April 24, 2001

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Emergency and Remedial Response Division
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Dear Mr. Taccone:

DUPONT NECCO PARK SOURCE AREA REPORT

Enclosed please find seven copies of the *DuPont Necco Park Source Area Report* that has been prepared to define source area limits for the A, B/C, and D/E/F flow zones. The report includes a discussion of the pre-design investigation results, specifically the baseline chemistry sampling and the comprehensive DNAPL survey.

Based on the source area definition for the B/C and D/E/F zones, the approximate number and spacing of extraction wells has been estimated and will be evaluated during the first phase of the bedrock investigations. The remedy for control of the A zone is described in the *Preliminary Design Submittal-Overburden Source Area Control and Cap Upgrade* for the Necco Park site (URSD, December 2000).

Please feel free to contact me at (716) 278-5496 if you have any questions regarding this submittal.

Sincerely,

Paul F. Mazierski, PG
Senior Project Leader

cc: Mr. George Shanahan, USEPA– Office of Regional Counsel (1)
Mr. David Foster, NYSDEC – Div of Environ. Remediation (Albany) (4)

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SOURCE AREA REPORT
NECCO PARK
NIAGARA FALLS, NY

Date: April 16, 2001

Project No: 44-D1NI7232.01 D0006

CORPORATE REMEDIATION GROUP
An Alliance between
DuPont and URS Diamond

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Executive Summary

This submittal for defining zone-specific source area limits at DuPont Necco Park site has been prepared pursuant to an Administrative Order (AO) issued by the United States Environmental Protection Agency (USEPA). This order was issued to conduct remedial design and remedial actions at Necco Park, located in Niagara Falls, New York. A Remedial Design (RD) work plan (dated February 2000) was prepared in accordance with the mutually agreed upon Statement of Work (SOW), which is attached in Appendix B of the AO. The RD work plan was approved by USEPA on July 20, 2000. As specified in Sections 8 and 9 of the RD Work Plan, this submittal utilizes results of the pre-design investigation baseline chemical monitoring and comprehensive DNAPL survey programs to establish source area limits for the three flow zones defined for remediation at the Necco Park site: (1) overburden (A Zone), (2) upper bedrock (B/C Zones), and (3) lower bedrock (D/E/F Zones). Methodology used in defining source area limits for the A, B/C, and D/E/F flow zones at Necco Park was derived, in general, from procedures described in the Necco Park Analysis of Alternatives (AOA) report (DERS, 1995). Consistent with the AOA, the primary criterion for defining source area limits was to identify the areal extent of free-phase and residual DNAPL. To be conservative, areas where aqueous constituents might theoretically indicate the presence of DNAPL were also examined.

Results of the chemical baseline assessment for the A and D/E/F zones indicate a general reduction in the number of wells where solubility criteria are met thereby decreasing the source area limits previously defined in the AOA. Source area extent for the B/C zone has not changed substantially from that identified in the AOA.

Using the results of the source area definition, the preliminary number and spacing for B/C and D/E/F groundwater extraction wells have been estimated. Modeling indicates that four pumping wells spaced at approximately 300 feet will control the B/C source area and two, possibly three, pumping wells spaced approximately 200 feet apart will be sufficient for the D/E/F source area. As described in the RD Work Plan, the wells will be installed in a phased approached during the upcoming bedrock pre-design investigations. Results of the A Zone assessment and recommended remedial design were included in the *Preliminary Design Submittal - Overburden Source Area Control and Cap Upgrade* (CRG 2000b).

1 INTRODUCTION

This Source Area Assessment Report has been prepared to meet requirements of the approved Remedial Design (RD) Work Plan (CRG, 2000a) for the DuPont Necco Park Landfill (the Site) located in Niagara Falls, New York. The RD Work Plan was prepared pursuant to Administrative Order (AO) Index No. II CERCLA-98-0215 dated September 28, 1998 issued by the United States Environmental Protection Agency (USEPA) to conduct remedial design and remedial action at the Site. This report addresses requirements stipulated in the mutually agreed upon Statement of Work (SOW), attached as Appendix B to the AO. Specifically, the focus of the report is definition of source area limits for the A Zone overburden and the B/C and D/E/F bedrock zones. An assessment of the appropriate technologies to control A Zone overburden groundwater flow to the far field has been conducted. Results of the A Zone assessment and recommended remedial design were included in the *Preliminary Design Submittal - Overburden Source Area Control and Cap Upgrade* (CRG 2000b). Source area limits defined for the bedrock zones in this report form the basis for additional pre-design investigations to determine appropriate design measures to achieve and monitor hydraulic control in the bedrock B through F Zones.

The source area, as defined in the SOW, is the area associated with 24 acre Necco Park landfill that acts as a continuing source of constituent migration to the downgradient aqueous environment. The primary criterion for defining the source area was the area extent of free-phase or residual DNAPL. To be conservative, areas where aqueous constituent levels theoretically indicate the presence of DNAPL were also included using solubility criteria for DNAPL compounds. This report presents findings of the pre-design investigation, and utilizes results of the baseline sampling groundwater event to define source area boundaries for three distinct flow zones identified as:

1) the overburden (A Zone)
2) the upper bedrock zones (B/C Zones), and
3) the lower bedrock zones (D/E/F Zones).

With the source area boundaries defined, locations of initial groundwater pumping wells have been identified and will be installed during the next phase of the pre-design investigations.

1.1 Submittal Organization

This report is being submitted to describe pre-design investigation findings that form the basis of the source area limit definitions. This report was prepared at the request of the Agency to define zone-specific source area limits to facilitate subsequent pre-design investigations to address hydraulic control of the bedrock flow zones.

A report introduction is provided in Section 1. Project objectives, SOW performance standards, and methodology are provided in Section 2. A description of pre-design investigation tasks and discussion of results is presented in Section 3. Zone-specific source area definitions and methodology are provided in Section 4. Utilizing the source area definitions, Section 5 includes a discussion of groundwater modeling results that form the basis of the selection of initial pumping well locations for the B/C and D/E/F Zones. References are provided in Section 6.

2 PURPOSE AND DESCRIPTION

2.1 Purpose

This Source Area Report has been prepared to identify source area limits for the overburden (A Zone), the upper bedrock zones (B/C Zones), and the lower bedrock zones (D/E/F Zones). Source area assessments have been completed using the results of pre-design investigations conducted during 2000.

2.2 Statement of Work Performance Standards

Performance standards for source area control of overburden groundwater (A Zone), from Section A.7.b. of the SOW, are as follows:

Contaminated groundwater in the overburden (a.k.a. A Zone) shall be prevented from migrating from the source area to the far-field. The source area boundary shall be defined for specific groundwater flow zones (aquifer or aquifers which posses similar physical and/or hydraulic characteristics) by utilizing the same criteria developed for the delineation of the source area in the Investigation and Analysis of Alternatives (I/AOA): 1) the extent in those zones where free-phase and residual DNAPL is observed in extraction wells, monitoring wells or otherwise; and 2) the extent in those zones where the concentration of contaminants in the groundwater may indicate the presence of DNAPL. The following solubility criteria shall be utilized to indicate that DNAPL may be present: a) one percent of a given compound's pure phase solubility, and b) one hundred percent of the effective solubility for a given compound. (EPA publication 9355.4-07FS) Based on numerous hydrogeologic investigations at the Site, a source area will be identified for three distinct flow zones: 1) the overburden (A Zone), 2) the upper bedrock (B and C Zones), and 3) the lower bedrock zones (D, E, and F Zones).

Contaminated groundwater in the overburden (A Zone) shall be prevented from migrating from the source area through hydraulic (e.g., installation and operation of a groundwater extraction system) and/or physical (e.g., sheet pile, slurry wall) methods. If a hydraulic system is employed, it shall be demonstrated that contaminated groundwater does not flow from the source area into the far-field by establishing hydraulic control. (For all zones, hydraulic control is defined as: the containment or control of the contaminated source area groundwater in such a manner as to prevent movement or migration of the contaminated source area groundwater beyond the downgradient boundary of the source area to the far-field. Success in obtaining hydraulic control will be defined as: the achievement of hydrodynamic control at the outer limits of the contaminated source area groundwater such that hydraulic gradients are inward to the pumping system(s). Methods for verifying that an inward gradient has been established are identified in the appropriate sections below.) Evidence of source area hydraulic control in the overburden shall be established through the installation, operation, maintenance and monitoring of groundwater extraction wells, monitoring wells/piezometers and/or *other means. If a physical barrier system is employed, it shall be demonstrated that contaminated groundwater in the overburden (A-Zone) does not flow through, beneath, or around the barrier system. This shall be demonstrated through the installation, operation, maintenance, and monitoring of groundwater monitoring wells/piezometers and/or other means.*

Performance standards for hydraulic control of the bedrock (B-F Zones) from Section A.7.c. of the SOW are as follows:

Contaminated groundwater from the upper and lower bedrock zones (a.k.a. B/C and D/E/F Zones) shall be prevented from migrating from the applicable source area. The source areas shall be defined as per Section A.7.b by hydraulic methods. It shall be demonstrated that contaminated groundwater flow does not occur from the source area to the far-field. Evidence of source area hydraulic control shall be established through the installation, operation, maintenance and monitoring of groundwater extraction wells, monitoring wells/peizometers and/or other means.

Groundwater extractions wells will be installed to prevent the movement of contaminated groundwater beyond the source area limits in the bedrock flow zones. As described in the RD Work Plan, well installation will proceed in a phased approach to allow for interpretation of the pre-design investigation findings, identify data gaps, and to optimize field efforts. The ultimate goal of this approach is the design of an appropriate remedial system that meets the objectives of the SOW. As described in the RD Work Plan, results of the distinct phases of the bedrock investigations (i.e., interpretation of pump test results and selection of additional extraction well locations) will be provided to the Agency before proceeding with subsequent phases of the investigation.

2.3 Overview of Methodology

Methodology used in defining source area limits for the A, B/C, and D/E/F flow zones at Necco Park was derived, in general, from procedures described in the Necco Park Analysis of Alternatives (AOA) report (DERS, 1995). Consistent with the AOA, the primary criterion for defining source area limits was to identify the areal extent of free-phase and residual DNAPL. To be conservative, areas where aqueous constituents might theoretically indicate the presence of DNAPL were also examined. Solubility criteria used for this evaluation are presented in EPA publication 9355.4-07FS, *Estimating Potential of Occurrence of DNAPL at Superfund Sites* and in the work of Shiu (1988) and Feenstra, Mackay, and Cherry (1991).

The first step in defining source area limits was to identify locations where free-phase DNAPL continues to be observed. The presence of free-phase DNAPL was assessed through collection of well bottom samples during pre-design investigations conducted in 2000. Data from this assessment, as well as historical observations of DNAPL, was one of the criteria used in determining source area limits. The source area is defined as a continuing source of constituent migration to the downgradient, or far-field, aqueous environment. In essence, any location where DNAPL was observed at least once was included in the analysis.

The second criterion used in defining source area limits was use of various solubility criteria to evaluate portions of the aqueous plume where constituent concentration may be indicative of the presence of DNAPL. Consistent with the AOA, the criteria used in the analysis described herein utilizes: (1) the effective solubility of a given compound and (2) 1% of a given compound's pure-phase solubility.

In areas where data could not feasibly be attained (i.e., beneath the CECOS sanitary and secure cells) the extent of any free-phase DNAPL was estimated using general knowledge of the physical nature of DNAPL movement and an assessment of analytical data regarding where various solubility criteria are no longer met. As discussed in Section 3, results of the 2000 baseline groundwater event did not increase source area extents first submitted in the Necco Park AOA. Consistent with field data, this suggests that there is no further DNAPL migration beyond historic source area limits.

3 PRE-DESIGN INVESTIGATIONS

Pre-design investigations at Necco Park were completed in accordance with the RD Work Plan and were conducted between August 28 and September 15, 2000. The A Zone overburden control investigation and baseline source area assessment, completed concurrent with the existing landfill cap investigation, included the following tasks:

- ? Baseline groundwater assessment
- ? Comprehensive DNAPL assessment

A description of each task and a discussion of the results are provided in the following sections.

3.1 Source Area Pre-Design Investigation (PDI) Scope

3.1.1 Baseline Groundwater Assessment

The baseline groundwater assessment for the Necco Park site was completed to meet the following objectives:

- ? Establish a comprehensive zone-specific baseline to determine current source area boundaries
- ? Continue to test the conceptual model described in the AOA (DERS, 1995)
- ? Continue to evaluate the effectiveness of the existing response actions.

The baseline sampling event was conducted concurrent with the comprehensive DNAPL assessment with the shared objective of defining source area extent and establishing baseline conditions for far-field groundwater quality in each of the major groundwater flow zones (A, B/C, and D/E/F). Overburden and bedrock wells sampled as part of the baseline event are identified in Table 3-1. Since the main objective of the baseline chemical monitoring event is to define zone specific source extents and establish baseline conditions for the far-field, wells identified in Table 3-1 are located predominantly near source area boundaries and in the far-field. Well locations are shown in Figure A-1 as an attachment to this report. Though not specified in the RD Work Plan, well VH-145G3 was inadvertently sampled because it was included in previous annual sampling events from 1996 to 1998.

Baseline groundwater sampling was performed between August 28 and September 14, 2000 by Severn Trent Laboratories (STL) of Amherst, New York. All field activities associated with the sampling were directed by URS Diamond (URSD) to ensure compliance with the methods described in the Necco Park RD Work Plan. As described in the RD Work Plan, sampling proceeded from locations of historically low constituent concentrations to those of higher concentrations. All baseline groundwater samples were collected using low-flow purge and sample methods utilizing non-dedicated air-driven bladder pumps and dedicated Teflon-lined tubing. The pumps were decontaminated before initial use and between well locations employing the methods described in the RD Work Plan.

Two additional wells were installed at existing well cluster 146 during the PDI to better define A and B Zone source area limits (Figure A-1). Wells 146AR and 146B were installed and developed in accordance with the procedures described in the RD Work Plan. Well 146AR was installed to replace well VH-146A that existed at this location in the past. Soil boring logs and well construction diagrams are provided in Appendix A. The wells were sampled as part of the chemical baseline assessment and surveyed for the presence of DNAPL as part of the comprehensive DNAPL survey.

