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Transect Study of the Intrinsic Bioremediation Test Plot

Dover Air Force Base
Dover, Delaware

TRANSECT STUDY OF THE INTRINSIC BIOREMEDIATION TEST PLOT

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CONTENTS

CONTENTS
(Continued)

FIGURES

CONTENTS
(Continued)

CONTENTS
(Continued)

TABLES

CONTENTS
(Continued)

APPENDIXES

EXECUTIVE SUMMARY

Under a joint research and development agreement, the Remediation Technology Development Forum (RTDF), a consortium of government and industry representatives, conducted a detailed characterization study of the chloroethene plume at Dover Air Force Base (DAFB), Dover, Delaware. The study was conducted to determine the mass flux of chlorinated ethenes, calculate apparent first-order decay rates, and compare these results to mass flux and degradation estimates from conventional groundwater monitoring well data. The study evaluated the distribution and mass flux of tetrachloroethene (PCE); trichloroethene (TCE); cis-1,2-dichloroethene (cis-1,2-DCE); vinyl chloride; and 1,2-dichloroethane (DCA) in the unconsolidated, fluvial, Columbia Aquifer by collecting samples and determining hydraulic conductivity at 103 discrete points along three transects across the plume.

Mass flux was calculated across each transect by summing the product of each chlorinated ethene concentration times groundwater flow rate for the area represented by each sampling point. Apparent biodegradation rates were then determined from the change in mass flux between upgradient and downgradient transects. For comparison purposes, the mass flux of chlorinated ethenes were also determined at each transect location using isoconcentration maps produced from groundwater monitoring well data and average groundwater flow rates.

Chloroethene mass flux were also determined from statistical analysis of the transect data. This analysis demonstrated a statistically significant difference in mass flux between the upgradient and two downgradient transects. However, no statistical difference was found between the two downgradient transects.

Comparison of mass flux from the transect study and monitoring well data resulted in similar conclusions concerning the transect study of the intrinsic bioremediation test plot. Although absolute values differed, both methods indicate natural attenuation is occurring. Results from both methods also supported previous findings that anaerobic processes degraded PCE; TCE; cis-1,2-DCE; and vinyl chloride in the upgradient portion of the study area and that aerobic processes degraded cis-1,2-DCE and vinyl chloride in the downgradient area. TCE in the aerobic portion of the study area persists beyond the study area boundaries.

Comparison of the results support that detailed plume analysis by collecting point data is not necessary to demonstrate natural attenuation at a site in which the vertical and lateral morphology of a plume is defined by monitoring well data. The transect study provided no significant information that had not previously been determined from existing monitoring well data to justify the estimated $175,000 study cost. The mass flux for each compound was generally consistent between the transect and monitoring well data. Further analysis of the transect data indicates that mass flux is sensitive to the hydraulic gradient in areas where large variations in hydraulic conductivities were observed.

SECTION 1
INTRODUCTION

This report presents results of a detailed evaluation of the transect study of the intrinsic bioremediation test plot conducted in 1997 at Dover Air Force Base (DAFB), Dover, Delaware (see Figure 1). Specific objectives of detailed geochemical and hydrogeologic data collected follow in Section 1.4. Subsequent sections present the investigation methods, results, findings, discussion, and conclusions.

Drafts of this report were reviewed by the Environmental Protection Agency (EPA), whose comments were incorporated into the text.

1.1 Background

Under a joint research and development agreement, the Remediation Technology Development Forum (RTDF) reviewed several sites for bioremediation pilot studies. The RTDF, a consortium of government and industry representatives that includes the United States Department of Energy (DOE), the EPA, Beak International, Ciba-Geigy, The Dow Chemical Company, DuPont, General Electric, ICI, Monsanto, and Zeneca, agreed to pool knowledge and resources to demonstrate the bioremediation of chlorinated solvents. The DAFB in Dover, Delaware, was selected to test two separate RTDF programs, an accelerated anaerobic biodegradation study and an intrinsic bioremediation study.

The intrinsic bioremediation program is being conducted because of the existence of a chloroethene plume in and downgradient of the highly industrialized West Management Unit (West Unit) of the DAFB, in the region identified as Area 6 (see Figure 2). The program is intended to demonstrate, through a combination of laboratory and field studies, the occurrence of the natural biological attenuation of chlorinated solvents in groundwater and to gain an understanding of the key parameters for predicting the rate and extent of reaction at other sites.

1.2 Site Geology and Hydrogeology

Complete geologic and hydrogeologic characterizations of the study area were conducted during the spring of 1995. The results of the characterization as detailed in the *Site Characterization of*

Area 6, Dover Air Force Base, In Support of Natural Attenuation and Enhanced Anaerobic Bioremediation Projects [DuPont Environmental Remediation Services (DERS), 1997] is summarized below.

DAFB is underlain by several geologic units, two of which are important in the intrinsic bioremediation study area, the Columbia Formation and the Calvert Formation. In the Dover area, the Pleistocene Columbia Formation is a fluvial deposit resulting from glacial outwash during the glacial recession. Because of the sediment-rich system, the deposits were laid down in a braided stream environment that scoured the underlying Miocene Calvert Formation. The Columbia is approximately 50 feet thick in the study area and consists of fine to medium silty sand; medium to coarse sand and gravel; and, in local areas, gravel and pebbles and possibly cobbles. The sand and gravel sequence of the Columbia Formation is overlain by a relatively continuous silt or clay ranging in thickness from approximately 2 to 5 feet. This clay is probably recent in age. Fill or topsoil, which may be as much as 7 feet thick, overlies the natural deposits.

The Columbia Formation is underlain by the Calvert Formation, a Miocene deposit of stiff silts and clays. The upper 12 to 18 inches of the Calvert Formation is brownish-red and deeper portions are dark gray, indicating that the surface was oxidized at one time. The Calvert Formation is continuous in the study area. Based on geologic studies to date, including soil borings and cone penetrometer test holes, the depth to the Calvert Formation ranges from 35 to 50 feet and is structurally lower to the southeast of the study area (see Figure 3).

1.3 Distribution of Chlorinated Organics

A complete characterization of the groundwater geochemistry of the study area was conducted by collecting and analyzing groundwater samples at triennial intervals. Figure 4 presents the monitoring well locations. The results of this characterization as detailed in the report titled *The Groundwater Geochemistry of Area 6, Dover Air Force Base, Dover Delaware* (RTDF, 1998) is summarized below.

Chlorinated volatile organic compounds (VOCs) are present in the fluvial deposits of the Columbia Formation in the intrinsic bioremediation program test plot. The Area 6 plumes are characterized primarily by chlorinated solvents and, to a lesser extent, petroleum hydrocarbons. The predominant constituents of concern (COCs) in this area are tetrachloroethene (PCE);

trichloroethene (TCE); cis-1,2-dichloroethene (cis-1,2-DCE); and vinyl chloride. The Columbia Formation fluvial deposits comprise a single aquifer, however, because of varying permeability in the stratified deposits, the alluvium generally can be divided into two flow zones, shallow and deep. Flow direction is similar in both zones, with groundwater flowing from the northern portion of the study area south and southwest toward the Saint Jones River. The highest VOC concentrations are found in the deep zone.

The shallow aquifer zone is between the water table (9 to 13.5 feet below grade) and a depth of approximately 25 feet. Elevated concentrations of chloroethene compounds (i.e., PCE; TCE; and cis-1,2-DCE) in the shallow aquifer are limited in lateral extent and correspond with identified source areas (DERS, 1997).

The deep aquifer is the zone between 25 feet and approximately 40 to 50 feet below grade, with the bottom of the deep zone corresponding to the top of the Calvert Formation. A structural contour map of the top of the Calvert Formation is included as Figure 3. The lateral extent of contamination in the deep portion of the Columbia aquifer is considerably larger in extent than what is observed in the shallow zone. Because slight downward vertical gradients exist, dissolved contaminants originating in shallow zone source areas tend to migrate to deeper portions of the aquifer, downgradient from the source areas. Isoconcentration maps of total [in units of micrograms per liter (µg/L)] and individual chloroethenes (i.e., PCE; TCE; cis-1,2-DCE; and vinyl chloride) within the deep zone from July 1996 are presented as Figures 5 through 9, respectively.

