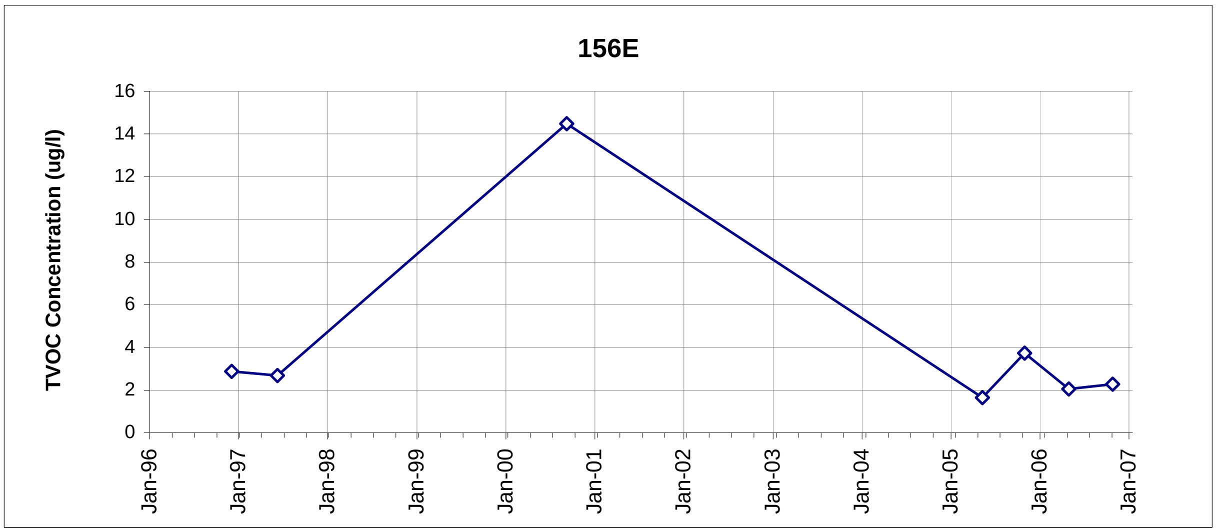


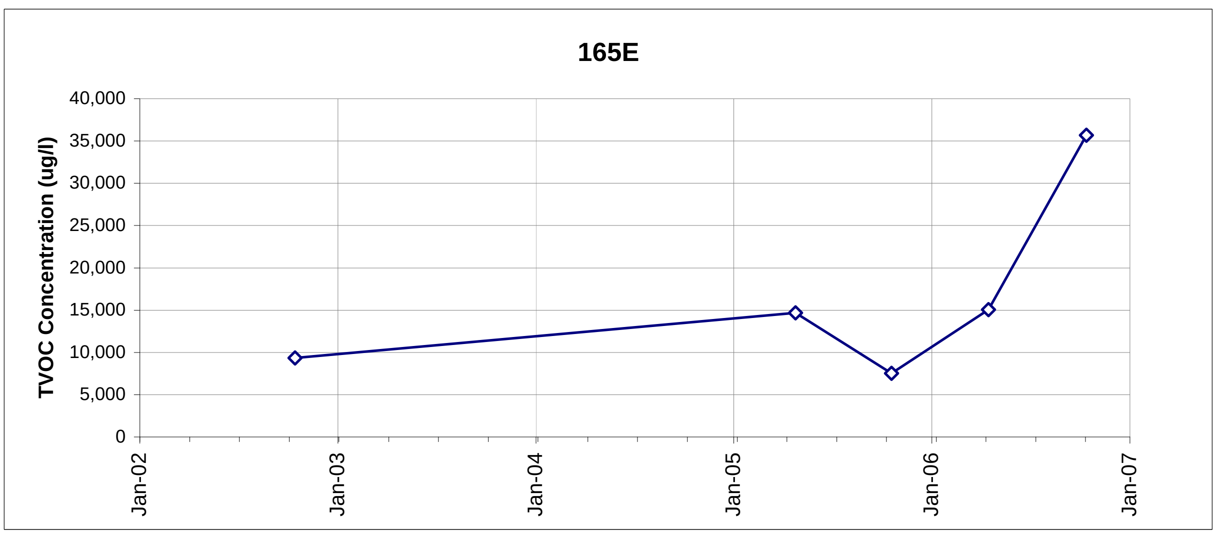



**Appendix D: TVOC Concentration Trend Plots**
**E-Zone Wells**
**Necco Park**



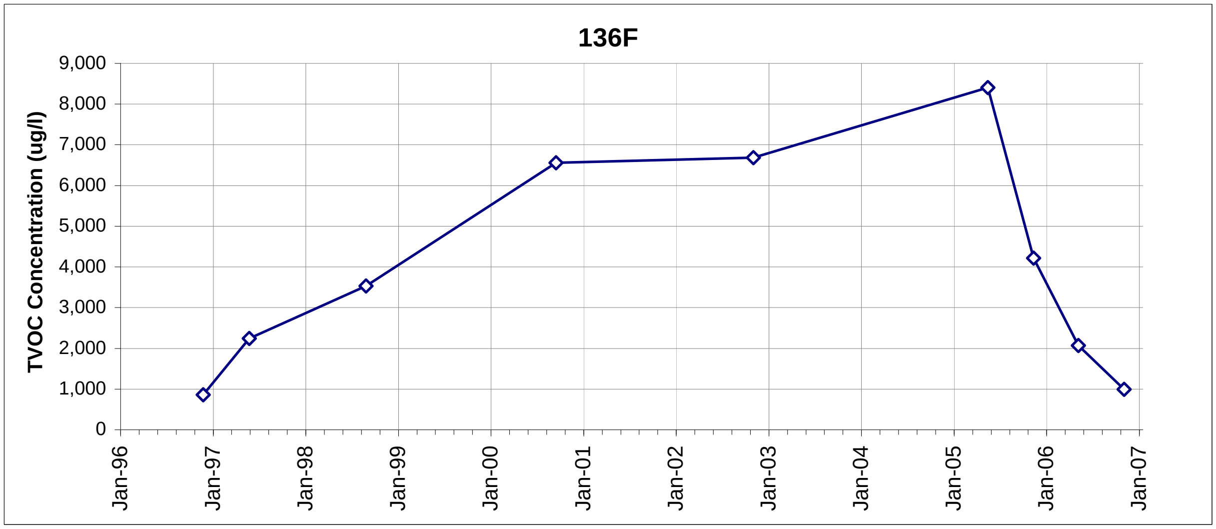



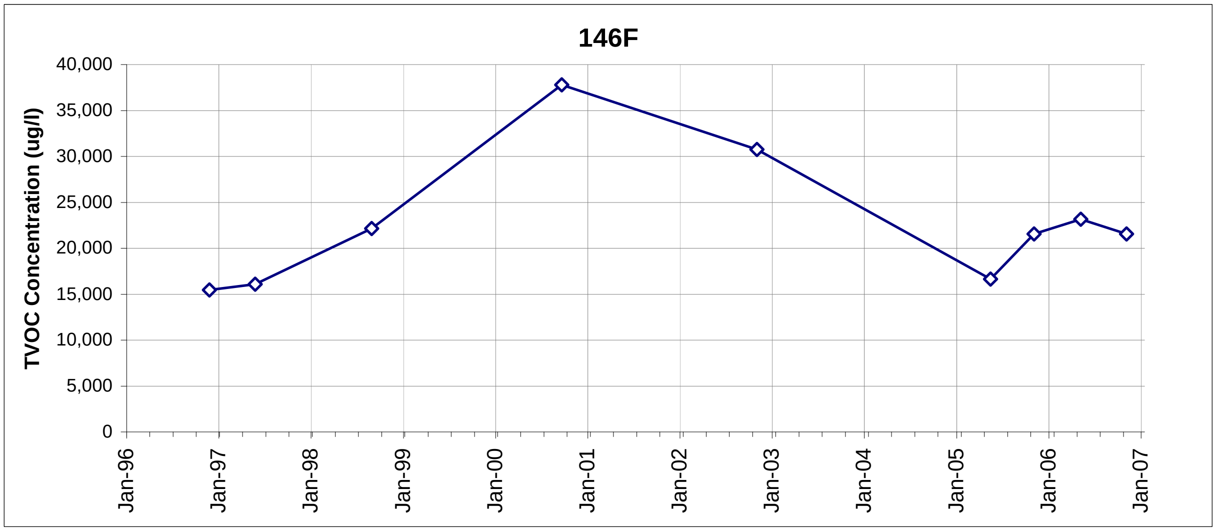



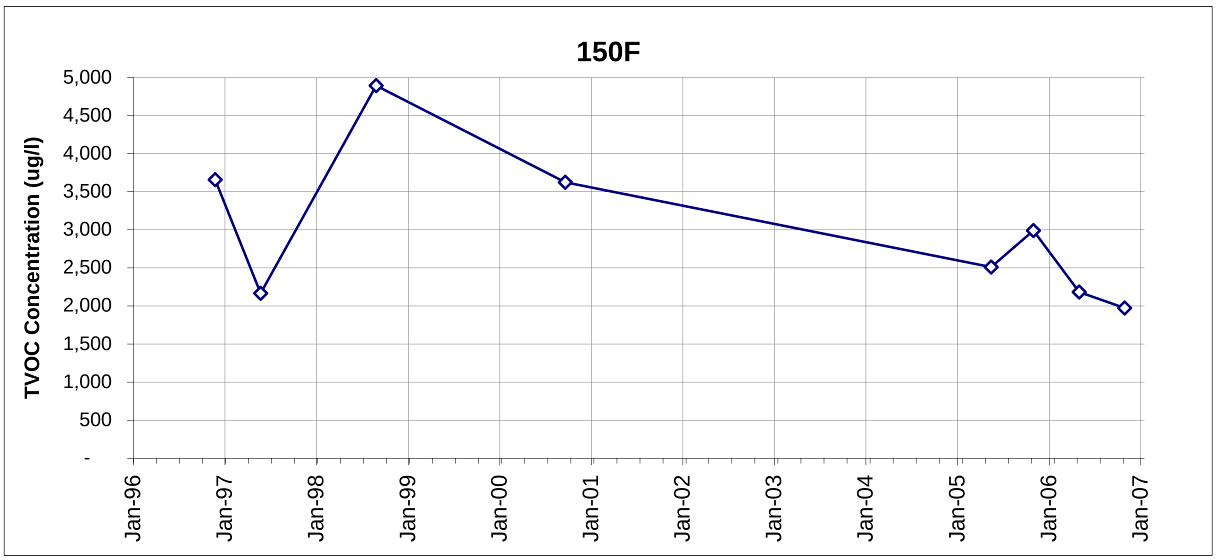
## APPENDIX D.6

TVOC Graphs F-Zone Wells

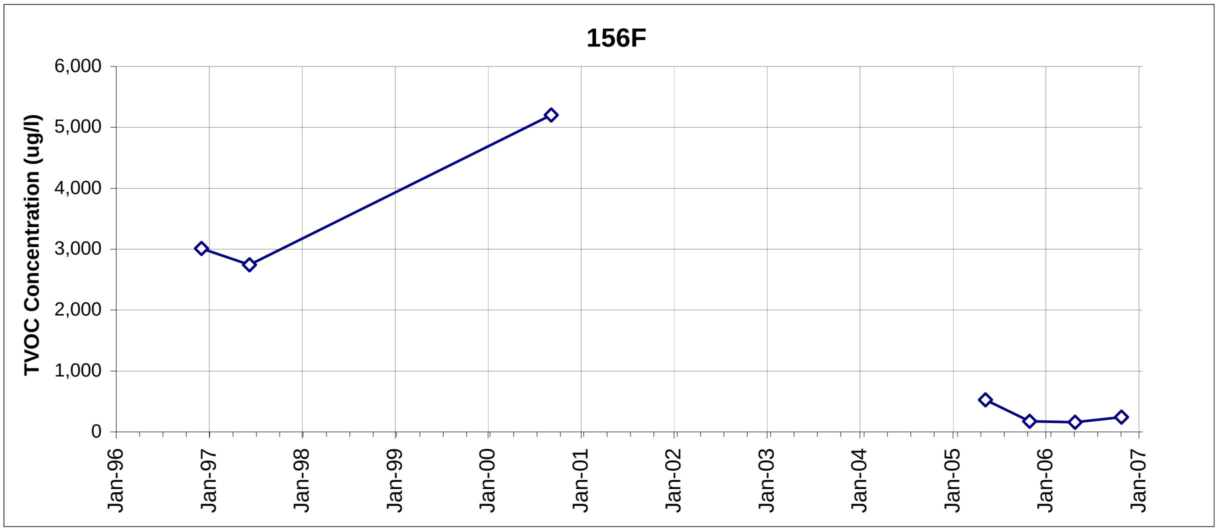
## Appendix D: TVOC Concentration Trend Plots
## F-Zone Wells
## Necco Park



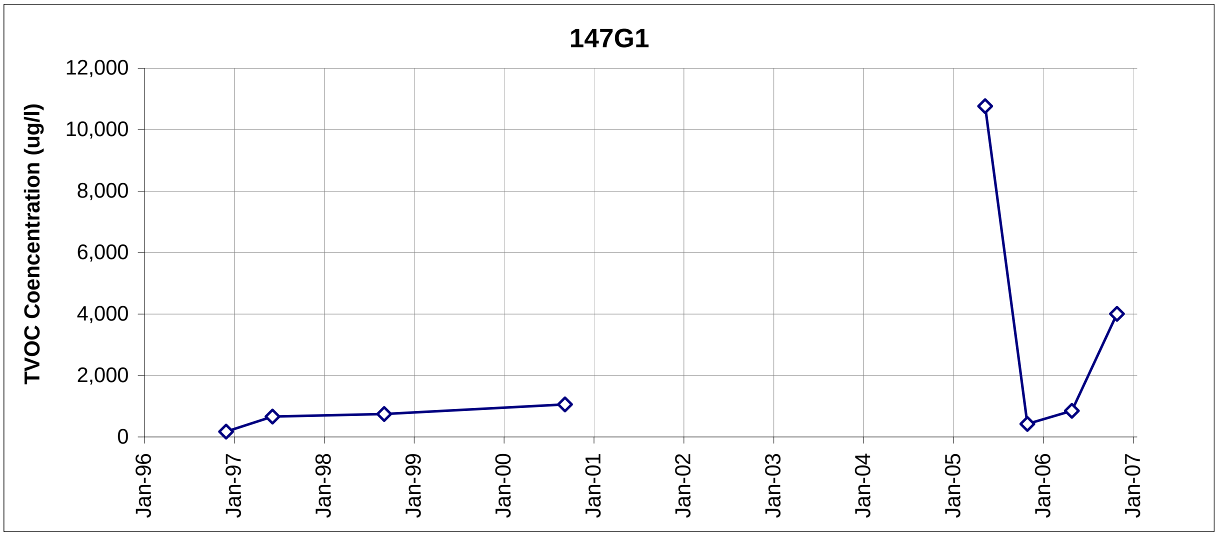