Results of the baseline sampling event are provided in Appendix B. A subset of the data from select wells situated near historic zone-specific source area limits was subjected to full data validation by a third party auditor. A summary of the data validation results is included in Appendix B. Complete results of the data validation with supporting documentation will be provided to the Agency in a separate submittal. A synopsis of the baseline chemistry results is provided in this section. Interpretation of the baseline data in defining source area boundaries is discussed in Section 4.

As indicated on Table 3-1, samples were collected at 8 locations to characterize A Zone overburden groundwater. Analytical results from samples collected from locations in close proximity to the southwest portion of the landfill (wells D-11 and D-13) detected total volatile organic compounds (TVOCs) at concentrations less than 100 ppb. Wells located near the southeast portion of the site (wells D-9 and 139A) continue to indicate higher constituent concentrations and are included in the A Zone source area. Far-field wells 150A and 145A had no detectable TVOCs, while far-field well 146AR TVOC concentration was less than 10 ppb. Low or non-detectable TVOC concentrations in the far-field are attributed to:

1) overall low conductivity of the A Zone materials,
2) the predominantly downward gradient to the B Zone, and
3) the completion specifications of the CECOS secure cells (SCMF-1 through 3) which include a constructed clay wall keyed into the natural lacustrine clay at depth.

Samples were collected from 16 B and C Zone wells to assess current chemistry status in the B/C flow zone. Wells situated near historic source area limits (wells 137B and 150B) indicated TVOC concentrations generally within previously reported concentration ranges. The only well near historic source area limits that has shown significant TVOC concentration increases over time is well 145C. TVOC concentrations at this location over the last 4 sampling events have been dominated by elevated levels of cis-DCE and vinyl chloride, degradation components of chlorinated solvents. Baseline results from wells within historic source area limits (wells 111B, D-23, 130B, 137C, and 138C) were generally within or higher than historic levels. Well location 138C had the greatest TVOC concentration increase over the past 4 sampling events, with TVOC concentrations increasing from 1,289 ppb in 1996 to 84,400 ppb in 2000. There has been historic DNAPL observations in well 138B at this location that may be related to the upward trend. Far-field wells 149C and 152B/C had no detectable TVOC concentrations while far-field well 146C had TVOC concentrations at levels below 100 ppb.

Samples were collected at 21 locations to characterize groundwater chemistry in the D/E/F flow zone. Baseline results from wells 136D, 145D, 150E, and 150F, located at the perimeter of the historic D/E/F source area, indicate TVOC concentrations within or slightly below historic levels. TVOC concentrations at wells 150E have been on the decline over the past 4 years. Results from well 145D indicate a modest increase from the previous sampling event in 1998. However, similar to the results for well 145C, the higher TVOC concentration is attributed to higher levels of cis-DCE and vinyl chloride, which suggest reduction of mass through biodegradation. Results from wells within historic D/E/F source area limits (wells 111D, 129D, 137D, 139D, and 129E) were generally higher than previous events. The greatest TVOC concentration increase from the previous sampling event was reported for well 137D. Total VOC concentrations increased from 7,810 ppb in 1998 to 111,500 ppb in 2000. Far-field wells 148D, 147F, 156D, and 136E had TVOC concentrations ranging from non-detectable levels to less than 100 ppb. With the exception of wells 146E and 146F, baseline results for the remaining D/E/F far field wells are within historic ranges and show no apparent trend. Results for wells 146E and 146F show a modest TVOC increase over the past two sampling events.

3.1.2 Comprehensive DNAPL Assessment

Well bottom observations were conducted at 153 monitoring well locations within the Necco Park source area and far field. Results of the well survey are summarized in Table 3-2. As noted on the table, some wells identified in the RD Work Plan for DNAPL observations were not included in the assessment because the wells no longer exist. These wells included 112A, 112D, 117C, and 141G.

The DNAPL assessment was conducted between August 14 and August 22, 2000 by STL under the direction of URSD. This assessment preceded the baseline sampling to allow time for stabilization of any sediment that may have been disturbed during well bottom assessments. The assessments were completed using either well bottom samplers or a weighted cotton string. In accordance with the RD Work Plan, wells slated for baseline sampling were assessed using a well bottom sampler. There are some exceptions where weighted string was used including wells in the continued monthly DNAPL monitoring program or wells that historically contained DNAPL. Bottom samplers used included Kemmerer and Bacon Bomb.

In general, results from the DNAPL assessment were consistent with past DNAPL evaluations. The only significant difference from past DNAPL evaluations was the detection of DNAPL in groundwater recovery well RW-1 and monitoring well VH-123A. No previous observations of DNAPL were made at these locations. Using the weighted string observation method, approximately 9 feet of DNAPL was detected in groundwater recovery well RW-1. Approximately 25 gallons of DNAPL was subsequently recovered from the well during the August 2000 DNAPL recovery event and an additional 10 gallons were recovered in December, 2000. Monthly observations are now in effect at this location. No DNAPL has been observed at this location in 2001.

The only other observation of DNAPL where it was not seen historically was at well VH-123A. The DNAPL at this location was quantified as a trace amount, detected only on the string weight and not recoverable using a well bottom sampler. Since this well is located within of the landfill itself and will fall within the defined A Zone source area, the presence of DNAPL at this location is less significant. DNAPL has not been observed at this location since completion of the 2000 pre-design investigations.

Routine DNAPL monitoring and removal continues at Necco Park and is documented in the monthly progress reports submitted to the Agency. The wells identified in Table 9-1 of the RD Work Plan have been modified to include monthly observations at wells RW-1 and VH-123A. Frequency of observations at these locations may be reduced after monitoring for a period of one year.

Pre-design investigations of the A Zone included examination of overburden materials for the presence of DNAPL during advancement of 22 soil borings located south of the Site. Samples collected from boring RDB-15 and borings RDB-17 through RDB-22 contained isolated intervals (< 1/8”) that contained residual DNAPL (CRG, 2000b). The location and depth of the observations is consistent with the results of the overburden DNAPL assessment completed in 1991 (WCC, 1993). Piezometers installed in borings RDB-15 and RDB-22 have been inspected for the presence of DNAPL. No observations of DNAPL have been made in the piezometers.

4 SOURCE AREA DEFINITION

4.1 Introduction

Zone-specific source area definitions have been determined using the general criteria developed for the AOA (DERS, 1995). The primary criterion for defining a source area is the areal extent of free-phase or residual DNAPL based on well bottom observations. To be conservative, areas where aqueous constituent levels might indicate the presence of DNAPL were included using various solubility criteria. Areas defined by both free-phase DNAPL areas and areas where aqueous concentrations may indicate the presence of DNAPL (i.e., solubility criteria were met) are included in the source area extents. The primary constituents of DNAPL at Necco Park are shown in Table 4-1.

4.2 Methodology

The approach to identifying source area limits was through analysis of baseline groundwater data for the three flow zones: A Zone, B/C Zone, and D/E/F Zone. The first step in the definition process was to examine the extent of free-phase DNAPL areas within and outside of Necco Park. This examination included free-phase DNAPL observations from well bottom samples collected in various investigations from 1984 up to and including the comprehensive DNAPL survey completed during the PDI in 2000. If DNAPL was ever observed at any well location, the well was included in the source area. DNAPL observations from soil borings completed during the PDI and previous investigations were also included in the source area.

The other approach used to define zone-specific source areas was to evaluate baseline groundwater chemistry results to determine if contaminant concentrations are indicative of DNAPL utilizing solubility criteria. These criteria included:

? Effective solubility for a given compound

? 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 are found at Necco Park site.

For this analysis, three compounds identified in the Necco Park DNAPL were evaluated using these solubility criteria. These compounds, hexachlorobutadiene, tetrachloroethene, and trichloroethene were selected for analysis based on their mole fraction percentage in DNAPL and the persistence in which they are detected in groundwater historically. Calculated solubility criteria for DNAPL compounds evaluated during this study are presented in Table 4-2.

4.3 Discussion of Results

As described in the RDWP, the primary objective of the baseline chemical monitoring event is to define the extent of zone specific source areas and establish baseline conditions for the far field. For this reason, the wells included in the baseline event are situated predominantly near source area boundaries and in the far field. Because the baseline sampling was the first event in two years and was conducted using a sampling method not previously used, an analysis of the most recent data was conducted to determine current source area status.

A comparison of baseline chemistry data from all flow zones to the effective solubility criteria for the given DNAPL constituents is summarized in Table 4-3. Comparison of chemistry results to 1% of pure-phase solubility criteria is provided in Table 4-4.

From a zone-specific standpoint, only one A zone well had constituent levels above either criteria (well 139A), which is consistent with results presented in the AOA. Results from wells D-11 and D-13 were well below either criterion. Previous results from these locations exceeded the 1% of pure-phase solubility for certain compounds. The observation of DNAPL at well 123A augmented the area where free-phase DNAPL was observed. Therefore, the primary criteria for the A Zone source limits illustrated in Figure 4-1 are:

? inclusion of the 24 acre landfill itself

? inclusion of areas south of the site where free-phase or residual DNAPL has been observed in A zone wells, specifically 53, 18SR, and 139A

A comparison of the baseline analytical results from the B/C Zone to the two criteria indicates no substantial variation from previously established source area limits documented in the AOA. BC flow zone source area limits are presented in Figure 4-2.

Baseline analytical results from the D/E/F Zone wells were compared to the two criteria and the results are presented on Figure 4-3. A decrease in constituent concentrations from historic levels at well clusters 136, 145, 146, and 150 have redefined the source area limits previously defined in the AOA. The resulting D/E/F source area is less extensive than previously defined. Only one exceedance, for the more conservative 1% of pure-phase solubility criteria, for only one compound was reported for wells at cluster (trichloroethene at 146E). Therefore, groundwater concentrations at this location are more indicative of aqueous constituents and not the presence of DNAPL in the vicinity. No DNAPL was observed in any D, E, or F Zone well inspected during the comprehensive DNAPL survey.

From a historical perspective, exceedances of the 1% of pure-phase solubility criteria, the more conservative of the two criteria, are on the decline (see Table 4-5). In general, several wells at key clusters located near historic source area boundaries (145, 146, 150) have shown a decline in the frequency of meeting the 1% pure-phase criteria. Many of these wells, which may have met the 1% pure phase criteria in the past, have not met this criterion for several years. This observation suggests that large parts of the source area are already captured by the existing pumping system and that the aqueous plume is beginning to attenuate through natural dispersive mechanisms and biodegradation.

5 CONCLUSIONS AND RECOMMENDATIONS

5.1 Source Area Limits

Analysis of the results of the baseline chemistry sampling and comprehensive DNAPL survey have been utilized to establish source area limits for the A, B/C, and D/E/F flow zones.

Chemistry results for the A Zone show limited migration of site constituents to the far-field. Results from wells D-11 and D-13, located in the southwest of the study area, reported TVOCs at concentrations less than 100 ppb. Low or non-detectable TVOC concentrations in the far-field are attributed to the overall low conductivity of the A Zone materials, a predominantly downward gradient to the B Zone, and the constructed clay walls of the downgradient CECOS secure cell landfills. The highest TVOC results were limited to the southeast portion of the study area where DNAPL has been observed in the overburden. Hydraulic control of the A Zone will be achieved through the installation of a groundwater interceptor trench. Although continued studies indicate that DNAPL observed in the overburden appears to be residual and that DNAPL recovery in the overburden is inefficient, the trench will be designed to allow for collection of DNAPL in the southeast portion of the study area if accumulation occurs.

Definition of the source area extent for the B/C Zone has not changed substantially from that identified in the AOA report. An evaluation of historic groundwater chemistry trends in the B/C Zone reveals no pattern that would warrant a redefinition of source area limits previously established.

PDI baseline chemistry results for the D/E/F Zone do indicate that reduced source area limits are appropriate. Although historically, wells at key wells situated at the historic D/E/F source area limits (well locations 136, 145, and 150) met the 1% pure phase solubility criteria as utilized in the AOA, none of these wells met the criteria for the 2000 baseline event. Far-field wells 148D, 147F, 156D, and 136E had TVOC concentrations ranging from non-detectable levels to less than 100 ppb. With the exception of 146E and 146F, baseline results for the remaining D/E/F far field wells are within historic ranges and show no apparent trend. Results for wells 146E and 146F show a modest TVOC increase over the past two sampling events. However, these wells do not consistently meet both solubility criteria for multiple compounds and are therefore within the far-field.

With the source area limits defined for the B/C and D/E/F flow zones, groundwater model calculations were performed to help determine the placement of the initial extraction wells. A summary of the model assumptions and results is provided in Section 5.2.

5.2 Recommended Extraction Well Installation

The combined source area zones for PCE, TCE, and hexachlorobutadiene (both effective solubility and 1% pure-phase solubility) were used to estimate the number of extraction wells necessary for capture of the source area extents. Pumping well locations and associated capture zones were estimated with the U.S. EPA's Wellhead Analytic Element Model, WhAEM2000 for Windows.

The hydrogeologic input to the model was obtained from the AOA (DERS, 1995). The input is summarized below.

Hydrogeologic Zone	**Hydraulic Conductivity (ft/day)**	**Aquifer Thickness (feet)[1]**	**Porosity**	**Recharge Rate (ft/day)[2]**	**Well Discharge (gpm)**	**Base Elevation (feet)**
B	133	1.5	0.05	3.24E-4	5	556
C	133	1.5	0.05	3.24E-4	5	551
D, E, and F	324	4.2	0.05	2.20E-4	12	512

NOTES:

1. Fracture zone thickness estimated in AOA, were summed in this analysis for the combined bedrock zones.
2. Bedrock recharge was estimated from the vertical conductance data in the AOA.

The particle tracking algorithm in WhAEM2000 was used to determine the capture zones for the B/C and D/E/F Zone remediation wells. Results of the analysis for the B/C Zone are shown on Figure 5-1. As shown on the figure, four B/C extraction wells would be required to achieve hydraulic control of the source area. The model input developed a well spacing of approximately 300 feet for placement of the B/C wells. The model runs to conceptualize well quantity and spacing to achieve hydraulic control of the D/E/F Zones indicate installation of two extraction wells at locations shown in Figure 5-2. Well spacing developed by the model for the D/E/F is approximately 200 feet. The actual locations of the wells may vary somewhat from those shown based on site conditions. Moreover, location of the extraction wells, particularly the B/C wells, may be strategically placed to optimize recovery of source area constituents beneath the CECOS secure cells to the south and the municipal waste landfill to the east of Necco Park. An assessment is currently in progress to determine locations of additional monitoring points to better evaluate hydraulic response from the pre-design investigation pumping tests. Clearly, additional hydraulic monitoring points are needed to effectively monitor pump test response in the D/E/F Zones. Results of the assessment will be used to select locations for additional hydraulic monitoring points, as appropriate. The location of the additional monitoring points will be provided to the Agency at least two weeks prior to the start of the first phase of the bedrock investigations.