1.4 Field Transect Study Objectives

The overall object of the field transect study was to evaluate, in detail, the distribution of chloroethenes along cross sections of the plume downgradient of the source areas. The data were used to determine if the majority of the mass of chloroethenes is limited to a small cross-sectional area and if the remainder of the plume is diffuse. The study also was used to determine if monitoring well data can represent plume mass distribution adequately. Finally, study results were used to evaluate the natural attenuation of the plume further.

SECTION 2
METHODS

To meet the objectives, detailed site characterization was necessary. The field transect study collected detailed site characterization data from 103 points along three transects across the chloroethene plume in the intrinsic bioremediation program area using Strataprobe® direct-push field sampling techniques. This detailed site characterization data were compared to more traditional site characterization data such as data from routinely sampled monitoring wells. The differences in chloroethene distribution obtained by each method were evaluated. The subsections below describe the methods used to design and implement the transect study.

2.1 Study Design Method

Transect locations were selected by analyzing existing monitoring well data using the Surfer® (Version 6) computer program from Golden Software, Inc., Golden, Colorado. Surfer was used to create regularly spaced (i.e., grid) data interpolated from irregularly spaced groundwater concentration (i.e., X, Y, and Z) data (see Table 1). The grid data were contoured to depict the distribution of COCs (i.e., Z values). Cross sections (i.e., transects) of the plumes were extracted from the grid data using the Surfer slice function. These transects were imported into an Microsoft Excel spreadsheet and analyzed to predict mass flux and natural attenuation rates (see Section 4.1).

Figures 10 through 14 present isoconcentration maps of July 1996 groundwater analytical data for total and individual chlorinated COCs (see Table 1). Figure 15 presents isoconcentration of chloride in groundwater based on July 1996 monitoring well data. The grid values from the monitoring well data were interpolated using the Surfer kriging algorithm. No variogram was created for the data. Instead, parameters for the kriging algorithm were developed using trial and error until contoured grid data reasonably represented the observed COC distribution shown in Figures 5 through 9. The following parameters were developed for the gridding algorithm:

- Grid Spacing: 50 feet x 50 feet
- Grid Method: Kriging
  - Component 1: Linear

- — A parameter: default
- — C parameter: default
- — Anisotropy = 5 @ 185° (general groundwater flow direction)

- Component 2: Gausian
  - — A parameter: Maximum Z value
  - — C parameter: default
  - — Anisotropy = 5 @ 185° (general groundwater flow direction)

❑ Search: Quadrant

- Search Ellipse
  - — Radius 1 = default
  - — Radius 2 = 800 (maximum plume width from manually contoured data)
  - — Angle = 185° (general groundwater flow direction)

Additionally, nondetected results were assigned zero values as were areas outside of the plume as defined by historical data.

A comparison of Figures 10 through 14 to their corresponding manually contoured data presented in Figures 5 through 9 shows that the computer-contoured data reasonably depict observed conditions. Variations from the manually contoured data occur near source areas, whereas computer-contoured data are represented by a more elliptical pattern and located along the plume edge where data are more erratic. These variations are not expected to significantly effect any subsequent analysis because mass flux analyses were performed downgradient of the source areas, and the concentrations along the plume edge are significantly less than in the central portion.

Figure 16 shows the three transect locations that were selected based on monitoring well data analysis. Transect locations were selected to sample groundwater near but downgradient of the source areas, midway downgradient, and at the leading edge of the plume. Transects were located downgradient of suspected source areas to avoid addition of mass between transects.

2.2 Field Methods

Groundwater samples were collected using Strataprobe direct-push technology. Sampling began at the outside locations of each transect to verify the lateral extent of the plume. Once the lateral extent of the plume was verified, the sampling proceeded inward toward the center of the plume. Samples were collected from 2-foot screen lengths at 5-foot depth intervals from the base of the deep zone of the Columbia Formation to the base of the shallow zone.

2.2.1 Direct-Push Technology Description

Because of the advantages of minimal waste generation and rapid sample collection, the Strataprobe was selected for this project. This unit uses a truck-mounted pneumatic hammer with a hydraulic ram to advance 2-inch outer diameter steel rods through the ground subsurface to the desired sample depth. The lead rod is equipped with a stainless-steel 0.006-inch slotted screen that is exposed to the water-bearing zone when the operator retracts the rods. In this investigation, the rods were pulled back to expose 2 feet of screen. A sacrificial steel drive point was used at each hole to advance the screen to sample depth.

2.2.2 Screen Development

Before testing or sampling was performed, field personnel developed the screened section according to the following procedure. Once the screen was exposed, the water level was allowed to equilibrate, and the static water level was recorded. Field personnel then inserted polyethylene tubing through the rods to the center of the screen section and began pumping the well with a peristaltic pump to develop the screen. Development was determined from visual observation of turbidity.

2.2.3 Hydraulic Conductivity Testing

To compute the mass flux of chloroethenes through the transect areas, hydraulic conductivity data were needed at each sample point. Hydraulic conductivity at each sample point was determined using an EPA-developed method that is described in a paper by Cho, et al. (2000) .

Specific Capacity Tests

After development of the screen zone, the water level was allowed to return to the static level. Field personnel raised the tubing until the intake was 1 foot below the recorded static water level and began pumping until both air and water were pumped. Where pumping rates were insufficient to cause 1 foot of drawdown, the tubing was raised until both air and water were pumped. With the pumping water level static, the flow rate was determined by collecting the purged water in a graduated cylinder and recording the amount of time required to collect a specific volume. The flow rate and drawdown could then be used to calculate the specific capacity for each sample point.

Well IR-07D Hydraulic Conductivity Calibration to Transect Specific Capacity

Initially, conversion of specific capacities obtained from the Strataprobe locations to hydraulic conductivities was attempted by developing a calibration factor. This calibration factor was obtained by conducting Strataprobe specific capacity tests adjacent to a monitoring well in which a drawdown test was conducted. This method was later abandoned for the method provided by Cho, et al. (2000) and described in Section 3. For completeness purposes, a description of the side-by-side test is presented below.

The Strataprobe specific capacity tests were conducted adjacent to monitoring well IR-07D and at depths correlating to the screened interval of the well. Monitoring well IR-07D was selected for the calibration test because it is screened in the same formation and zone in which the sampling and specific capacity testing were conducted.

First, the Strataprobe specific capacity tests were conducted adjacent to the well. The field crew performed three separate tests: one each at the top, middle, and bottom depths of the monitoring well screen section (see Figure 17). After the specific capacity tests were completed, a drawdown test was performed on the monitoring well to determine the hydraulic conductivity. The well was initially pumped at 1 to 2 gallons per minute (gpm) using a centrifugal pump with 1 3/4-inch black polyethylene drop tubing. The pumping rate was increased twice until a steady drawdown was achieved (see Figure 18). Using a pumping rate of 7.9 gpm and a drawdown of 1.2 feet, the hydraulic conductivity was computed to be 31 feet/day (ft/day) [1.17×10^{-2} centimeters per sec (cm/sec)].

2.2.4 Groundwater Sampling

After completing the specific capacity tests at each sample point, groundwater samples were collected for both laboratory and field analysis. Samples were collected using the same peristaltic pump and dedicated polyethylene tubing that was used in the specific capacity tests.

Prior to sampling, the water in the rods was purged by pumping from the screen zone until field parameters became stable. First, the groundwater was pumped until the turbidity reduced to a reasonable level. Then, the tubing was connected to an in-line flow cell, and parameters were recorded for each well volume purged until pH, temperature, and specific conductance became stable.

For this project, a QED Purge Saver flow cell was used. This flow cell is designed to provide accurate measurements from a flow of groundwater with no aeration. Parameters measured include temperature, pH, conductivity, redox, and dissolved oxygen (see Appendix A for field measurements). To ensure proper flow cell operation, the instrument was calibrated daily before sampling began. A calibration check was performed at midday to confirm instrument accuracy.

When field parameters measured by the flow cell stabilized, the polyethylene tube was disconnected, and samples were collected. The flow rate was reduced to approximately 100 milliliters per minute (ml/min) or to the lowest rate at which an even flow of water could be attained. Sample containers were filled with the discharge toward the sides of the wall to minimize volatilization.

Samples were collected for the following parameters: priority pollutant VOCs, including trans- and cis-1,2-DCE; total organic carbon; methane; ethane; ethene; propane; sulfide; sulfate; nitrate; nitrite; chloride; and alkalinity. All samples were placed on ice in a cooler and shipped by overnight courier to the ICI laboratory in Mississauga, Canada, for analysis.