**Appendix D: TVOC Concentration Trend Plots**
**F-Zone Wells**
**Necco Park**

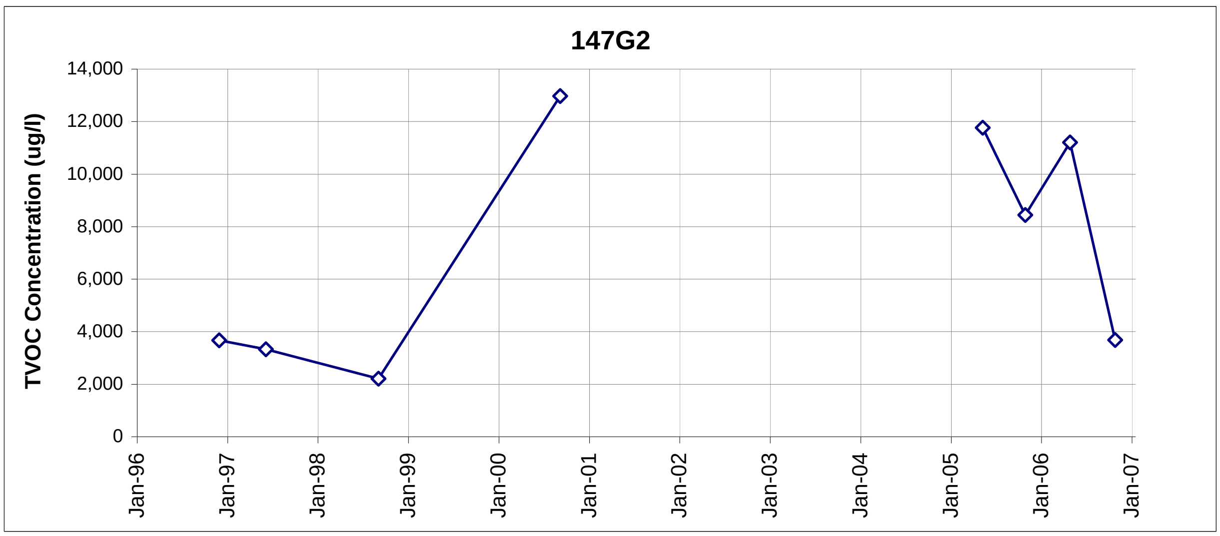


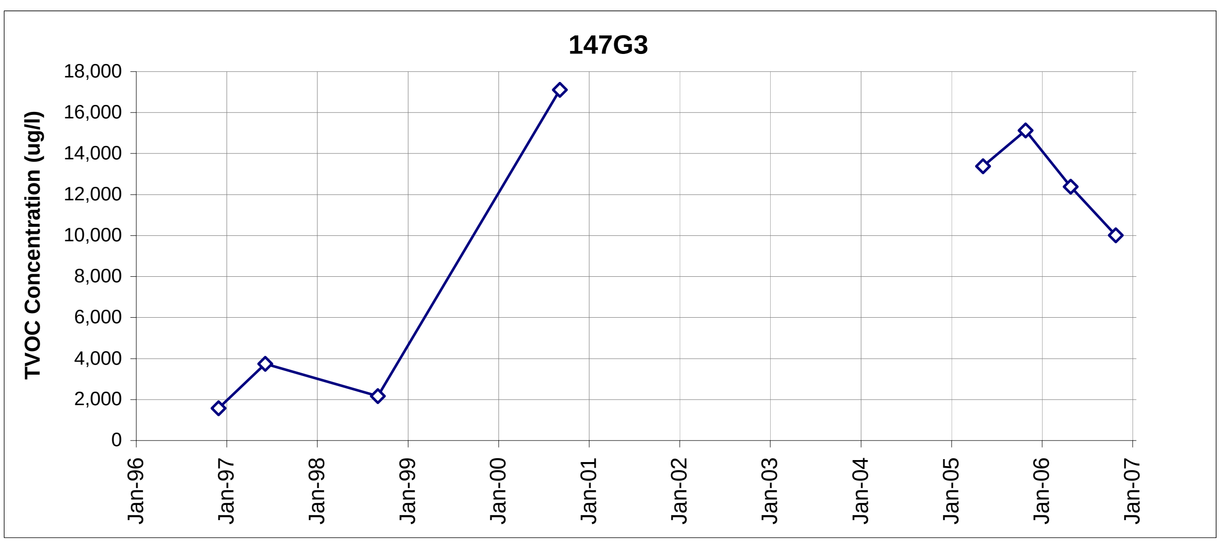
# APPENDIX D.7

TVOC Graphs G-Zone Wells

# Appendix D: TVOC Concentration Trend Plots
## G-Zone Wells
## Necco Park



# APPENDIX E

# CHLORINATED ETHENES & ETHENE

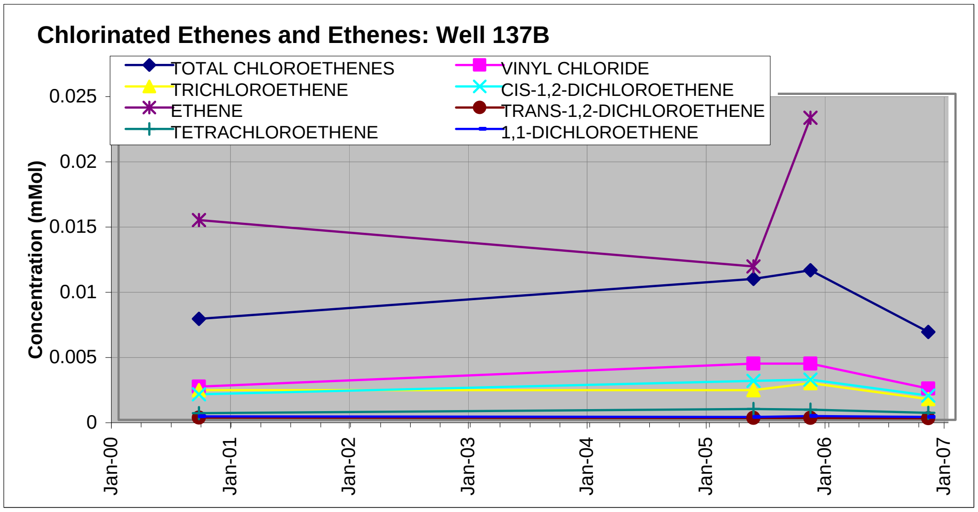
**Appendix E: Chlorinated Ethenes and Ethene**
**B/C - Zone Wells**
**DuPont Necco Park**