As described in the RD Work Plan, well installation will proceed in a phased approach to allow for interpretation of the pre-design investigation findings, identify data gaps, and to optimize field efforts. The ultimate goal of this approach is the design of an appropriate remedial system that meets the objectives of the SOW. The first B/C well to be installed during the next phase of the pre-design investigation will be the eastern-most extraction well. As described in the RD Work Plan, results of the distinct phases of the bedrock investigations (i.e., interpretation of pump test results and selection of additional extraction well locations) will be provided to the Agency before proceeding with subsequent phases of the investigation.

6 REFERENCES

DuPont Corporate Remediation Group (CRG). 2000. *Remedial Design Work Plan,* Necco Park, Niagara Falls, New York.

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TABLES

Table 3-1
Baseline Chemical Monitoring Program
Necco Park, Niagara Falls, NY

MONITORING WELL	ZONE	MONITORING WELL	ZONE
D-11	A	VH-129D(NEW)	D
D-13	A	**VH-136D**	D
D-9	A	VH-137D	D
VH-137A	A	**VH-139D**	D
VH-139A	A	VH-145D	D
VH-145A	A	**VH-147D**	D
VH-146AR**	A	**VH-148D**	D
VH-150A	A	VH-156D	D
VH-111B	B	**VH-129E**	E
D-23	B	**VH-136E**	E
VH-130B	B	**VH-145E**	E
VH-136B	B	**VH-146E**	E
VH-137B	B	VH-150E	E
VH-139B	B	**VH-156E**	E
VH-146B*	B	**VH-136F**	F
VH-150B	B	**VH-146F**	F
VH-152BC	B/C	**VH-147F**	F
VH-136C	C	VH-150F	F
VH-137C	C	**VH-156F**	F
VH-138C	C	VH-129G	G2
VH-145C*	C	VH-130G	G2 + G3
VH-146C*	C	VH-136G	G
VH-149C	C	VH-143G	G
VH-151C	C	VH-145G2	G2
VH-111D	D	VH-147G1	G1
VH-123D	D	VH-147G2	G2
		VH-147G3	G3

*Well does not meet bedrock zone water bearing criteria ($k<10^{-4}$ cm/sec) but may be needed to define source area.

**Well to be installed

Wells in **bold** were utilized in the natural attenuation assessment.

TABLE 3-2
NECCO PARK PRE-DESIGN INVESTIGATION
COMPREHENSIVE DNAPL SURVEY RESULTS

WELL ID	DATE	TEST METHOD	NAPL PRESENCE	COMMENTS
53	08/17/00	String Test	No	
102B	08/18/00	String Test	No	
105C	08/18/00	String Test	No	
105CD	08/18/00	String Test	No	
105D	08/18/00	String Test	No	
111B	08/14/00	Kemmerer Sampler	No	
111D	08/14/00	Kemmerer Sampler	No	
112A	--	--	--	Well Destroyed
112B	08/18/00	String Test	No	
112C	08/18/00	String Test	No	
112D	08/18/00	--	--	Not found; Well presumed destroyed
112F	08/18/00	String Test	No	
112J	08/18/00	String Test	No	
114B	08/21/00	String Test	No	
115B	08/21/00	Kemmerer Sampler	No	
115C	08/21/00	Kemmerer Sampler	No	
115D	08/21/00	Kemmerer Sampler	No	
116B	08/21/00	Kemmerer Sampler	No	
117A	08/21/00	String Test	No	
117C	--	--	--	Grouted during SFR construction
117E	08/21/00	String Test	No	
118B	08/18/00	String Test	No	
119B	08/21/00	Kemmerer Sampler	No	
120B	08/21/00	Kemmerer Sampler	No	
123A	**08/16/00**	**Kemmerer Sampler & String Test**	**Yes**	**Sediment blocking sampler. String test to verify. Trace of DNAPL on string weight.**
123B	08/16/00	Kemmerer Sampler	No	
123C	08/16/00	Kemmerer Sampler	No	
123D	08/16/00	Kemmerer Sampler	No	Clear
123E	08/16/00	Bomb Sampler	No	Black suspended sediment
123F	08/16/00	Kemmerer Sampler	No	
127C	08/21/00	Kemmerer Sampler	No	
128A	08/21/00	Kemmerer Sampler	No	
129B	08/14/00	String Test	No	
129C	**08/14/00**	**String Test**	**Yes**	**1.5 feet of DNAPL**
129D(OLD)	08/14/00	String Test	No	
129DR	08/14/00	Kemmerer Sampler	No	
129E	08/14/00	Kemmerer Sampler	No	
129F	08/14/00	Kemmerer Sampler	No	
129G	08/14/00	Kemmerer Sampler	No	
130B	08/14/00	String Test	No	
130C	08/14/00	String Test	No	
130D	08/14/00	String Test	No	
130F	08/14/00	Kemmerer Sampler	No	
130G	08/14/00	Kemmerer Sampler	No	
131A	**08/18/00**	**String Test**	**Yes**	**Approx. 1 foot of DNAPL**
136B	08/17/00	Kemmerer Sampler	No	Clear
136C	08/17/00	Kemmerer Sampler	No	Clear
136D	08/17/00	Kemmerer Sampler	No	
136E	08/17/00	Bomb Sampler	No	Black suspended sediment.
136F	08/17/00	Bomb Sampler	No	Black suspended sediment.
136G	08/17/00	Kemmerer Sampler	No	
137A	08/14/00	String Test	No	

TABLE 3-2
NECCO PARK PRE-DESIGN INVESTIGATION
COMPREHENSIVE DNAPL SURVEY RESULTS

WELL ID	DATE	TEST METHOD	NAPL PRESENCE	COMMENTS
137B	08/14/00	String Test	No	
137C	08/14/00	Kemmerer Sampler	No	
137CD	08/14/00	String Test	No	
137D	08/14/00	Kemmerer Sampler	No	
138B	08/14/00	String Test	No	
138C	08/14/00	String Test	No	
139A	08/14/00	String Test	No	
139B	08/14/00	String Test	No	
139C	08/14/00	String Test	No	
139D	08/14/00	String Test	No	
140A	08/18/00	String Test	No	
140B	08/18/00	String Test	No	
140C	08/18/00	String Test	No	
140E	08/18/00	String Test	No	
141B	08/18/00	Kemmerer Sampler	No	Black suspended sediment.
141C	08/18/00	Kemmerer Sampler	No	Milky brown sediment.
141D	08/18/00	Kemmerer Sampler	No	
141E	08/18/00	Kemmerer Sampler	No	
141F	08/18/00	Kemmerer Sampler	No	
141G	--	--	--	Well not located and presumed decommissioned.
142A	08/21/00	Kemmerer Sampler	No	
142B	08/18/00	Kemmerer Sampler	No	Clear
142C	08/18/00	Kemmerer Sampler	No	Clear
142D	08/18/00	Kemmerer Sampler	No	Black suspended sediment in sample.
142E	08/18/00	Kemmerer Sampler	No	Black suspended sediment in sample.
142F	08/18/00	Bomb Sampler	No	Black suspended sediment in sample.
143G	08/16/00	Kemmerer Sampler	No	Clear
145A	08/16/00	Kemmerer Sampler	No	
145D	08/16/00	Kemmerer Sampler	No	
145E	08/16/00	Kemmerer Sampler	No	
145F	08/16/00	Kemmerer Sampler	No	
145G2	08/16/00	Kemmerer Sampler	No	
145G3	08/16/00	Kemmerer Sampler	No	
146AR	9/28/2000	Kemmerer Sampler	No	
146B	9/28/2000	Kemmerer Sampler	No	
146C	08/17/00	Kemmerer Sampler	No	Black suspended sediment.
146E	08/17/00	Kemmerer Sampler	No	
146F	08/17/00	Bomb Sampler	No	Black suspended sediment.
147B	08/15/00	Kemmerer Sampler	No	
147C	08/15/00	Kemmerer Sampler	No	
147D	08/15/00	Kemmerer Sampler	No	
147F	08/15/00	Kemmerer Sampler	No	
147G1	08/15/00	Kemmerer Sampler	No	
147G2	08/15/00	Kemmerer Sampler	No	
147G3	08/15/00	Kemmerer Sampler	No	
148B	08/15/00	Kemmerer Sampler	No	
148C	08/15/00	Kemmerer Sampler	No	
148D	08/15/00	Kemmerer Sampler	No	
148F	08/15/00	Kemmerer Sampler	No	
148G	08/15/00	Kemmerer Sampler	No	
149A	08/15/00	Kemmerer Sampler	No	
149B	08/15/00	Kemmerer Sampler	No	

TABLE 3-2
NECCO PARK PRE-DESIGN INVESTIGATION
COMPREHENSIVE DNAPL SURVEY RESULTS

WELL ID	DATE	TEST METHOD	NAPL PRESENCE	COMMENTS
149C	08/15/00	Kemmerer Sampler	No	
149D	08/15/00	Kemmerer Sampler	No	
150A	08/17/00	Kemmerer Sampler	No	Clear
150B	08/17/00	Kemmerer Sampler	No	Black suspended sediment.
150E	08/17/00	Kemmerer Sampler	No	Black suspended sediment.
150F	08/17/00	Bomb Sampler	No	
151A	08/15/00	Kemmerer Sampler	No	
151B	08/15/00	Kemmerer Sampler	No	
151C	08/15/00	Kemmerer Sampler	No	
152A	08/15/00	Kemmerer Sampler	No	
152BC	08/15/00	Kemmerer Sampler	No	
153A	08/21/00	Kemmerer Sampler	No	
153B	08/21/00	Kemmerer Sampler	No	
153C	08/21/00	Kemmerer Sampler	No	
153D	08/21/00	Kemmerer Sampler	No	
153E	08/21/00	Kemmerer Sampler	No	
153G2	08/21/00	Kemmerer Sampler	No	
153G3	08/21/00	Kemmerer Sampler	No	
154A	08/21/00	Kemmerer Sampler	No	
154B	08/21/00	Kemmerer Sampler	No	
154D	08/21/00	Kemmerer Sampler	No	Black, no DNAPL
154E	08/21/00	Kemmerer Sampler	No	
155A	08/22/00	Kemmerer Sampler	No	
155C	08/22/00	--	--	Well decommissioned in 1990 due to artesian conditions.
155D	08/22/00	Kemmerer Sampler	No	
155ER	08/22/00	Kemmerer Sampler	No	
156A	08/15/00	Kemmerer Sampler	No	
156B	--	--	--	Well never existed.
156C	08/15/00	Kemmerer Sampler	No	
156D	08/15/00	Kemmerer Sampler	No	
156E	08/15/00	Kemmerer Sampler	No	
156F	08/15/00	Kemmerer Sampler	No	
156G	08/15/00	Kemmerer Sampler	No	
158A	08/21/00	Kemmerer Sampler	No	
158B	08/21/00	Kemmerer Sampler	No	
158C	08/21/00	Kemmerer Sampler	No	
158D	08/21/00	Kemmerer Sampler	No	
159A	08/16/00	Kemmerer Sampler	No	Black suspended sediment
159B	08/16/00	Kemmerer Sampler	No	Black suspended sediment
159C	08/16/00	Kemmerer Sampler/ String Test	No	Used string method due to sediment blockage of sampler.
159D	08/16/00	Kemmerer Sampler	No	Black suspended sediment
CECOS 18SR	08/22/00	String Test	No	
CECOS 52SR	08/22/00	String Test	No	
D-11	08/17/00	Kemmerer Sampler	No	Milky red-brown
D-13	08/17/00	Kemmerer Sampler	No	Black suspended sediment
D-23	**08/14/00**	**String Test**	**Yes**	**<1.0 foot of DNAPL**
D-9	08/17/00	Kemmerer Sampler	No	Milky red-brown.
PNRW-1	08/18/00	String Test	No	
PNRW-2	08/18/00	String Test	No	
RW-1	**08/17/00**	**String Test**	**Yes**	**Approx. 9 feet of DNAPL on string**
RW-2	**08/17/00**	**String Test**	**Yes**	**Approx. 5 feet of DNAPL observed**
RW-3	08/17/00	String Test	No	

Table 4-1
Primary DNAPL Constituents
Necco Park, Niagara Falls, NY

Constituent	Mole Fraction in DNAPL (%)
Hexachlorobutadiene	59
Hexachloroethane	9
Hexachlorobenzene	2
Carbon tetrachloride	5
Chloroform	1
Tetrachloroethene	3
1,1,2,2-tetrachloroethane	5
Trichloroethene	4

Note: The data was derived from the following sources:

WCC. 1986. NAPL Investigation, Necco Park.
WCC. 1987. NAPL Sampling and Analytical Plan.
WCC. 1987. Results of NAPL Sampling and
Analytical Program, Necco Park

Table 4-2
DNAPL Components and Solubility Criteria Values
Necco Park, Niagara Falls, NY

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 4-3
2000 Baseline Event
Effective Solubility Exceedances For DNAPL Compounds
Necco Park, Niagara Falls, NY

Well ID	Flow Zone	Analyte	Criteria	Concentration
D-23	B	HEXACHLOROBUTADIENE	1180	12,000
VH-137C	C	TETRACHLOROETHENE	4500	6,400
VH-137D	D	TETRACHLOROETHENE	4500	6,200
VH-137D	D	TRICHLOROETHENE	44000	57,000
VH-137D	D	HEXACHLOROBUTADIENE	1180	1,600
VH-139A	A	TETRACHLOROETHENE	4500	7,100
VH-139A	A	HEXACHLOROBUTADIENE	1180	1,600
VH-139B	B	HEXACHLOROBUTADIENE	1180	1,600
VH-139D	D	HEXACHLOROBUTADIENE	1180	2,000