In addition to laboratory analytical data, field tests were conducted for total and dissolved iron, manganese, and sulfide. These field tests were conducted using the ChemMetrics™ chlorimetric test kits. Dissolved manganese samples were field-filtered using a 45-micron filter and peristaltic pump.

VOC headspace analysis was also performed on samples from each location by collecting sample water in a mason jar and securing foil over the lid with the screw-on ring top. Approximately one half an hour after the headspace sample was collected, the headspace was sampled with a flame ionization detector by piercing the foil with the probe. Headspace readings ranged from 0 to 420 parts per million (ppm) (see Appendix A).

2.3 Cost

The total cost to conduct the study was approximately $175,000 as summarized below. This cost is an order of magnitude greater the estimated cost of $15,000 to determine the mass flux using existing monitoring well data as described in Section 4.1.

Strataprobe Contractor	$64,800
Strataprobe Contractor (remobilization for confirmation samples)	$4,640
Surveying Contractor	$5,000
ICI Sample Analysis (estimated from commercial rates)	$33,000
Field Oversight and Data Management (DERS)	$48,000
Data Evaluation and Report Preparation (estimated)	$20,000
TRANSECT STUDY TOTAL	**$175,440**

SECTION 3
RESULTS

The subsections below present the hydraulic conductivity and analytical results obtained during the field investigation.

3.1 Hydraulic Conductivity Determinations

Hydraulic conductivities were determined through the method described by Cho, et al. (2000). Using this method, the calculated hydraulic conductivities ranged from 0.3 ft/day (1.07×10^{-4} cm/sec) to 339 ft/day (1.2×10^{-1} cm/sec) and averaged 18 ft/day (6.56×10^{-3} cm/sec). Appendix B summarizes the calculated hydraulic conductivities. This average hydraulic conductivity is significantly less than the sitewide average of 68 ft/day (2.4×10^{-2} cm/sec) determined from more conventional pumping and falling head (i.e., slug) tests (DERS, 1997).

The hydraulic conductivity calculated using the method provided by Cho, et al. (2000) is too low to reasonably account for the observed contaminant plume at the site. Using the calculated average hydraulic conductivity *(K)* of 18 ft/day, a sitewide average hydraulic gradient *(I)* of 0.002, and an estimated porosity *(n)* of 0.35, the groundwater flow velocity (v) at the site is as follows:

$$v=-ki/n = 37\ ft/year \qquad (1)$$

The groundwater contaminant plume at DAFB is approximately 7,000 feet in length. Therefore, using an average hydraulic conductivity of 18 ft/day, the contaminant plume age would be approximately 190 years, clearly prior to establishment of the base. The sitewide hydraulic conductivity of 68 ft/day results in a plume age of 50 years, which coincides with the expected initial contaminant releases at the site.

As shown above, the calculated hydraulic conductivities did not reasonably describe the observed plume conditions at DAFB and underestimated hydraulic conductivities as compared with average sitewide values determined from pumping and falling head tests (DERS, 1997). As a result, a calibration factor was subsequently determined from the sitewide hydraulic conductivity and statistical analysis of specific capacity distribution.

Statistical analysis of the specific capacity results from the Strataprobe tests showed that the distribution of these data is lognormal (see Table 2). Further analysis presented in Table 3 showed that the mean value of specific capacity from this distribution is 0.114 ml/cm/sec. Thus, the calibration factor required to make this mean value equivalent to the sitewide hydraulic conductivity is 0.21. This calibration factor was used to determine the hydraulic conductivity at each transect sample location (see Table 4).

Figures 19, 20, and 21 present the resulting hydraulic conductivities at each transect sample location. The distribution of hydraulic conductivities appears to be random within and between each transect as shown in these figures. The hydraulic conductivities were used in combination with the field flow observations presented in Appendix A to better determine the depth of the Calvert Formation, which marks the lower flow system boundary. It should be noted that a number of these samples are believed to have intersected the Calvert Formation based on substantially decreased or no recharge observed. As a result, the sampling device was, in some instances, retracted until sufficient recharge was observed to indicate the presence of aquifer material. The depth of the Calvert Formation was determined based on these observations, which are detailed in the sampling logs presented in Appendix A.

The source of discrepancies between the hydraulic conductivity arrived by the method provided (Cho, et al., 2000) and reported by others (DERS, 1997) may be related to skin effects caused by the sampling method or possibly heterogeneity of the geologic material. Advancement of the Strataprobe may have caused clay and silt to be smeared along the borehole wall, thereby causing skin effects that could not be removed during development with the low volume (i.e., peristaltic) equipment required by the investigation technique.

3.2 Analytical Results

3.2.1 Chlorinated VOCs

Groundwater analytical results from samples collected at each transect are presented in Table 5. Figures 22 through 36 present COC concentrations [i.e., PCE; TCE; cis-1,2-DCE; vinyl chloride; and 1,2-dichloroethane (DCA)] at each transect. As shown on Table 5, numerous other VOCs were detected in groundwater samples collected during the study. The most notable of these VOCs is carbon tetrachloride, along with degradation products chloroform and dichloromethane. These compounds were detected primarily along the eastern portion of the study area;

determining their lateral extent and subsequent mass flux and attenuation was beyond the scope of this study.

As shown in Figures 22 through 24, PCE concentrations in groundwater in upgradient Transect A are concentrated at location TA-03 in the western part of the transect. Elevated PCE concentrations were detected in the shallow samples collected from eastern transect location TA-09. However, PCE at this location appears to be unrelated to the study area plume and likely marks the western edge of a more shallow PCE source east of the study area. As a result, this transect location was not included in analyses. Downgradient of Transect A, PCE was not observed at elevated concentrations (greater than 15 µg/L) or widely distributed in Transect B or Transect C (see Figures 23 and 24).

TCE was detected over the widest study area portion (see Figures 25 through 27). At Transect A, two areas of TCE separated by low concentrations at TA-04 and well nest IR-07 were detected (see Figure 25). As with PCE, elevated TCE concentrations were detected in shallow samples collected from eastern transect location TA-09. This occurrence appears to mark the western boundary of a more shallow source east of the study area. Downgradient of Transect A at Transect B, TCE concentrations were more broadly distributed across the central transect portion (see Figure 26). At Transect C, TCE concentrations continued to be broadly distributed and decreased with the exception of location TC-04 at 40 feet below grade (see Figure 27). The TCE concentration (500 µg/L) at this location was similar to concentrations observed at upgradient Transect B. To confirm this observation, additional transect locations were subsequently installed 5 feet east and west of location TC-04 (i.e., TC-04A and TC-04B, respectively). TCE concentrations at these locations were similar (i.e., 256 and 306 µg/L) to those observed at TC-04 (see Table 6).

cis-1,2-DCE, a degradation product of TCE, was detected at concentrations similar to TCE at Transect A, but concentrations decreased rapidly downgradient toward Transect B (see Figures 28 and 29). cis-1,2-DCE was not detected in Transect C (see Figure 30). As shown in Figure 28, cis-1,2-DCE is concentrated along the western portion of Transect A and was present at concentrations similar or higher than TCE (see Figure 25). However, in the central and eastern portions of Transect A, cis-1,2-DCE concentrations were one to two orders of magnitude less than TCE concentrations. This distribution indicates that the western portion of the plume is degrading more actively than the eastern portion. At Transect B, cis-1,2-DCE was broadly

distributed and generally one to two orders of magnitude below TCE concentrations (see Figures 29 and 26 for cis-1,2-DCE and TCE, respectively). An anomalous high concentration of cis-1,2-DCE was observed in the shallow portion of eastern transect location TB-10 (see Figure 29). This high concentration may be related to degradation of TCE occurrences in the shallow zone observed at upgradient location TA-09 (see Figure 25). cis-1,2-DCE was not observed in Transect C, indicating complete degradation (see Figure 30).

As with cis-1,2-DCE, vinyl chloride distribution indicates that the western portion of the plume is degrading more actively than the eastern portion. In Transect A, vinyl chloride was only observed in the western portion of the plume (see Figure 31). Downgradient at Transect B vinyl chloride was not detected, with the exception of an anomalous occurrence observed in the shallow portion of location TB-10 (see Figure 32). This occurrence is coincident with and attributed to the degradation of elevated cis-1,2-DCE concentrations observed at this location (see Figure 29). Vinyl chloride was not observed in Transect C, indicating complete degradation (see Figure 33).