## WELL 137B

**Monitoring Well Summary**

- Source area
- Decrease in Total Chlorinated Ethenes 2005-2006
- Mostly TCE, cDCE, VC
- No DHE data available
- No 2006 Ethene data available

| 2006 2nd Round Data | (ppb) |
|---|---|
| PCE | 91 |
| TCE | 210 |
| Cis- 1,2 DCE | 180 |
| VC | 150 |
| Trans-1,2 DCE | 11 |
| 1,1-DCE | 22 |
| **TOTAL** | **670.2** |

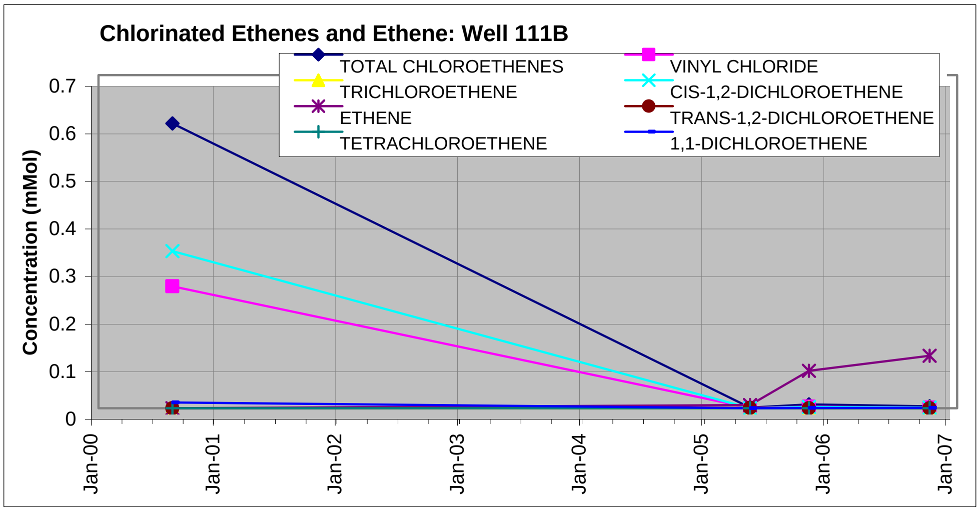



## WELL 111B

**Monitoring Well Summary**

- Source area
- Decrease in Total Chlorinated Ethenes 2000-2006
- Mostly TCE, cDCE, VC
- Good Ethene production
- Strong DHE signal
- Ethene 3,100 ppb

| 2006 2nd Round Data | (ppb) |
|---|---|
| PCE | 13 |
| TCE | 140 |
| Cis- 1,2 DCE | 100 |
| VC | 88 |
| Trans-1,2 DCE | 7.4 |
| 1,1-DCE | 50 |
| **TOTAL** | **678.4** |

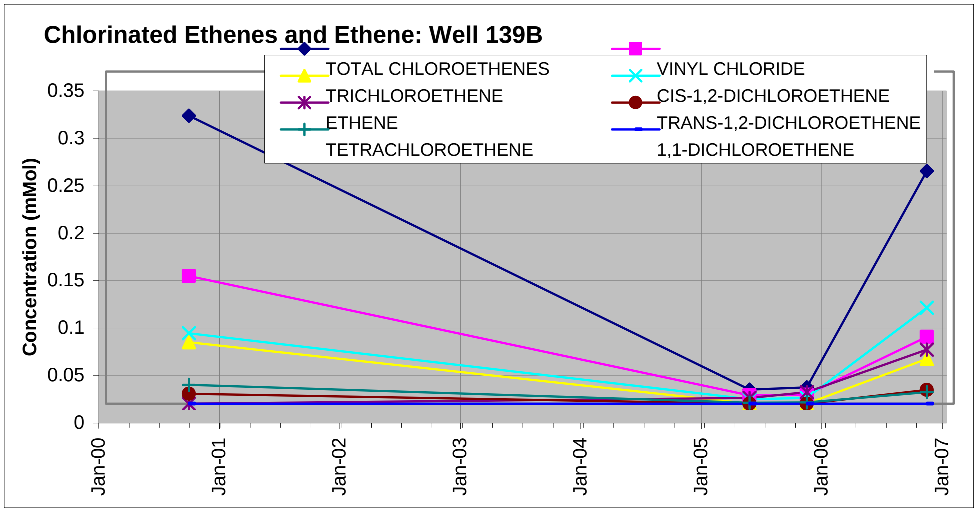



## WELL 139B

**Monitoring Well Summary**

- Source area
- NAPL observed in 1992
- Sharp Increase in Total Chlorinated Ethenes 2000-2005
- Mostly TCE, cDCE, VC, PCE
- Good Ethene production
- Ethene 1,600 ppb

| 2006 2nd Round Data | (ppb) |
|---|---|
| PCE | 2,000 |
| TCE | 6,200 |
| Cis- 1,2 DCE | 9,800 |
| VC | 4,400 |
| Trans-1,2 DCE | 1,400 |
| 1,1-DCE | <450 |
| **TOTAL** | **68,200** |



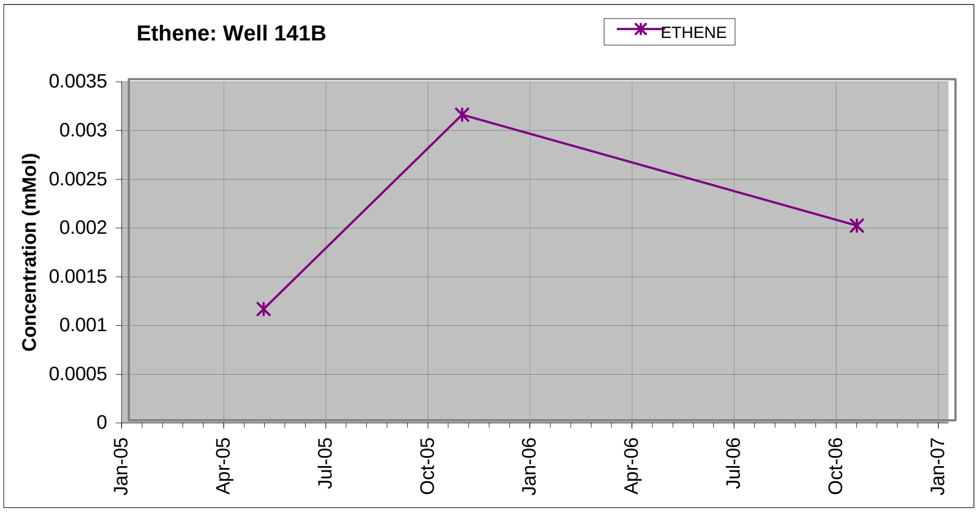
## Appendix E: Chlorinated Ethenes and Ethene
## B/C - Zone Wells
## DuPont Necco Park

### WELL 141B

**Monitoring Well Summary**

- Upgradient Well
- Clean: No Chlorinated Ethenes detected
- Weak DHE signal
- Ethene 56 ppb

| 2006 2nd Round Data | (ppb) |
|---|---|
| PCE | <3.2 |
| TCE | <4.7 |
| Cis- 1,2 DCE | <3.5 |
| VC | <3.5 |
| Trans-1,2 DCE | <2.7 |
| 1,1-DCE | <3.0 |
| **TOTAL** | **0** |

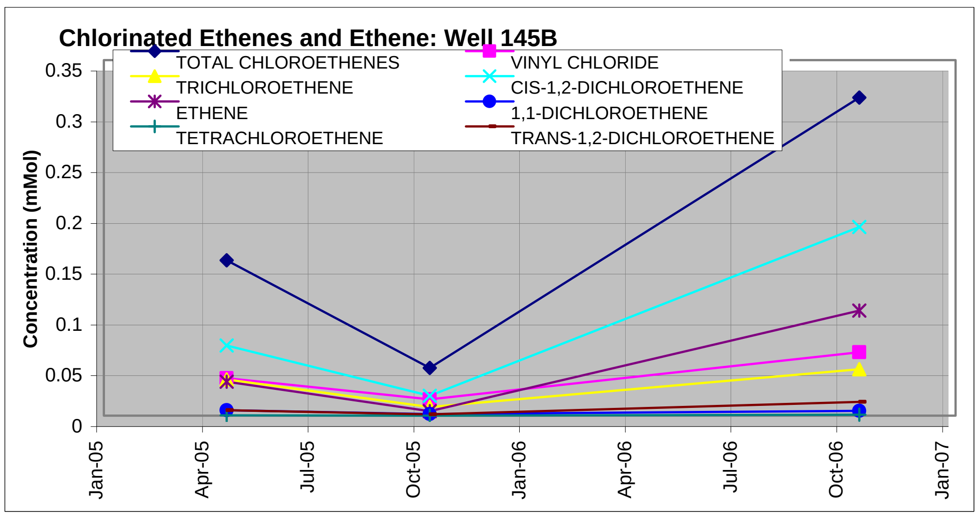



### WELL 145B

**Monitoring Well Summary**

- Down gradient Well
- Increase in Total Chlorinated Ethenes 2005-2006
- Mostly TCE, cDCE, VC
- DHE not detected
- Good Ethene production
- Ethene 2,900 ppb

| 2006 2nd Round Data | (ppb) |
|---|---|
| PCE | 180 |
| TCE | 6,000 |
| Cis- 1,2 DCE | 18,000 |
| VC | 3,900 |
| Trans-1,2 DCE | 1,300 |
| 1,1-DCE | 470 |
| **TOTAL** | **31,010** |