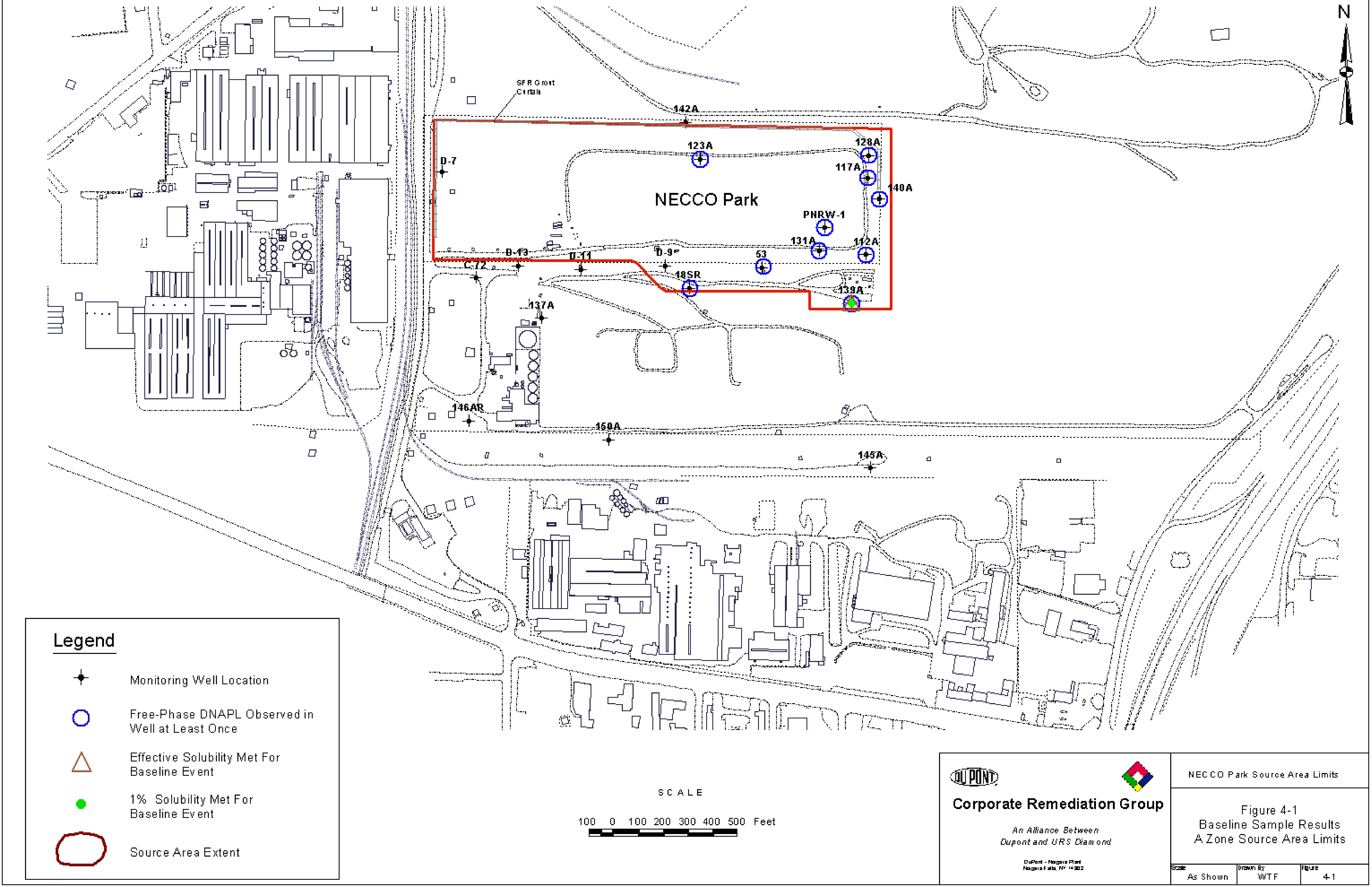
Table 4-4
2000 Baseline Event
1% of Pure-Phase Solubility Exceedances for DNAPL Compounds
Necco Park, Niagara Falls, NY

Well ID	Analyte	Conc Exceeding	Criteria
D-23	TETRACHLOROETHENE	4,200	1500
D-23	TRICHLOROETHENE	19,000	11000
D-23	1,1,2,2-TETRACHLOROETHANE	34,000	29000
D-23	HEXACHLOROBUTADIENE	12,000	20
VH-111D	TETRACHLOROETHENE	1,900	1500
VH-111D	TRICHLOROETHENE	28,000	11000
VH-129D	HEXACHLOROBUTADIENE	39	20
VH-129E	HEXACHLOROBUTADIENE	37	20
VH-136B	TETRACHLOROETHENE	2,400	1500
VH-136C	TETRACHLOROETHENE	3,400	1500
VH-137C	TETRACHLOROETHENE	6,400	1500
VH-137C	TRICHLOROETHENE	23,000	11000
VH-137C	HEXACHLOROBUTADIENE	650	20
VH-137D	TETRACHLOROETHENE	6,200	1500
VH-137D	TRICHLOROETHENE	57,000	11000
VH-137D	HEXACHLOROBUTADIENE	1,600	20
VH-138C	TETRACHLOROETHENE	4,500	1500
VH-138C	TRICHLOROETHENE	37,000	11000
VH-138C	HEXACHLOROBUTADIENE	510	20
VH-139A	TETRACHLOROETHENE	7,100	1500
VH-139A	TRICHLOROETHENE	21,000	11000
VH-139A	HEXACHLOROBUTADIENE	1,600	20
VH-139B	TETRACHLOROETHENE	3,300	1500
VH-139B	HEXACHLOROBUTADIENE	1,600	20
VH-139D	TETRACHLOROETHENE	4,000	1500
VH-139D	HEXACHLOROETHANE	510	500
VH-139D	HEXACHLOROBUTADIENE	2,000	20
VH-146E	TRICHLOROETHENE	21,000	11000

Table 4-5
Summary of 1% Pure-Phase Solubility Criteria Exceedances for DNAPL Compounds - All Events
Necco Park, Niagara Falls, NY

Well ID	Analyte	# Samples	# Hit	Concentration	Limit	% Hits Above	Comments
136D	HEXACHLOROBUTADIENE	19	7	1,100	20	31.58%	1 Exceedance in past 4 events
145C	HEXACHLOROBUTADIENE	18	2	664	20	11.11%	No exceedances in past 4 events
145E	TRICHLOROETHYLENE	20	17	11,600	11000	5.00%	No exceedances in past 4 events
145E	HEXACHLOROBUTADIENE	20	3	570	20	10.00%	No exceedances in past 4 events
146C	HEXACHLOROBUTADIENE	17	1	290	20	5.88%	No exceedances in past 4 events
146E	TETRACHLOROETHYLENE	20	13	15,200	1500	55.00%	No exceedances in past 4 events
146E	TRICHLOROETHYLENE	20	15	28,200	11000	60.00%	2 exceedances in past 4 events
146E	HEXACHLOROBUTADIENE	20	2	375	20	5.00%	No exceedances in past 4 events
146F	TETRACHLOROETHYLENE	20	14	12,700	1500	60.00%	No exceedances in past 4 events
146F	TRICHLOROETHYLENE	20	17	36,600	11000	55.00%	No exceedances in past 4 events
150E	HEXACHLOROBUTADIENE	20	6	890	20	20.00%	No exceedances in past 4 events
150F	HEXACHLOROBUTADIENE	18	2	100	20	5.56%	No exceedances in past 4 events

FIGURES



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Corporate Remediation Group

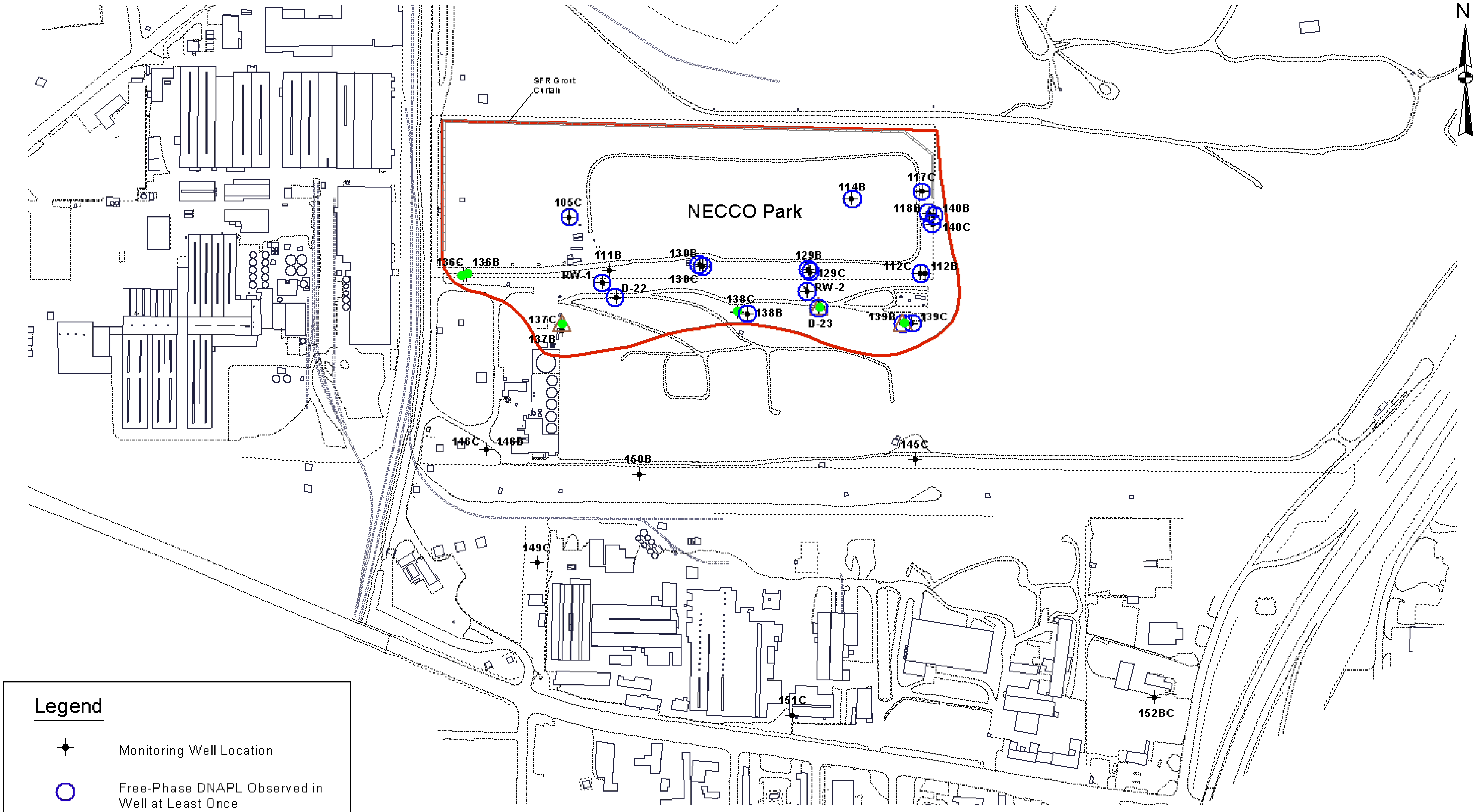
An Alliance Between
Dupont and URS Diamond

DuPont - Niagara Plant
Niagara Falls, NY 14302

NECCO Park Source Area Limits

Figure 4-1
Baseline Sample Results
A Zone Source Area Limits

Scale	Drawn By	Figure
As Shown	WTF	4-1



Legend

- ✛ Monitoring Well Location
- ○ Free-Phase DNAPL Observed in Well at Least Once
- △ Effective Solubility Met For Baseline Event
- ● 1% Solubility Met For Baseline Event
- ⬭ Source Area Extent

SCALE

100 0 100 200 300 400 500 Feet

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Niagara Falls, NY 14302

NECCO Park Source Area Limits

Figure 4-2
Baseline Sample Results
B/C Zone Source Area Limits

Scale	Drawn By	Figure
As Shown	WTF	4-2

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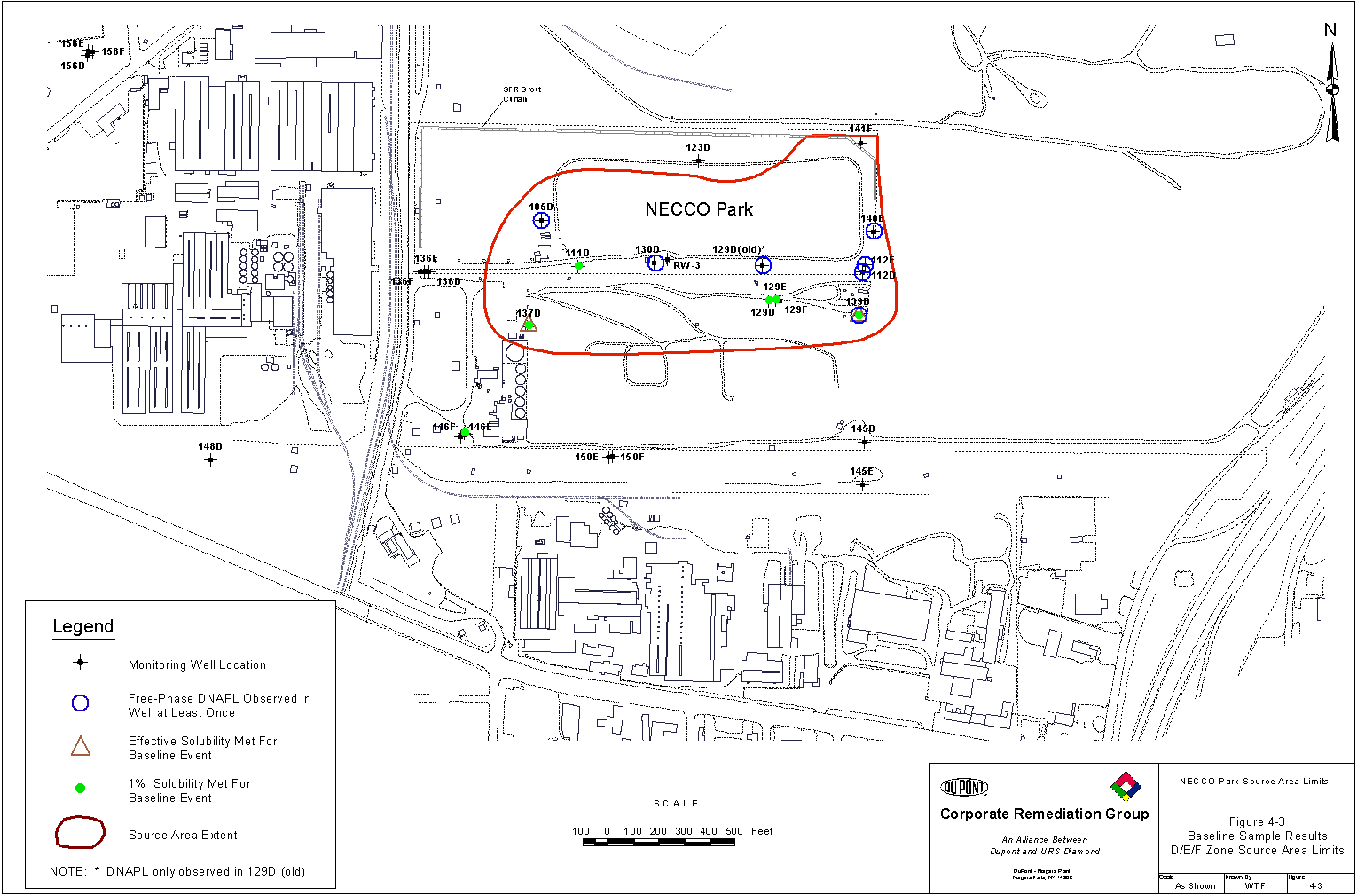