The other primary chlorinated compound evaluated, 1,2-DCA, was observed along the western portion of the study area at Transect A (see Figure 34). Downgradient at Transect B, 1,2-DCA was observed at less concentration but was more broadly distributed (see Figure 35). Finally, 1,2-DCA was detected sporadically across Transect C and at concentrations only slightly above detection limits (see Figure 36).

3.2.2 Chloride

Chloride generation provides a direct indication of chlorinated VOC dehalogenation at DAFB. The chloride distributions observed at each transect are presented in Figures 37 through 39. In Transect A, the highest chloride concentrations were observed west and east of elevated chlorinated VOC concentrations (e.g., TCE and cis-1,2-DCE distributions as shown in Figures 25 and 28). As shown in Figure 38, at downgradient Transect B elevated chloride concentrations were again observed proximal but not coincident to the highest chlorinated VOC concentrations (see Figure 26). At Transect C, the highest chloride concentration was observed along the eastern edge of the transect and may be related to a chloride source east of the study area (see Figure 39).

3.2.3 Gases

Ethene and methane were also detected in groundwater samples (see Table 5). Figures 40 through 45 present these results along each transect.

Ethene distribution was not widespread across the site and concentrations were low (i.e., less than 11 µg/L). Ethene was only detected at location TA-03 at Transect A (see Figure 40); however, this detection is coincident with the highest vinyl chloride concentration detected along the transect and provides evidence for complete dechlorination of the chloroethenes (see Figure 31). Downgradient of Transect A, ethene was only detected at two locations: once within the Calvert Formation clay along Transect B and once within the upper portion of the deep zone in Transect C (see Figures 41 and 42).

Previous reports indicate that methanogensis is an important biotransformation process at DAFB (RTDF, 1998). The distribution of methane detected during the transect study support these conclusions. Methane distribution was coincident with the presence of chlorinated VOCs at Transect A (see Figure 43). Downgradient of Transect A, methane was only detected sporadically and at relatively low concentrations, indicating that methanogensis is not persistent downgradient of Transect A (see Figures 44 and 45).

3.2.4 Dissolved Oxygen and Redox

Dissolved oxygen and redox measurements were collected in the field during the study to identify zones of reducing and oxidizing conditions (see Appendix A). In general, a combination of low (i.e., less than 1 ppm) dissolved oxygen and negative redox values were used to identify reducing conditions. Where discrepancies between dissolved oxygen and redox existed, information from field logs or other analytical data (e.g., dissolved iron) were used to identify reducing conditions.

The measurements obtained support previous reports stating that reducing conditions promoting dehalogenation operate upgradient at the site and that oxidative biotransformation occurs downgradient (RTDF, 1998). As shown in Figure 46, a relatively broad cross section of Transect A shows reducing conditions with relatively low oxygen concentrations and redox levels. Downgradient of Transect A, reducing conditions were observed but were more localized

(see Figures 47 and 48). These observations also support the conceptual biodegradation model for the site.

SECTION 4
FINDINGS

Mass flux and the subsequent biotransformation kinetics of total chloroethenes and individual COCs were determined by two methods. Results from this analysis were compared to determine if monitoring well data can adequately describe natural attenuation processes at DAFB. Mass flux was first calculated by using plume maps generated from monitoring well data during field study design. Then, mass flux was calculated from the transect data and compared to monitoring well data analysis. Additionally, mass flux from the transect data was determined using two methods to further evaluate natural attenuation at DAFB: direct calculation and statistical analysis. The subsections below present the analysis methods and a discussion of findings.

In each analysis, the mass flux of individual chloroethenes; 1,2-DCA; and chloride ion was determined by multiplying the relevant concentration, *c*, at each sample point by the groundwater flow *(Q)* determined through Darcy's law.

$$M = Q\,c = K\,i\,A\,c \qquad (2)$$

where:
K = Hydraulic conductivity
i = Hydraulic Gradient
A = Cross-sectional area

Resulting mass flux were used to calculate apparent biodegradation rates between transects based on the method presented by Wilson, et al. (1994) in which the apparent degradation rate, $-k$, is given by the following:

$$-k = ln(C_{j+1}/C_j)/\Delta t \qquad (3)$$

where:
C = Mass flux or concentration at transect j
Δt = COC travel time between transects

The travel time for each COC was corrected for retardation by dividing the groundwater travel time by the retardation factor *(Rf)* for each COC as given by the following:

$$Rf = 1 + (\rho_b + n)\ (K_d) \qquad (4)$$

where:

ρ_b = Bulk density

n = Porosity

$K_d = (K_{oc})(f_{oc})$, where f_{oc} is the fraction of organic content and K_{oc} is the partitioning coefficient

4.1 Monitoring Well Data Evaluation

COC isoconcentration maps generated from existing monitoring well data were used to evaluate natural attenuation at DAFB. The mass balance of chloroethenes and chloride provide evidence of natural attenuation. Biotransformation kinetics were determined by simulating transects through the isoconcentration maps using Surfer. These simulation results were compared with findings from the transect data.

4.1.1 Mass Balance of Chlorinated Ethenes and Chloride

The natural attenuation of chloroethenes is supported by the mass balance of chloroethene and chloride ion above background in groundwater at DAFB. Comparing the mass of chloride ion in groundwater versus the mass of chloride contained within the chloroethenes indicates that significant degradation is occurring. As shown on Figure 15, chloride concentrations in groundwater increase from upgradient background levels [5 to 10 milligrams per liter (mg/L)] coincident with the chloroethene plumes (see Figure 10). Elevated chloride concentrations were also present downgradient of known source areas (RTDF, 1998). The similar distributions indicate that chloride ion is being generated from chloroethene reduction.

Background concentrations of chloride were determined from six episodes of sitewide groundwater sampling conducted between June 1995 and March 1997 (RTDF, 1998). No other significant source of chloride ion has been identified at DAFB. Specifically, shallow groundwater monitoring results do not indicate the presence of road salt or other sources of chloride ion (RTDF, 1998).

Using the volume function in Surfer, the mass of chloride contained in the dissolved chloroethenes can be calculated from data files used to create plume maps (Figures 10 through 14). This total mass can be compared with the chloride ion plume mass determined from Figure 15. The "volume" of each plume calculated by Surfer can be converted to the chloride mass, M, within each plume using the following relationship:

$$M = (V_{Surfer})\ (t)\ (\emptyset)\ (mw_{cl}) \qquad \textbf{(5)}$$

where:

V_{Surfer} = Volume calculated by Surfer (ft^2 mg/L).
(Chloride corrected for background concentration.)

t = Aquifer thickness (10 ft)

$\emptyset$ = Porosity (0.35)

mw_{cl} = Molecular weight of chloride in each compound

Table 7 summarizes the results. Based on this analysis, chloroethene plumes at DAFB represent only 0.5% to 2.4% of total chloride mass above the background levels of 5 and 10 mg/L, respectively. These results demonstrate that more than 95% of the dissolved chloroethene plume has been transformed to chloride.

4.1.2 Mass Flux Determined from Monitoring Well Data

Mass flux was determined from monitoring well data used to develop the transect study (see Section 2.1). A more general approach than the subsequent transect study was employed to determine mass flux because detailed aquifer characteristics collected during the transect study would not normally be available for this type of analysis. Mass flux at each transect was determined using contour maps of analytical data collected from monitoring wells and processing functions of Surfer. Appendix C presents the calculations for each transect, as described below.

First, transect field sample locations were imported into the chloroethene Surfer grid files. Figure 16 shows the transect locations that were electronically overlain on Figures 10 through 14). The Surfer slice function was used to cut a cross section across each plume where the X axis represents distance to each grid line along the slice, and the Y axis represents the concentration interpolated at each grid line location. Mass flux for each COC at each transect

was determined by multiplying the concentration interpolated along each transect by the groundwater flow (see Equation 2).

The average hydraulic conductivity of 68 ft/day was used because specific values at each transect would normally not be available. Cross-sectional area *(A)* was determined for each COC concentration value by a cell defined by half of the distance to the next point or, for the first and last value, the distance to the end of the slice. The thickness of the aquifer was uniformly set at 10 feet, which is average for the deep zone at DAFB.