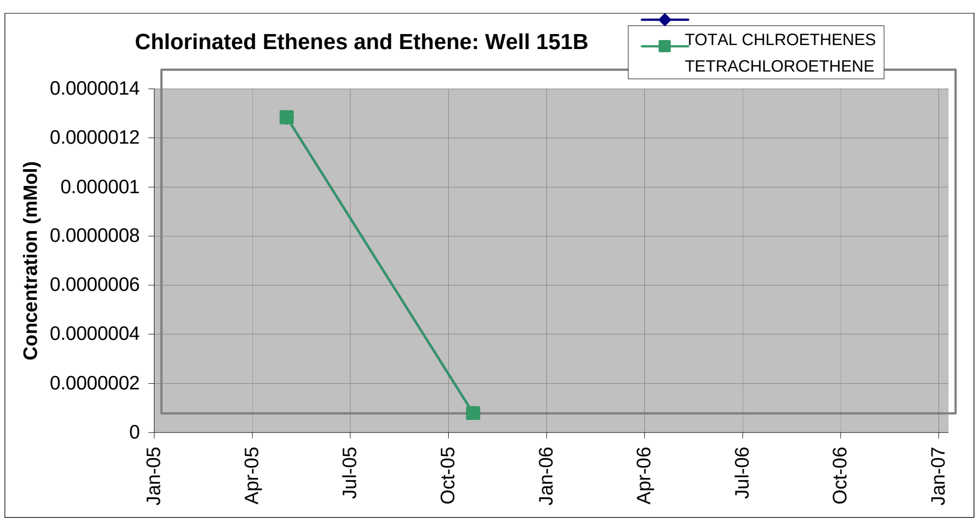



### WELL 151B

**Monitoring Well Summary**

- Far downgraient well
- Clean: No Chlorinated Ethenes detected
- Moderate DHE signal
- No 2006 data available

| 2006 2nd Round Data | (ppb) |
|---|---|
| PCE | |
| TCE | |
| Cis- 1,2 DCE | |
| VC | |
| Trans-1,2 DCE | |
| 1,1-DCE | |
| **TOTAL** | |



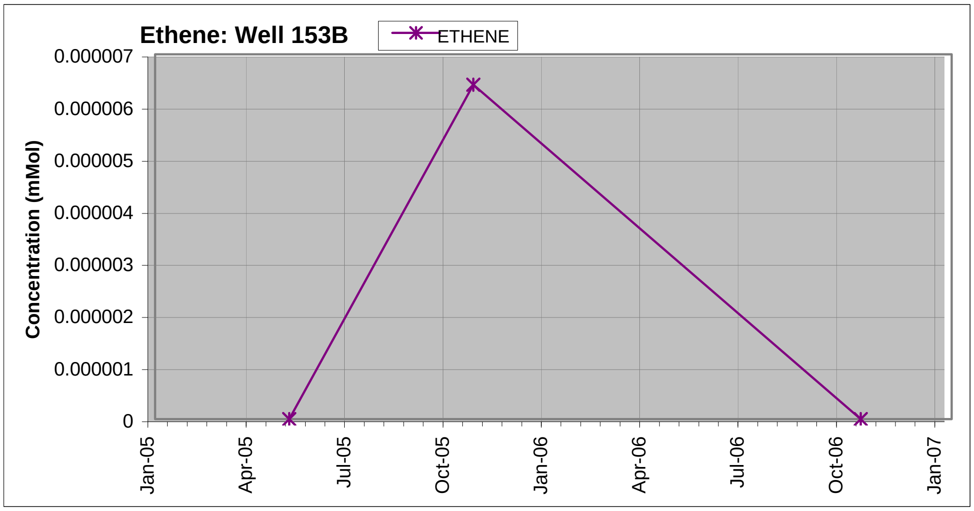
## Appendix E: Chlorinated Ethenes and Ethene
## B/C - Zone Wells
## DuPont Necco Park

### WELL 153B

**Monitoring Well Summary**

- East side gradient well
- Clean: No Chlorinated Ethenes detected
- Moderate DHE signal

| 2006 2nd Round Data | (ppb) |
|---|---|
| PCE | <0.19 |
| TCE | <0.28 |
| Cis- 1,2 DCE | <0.21 |
| VC | <0.21 |
| Trans-1,2 DCE | <0.16 |
| 1,1-DCE | <0.18 |
| **TOTAL** | **0** |

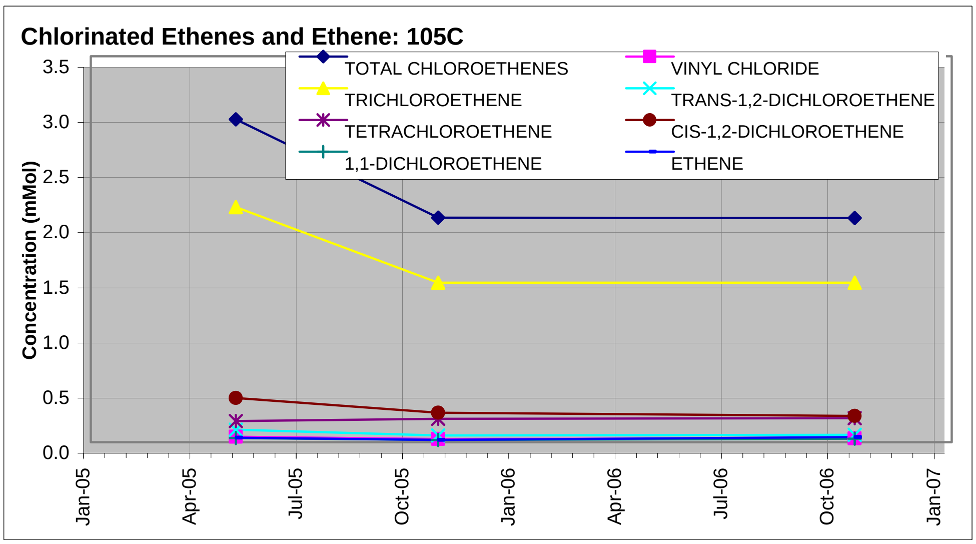



### WELL 105C

**Monitoring Well Summary**

- Source area
- DNAPL observed in 1992
- Exceeds effective solubility and 1% absolute solubility for: PCE, TCE, CF
- Flat to decreasing total chlorinated Ethenes 2000-2006
- Moderate DHE signal
- Weak VC and Ethene production
- High Chloroform: 120,000 ppb
- Ethene 1,300 ppb

| 2006 2nd Round Data | (ppb) |
|---|---|
| PCE | 36,000 |
| TCE | 190,000 |
| Cis- 1,2 DCE | 23,000 |
| VC | 2,100 |
| Trans-1,2 DCE | 6,500 |
| 1,1-DCE | 3,200 |
| **TOTAL** | **406,600** |



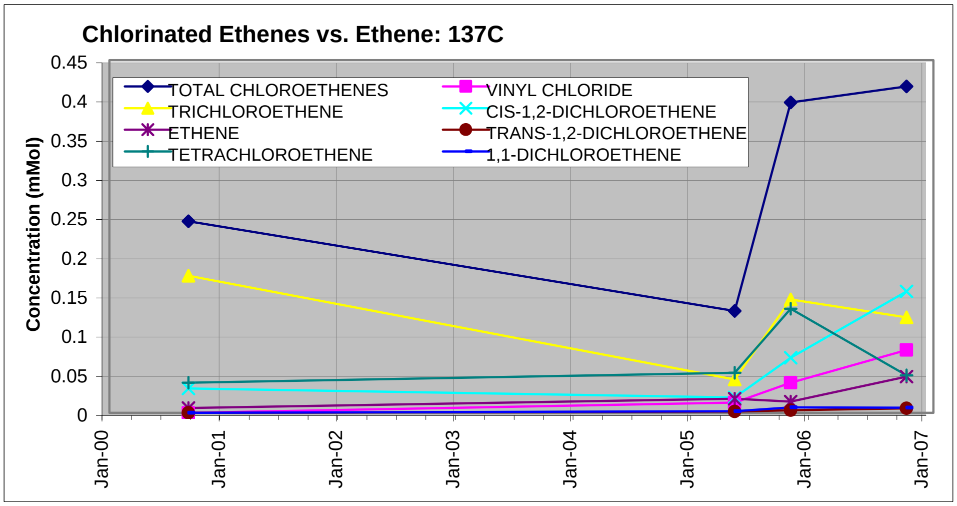
## Appendix E: Chlorinated Ethenes and Ethene
## C/D - Zone Wells
## Necco Park

### WELL: 137C

**Monitoring Well Summary**

- Source area
- Exceeds Effective Solubility for PCE
- Exceeds 1% Solubility for PCE, TCE
- Moderate increase in Total chlorinated ethenes 2005-2006
- Good Ethene production
- Moderate/Strong DHE signal
- Ethene 1300ppb

| 2006 2nd Round Data | (ppb) |
|---|---|
| PCE | 7,900 |
| TCE | 16,000 |
| Cis- 1,2 DCE | 15,000 |
| VC | 5,000 |
| Trans-1,2 DCE | 560 |
| 1,1-DCE | 650 |
| **TOTAL** | **45,110** |