Legend

✛	Monitoring Well Location
○	Free-Phase DNAPL Observed in Well at Least Once
△	Effective Solubility Met For Baseline Event
●	1% Solubility Met For Baseline Event
⬭	Source Area Extent

NOTE: * DNAPL only observed in 129D (old)

Corporate Remediation Group

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Niagara Falls, NY 14302

NECCO Park Source Area Limits

Figure 4-3
Baseline Sample Results
D/E/F Zone Source Area Limits

Scale	Drawn By	Figure
As Shown	WTF	4-3

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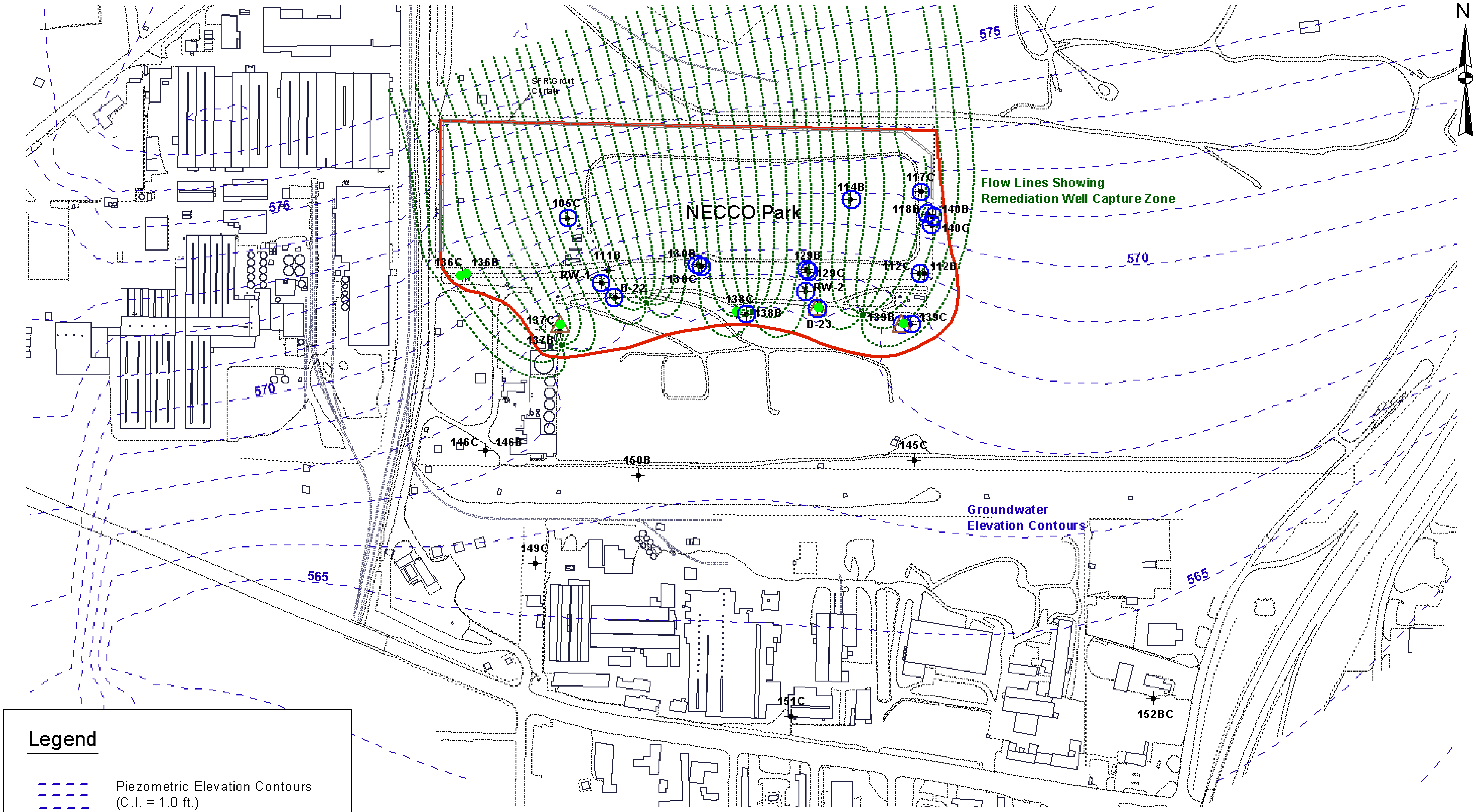

Legend

- - - - Piezometric Elevation Contours (C.I. = 1.0 ft.)

/ / / Particle Traces Delineating Hydraulic Capture Zone

○ Source Area Extent

DU PONT

Corporate Remediation Group

An Alliance Between
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Niagara Falls, NY 14302

NECCO Park Source Area Limits

Figure 5-1
Remediation Well
Capture Zones for
B/C Zone Source Area

Scale	Drawn By	Figure
As Shown	WTF	5-1

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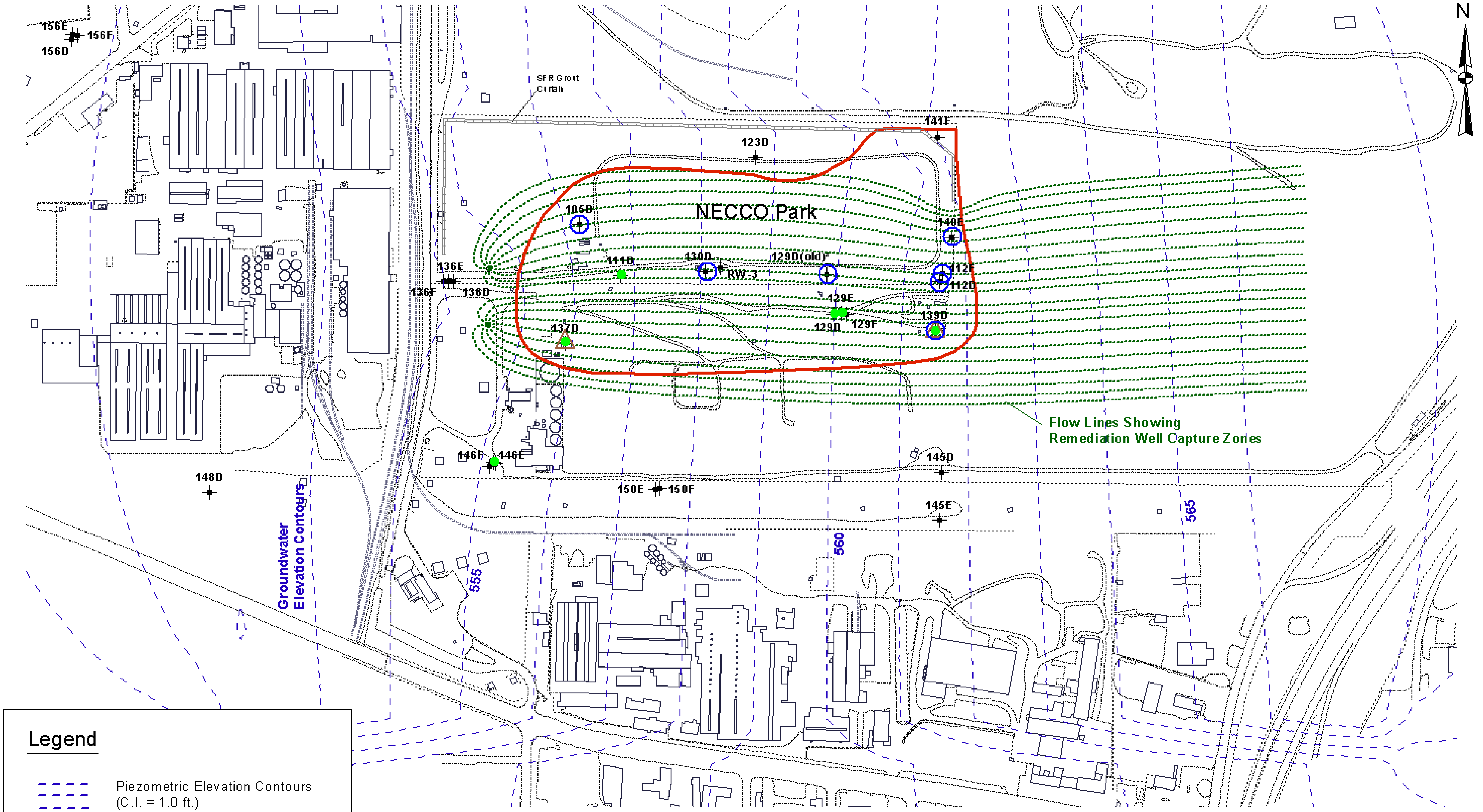

Legend

- Piezometric Elevation Contours (C.I. = 1.0 ft.)
- Particle Traces Delineating Hydraulic Capture Zone
- Source Area Extent

SCALE

100 0 100 200 300 400 500 Feet

Corporate Remediation Group

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Dupont and URS Diamond

DuPont - Niagara Plant
Niagara Falls, NY 14302

NECCO Park Source Area Limits

Figure 5-2
Remediation Well
Capture Zones for
D/E/F Zone Source Area

Scale	Drawn By	Figure
As Shown	WTF	5-2

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APPENDICES

APPENDIX A

SOIL BORING LOGS/MONITORING WELL CONSTRUCTION DETAILS

URS DIAMOND

LOG OF BORING 146 AR

SHEET 1 OF 1

PROJECT NAME/NUMBER: DuPont Necco Park / 44D1NI7232.2K LOCATION: Niagara Falls, New York		**DATE STARTED:** 8/22/2000	**DATE COMPLETED:** 8/22/2000
DRILLING CONTRACTOR: Nothnagle Drilling	**FOREMAN:** Brian Bertrand	GROUND ELEVATION (FT MSL): 573.19	WATER DEPTH (FT TOC): 6.14 on 9/22 (slug test)
DRILLING EQUIPMENT: CME-75 Drill Rig		COMPLETION DEPTH (FT BGS): 14.0	ROCK DEPTH (FT BGS): 11.5
TYPE BIT: NA	**TYPE OF CORE BARREL:** NA	**COMPLETION METHOD:** Shallow overburden well	
CASING: NA		**NO. OF SOIL SAMPLES (DISTURBED/UNDISTURBED):** 0/0	
CASING HAMM NA · WEIGHT:	**DROP** NA	**ENVIRONMENTAL SAMPLES:** NA	
SAMPLER:		**BORING COORDINATES:** N 1127332.711, E 1036910.100	
SAMPLER HAMMER WEIGHT:	**DROP:**	**INSPECTOR:** Jennifer Cristy	

DESCRIPTION	Depth (FT BGS)	Water Table	SAMPLES No.	SAMPLES SPT	SAMPLES Rec. (%)	LABORATORY TESTS W.C. (%)	LABORATORY TESTS L.L. (%)	LABORATORY TESTS P.L. (%)	LABORATORY TESTS PID (PPM)	Remarks
	0	▼								
				NA	NA					
				NA	NA					
	5			NA	NA					
				NA	NA					
				NA	NA					
	10									
***END OF BORING AT 11.5 FT.**				NA	NA					
***See log for VH-146B for soil description**										
***Well replacement**				NA	NA					
	15									
	20									
	25									
	30									
	35									
	40									

SPT = Standard Penetration Resistance Value (blows/foot)

Rec. = Split Spoon Sample Recovery (%)

WOR = Weight of Rod

URS DIAMOND

LOG OF BORING 146 B

SHEET 1 OF 1

PROJECT NAME/NUMBER:	DuPont Necco Park / 44D1NI7232.2K			**DATE STARTED:** 8/22/00	**DATE COMPLETED:** 8/22/00
LOCATION:	Niagara Falls, New York				
DRILLING CONTRACTOR: Nothnagle Drilling		**FOREMAN:** Brian Bertrand		**GROUND ELEVATION (FT MSL)** 573.2	**WATER DEPTH (FT BGS):** 6.81 on 10/23/00
DRILLING EQUIPMENT: CME-75				**COMPLETION DEPTH (FT BGS)** 21.3	**ROCK DEPTH (FT BGS):** 11.3
TYPE BIT:	NA	**TYPE OF CORE BARREL:**		**COMPLETION METHOD:**	Open-hole bedrock well
CASING:	NA		NX	**NO. OF SOIL SAMPLES (DISTURBED/UNDISTURBED):**	6/0
CASING HAMMER	NA	WEIGHT: NA	**DROP** NA	**ENVIRONMENTAL SAMPLES:**	NA
SAMPLER:	2-in. O.D. Standard Split Spoon			**BORING COORDINATES:**	N 1127335.507, E 1036897.100
SAMPLER HAMMER WEIGHT:	140 lbs.	**DROP:**	30 in.	**INSPECTOR:**	Jennifer Cristy