The hydraulic gradient *(i)* was determined from the groundwater contour map of March 1997 monitoring well water level data (see Figure 49). The hydraulic gradient at each transect was calculated individually to reflect the increasing gradient between Transect A and Transect C. Table 8 summarizes and Figure 50 graphically presents the resulting mass flux for each COC.

As shown on Figure 50, chloroethene mass flux decreases by more than an order of magnitude from in the downgradient direction while chloride mass flux remains relatively constant, decreasing by less than an order of magnitude. Because chloride acts as a conservative tracer, the decrease in chloride mass flux is attributed to dilution from infiltration. Infiltration into the deep zone and dilution is further indicated by the divergent groundwater flow as depicted on Figure 49. Biodegradation of the chloroethene plume is indicated by the greater decrease in mass flux than that attributed to dilution (as indicated by chloride).

4.1.3 Apparent Biodegradation Rates from Monitoring Well Data

Apparent biodegradation rates used from analyzing monitoring well data were calculated from the mass flux determined above (see Equation 3). The results of the biodegradation rate calculations are included in Table 8, along with mass flux determined above. Degradation half-lives ranged from 1.5 to 12 years.

4.2 Transect Data Evaluation

Data collected during the transect study were used two ways to determine mass flux. The first method determined the mass flux of individual and total chloroethenes by summing mass flux at each data point in a manner similar to that used in the monitoring well data evaluation presented

in Section 4.1. The second evaluation method used statistical techniques to analyze total mass flux at each transect. The subsections below present the findings of both analytical techniques.

4.2.1 Mass Flux Determined by Summation of Transect Data

Analytical and hydraulic conductivity data collected at each transect sample point were used to calculate mass flux in the area represented by the point using Equation 2.

Hydraulic conductivities were obtained from the specific capacity tests conducted at each sample location (see Section 3.1 and Table 4). As discussed in Section 3.1, the calibration factor used to estimate hydraulic conductivities from the specific capacity tests was corrected based on the distribution of the specific capacity test results and the sitewide average hydraulic conductivity of 68 ft/day. The cross-sectional area *(A)* was determined for each sample point by a cell defined by half of the distance to the nearest sampling point or the distance to the nearest boundary. Figures 51, 52, and 53 show the area assigned to each sampling point in Transects A, B, and C, respectively.

Unlike hydraulic conductivity and analytical results, the hydraulic gradient *(i)* could not be collected at each sample location. Thus, the hydraulic gradient was determined using a sitewide groundwater contour map of March 1997 monitoring well water level data (see Figure 49). Gradients from sitewide data were corrected for the angle of incident between flow lines and each transect because the divergent flow lines do not uniformly cross the transects at right angles. The resulting component of flow normal to each transect was used in the calculations. To obtain the perpendicular component of flow, the perpendicular component of gradient (i_{normal}) was determined by measuring the angle, θ, between the flow line and a line perpendicular to the transect. Once the angle, θ, was measured, the perpendicular component of gradient was computed as follows:

$$i_{normal} = (i)\ (\cos\ \theta) \qquad \textbf{(6)}$$

Substituting i_{normal} for i in the previous equation results in the perpendicular component of flow. Flow calculation results are summarized in Table 9. As summarized below, by correcting for the component of flow perpendicular to the transect, the total flow at each transect was reduced by up to 19%. Specific flow decreases at each transect are as follows:

- Transect A: 13.6% flow decrease
- Transect B: 18.8% flow decrease
- Transect C: 18.8% flow decrease

After the flow values were computed, mass flux was determined for each chloroethene; 1,2-DCA; and chloride at each location by dividing the analytical results for these compounds by their molecular or atomic weights and multiplying by the flow. The results of these calculations are listed in Table 10; the mass flux for each transect is summarized in Table 11.

As shown in Table 11, initial calculations indicated a slight (i.e., 2.4 times) increase of TCE mass flux and, hence, total chloroethene mass flux from Transect B to Transect C. The increase in mass flux between Transects B and C results from an elevated hydraulic conductivity measured at location TC-04-40 (see Figure 21) and approximately equivalent TCE concentrations between Transect B and Transect C (see Figures 26 and 27, respectively). Hydraulic conductivity at this location was higher than the upper measurement limits and more than an order of magnitude greater than the mean hydraulic conductivity for the site (2,000 versus 68 ft/day). This elevated hydraulic conductivity, when combined with the TCE concentration at TC-04-40, resulted in an apparent increase in mass flux. A similar elevated hydraulic conductivity effect at Transect B location TB-05-51.5 was observed.

Because no TCE source is suspected between Transects B and C, the increase in mass flux is attributed to data uncertainties. These uncertainties may be due to the variability in contaminant distribution, measurement error, or the scale at which different variables used in determining mass flux were measured. The transect study was designed to reduce uncertainty in contaminant distribution to the extent practicable. Samples were collected vertically at 5-foot intervals and horizontally at approximately 250 feet or less; the resulting concentrations supported the site conceptual model. As presented in Section 4.2.3, the data indicate a lognormal distribution with an acceptable level of confidence. As a result, the data appear to describe the contaminant distribution at the site adequately. Sources of measurement error are discussed in more detail in Section 3.1 and include skin effects associated with the sampling method. To confirm results at TC-04-40, additional samples were collected from Strataprobe borings located 5 feet normal to the direction of groundwater flow from TC-04-40. Sample results from these borings were similar to the original sample.

Determination of concentration and hydraulic conductivity variables in calculating mass flux were obtained at point locations through Strataprobe sampling. In contrast, hydraulic gradients were determined from groundwater contour maps on a subregional scale. To demonstrate the possible effects of these differing scales on mass flux determination, further sensitivity analysis was conducted. Assuming conservation of mass, Darcy's law dictates that an increase in hydraulic conductivity results in an equal decrease in hydraulic gradient or cross-sectional area. This concept is shown empirically in Figure 54 and demonstrates that more than an order of magnitude decrease in gradient can result from increased hydraulic conductivity observed at TC-04-40.

To demonstrate the effect of hydraulic conductivity on hydraulic gradient (see Figure 54), the United States Geological Survey (USGS) model MODFLOW was applied. A lens of high hydraulic conductivity was modeled as a cross section along a flow path. The dimension of the model was 500 by 10 feet and of unit depth. The 500-foot length was based on the resolution of hydraulic gradient at DAFB from monitoring well data (see Figure 50). Model and lens vertical dimensions were based on the results of the transect sampling in which sample point TC-04-40 is 5-feet thick and is bounded by sample TC-04-35 located 5 feet above. Finally, the lens length was set at $1/10^{th}$ the distance between Transects B and C to reflect the discontinuous nature of the braided stream depositional environment

As this analysis demonstrates, the combination of sitewide hydraulic gradients with point measurements of hydraulic conductivities can dramatically affect flow rates for large variations of hydraulic conductivities. Based on this evaluation, the hydraulic gradient used to determine mass flux at location TC-04-40 was decreased to demonstrate the possible effect that an increase in hydraulic conductivity can have on the resulting mass flux calculation. The resulting mass flux is presented with the unadjusted value in Table 11 and graphically as Figure 55. As shown on Table 11 and Figure 55, the mass flux of chloroethenes decrease by more than an order of magnitude between Transects A and C. This mass flux decrease is generally constant between transects with the exception of TCE. TCE mass flux decreases by more than an order of magnitude between Transects A and B. As discussed above, the mass flux of TCE between Transects B and C did not change appreciably within the error of the study.

Chloride mass flux decreases at a constant rate and by less than an order of magnitude from Transects A to C. Because chloride is a conservative tracer, this decrease is attributed to dilution

and because the decrease is less than decreases observed in chloroethene mass flux, chloroethene plume biodegradation is generally indicated. However, even by correcting the mass flux for hydraulic conductivity effects on gradient, the rate of decrease in TCE mass flux between Transects B and C is similar to the rate of decrease in chloride mass flux between the two transects. As a result, dilution appears to account for any TCE attenuation between Transects B and C.

4.2.2 Biodegradation Rates from Transect Data

Apparent biodegradation rates from the analysis of transect data were calculated from the mass flux determined above (see Equation 3). The results of the biodegradation rate calculations are included in Table 12, along with the mass flux determined for each COC. Degradation half-lives were generally consistent between 2.2 and 3.7 years, with the exception of TCE attenuation between Transects B and C. Reduced TCE attenuation is noted between the two transects even when using a reduced hydraulic gradient that results in a half-life of 9.6 years from Transects B to C.