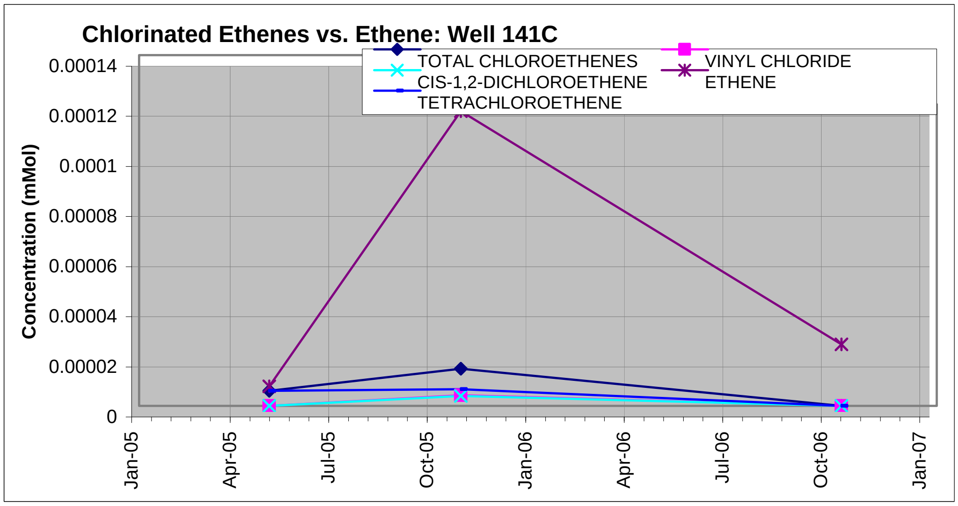



### WELL: 141C

**Monitoring Well Summary**

- Upgradient
- Clean-All chlorinated ethenes non detect
- Weak ethene production
- Strong DHE signal
- Ethene 0.69 ppb

| 2006 2nd Round Data | (ppb) |
|---|---|
| PCE | <0.19 |
| TCE | <0.28 |
| Cis- 1,2 DCE | <0.21 |
| VC | <0.21 |
| Trans-1,2 DCE | <0.16 |
| 1,1-DCE | <0.18 |
| **TOTAL** | **0** |

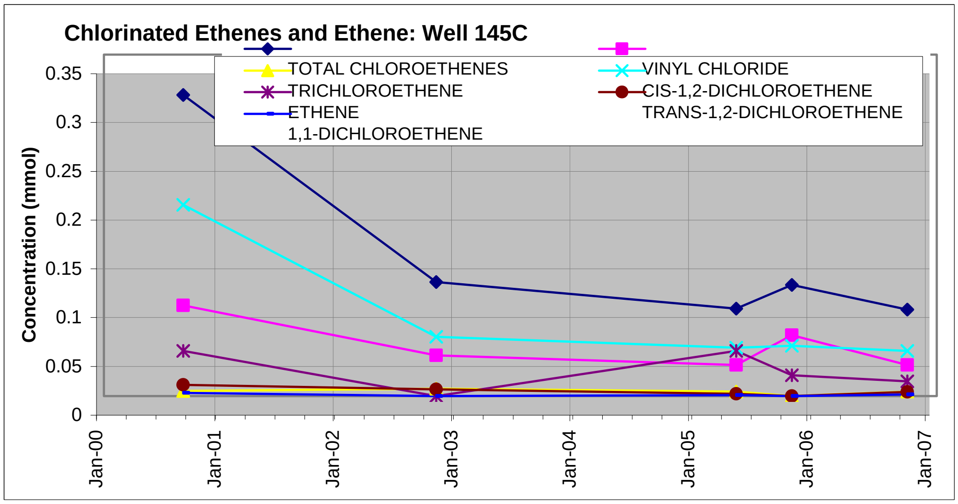



### WELL: 145C

**Monitoring Well Summary**

- Downgradient
- Near Source Boundary
- Continued reduction in Chlorinated Ethenes
- Mostly cis 1,2-DCE and VC
- Moderate ethene production
- DHE signal not detected
- Ethene 420 ppb

| 2006 2nd Round Data | (ppb) |
|---|---|
| PCE | <38 UJ |
| TCE | 590 |
| Cis- 1,2 DCE | 4,500 |
| VC | 2,000 |
| Trans-1,2 DCE | 400 |
| 1,1-DCE | 160 |
| **TOTAL** | **7,650** |

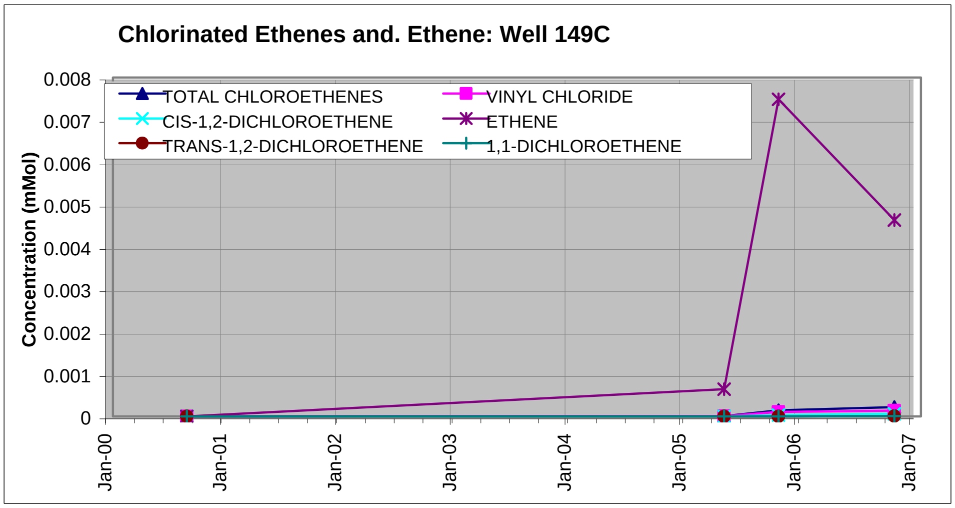


## Appendix E: Chlorinated Ethenes and Ethene
## C/D - Zone Wells
## Necco Park

### WELL: 149C

**Monitoring Well Summary**
- Downgradient
- Slight increase in Total Chlorinated Ethenes 2000-2005
- Mostly VC
- Good ethene production
- Moderate DHE signal
- Ethene 130 ppb

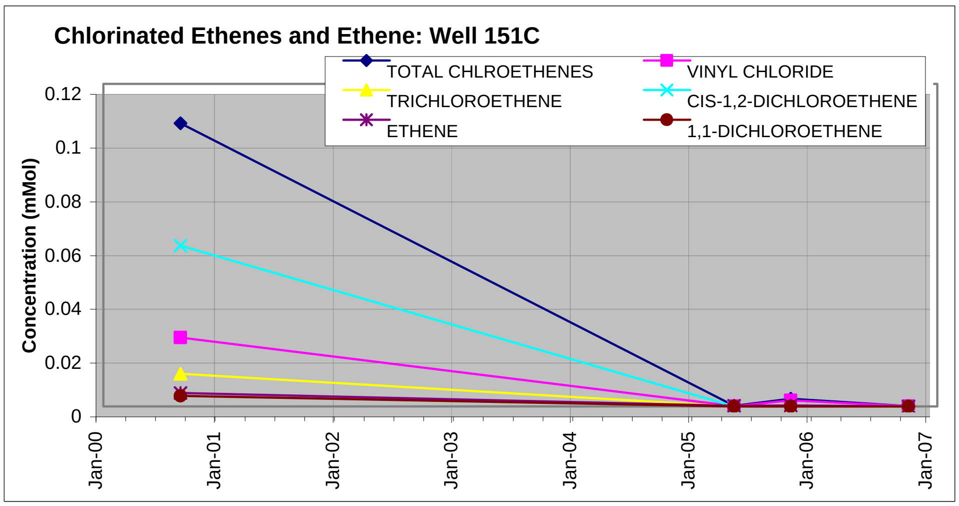
| 2006 2nd Round Data | (ppb) |
|---|---|
| PCE | <0.19 |
| TCE | <0.28 |
| Cis- 1,2 DCE | 6.1 |
| VC | 8.7 |
| Trans-1,2 DCE | 0.95 |
| 1,1-DCE | 0.61 |
| **TOTAL** | **16.36** |




### WELL: 151C

**Monitoring Well Summary**
- Far downgradient
- Reduction in total Chlorinated Ethenes 2000-2006
- Moderate / Strong DHE signal
- Weak ethene production

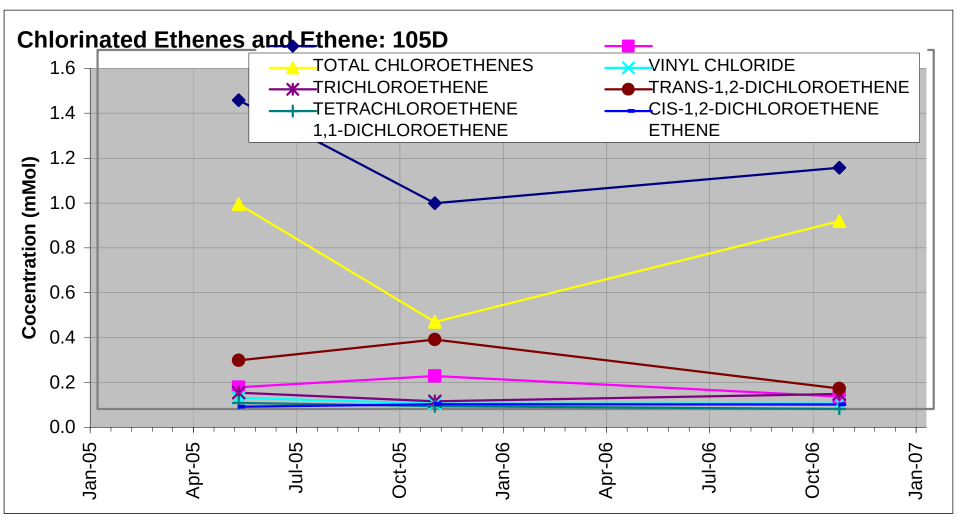
| 2006 2nd Round Data | (ppb) |
|---|---|
| PCE | <0.19 |
| TCE | 0.77 |
| Cis- 1,2 DCE | 2 |
| VC | 4.7 |
| Trans-1,2 DCE | 4.4 |
| 1,1-DCE | <0.18 |
| **TOTAL** | **11.87** |