DESCRIPTION	Sample Interva	Depth (FT BGS)	Water Table	SAMPLES No.	SAMPLES SPT	SAMPLES Rec. (%)	LABORATORY TESTS W.C. (%)	LABORATORY TESTS L.L. (%)	LABORATORY TESTS P.L. (%)	LABORATORY TESTS PID (PPM)	Remarks
		0	▼								
0.0-2.0': Sandy silt (SM), trace clay, trace coarse gravel, trace organics. Color is brown, dry and loose.				**S1**	7,8,12,25	30				0.6	
2.0-4.0': Same as above: moisture increasing with depth.				**S2**	12,21,13,14	50				0.0	
4.0-6.0': Sandy silt, some clay, trace coarse gravel and coal. Plastic in foot. Color is brown, moist.		5		**S3**	3,2,3,5	25				0.0	
6.0'-8.0': Same as above grading to silty clay (OM), trace gravel. Color grades from brown to grey brown. Moderate plasticity.				**S4**	3,2,2,8	60				0.0	
8.0'-10.0': Same as as above: Silty Clay (grey grading to red brown), trace gravel well rounded.				**S5**	3,5,7,8	50				0.2	
		10									
10.0'-11.3': Same as above. Weathered dolomite at 11.3 feet. **Auger refusal at 11.3 FT.**				**S6**	12,25,100/4	25				0.4	
11.3-21.3: Gray/Brn dolostone (Lockport formation), water-bearing fracture (B Zone) at 16.3'.		15		**R-1**	Run R-1 11.3 - 18.3' RQD = 58%	100				0.0	Fracture at 16.3 ft.
		20		**R-2**	Run R-2 18.3 - 21.3' RQD = 100%	100				0.0	
		25									
		30									Total Water Loss: 350 Gal. Removed 410 Gal. during well development.
		35									
		40									

SPT = Standard Penetration Resistance Value (blows/foot)

Rec. = Split Spoon Sample Recovery (%)

WOR = Weight of Rod

DRILLING SUMMARY

Geologist:
Jennifer Christy

Drilling Company:
Nothnagle Drilling

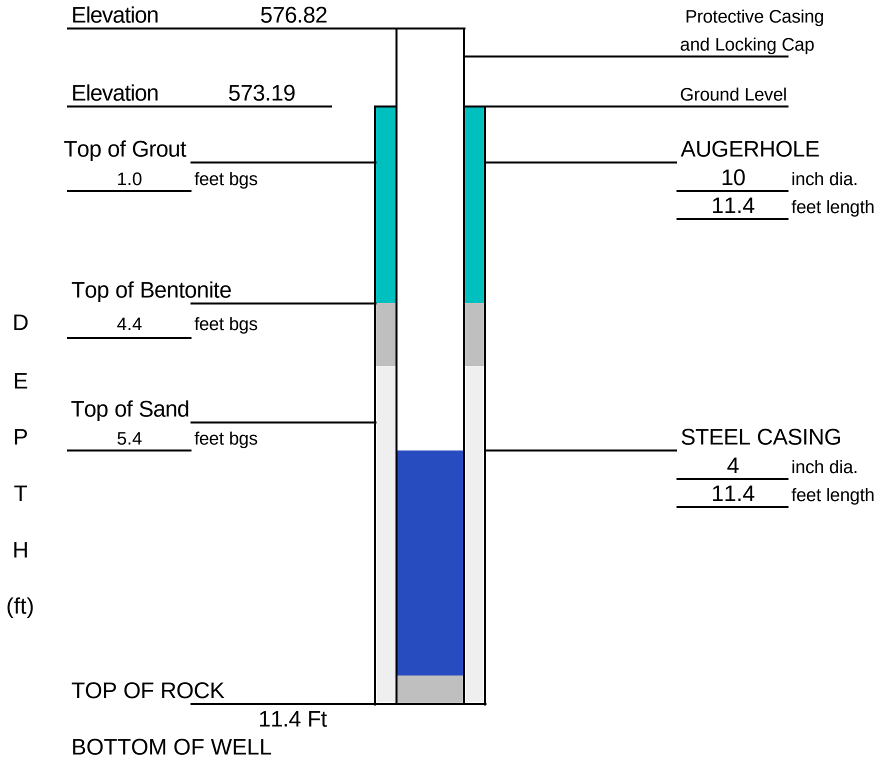
Driller:
Brian Bertrand

Rig Make/Model:
CME-75

Date:
8/22/2000

GEOLOGIC LOG

Depth(ft.)	Description
0.0 -5.0 Ft	Fill; Brown f-sandy silt some gravel
6.0-8.0 Ft	As above, grading to f-sand silt and clay
8.0-10.0 Ft.	Brown silty clay, some sand, trace gravel
10-11.4'	As above, more clay
11.4'	Bedrock



Elevation 576.82

Protective Casing and Locking Cap

Elevation 573.19

Ground Level

Top of Grout 1.0 feet bgs

AUGERHOLE
10 inch dia.
11.4 feet length

Top of Bentonite 4.4 feet bgs

Top of Sand 5.4 feet bgs

STEEL CASING
4 inch dia.
11.4 feet length

TOP OF ROCK
11.4 Ft
BOTTOM OF WELL

Not to Scale

WELL DESIGN

CASING MATERIAL

Surface: Carbon Steel
Well: Stainless Steel
Monitor: NA

SCREEN MATERIAL

Type: Stainless
Interval: 6.5-11.5'
Slot Size: 0.02

FILTER MATERIAL

Type: Morie 0.0 Setting: 5.4-11.4'

SEAL MATERIAL

Type: Bentonite Setting: 4.4-5.4'
Type: Grout Setting: 1.0-4.4'

COMMENTS:

Replacement well

ROCK CORING

Cored Interval: NA
Core Diameter: NA
Reamed Diameter: NA

LEGEND

🟦 Grout
▭ Bentonite
▭ Sand

Client: DuPont CRG

Location: **Necco Park**

Project No.: **44D1NI7232.2K**

URS Diamond Group

MONITORING WELL CONSTRUCTION DETAILS

Well Number: **146AR**

DRILLING SUMMARY

Geologist:
Jennifer Christy

Drilling Company:
Nothnagle Drilling

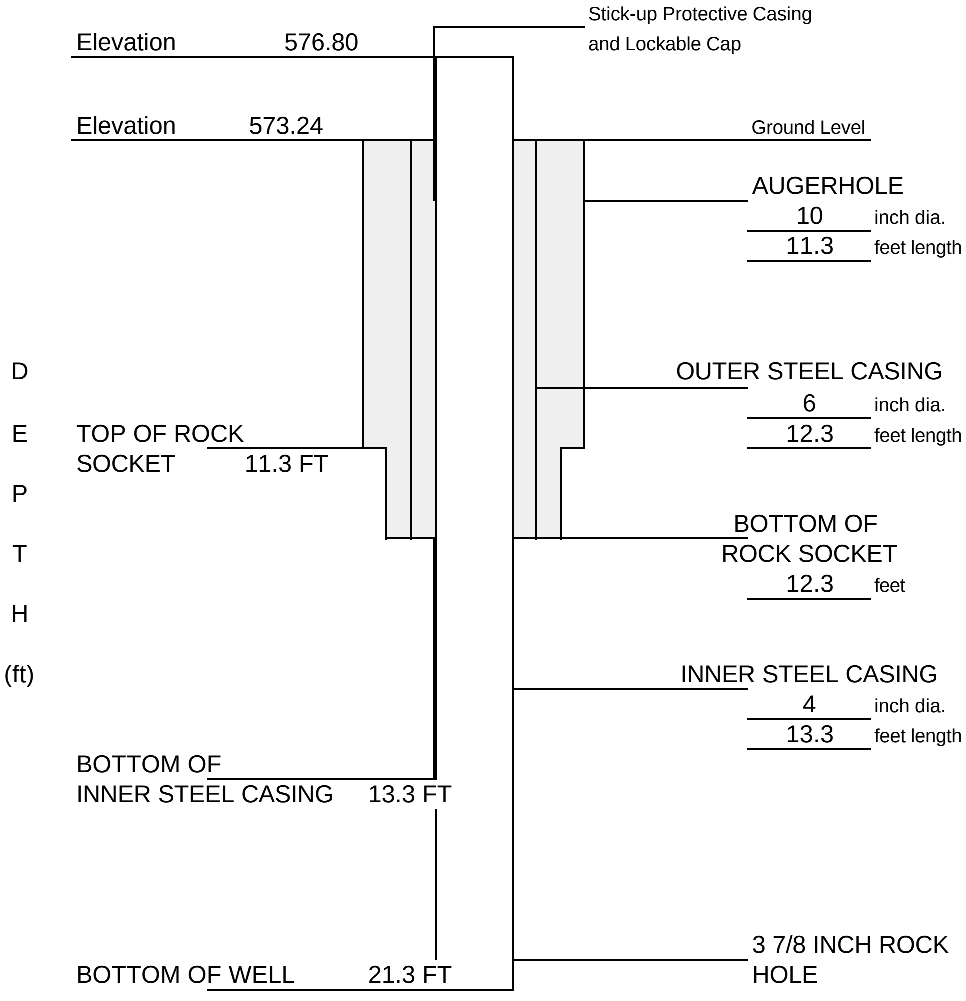
Driller:
Brian Bertand

Rig Make/Model:
CME-75

Date:
8/21/2000

GEOLOGIC LOG

Depth(ft.)	Description
0.0 -4.0 Ft	Fill; sandy-silt, trace gravel, trace organics
4.0 -6.0 Ft	brown f-m sand, trace silt some clay
6.0 - 8.0 Ft	As above grading to grey silty clay, trace gravel
8.0 -10.0 Ft	Grey silty clay grading to red-brown clayey silt, trace gravel (red-brown till)
10.0-11.3 Ft	As above, refusal at 11.3'
11.3-21.3 Ft	Lockport dolomite Water bearing zone at 16.3 Ft.



Not to Scale

WELL DESIGN

CASING MATERIAL

Surface: Steel

Well: NA

Monitor: NA

SCREEN MATERIAL

Type: NA (Open hole)

Slot Size: NA

FILTER MATERIAL

Type: NA Setting: NA

SEAL MATERIAL

Type: Cement Setting: 1.0-13.3'

COMMENTS:

ROCK CORING

Cored Interval: 11.3-21.3 Ft

Core Diameter: 3-inch

Reamed Diameter: 3 7/8-inch

LEGEND

▨ Cement/Bentonite Grout

Client: DuPont CRG

Location: Necco Park

Project No.: 44D1NI7232.2K

URS Diamond Group

MONITORING WELL CONSTRUCTION DETAILS

Well Number: 146B

APPENDIX B

BASELINE ANALYTICAL RESULTS

APPENDIX B
NECCO PARK BASELINE GROUNDWATER DATA

Sample Name:		111B	111D	111D	123D	129D	129E
Sample Date:		9/14/00	9/14/00	9/14/00 DUP	8/29/00	9/7/00	9/7/00
Volatiles							
1,1,2,2-Tetrachloroethane	µg/L	<1000	4800	4200	<5.0	3700	1000
1,1,2-Trichloroethane	µg/L	<1000	12000	13000	<5.0	1300	270
1,1-Dichloroethene	µg/L	1200	1100	1200	10	<100	27
1,2-Dichloroethane	µg/L	2900	<1000	<1000	<5.0	<100	200
Carbon Tetrachloride	µg/L	<1000	<1000	2600	<5.0	110	<25
Chloroform	µg/L	3600	21000	23000	<5.0	5100	610
cis-1,2-Dichloroethene	µg/L	32000	14000	15000	150	1100	740
Tetrachloroethene	µg/L	<1000	1900	2100	140	230	74
trans-1,2-Dichloroethene	µg/L	<1000	2900	3500	<5.0	380	360
Trichloroethene	µg/L	<1000	28000	31000	75	4400	680
Vinyl Chloride	µg/L	16000	1400	2400	52	320	250
Semi-Volatiles							
2,4,5-Trichlorophenol	µg/L	<120	<40	<40	<100	<10	<10
2,4,6-Trichlorophenol	µg/L	<120	<40	<40	<100	<10	<10
3-METHYLPHENOL	µg/L	750 #	50 #	<40	<100	<10	<10
4-Methylphenol	µg/L	750 #	50 #	<40	<100	<10	<10
Hexachlorobenzene	µg/L	<120	<40	<40	<100	<10	<10
Hexachlorobutadiene	µg/L	<120	<40	<40	<100	39	37
Hexachloroethane	µg/L	<120	<40	<40	<100	<10	<10
Pentachlorophenol	µg/L	<120	<40	<40	<100	<10	<10
Phenol	µg/L	430	170	200	720	<10	<10
Metals							
Barium, Dissolved	mg/L	298	0.23	0.46	<0.20	<0.20	<0.20
Miscellaneous Parameters							
Chloride	mg/L	3100	3600	4400	530	1400	951
Field Parameters							
PH	Std	7.04	6.21	NA	9.6	6.73	7.4
SPECIFIC CONDUCTANCE	µmhos/Cm	16420	14087	NA	3290	5590	4646
TEMPERATURE	º C	18.4	16.8	NA	12.7	12.7	13.2

NOTES:

< Less than PQL
NA Not Analyzed
J Result qualified as estimated value >= MDL and <= PQL
D Concentration is reported from a diluted run
E Result exceeds calibration range of the GC/MS instrument
B Analyte was also detected in the associated blank
L Physical and chemical interferences are present
\# Combined total of 3- and 4-methylphenol due to coelution.