4.2.3 Mass Flux Determined by Statistical Analysis

An alternative approach to determining the mass flow of chloroethenes through each transect is to use statistical techniques to estimate the mean mass flow per unit area, m, and then multiply this value by the total area of the transect. From Equation 2, the mole flux/unit area/day, m_P, at the specified sampling point, p, in each transect can be derived from the product of K_P, i_P, and c_P. As in the summation method, only the component of flow perpendicular to the transect line is considered. The values of mass flux of total chloroethenes per square meter per day for each transect point are presented in Table 13.

Distribution

To calculate the mean mass flux value, m, and estimate the error involved, information is required on the form of the distribution of m_P values within each transect. The frequency distribution of m_P values for each transect is provided in Table 14, and a comparison with typical lognormal and normal distributions is contained in Figure 56. The comparison indicates that the distribution of m_P values is qualitatively more like a lognormal than a normal distribution.

This tentative conclusion was tested more rigorously by performing the Shapiro-Wilk's test (Shapiro and Wilk, 1965). This test establishes whether the set of empirical results are drawn from a lognormal or a normal distribution. A W-statistic is calculated and its value is compared with reference values derived for specific quantile levels. If the value of W_{set} is greater than the $W_{reference,}$ the hypothesis that the underlying distribution is lognormal or normal is accepted at the specified quantile level. The results of the Shapiro-Wilk's test for the set of m_P values from each transect are contained in Table 15. These results confirm the original view that the distributions are lognormal and *not* normal for the data sets from each of the three transects at the 0.01 quantile.

Calculation of the Mean Value of *mp* for Each Transect

Having established that the distribution of m_P values for each transect is lognormal, the mean value, m, and an estimate of the error for a 90% confidence interval can be calculated using a standard formula (Finney, ____). The results of these calculations are provided in Table 16.

Calculation of the Mole Flux for Each Transect

The mole flux per day for the whole region of each transect can be calculated by multiplying the mean mass flux per unit area value by the appropriate transect areas. The mean values generated by this statistical analysis are only applicable to the regions defined by the boundaries of the sample points as shown in Figure 57. The areas calculated in this way are presented in Table 17. These values were subsequently used to generate the plots in Figure 58 and estimate the mole flux per day of total chloroethenes for each transect.

Statistical analysis determined that there is a statistically significant decrease in the mass flux of total chloroethenes from Transects A to Transect B and C. Although the mean value of mass flux at Transect C was less than Transect B, the values were not statistically different because their upper and lower limits overlapped.

SECTION 5
DISCUSSION AND CONCLUSIONS

5.1 Discussion

Mass flux and subsequent natural attenuation rates were determined from contoured monitoring well data and point data collected with a Strataprobe. The monitoring well data used subregional (i.e., sitewide) parameters of hydraulic conductivity, hydraulic gradient, and aquifer thickness in determining mass flux. Conversely, the Strataprobe sampling attempted to determine the hydraulic conductivity and concentration parameters at each localized point. Indication of natural attenuation from the transect study data was also evaluated by summing mass flux at each point and statistical analysis.

5.1.1 Discussion of Data Set and Analysis Method Differences

The absolute value of mass flux calculated from the separate data sets differ. The total mass flux of chloroethenes at each transect summed over each sample point falls within the range of total mass flux estimated statistically, as expected (see Table 18). However, mass flux calculated from monitoring well data falls outside and above the range estimated statistically. This difference is expected because of the difference in the data source (i.e., Strataprobe versus monitoring well data).

Both data sets indicate that natural attenuation of the plume is occurring. Although absolute values differ between mass flux determined from Strataprobe versus well data, similar conclusions about COC natural attenuation can be made. Table 19 summarizes the natural attenuation rates calculated from the transect and monitoring well data. Natural attenuation rates calculated from monitoring well data were generally conservative relative to rates calculated from transect data. That is, with the exception of PCE and TCE from Transect B to Transect C, natural attenuation rates were lower when calculated from monitoring well data than from Strataprobe data.

As presented in Section 4.2.1, mass flux calculated from both data sets contain uncertainties. Monitoring well data use sitewide parameters and is not affected by variations at a smaller scale. The Strataprobe sampling attempts to account for these

variations by collecting concentration and hydraulic conductivity data at individual points. However, sitewide hydraulic gradients, which must be used in mass flux determination, result in significant uncertainty because of the different scale at which this parameter is determined. That is, hydraulic gradients are determined sitewide versus point determinations of hydraulic conductivities and analyte concentrations. In addition, although 103 individual points were collected during the study, the cross-sectional area assigned to each point ranged as high as 3,420 ft^2. Applying point data (i.e., hydraulic conductivity and chemical analysis) to such a large area also results in uncertainty.

Although analyzing both data sets resulted in similar conclusions (i.e., natural attenuation of chlorinated VOCs is occurring), the cost of conducting this study was more than 10 times the cost of determining mass flux from existing monitoring well data. As a result, conducting a detailed transect study is unwarranted at a site such as DAFB where the existing monitoring well network data effectively describes the lateral and vertical plume limits.

5.1.2 Interpretation of Natural Attenuation from Transect Study Findings

In addition to the primary study objective, which compares the two methods presented above, a number of observations about the intrinsic bioremediation test plot can be made from data collected during the study. These observations support previous study conclusions that used monitoring well data (DERS, 1997). Both monitoring well and Strataprobe data sets indicate that chlorinated VOC natural attenuation is occurring at the site. In addition, chloride data collected during the transect study provide further evidence for natural attenuation and can be used for mass balance analysis.

Chlorinated VOC natural attenuation is indicated by mass flux analysis of both monitoring well data and Strataprobe point data. As shown in Figures 24, 27, 30, 33, and 36, complete degradation of cis-1,2-DCE and vinyl chloride and nearly complete degradation of PCE and 1,2-DCA occur prior to Transect C. TCE was not completely degraded and persists downgradient of the transect study area. This plume morphology supports previous studies that indicate reductive dehalogenation (i.e., PCE→TCE→cis-1,2-DCE→Vinyl Chloride→Ethene) in the anaerobic area generally

upgradient of Transect B and that aerobic oxidation of cis-1,2-DCE; vinyl chloride; and ethene in the downgradient direction (DERS, 1997).

Anaerobic dehalogenation in the area of Transect A with aerobic biotransformation downgradient is also supported by biochemical indicators. Methane was detected coincident with the chlorinated VOCs along Transect A, but was sporadic (only detected at two locations) at downgradient Transects B and C (see Figures 43, 44, and 45). Similarly, an extensive anaerobic zone as defined by low oxygen concentrations and redox levels was observed at Transect A, but only was localized downgradient at Transects B and C.

As shown in Table 7, the mass of chloride ion above background (i.e., 5 to 10 mg/L) accounts for more than 95% of the total mass of chloride (i.e., organic and ionic) observed in groundwater. This occurrence supports the theory that chlorinated VOC biodegradation, resulting in chloride release, is occurring. No other significant source of chloride is suspected at the site.

5.2 Conclusions

The following conclusions result from the intrinsic bioremediation plume transect study at DAFB:

- Chlorinated VOC natural attenuation is occurring in deep zone groundwater based on the mass flux analysis of three transects constructed across the plume. Natural attenuation was indicated by using both monitoring well data and point data collected from 103 Strataprobe sample locations.
- Complete degradation of cis-1,2-DCE and vinyl chloride and nearly complete degradation of PCE and DCA occurred in the transect study area. Complete TCE degradation was not observed within the transect study area.
- Transect data support previous reports (DERS, 1997) evaluating monitoring well data that demonstrate that both anaerobic dehalogenation and aerobic oxygenation of chlorinated VOCs are occurring. Anaerobic processes are occurring in the upgradient portion of the site and aerobic processes predominate in the downgradient direction. These conditions result in the persistence of TCE downgradient of the transect study area.
- Uncertainties in conducting the mass flux analysis of point data include applying point source data to large cross-sectional areas and accounting for the effects on

hydraulic gradient of large hydraulic conductivity variations. These uncertainties can affect calculations of mass flux values significantly.