### WELL: 105D

**Monitoring Well Summary**
- Source area
- DNAPL observed 1986
- Exceeds effective solubility for CT, PCE, TCE
- Exceeds 1% solubility for CT, CF, PCE, 1122-PCE, TCE
- Significant decrease in total chlorinated ethenes, 2000-2005, leveling from 05-06
- Chloroform concentration 80,000 ppb
- Moderate / Strong DHE signal
- Moderate Ethene Production
- Ethene 560 ppb

| 2006 2nd Round Data | (ppb) |
|---|---|
| PCE | 11000 |
| TCE | 110000 |
| Cis- 1,2 DCE | 8800 |
| VC | 3500 |
| Trans-1,2 DCE | 2400 |
| 1,1-DCE | <1100 |
| **TOTAL** | **135,700** |



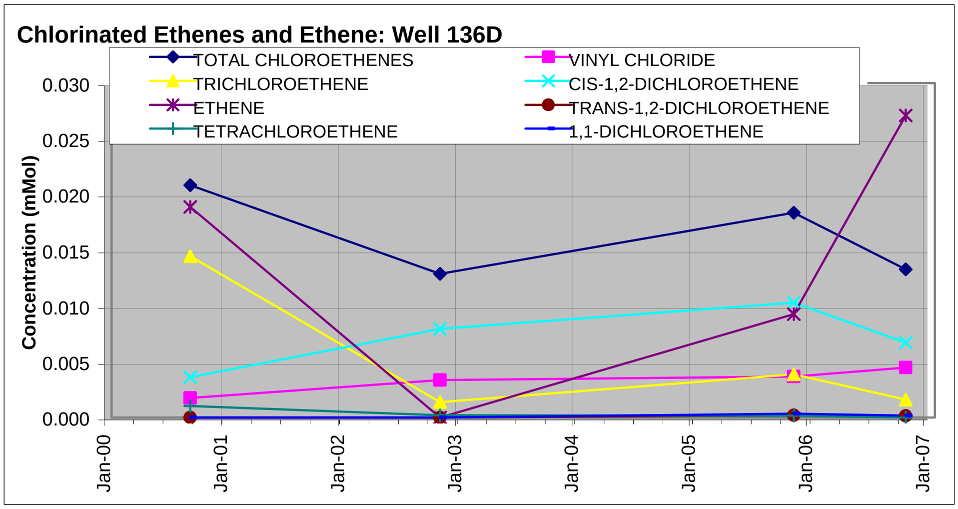
## Appendix E: Chlorinated Ethenes and Ethene
## C/D - Zone Wells
## Necco Park

### WELL: 136D

**Monitoring Well Summary**

- Near downgradient well
- Continued reduction in total chlorinated ethenes 2000-2006
- Mostly TCE, cDCE, VC
- Good ethene production
- Moderate / Strong DHE signal
- Ethene 760 ppb

| 2006 2nd Round Data | (ppb) |
|---|---|
| PCE | <5.4 |
| TCE | 210 |
| Cis- 1,2 DCE | 650 |
| VC | 280 |
| Trans-1,2 DCE | 14 |
| 1,1-DCE | 16 |
| **TOTAL** | **1,170** |

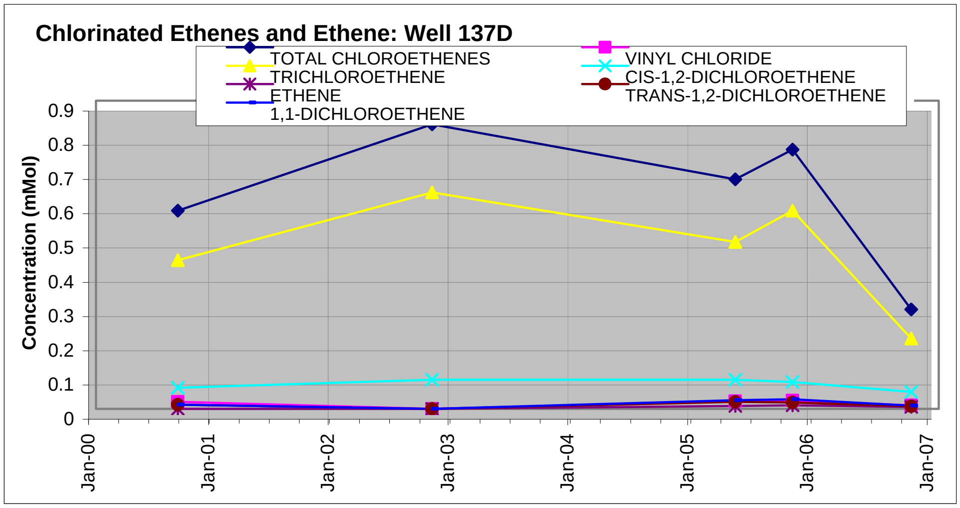



### WELL: 137D

**Monitoring Well Summary**

- Source area
- Exceeds 1% solubility for PCE
- Decreasing total chlorinated ethenes 2005-2006
- TCE dominant species
- Chloroform concentration 17,000 ppb
- DHE not detected
- Weak ethene production

| 2006 2nd Round Data | (ppb) |
|---|---|
| PCE | 1400 |
| TCE | 27000 |
| Cis- 1,2 DCE | 4800 |
| VC | 670 |
| Trans-1,2 DCE | 720 |
| 1,1-DCE | 880 |
| **TOTAL** | **35,470** |



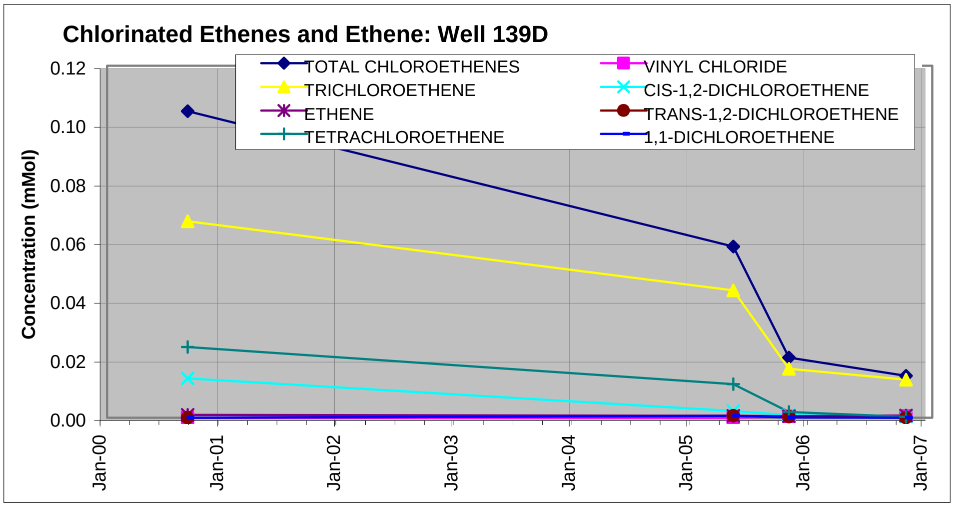
**Appendix E: Chlorinated Ethenes and Ethene**
**D/E - Zone Wells**
**Necco Park**

## WELL: 139D

**Monitoring Well Summary**

- Source area
- DNAPL observed 1992
- Reduction in total chlorinated ethenes 2000-2006
- DHE not detected
- Weak ethene production
- Ethene 21 ppb

| 2006 2nd Round Data | (ppb) |
|---|---|
| PCE | 63 |
| TCE | 1,700 |
| Cis- 1,2 DCE | 46 |
| VC | 34 |
| Trans-1,2 DCE | <16 |
| 1,1-DCE | <18 |
| **TOTAL** | **1,843** |

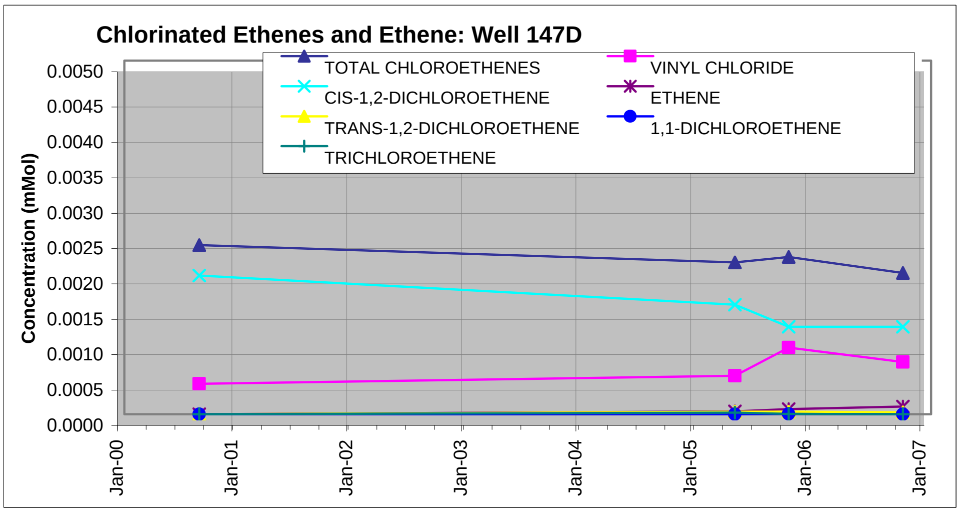



## WELL: 147D

**Monitoring Well Summary**

- Far downgradient
- Flat total chlorinated ethenes 2000-2006
- Mostly cDCE, VC
- Moderate DHE signal
- Weak ethene production
- Ethene 3.1 ppb

| 2006 2nd Round Data | (ppb) |
|---|---|
| PCE | <0.95 |
| TCE | <1.4 |
| Cis- 1,2 DCE | 120 |
| VC | 46 |
| Trans-1,2 DCE | 3 |
| 1,1-DCE | <0.90 |
| **TOTAL** | **168.5** |