APPENDIX B
NECCO PARK BASELINE GROUNDWATER DATA

Sample Name:		129G	130B	130G	136B	136C	136D
Sample Date:		9/7/00	9/6/00	9/6/00	9/7/00	9/7/00	9/7/00
Volatiles							
1,1,2,2-Tetrachloroethane	µg/L	2800	1900	1900	<100	<100	<50
1,1,2-Trichloroethane	µg/L	470	1200	4500	<100	<100	66
1,1-Dichloroethene	µg/L	<100	1500	660	<100	<100	<50
1,2-Dichloroethane	µg/L	<100	<1000	<500	<100	<100	<50
Carbon Tetrachloride	µg/L	1200	<1000	<500	<100	<100	<50
Chloroform	µg/L	5100	3400	8400	<100	<100	590
cis-1,2-Dichloroethene	µg/L	<100	21000	15000	<100	<100	350
Tetrachloroethene	µg/L	370	1400	1600	2400	3400	170
trans-1,2-Dichloroethene	µg/L	<100	<1000	1900	<100	<100	<50
Trichloroethene	µg/L	3700	3500	15000	470	650	1900
Vinyl Chloride	µg/L	<100	23000	700	<100	<100	110
Semi-Volatiles							
2,4,5-Trichlorophenol	µg/L	<100	<200	<50	3700	950	350
2,4,6-Trichlorophenol	µg/L	<100	<200	<50	510	1900	100
3-METHYLPHENOL	µg/L	<100	580 #	<50	<500	<250	<50
4-Methylphenol	µg/L	<100	580 #	<50	<500	<250	<50
Hexachlorobenzene	µg/L	<100	<200	<50	<500	<250	<50
Hexachlorobutadiene	µg/L	<100	<200	<50	<500	<250	<50
Hexachloroethane	µg/L	<100	<200	<50	<500	<250	<50
Pentachlorophenol	µg/L	<100	<200	<50	14000	54000	380
Phenol	µg/L	<100	390	190	<500	<250	<50
Metals							
Barium, Dissolved	mg/L	<0.20	38.5	<0.20	<0.20	<0.20	<0.20
Miscellaneous Parameters							
Chloride	mg/L	10000	7700	1400	140	170	196
Field Parameters							
PH	Std	6.52	6.74	6.61	10.4	12.06	7.87
SPECIFIC CONDUCTANCE	µmhos/Cm	25860	20543	5838	2248	2648	1533
TEMPERATURE	º C	12.5	13.1	12.3	17.4	16.1	13.9

NOTES:

< Less than PQL
NA Not Analyzed
J Result qualified as estimated value >= MD
D Concentration is reported from a diluted r
E Result exceeds calibration range of the G
B Analyte was also detected in the associat
L Physical and chemical interferences are p
Combined total of 3- and 4-methylphenol

APPENDIX B
NECCO PARK BASELINE GROUNDWATER DATA

Sample Name:		136E	136F	136G	137A	137B	137C
Sample Date:		9/8/00	9/8/00	9/8/00	9/8/00	9/8/00	9/8/00
Volatiles							
1,1,2,2-Tetrachloroethane	µg/L	1.9	<100	<1.0	<5.0	<5.0	<1000
1,1,2-Trichloroethane	µg/L	<1.0	230	<1.0	<5.0	<5.0	<1000
1,1-Dichloroethene	µg/L	<1.0	<100	<1.0	22	25	<1000
1,2-Dichloroethane	µg/L	7.2	<100	<1.0	15	16	<1000
Carbon Tetrachloride	µg/L	<1.0	<100	<1.0	<5.0	<5.0	<1000
Chloroform	µg/L	2.7	390	<1.0	11	8.8	8100
cis-1,2-Dichloroethene	µg/L	17	3200	1.4	200	190	3000
Tetrachloroethene	µg/L	1.4	<100	<1.0	77	85	6400
trans-1,2-Dichloroethene	µg/L	4.2	<100	<1.0	16	16	<1000
Trichloroethene	µg/L	25	380	<1.0	290	300	23000
Vinyl Chloride	µg/L	16	2300	<1.0	150	160	<1000
Semi-Volatiles							
2,4,5-Trichlorophenol	µg/L	<10	96	<10	<20	<25	2600
2,4,6-Trichlorophenol	µg/L	<10	<20	<10	<20	<25	4200
3-METHYLPHENOL	µg/L	<10	<20	<10	61 #	77 #	<500
4-Methylphenol	µg/L	<10	<20	<10	61 #	77 #	<500
Hexachlorobenzene	µg/L	<10	<20	<10	<20	<25	<500
Hexachlorobutadiene	µg/L	<10	<20	<10	<20	<25	650
Hexachloroethane	µg/L	<10	<20	<10	<20	<25	<500
Pentachlorophenol	µg/L	<10	<20	<10	<20	<25	39000
Phenol	µg/L	<10	<20	<10	150	150	<500
Metals							
Barium, Dissolved	mg/L	<0.20	<0.20	<0.20	18.9	7.3	<0.20
Miscellaneous Parameters							
Chloride	mg/L	192	263	120	1200	1240	519
Field Parameters							
PH	Std	7.5	7.65	7.16	12.68	12.76	7.64
SPECIFIC CONDUCTANCE	µmhos/Cm	1423	1650	1587	10101	9452	2448
TEMPERATURE	º C	14.3	14.6	13.9	18.4	15.1	13.1

NOTES:

< Less than PQL
NA Not Analyzed
J Result qualified as estimated value >= MD
D Concentration is reported from a diluted r
E Result exceeds calibration range of the G
B Analyte was also detected in the associat
L Physical and chemical interferences are p
\# Combined total of 3- and 4-methylphenol

APPENDIX B
NECCO PARK BASELINE GROUNDWATER DATA

Sample Name:		137D	138C	138C	139A	139B	139D
Sample Date:		9/11/00	9/11/00	9/11/00 DUP	9/13/00	9/13/00	9/13/00
Volatiles							
1,1,2,2-Tetrachloroethane	µg/L	<1000	2300	2400	3300	4000	7200
1,1,2-Trichloroethane	µg/L	4600	11000	11000	<2500	330	1600
1,1-Dichloroethene	µg/L	1200	<1000	<1000	<2500	<200	<500
1,2-Dichloroethane	µg/L	<1000	<1000	<1000	<2500	410	<500
Carbon Tetrachloride	µg/L	<1000	3400	3300	<2500	790	<500
Chloroform	µg/L	34000	18000	17000	67000	4700	11000
cis-1,2-Dichloroethene	µg/L	6000	5000	5200	<2500	7200	1300
Tetrachloroethene	µg/L	6200	4500	4700	7100	3300	4000
trans-1,2-Dichloroethene	µg/L	1200	1200	1200	<2500	1000	<500
Trichloroethene	µg/L	57000	37000	36000	21000	8500	8800
Vinyl Chloride	µg/L	1300	2000	1700	<2500	8400	<500
Semi-Volatiles							
2,4,5-Trichlorophenol	µg/L	570	<67	<67	<250	<250	<330
2,4,6-Trichlorophenol	µg/L	1100	<67	<67	<250	<250	<330
3-METHYLPHENOL	µg/L	<200	180 #	170 #	<250	<250	<330
4-Methylphenol	µg/L	<200	180 #	170 #	<250	<250	<330
Hexachlorobenzene	µg/L	<200	<67	<67	<250	<250	<330
Hexachlorobutadiene	µg/L	1600	510	480	1600	1600	2000
Hexachloroethane	µg/L	<200	91	78	<250	<250	510
Pentachlorophenol	µg/L	1400	<67	<67	<250	<250	<330
Phenol	µg/L	420	490	500	<250	<250	<330
Metals							
Barium, Dissolved	mg/L	<0.20	<0.20	<0.20	0.42	0.74	<0.20
Miscellaneous Parameters							
Chloride	mg/L	1500	1720	1750	7500	3440	226
Field Parameters							
PH	Std	6.51	8.73	NA	6.11	8.48	6.92
SPECIFIC CONDUCTANCE	µmhos/Cm	6396	8350	NA	20654	8312	3006
TEMPERATURE	º C	16.7	15.9	NA	15.7	13.6	13.6

NOTES:

< Less than PQL
NA Not Analyzed
J Result qualified as estimated value >= M
D Concentration is reported from a diluted r
E Result exceeds calibration range of the G
B Analyte was also detected in the associat
L Physical and chemical interferences are p
\# Combined total of 3- and 4-methylphenol

APPENDIX B
NECCO PARK BASELINE GROUNDWATER DATA

Sample Name:		143G	145A	145C	145D	145E	145G2
Sample Date:		8/28/00	9/5/00	9/6/00	9/6/00	9/5/00	9/5/00
Volatiles							
1,1,2,2-Tetrachloroethane	µg/L	<1.0	<1.0	470	<50	2700	<1.0
1,1,2-Trichloroethane	µg/L	<1.0	<1.0	980	350	<250	1.2
1,1-Dichloroethene	µg/L	<1.0	<1.0	330	<50	<250	<1.0
1,2-Dichloroethane	µg/L	<1.0	<1.0	370	<50	260	<1.0
Carbon Tetrachloride	µg/L	<1.0	<1.0	<250	<50	<250	<1.0
Chloroform	µg/L	<1.0	<1.0	340	240	780	8.8
cis-1,2-Dichloroethene	µg/L	15	<1.0	19000	1800	16000	22
Tetrachloroethene	µg/L	<1.0	<1.0	<250	<50	400	<1.0
trans-1,2-Dichloroethene	µg/L	2.5	<1.0	1100	280	1600	3.5
Trichloroethene	µg/L	1.1	<1.0	680	230	1100	8.3
Vinyl Chloride	µg/L	25	<1.0	5800	460	2700	7.7
Semi-Volatiles							
2,4,5-Trichlorophenol	µg/L	<10	<10	<100	<200	<40	<40
2,4,6-Trichlorophenol	µg/L	<10	<10	<100	<200	<40	<40
3-METHYLPHENOL	µg/L	<10	<10	140 #	<200	54 #	<40
4-Methylphenol	µg/L	<10	<10	140 #	<200	54 #	<40
Hexachlorobenzene	µg/L	<10	<10	<100	<200	<40	<40
Hexachlorobutadiene	µg/L	<10	<10	<100	<200	<40	<40
Hexachloroethane	µg/L	<10	<10	<100	<200	<40	<40
Pentachlorophenol	µg/L	<10	<10	<100	<200	<40	<40
Phenol	µg/L	<10	<10	<100	210	<40	<40
Metals							
Barium, Dissolved	mg/L	<0.20	<0.20	0.38	0.73	<0.20	<0.20
Miscellaneous Parameters							
Chloride	mg/L	190	31	18000	37000	6620	6000
Field Parameters							
PH	Std	6.99	6.62	6.36	6.18	6.83	6.68
SPECIFIC CONDUCTANCE	µmhos/Cm	2772	1609	47300	74981	17850	18227
TEMPERATURE	º C	12.3	12.6	16.7	19.9	11.7	11.3

NOTES:

< Less than PQL
NA Not Analyzed
J Result qualified as estimated value >= MD
D Concentration is reported from a diluted r
E Result exceeds calibration range of the G
B Analyte was also detected in the associat
L Physical and chemical interferences are p
\# Combined total of 3- and 4-methylphenol

Sample Name:		145G3	146AR	146B	146C	146E	146F
Sample Date:		9/5/00	9/12/00	9/12/00	9/12/00	9/12/00	9/13/00
Volatiles							
1,1,2,2-Tetrachloroethane	µg/L	<1.0	<1.0	<1.0	<1.0	<1000	<1000
1,1,2-Trichloroethane	µg/L	4.1	<1.0	<1.0	<1.0	<1000	1200
1,1-Dichloroethene	µg/L	<1.0	1.3	8.2	<1.0	<1000	<1000
1,2-Dichloroethane	µg/L	<1.0	<1.0	1.1	<1.0	<1000	<1000
Carbon Tetrachloride	µg/L	<1.0	<1.0	<1.0	<1.0	<1000	<1000
Chloroform	µg/L	2.4	<1.0	<1.0	<1.0	4900	<1000
cis-1,2-Dichloroethene	µg/L	21	1	50	3.5	4200	21000
Tetrachloroethene	µg/L	<1.0	<1.0	6.8	2	<1000	<1000
trans-1,2-Dichloroethene	µg/L	6.2	<1.0	8.7	<1.0	<1000	1700
Trichloroethene	µg/L	<1.0	<1.0	6.3	7.3	21000	9700
Vinyl Chloride	µg/L	3.7	4.3	36	7.6	1400	3100
Semi-Volatiles							
2,4,5-Trichlorophenol	µg/L	<10	<10	79	<10	1600	1400
2,4,6-Trichlorophenol	µg/L	<10	<10	15	<10	280	510
3-METHYLPHENOL	µg/L	<10	<10	23 #	<10	<200	<200
4-Methylphenol	µg/L	<10	<10	23 #	<10	<200	<200
Hexachlorobenzene	µg/L	<10	<10	<10	<10	<200	<200
Hexachlorobutadiene	µg/L	<10	<10	<10	<10	<200	<200
Hexachloroethane	µg/L	<10	<10	<10	<10	<200	<200
Pentachlorophenol	µg/L	<10	16	22	<10	200	<200
Phenol	µg/L	<10	<10	<10	<10	<200	780
Metals							
Barium, Dissolved	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Miscellaneous Parameters							
Chloride	mg/L	9700	480	430	110	353	1500
Field Parameters							
PH	Std	7.6	8.08	11.38	7.65	7.23	6.37
SPECIFIC CONDUCTANCE	µmhos/Cm	24704	2283	1415	1235	2175	6268
TEMPERATURE	º C	12.1	18.9	16.1	16.1	13.5	12.5

NOTES:

< Less than PQL
NA Not Analyzed
J Result qualified as estimated value >= MD
D Concentration is reported from a diluted r
E Result exceeds calibration range of the G
B Analyte was also detected in the associat
L Physical and chemical interferences are p
\# Combined total of 3- and 4-methylphenol

Sample Name:		147D	147D	147F	147G1	147G2	147G3
Sample Date:		8/31/00	8/31/00 DUP	8/31/00	8/31/00	8/31/00	8/31/00
Volatiles							
1,1,2,2-Tetrachloroethane	µg/L	<5.0	<5.0	<1.0	<20	<200	430
1,1,2-Trichloroethane	µg/L	<5.0	<5.0	<1.0	<20	260	410
1,1-Dichloroethene	µg/L	<5.0	<5.0	<1.0	<20	<200	220
1,2-Dichloroethane	µg/L	<5.0	<5.0	<1.0	28	230	260
Carbon Tetrachloride	µg/L	<5.0	<5.0	<1.0	<20	<200	<100
Chloroform	µg/L	<5.0	<5.0	<1.0	<20	<200	<100
cis-1,2-Dichloroethene	µg/L	190	200	1.3	<20	4100	9600
Tetrachloroethene	µg/L	<5.0	<5.0	<1.0	<20	<200	<100
trans-1,2-Dichloroethene	µg/L	<5.0	<5.0	<1.0	110	680	600
Trichloroethene	µg/L	<5.0	<5.0	<1.0	<20	<200	<100
Vinyl Chloride	µg/L	27	29	1	830	7300	4700
Semi-Volatiles							
2,4,5-Trichlorophenol	µg/L	<10	<10	<10	<10	<40	<40
2,4,6-Trichlorophenol	µg/L	<10	<10	<10	<10	<40	<40
3-METHYLPHENOL	µg/L	<10	<10	<10	<10	<40	<40
4-Methylphenol	µg/L	<10	<10	<10	<10	<40	<40
Hexachlorobenzene	µg/L	<10	<10	<10	<10	<40	<40
Hexachlorobutadiene	µg/L	<10	<10	<10	<10	<40	<40
Hexachloroethane	µg/L	<10	<10	<10	<10	<40	<40
Pentachlorophenol	µg/L	<10	<10	<10	<10	<40	<40
Phenol	µg/L	<10	<10	<10	<10	<40	<40
Metals							
Barium, Dissolved	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Miscellaneous Parameters							
Chloride	mg/L	25.4	25.6	124	500	1900	2200
Field Parameters							
PH	Std	7.25	NA	7.25	6.9	6.61	6.68
SPECIFIC CONDUCTANCE	µmhos/Cm	1536	NA	2570	3142	7464	8756
TEMPERATURE	º C	15.2	NA	14.6	15.1	15.2	14.9