- The cost of detailed sampling for the transect study ($175,000) compared with the cost of conducting a mass flux analysis using existing monitoring well data ($15,000) indicates that this type of study is unwarranted for groundwater plumes whose limits are defined by existing monitoring well networks.
- Statistical analysis determined that there is a statistically significant decrease in the mass flux of total chloroethenes from Transect A to Transects B and C. Although the mean value of mass flux at Transect C was less than Transect B, the values were not statistically different because their upper and lower limits overlapped.

SECTION 6
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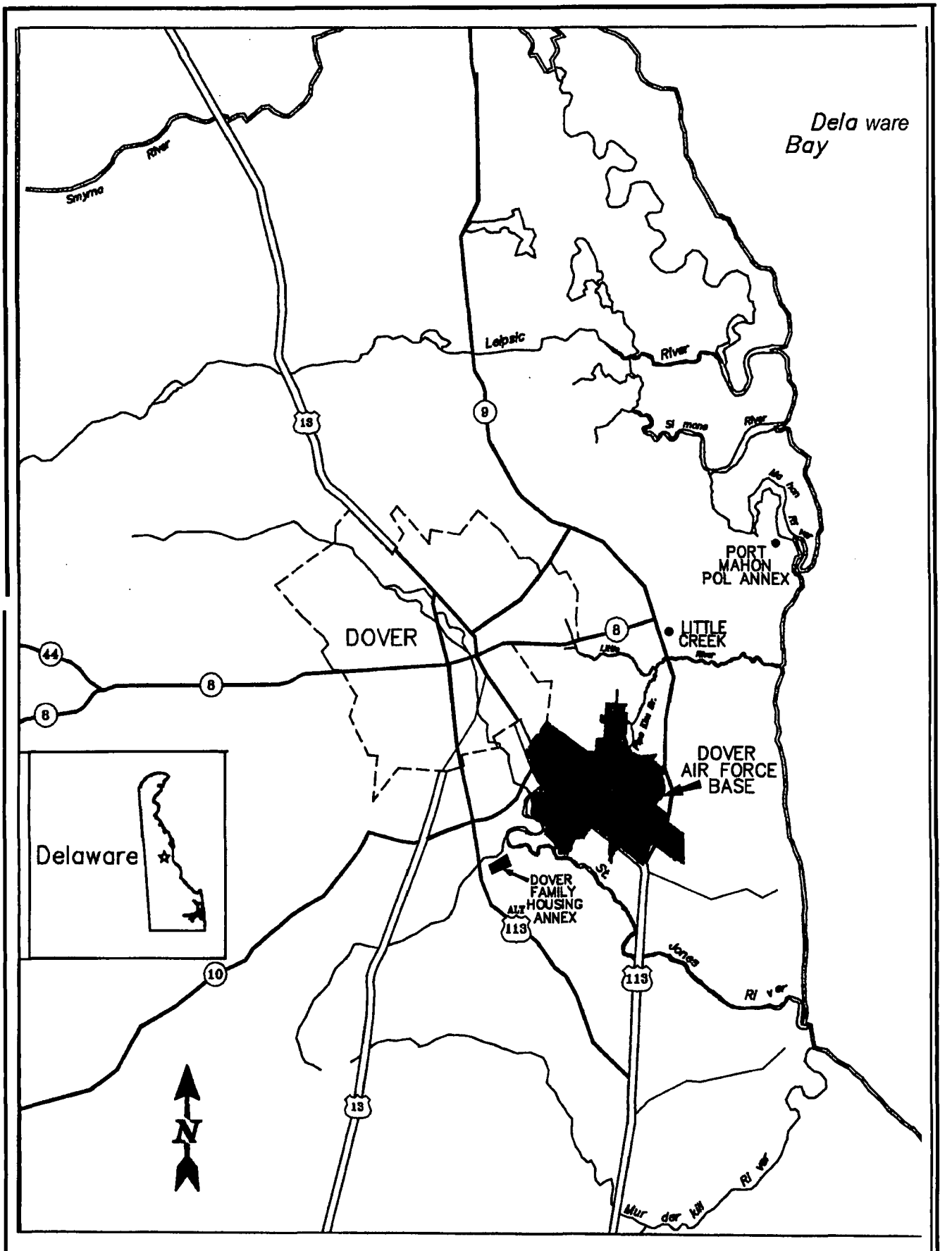