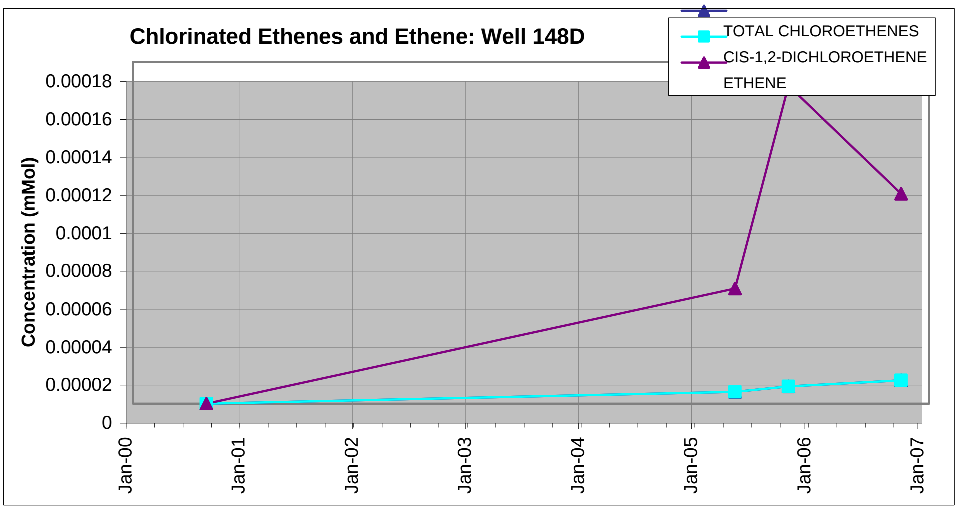



## WELL: 148D

**Monitoring Well Summary**

- Downgradient
- Slight increase in Total Chlorinated Ethenes 2005-2006
- Mostly cDCE
- Weak ethene production
- Weak DHE signal

| 2006 2nd Round Data | (ppb) |
|---|---|
| PCE | <0.19 |
| TCE | <0.28 |
| Cis- 1,2 DCE | 1 |
| VC | <0.28 |
| Trans-1,2 DCE | <0.16 |
| 1,1-DCE | <0.18 |
| **TOTAL** | **1.2** |



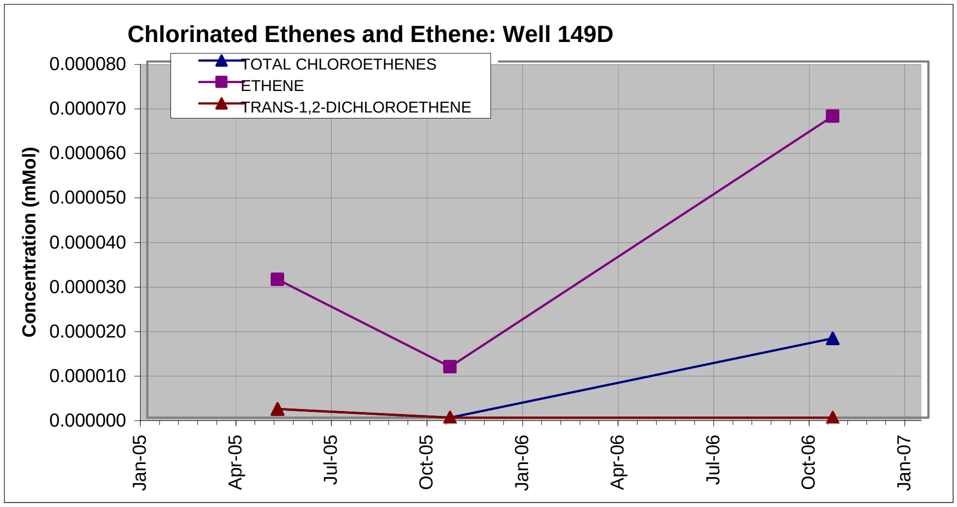
# Appendix E: Chlorinated Ethenes and Ethene
## D/E - Zone Wells
## Necco Park

### WELL: 149D

**Monitoring Well Summary**

- Sidegradient
- Slight increase in Total Chlorinated Ethenes 2005-2006
- Mostly tDCE
- Moderate ethene production
- Moderate DHE signal
- Ethene 1.9 ppb

| 2006 2nd Round Data | (ppb) |
|---|---|
| PCE | <0.19 |
| TCE | <0.28 |
| Cis- 1,2 DCE | 0 |
| VC | 1 |
| Trans-1,2 DCE | <0.16 |
| 1,1-DCE | <0.18 |
| **TOTAL** | **1.29** |

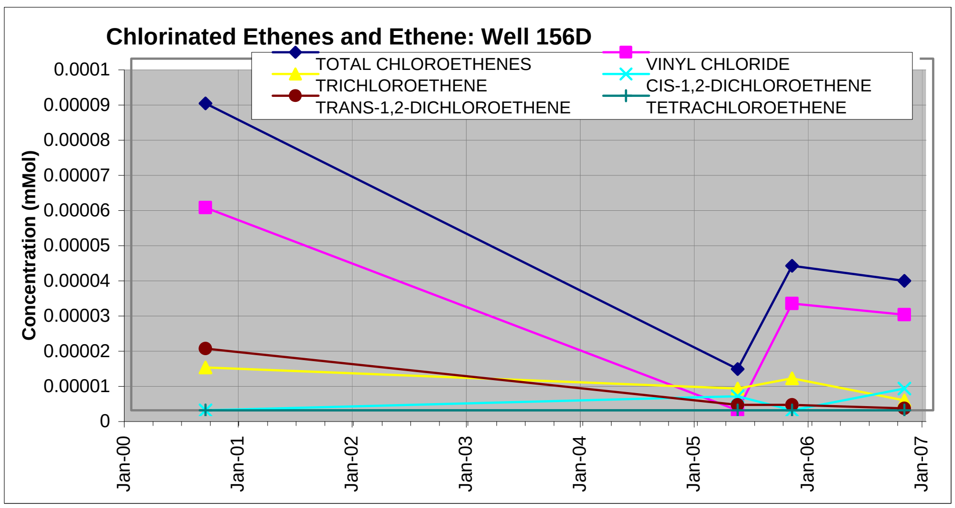



### WELL: 156D

**Monitoring Well Summary**

- Far downgradient
- Clean-All chlorinated ethenes below 2 ppb
- Mostly VC
- Moderate DHE signal

| 2006 2nd Round Data | (ppb) |
|---|---|
| PCE | <0.19 |
| TCE | 0 |
| Cis- 1,2 DCE | 1 |
| VC | 2 |
| Trans-1,2 DCE | 1 |
| 1,1-DCE | <0.18 |
| **TOTAL** | **3.23** |

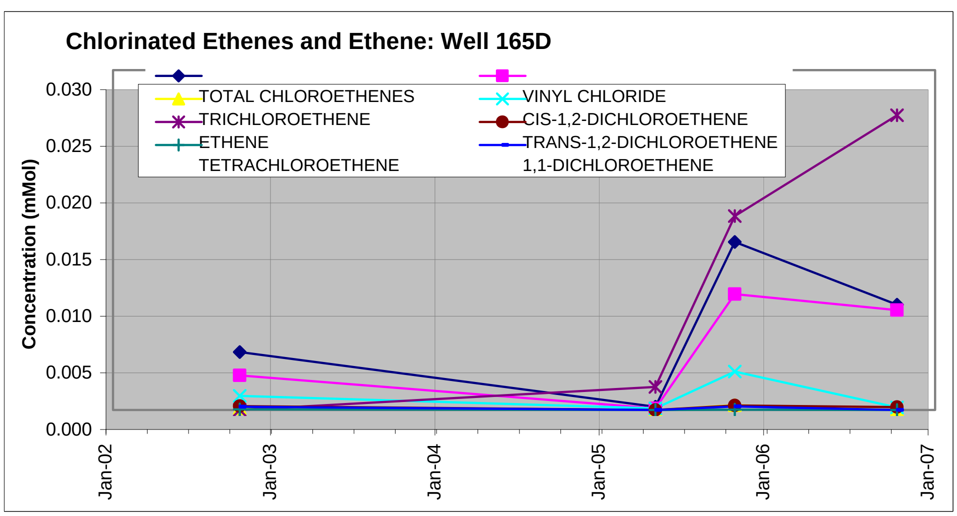



### WELL: 165D

**Monitoring Well Summary**

- Source area
- Near source boundary
- Decreasing Total Chlorinated Ethenes 2005-2006
- Good ethene production
- DHE not detected
- Primarily VC
- Ethene 730 ppb

| 2006 2nd Round Data | (ppb) |
|---|---|
| PCE | <7.6 |
| TCE | <11 |
| Cis- 1,2 DCE | 22 |
| VC | 550 |
| Trans-1,2 DCE | 25 |
| 1,1-DCE | <7.2 |
| **TOTAL** | **597** |

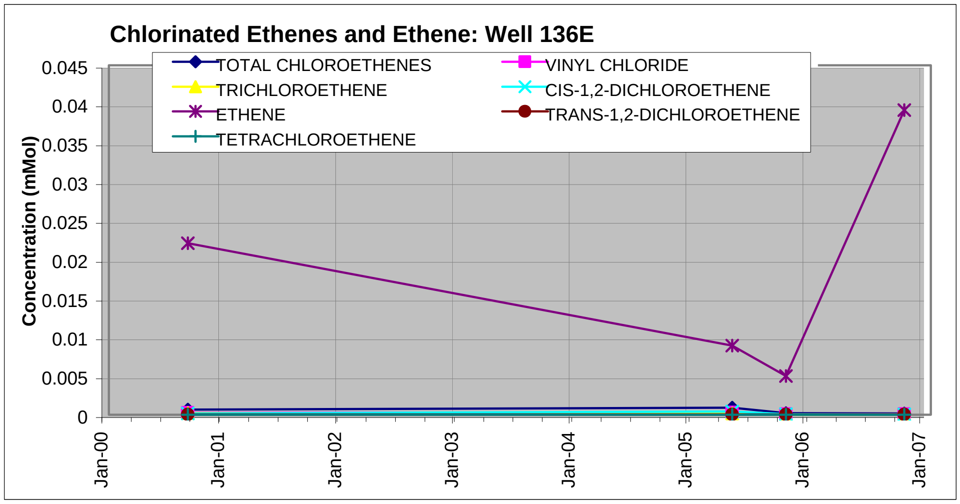


## WELL: 136E

**Monitoring Well Summary**

- Near downgradient
- Nearly clean- All Chlorinated Ethenes below 32 ppb
- Good ethene production
- Strong DHE signal
- Ethene 1100 ppb

| 2006 2nd Round Data | (ppb) |
|---|---|
| PCE | <0.19 |
| TCE | 3.8 |
| Cis- 1,2 DCE | 3 |
| VC | 5.2 |
| Trans-1,2 DCE | 3.8 |
| 1,1-DCE | <0.18 |
| **TOTAL** | **15.8** |