NOTES:

< Less than PQL
NA Not Analyzed
J Result qualified as estimated value >= MI
D Concentration is reported from a diluted r
E Result exceeds calibration range of the G
B Analyte was also detected in the associat
L Physical and chemical interferences are p
\# Combined total of 3- and 4-methylphenol

APPENDIX B
NECCO PARK BASELINE GROUNDWATER DATA

Sample Name:		148D	149C	150A	150B	150E	150F
Sample Date:		8/29/00	8/28/00	9/11/00	9/11/00	9/11/00	9/12/00
Volatiles							
1,1,2,2-Tetrachloroethane	µg/L	<1.0	<1.0	<1.0	<20	<5.0	<100
1,1,2-Trichloroethane	µg/L	<1.0	<1.0	<1.0	<20	<5.0	<100
1,1-Dichloroethene	µg/L	<1.0	<1.0	<1.0	<20	25	140
1,2-Dichloroethane	µg/L	<1.0	<1.0	<1.0	<20	<5.0	<100
Carbon Tetrachloride	µg/L	<1.0	<1.0	<1.0	<20	<5.0	<100
Chloroform	µg/L	<1.0	<1.0	<1.0	<20	27	150
cis-1,2-Dichloroethene	µg/L	<1.0	<1.0	<1.0	610	270	2300
Tetrachloroethene	µg/L	<1.0	<1.0	<1.0	630	<5.0	<100
trans-1,2-Dichloroethene	µg/L	<1.0	<1.0	<1.0	32	23	140
Trichloroethene	µg/L	<1.0	<1.0	<1.0	590	44	120
Vinyl Chloride	µg/L	<1.0	<1.0	<1.0	260	97	540
Semi-Volatiles							
2,4,5-Trichlorophenol	µg/L	<10	<10	<10	480	<40	<100
2,4,6-Trichlorophenol	µg/L	<10	<10	<10	<67	<40	<100
3-METHYLPHENOL	µg/L	<10	<10	<10	84 #	<40	<100
4-Methylphenol	µg/L	<10	<10	<10	84 #	<40	<100
Hexachlorobenzene	µg/L	<10	<10	<10	<67	<40	<100
Hexachlorobutadiene	µg/L	<10	<10	<10	<67	<40	<100
Hexachloroethane	µg/L	<10	<10	<10	<67	<40	<100
Pentachlorophenol	µg/L	<10	<10	<10	210	<40	<100
Phenol	µg/L	<10	<10	<10	240	210	760
Metals							
Barium, Dissolved	mg/L	<0.20	<0.20	<0.20	0.96	<0.20	0.38
Miscellaneous Parameters							
Chloride	mg/L	175	244	110	1700	6000	13000
Field Parameters							
PH	Std	7.15	8.32	7.16	11.64	6.25	6.06
SPECIFIC CONDUCTANCE	µmhos/Cm	1709	1350	1950	4251	17449	32606
TEMPERATURE	º C	13.7	15	16.3	14.2	15.6	14.4

NOTES:

< Less than PQL
NA Not Analyzed
J Result qualified as estimated value >= MD
D Concentration is reported from a diluted r
E Result exceeds calibration range of the G
B Analyte was also detected in the associat
L Physical and chemical interferences are p
\# Combined total of 3- and 4-methylphenol

APPENDIX B
NECCO PARK BASELINE GROUNDWATER DATA

Sample Name:		151C	152BC	156D	156E	156F	D-11
Sample Date:		8/30/00	8/28/00	8/30/00	8/30/00	8/30/00	8/30/00
Volatiles							
1,1,2,2-Tetrachloroethane	µg/L	<100	<1.0	<1.0	<1.0	<100	<2.0
1,1,2-Trichloroethane	µg/L	<100	<1.0	<1.0	<1.0	<100	<2.0
1,1-Dichloroethene	µg/L	380	<1.0	<1.0	<1.0	<100	7.4
1,2-Dichloroethane	µg/L	<100	<1.0	<1.0	<1.0	<100	<2.0
Carbon Tetrachloride	µg/L	<100	<1.0	<1.0	<1.0	<100	<2.0
Chloroform	µg/L	1400	<1.0	<1.0	<1.0	<100	3.8
cis-1,2-Dichloroethene	µg/L	5800	<1.0	<1.0	2.1	1500	12
Tetrachloroethene	µg/L	<100	<1.0	<1.0	<1.0	<100	10
trans-1,2-Dichloroethene	µg/L	370	<1.0	1.7	1.8	160	2.1
Trichloroethene	µg/L	1600	<1.0	1.6	2.4	<100	56
Vinyl Chloride	µg/L	1600	<1.0	3.6	7.7	3500	<2.0
Semi-Volatiles							
2,4,5-Trichlorophenol	µg/L	<40	<10	<10	<10	360	<20
2,4,6-Trichlorophenol	µg/L	<40	<10	<10	<10	56	<20
3-METHYLPHENOL	µg/L	120 #	<10	<10	<10	<40	<20
4-Methylphenol	µg/L	120 #	<10	<10	<10	<40	<20
Hexachlorobenzene	µg/L	<40	<10	<10	<10	<40	<20
Hexachlorobutadiene	µg/L	<40	<10	<10	<10	<40	<20
Hexachloroethane	µg/L	<40	<10	<10	<10	<40	<20
Pentachlorophenol	µg/L	<40	<10	<10	<10	<40	<20
Phenol	µg/L	260	<10	<10	<10	<40	120
Metals							
Barium, Dissolved	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Miscellaneous Parameters							
Chloride	mg/L	5590	170	270	248	368	420
Field Parameters							
PH	Std	6.21	7.04	7.01	7.04	6.96	11.49
SPECIFIC CONDUCTANCE	µmhos/Cm	19435	1770	2083	2162	3030	1955
TEMPERATURE	º C	20.3	13.8	15.1	13.6	14.3	18

NOTES:

< Less than PQL
NA Not Analyzed
J Result qualified as estimated value >= MD
D Concentration is reported from a diluted r
E Result exceeds calibration range of the G
B Analyte was also detected in the associat
L Physical and chemical interferences are p
\# Combined total of 3- and 4-methylphenol

APPENDIX B
NECCO PARK BASELINE GROUNDWATER DATA

Sample Name: Sample Date:		D-13 8/29/00	D-23 9/14/00	D-9 9/6/00
Volatiles				
1,1,2,2-Tetrachloroethane	µg/L	<1.0	34000	65
1,1,2-Trichloroethane	µg/L	<1.0	8500	65
1,1-Dichloroethene	µg/L	<1.0	<1000	19
1,2-Dichloroethane	µg/L	<1.0	3200	<5.0
Carbon Tetrachloride	µg/L	<1.0	2700	<5.0
Chloroform	µg/L	<1.0	51000	110
cis-1,2-Dichloroethene	µg/L	<1.0	8200	28
Tetrachloroethene	µg/L	1.5	4200	94
trans-1,2-Dichloroethene	µg/L	<1.0	1400	9.4
Trichloroethene	µg/L	1.4	19000	320
Vinyl Chloride	µg/L	<1.0	2000	8.3
Semi-Volatiles				
2,4,5-Trichlorophenol	µg/L	<40	<2000	<10
2,4,6-Trichlorophenol	µg/L	<40	<2000	<10
3-METHYLPHENOL	µg/L	44 #	<2000	<10
4-Methylphenol	µg/L	44 #	<2000	<10
Hexachlorobenzene	µg/L	<40	<2000	<10
Hexachlorobutadiene	µg/L	<40	12000	<10
Hexachloroethane	µg/L	<40	<2000	<10
Pentachlorophenol	µg/L	<40	<2000	<10
Phenol	µg/L	250	<2000	<10
Metals				
Barium, Dissolved	mg/L	0.26	2430	<0.20
Miscellaneous Parameters				
Chloride	mg/L	630	2800	130
Field Parameters				
PH	Std	12.18	7.04	7.32
SPECIFIC CONDUCTANCE	µmhos/Cm	3868	64571	1555
TEMPERATURE	º C	18.5	12.6	15.9

NOTES:

< Less than PQL
NA Not Analyzed
J Result qualified as estimated value >= MI
D Concentration is reported from a diluted r
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L Physical and chemical interferences are p
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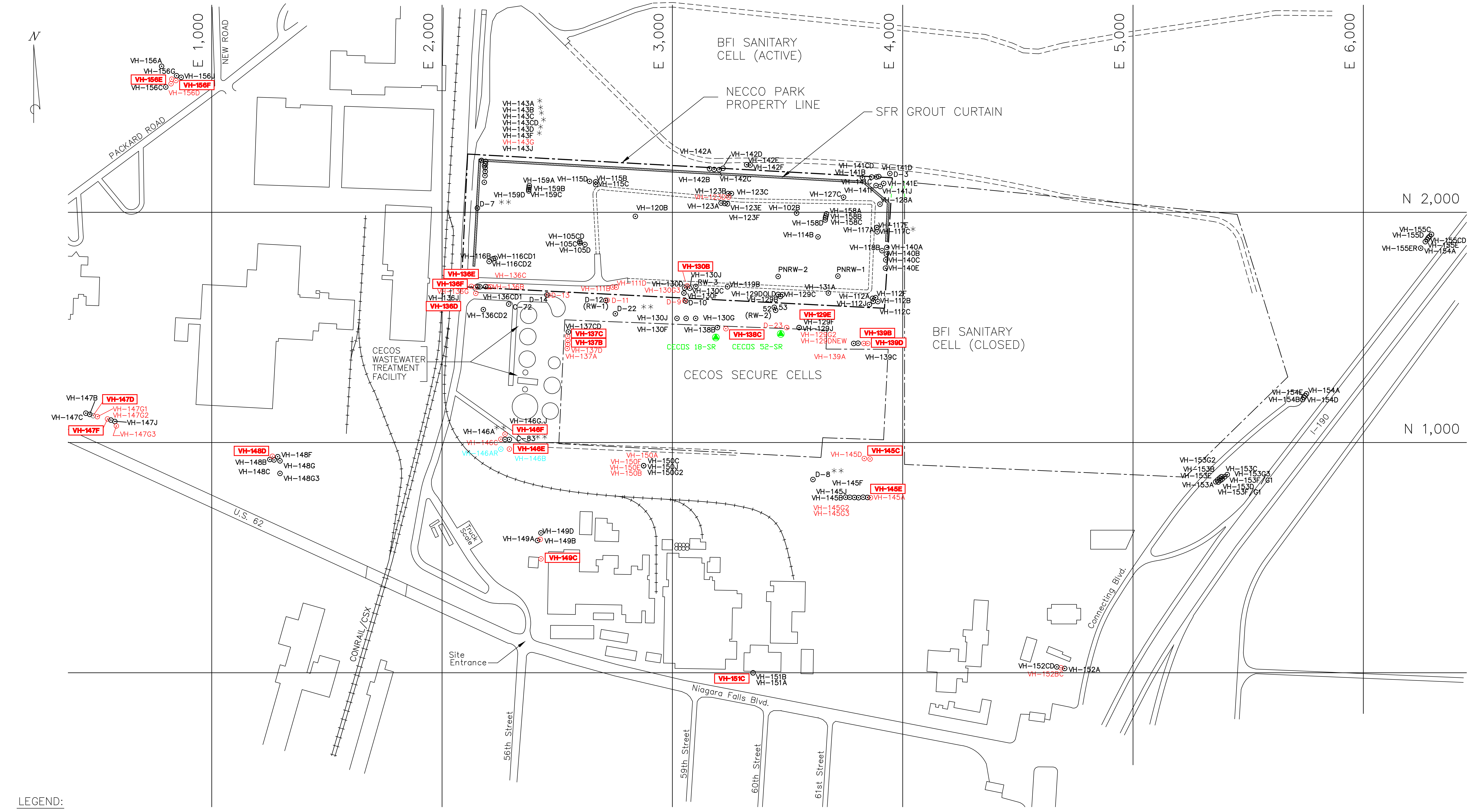
ATTACHMENTS



0 200 400
FEET

LEGEND:

⊙	MONITORING WELL
⊙	PROPOSED MONITORING WELL
CECOS 18-SR ▲	CECOS MONITORING WELL
*	WELL GROUTED DURING SFR GROUT CURTAIN INSTALLATION
**	WELL ABANDONED
=====	UNPAVED ROAD
D-11 ⊙	BASELINE CHEMICAL MONITORING PROGRAM WELL
VH-151C	WELLS FOR NATURAL ATTENUATION ASSESSMENT

TAKEN FROM WOODWARD-CLYDE DWG. No. 81370160

NO.	REVISIONS	BY	DATE

	INITIALS
DESIGNED	
DRAWN SMF	
CHECKED PFM	
APPROVED(DESIGN) JMM	
APPROVED(CONSTRUCTION)	

DUPONT

Corporate Remediation Group

An Alliance between
DuPont and The W-C Diamond Group

Barley Mill Plaza, Building 27
Wilmington, Delaware 19880-0027

MONITORING WELL LOCATION MAP

DuPONT NECCO PARK
NIAGARA FALLS, NEW YORK

SCALE	DATE	DRAWING NO.	FIGURE
1" = 200'	10/26/99	1281-1A	1A