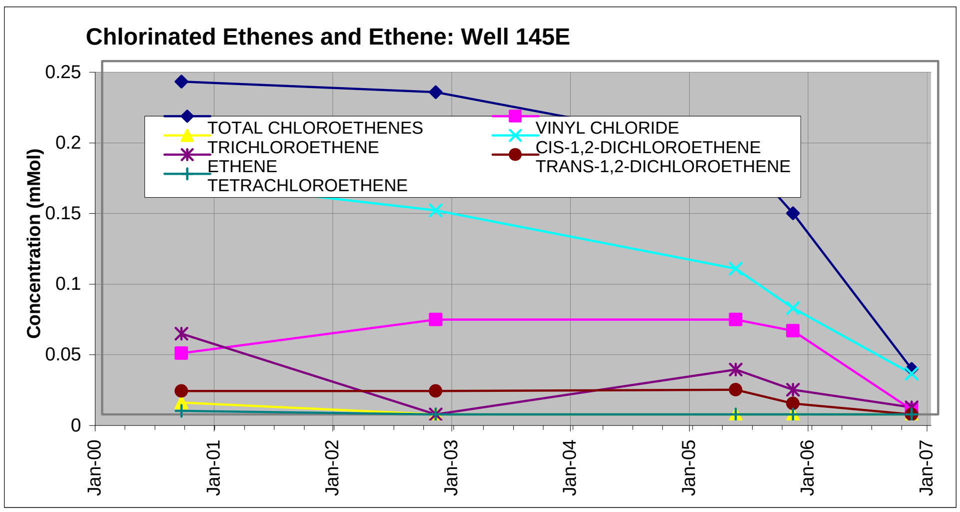



## WELL: 145E

**Monitoring Well Summary**

- Sidegradient
- Significant decrease in total chlorinated ethenes2005-2006
- Mostly cDCE, VC
- Moderate DHE signal
- Moderate Ethene production
- Ethene 140 ppb

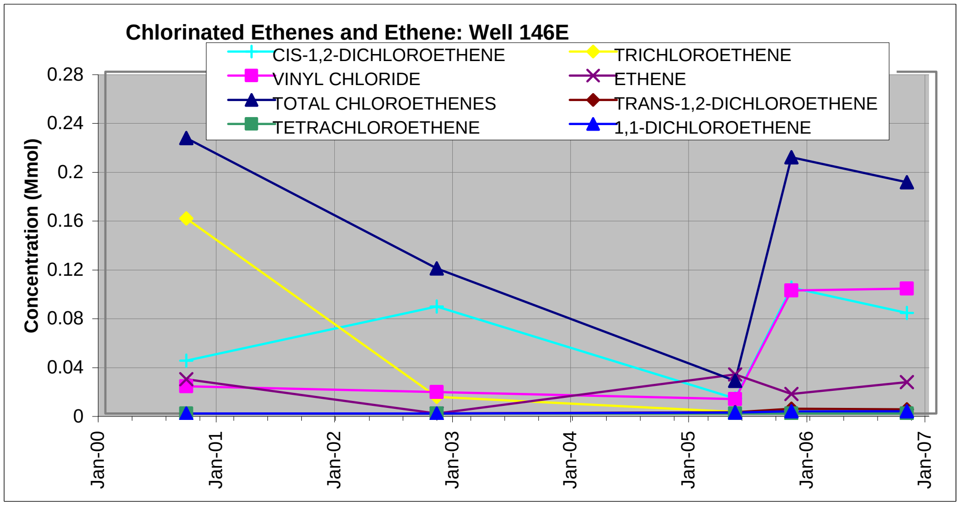
| 2006 2nd Round Data | (ppb) |
|---|---|
| PCE | <63 UJ |
| TCE | <56 |
| Cis- 1,2 DCE | 2,800 |
| VC | 210 |
| Trans-1,2 DCE | <32 |
| 1,1-DCE | <36 |
| **TOTAL** | **3,010** |



# Appendix E: Chlorinated Ethene and Ethene
## E/F - Zone Wells
## Necco Park

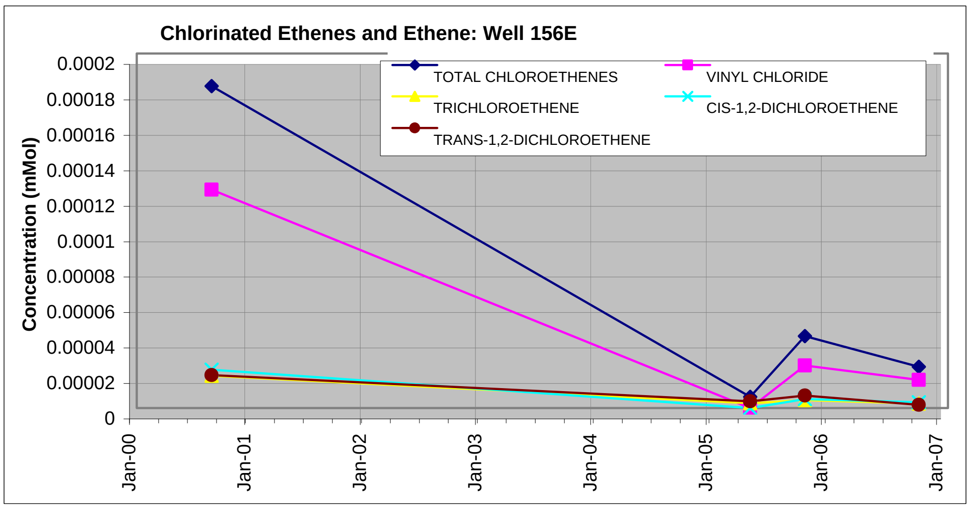
### WELL: 146E

| Monitoring Well Summary | |
|---|---|
| · Source area<br>· Near source boundary<br>· Slight decrease in total chlorinated ethenes 2005-2006<br>· Primarily VC and cDCE<br>· Strong DHE signal<br>· Good Ethene production<br>· Ethene 720 ppb | |
| **2006 2nd Round Data** | **(ppb)** |
| PCE | <63 UJ |
| TCE | 150 |
| Cis- 1,2 DCE | 8,000 |
| VC | 6,400 |
| Trans-1,2 DCE | 330 |
| 1,1-DCE | 180 |
| **TOTAL** | **15,060** |



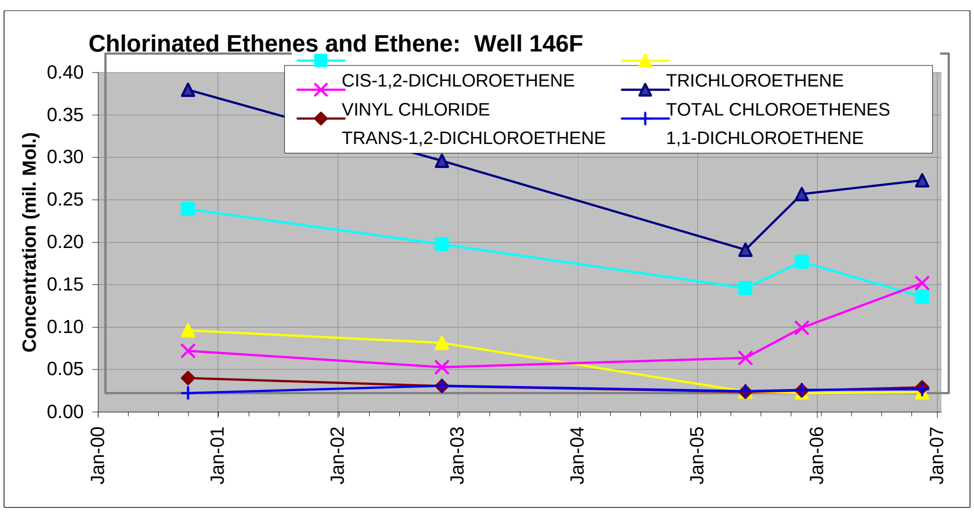

### WELL: 156E

| Monitoring Well Summary | |
|---|---|
| · Far downgradient<br>· Nearly clean-All chlorinated ethenes below 2 ppb<br>· Significant decrease in total chlorinated ethenes 2000-2006<br>· Moderate DHE signal | |
| **2006 2nd Round Data** | **(ppb)** |
| PCE | <0.19 |
| TCE | 0.32 |
| Cis- 1,2 DCE | 0.31 |
| VC | 0.99 |
| Trans-1,2 DCE | 0.18 |
| 1,1-DCE | <0.18 |
| **TOTAL** | **1.8** |




### WELL: 146F

| Monitoring Well Summary | |
|---|---|
| · Source area<br>· Near source boundary<br>· Decreasing total chlorinated ethenes 2000-2006<br>· Primarily cDCE, VC<br>· Moderate Ethene production<br>· Ethene 860 ppb | |
| **2006 2nd Round Data** | **(ppb)** |
| PCE | <79 |
| TCE | 120 |
| Cis- 1,2 DCE | 11,000 |
| VC | 8,100 |
| Trans-1,2 DCE | 650 |
| 1,1-DCE | 440 |
| **TOTAL** | **20,310** |




### WELL: 150F

## Appendix E: Chlorinated Ethene and Ethene
## E/F - Zone Wells
## Necco Park

**Monitoring Well Summary**

- Sidegradient
- Declining total chlorinated ethenes 2005-2006
- Mostly cDCE, VC
- Weak ethene production
- Ethene 72 ppb

| **2006 2nd Round Data** | **(ppb)** |
|---|---|
| PCE | <12 |
| TCE | <18 |
| Cis- 1,2 DCE | 1,200 |
| VC | 540 |
| Trans-1,2 DCE | <10 |
| 1,1-DCE | <11 |
| **TOTAL** | **1,740** |