FIGURE 1
LOCATION OF
DOVER AIR FORCE BASE

Source: Dames and Moore

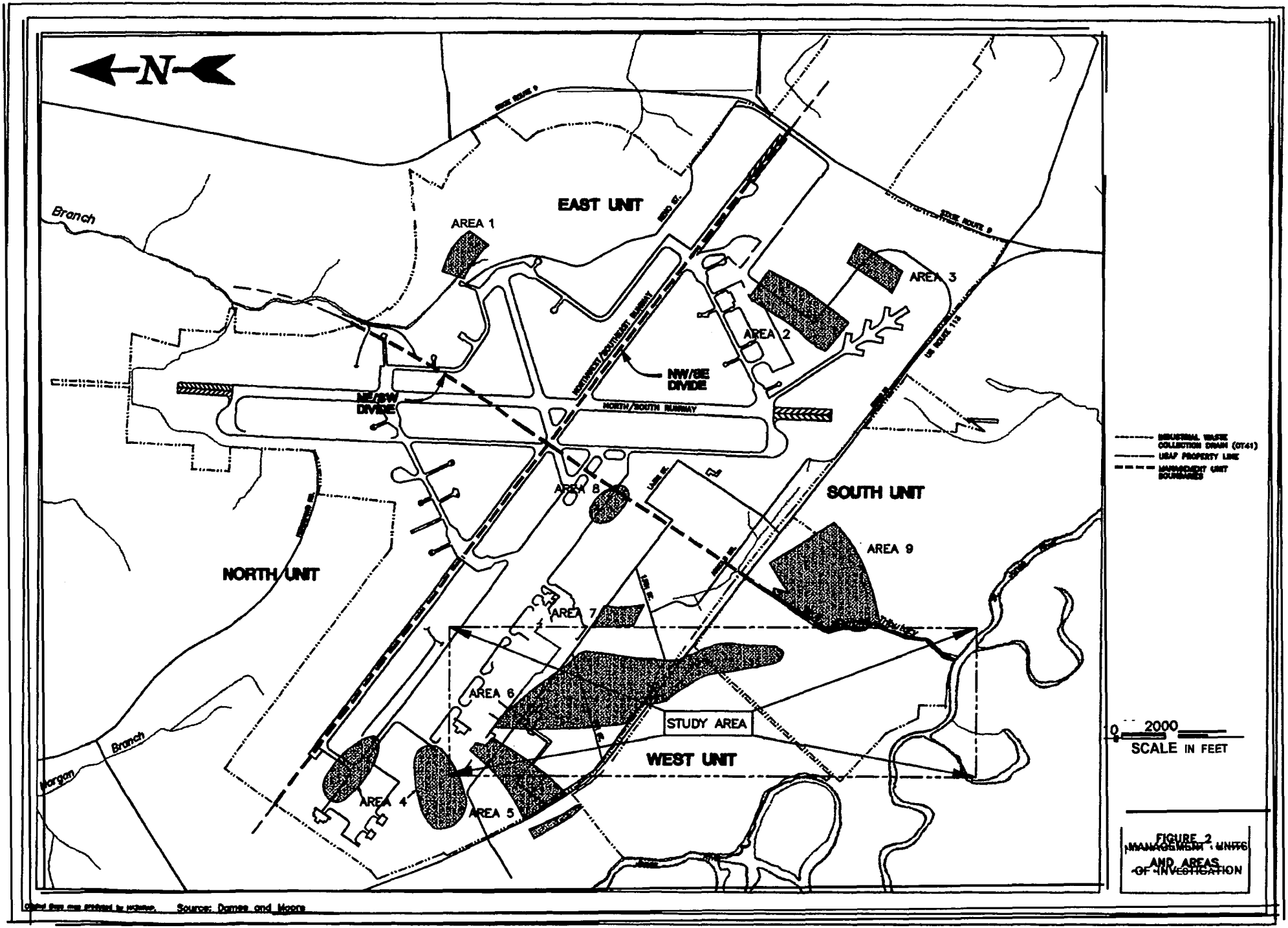


FIGURE 2
MANAGEMENT UNITS
AND AREAS
OF INVESTIGATION

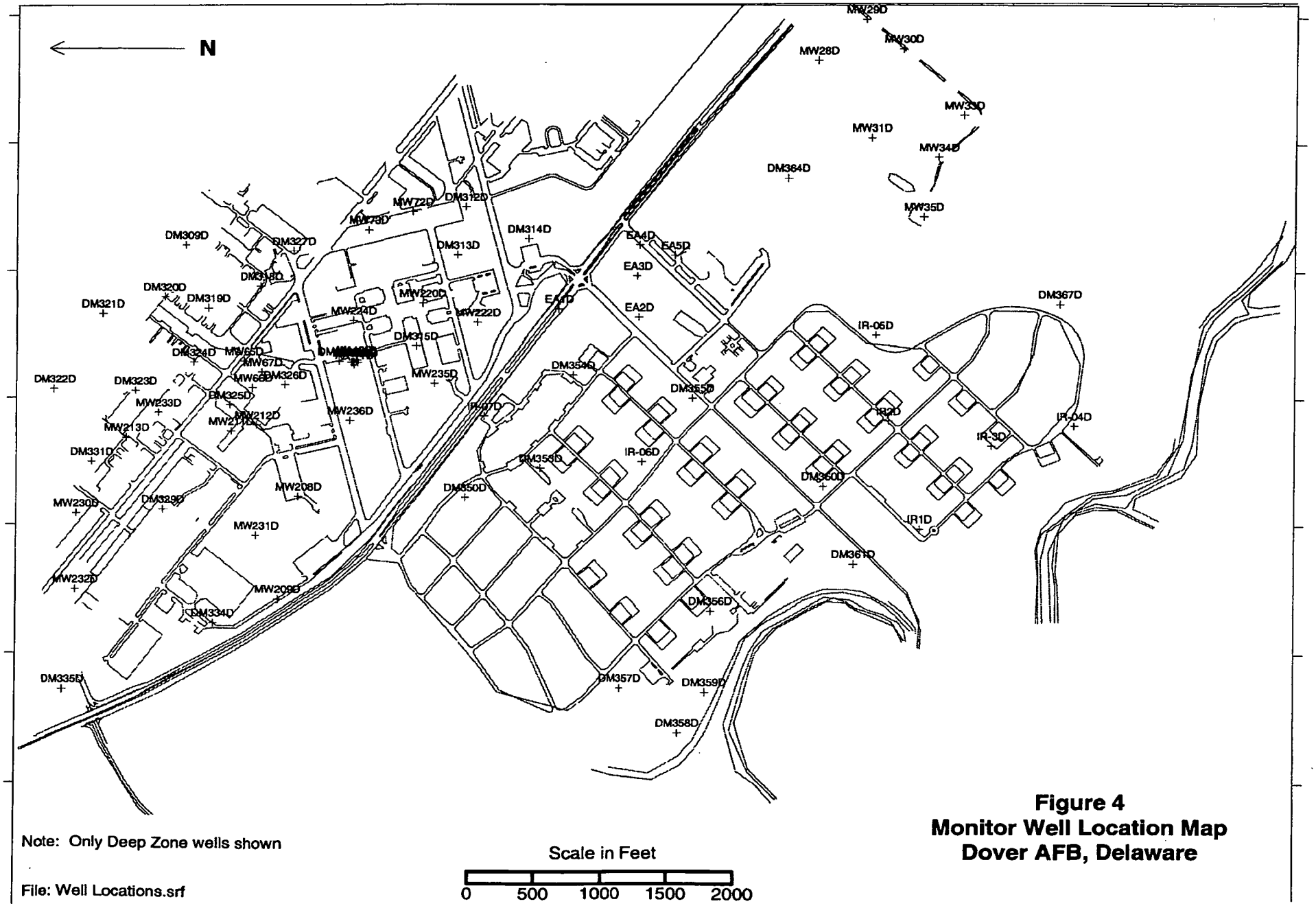
Source: Dames and Moore

Countour elevations (ft msl) based on Geoprobe and Cone Penatrometer Investigation (DERS, 1997)

Scale in Feet

0 500 1000 1500 2000

Figure 3
Structure Contour Map of Top of Calvert Formation
Dover Air Force Base
Dover, Delaware



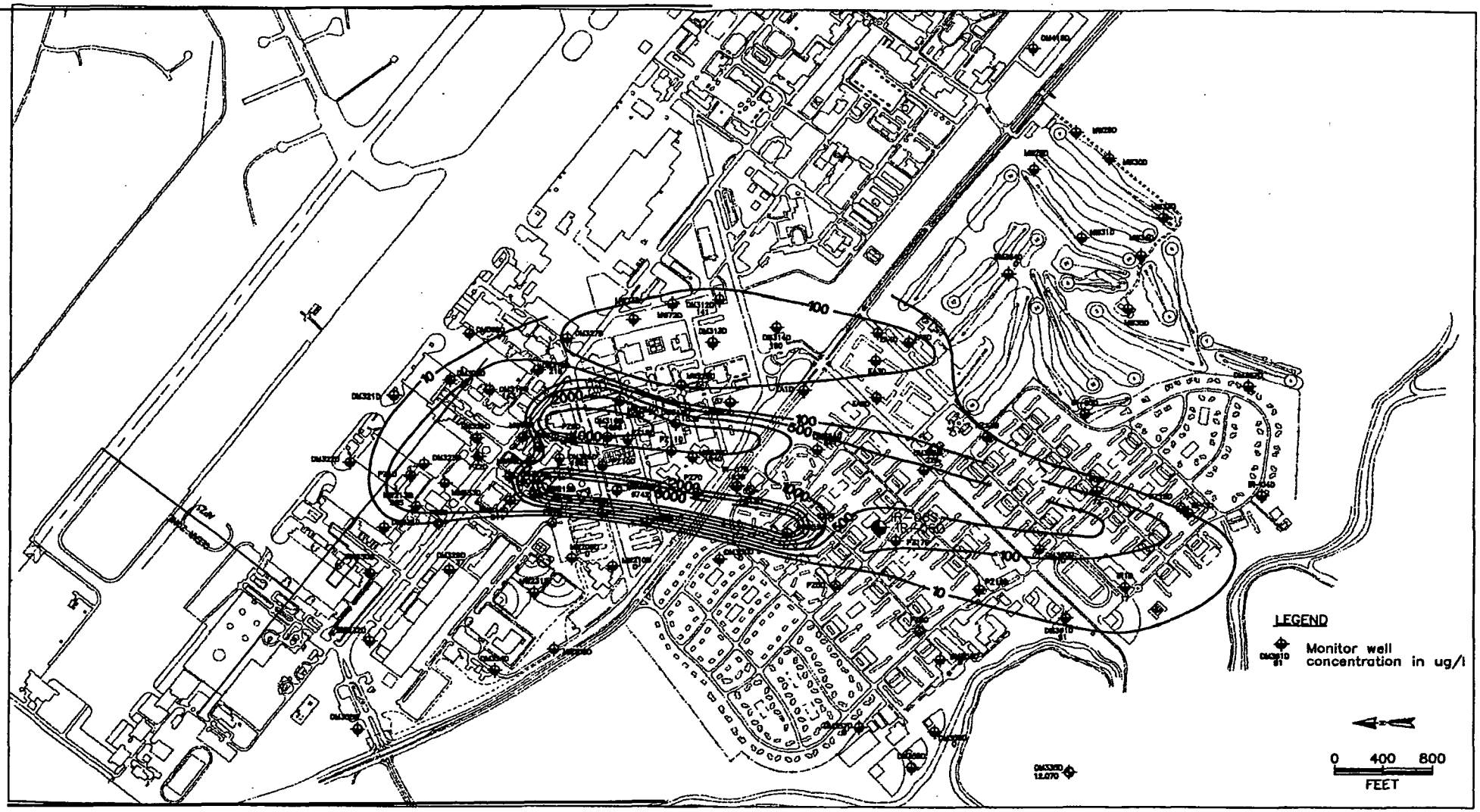
Note: Only Deep Zone wells shown

File: Well Locations.srf

Scale in Feet

0 500 1000 1500 2000

Figure 4
Monitor Well Location Map
Dover AFB, Delaware



Corporate Remediation Group
An Alliance between DuPont and The E-C Division of Dow
Barley Mill Plaza, Building 27
Wilmington, Delaware 19880-0027

TITLE:
Total Chloroethene Isoconcentration Map
July 1996, Deep Groundwater Flow Zone
Dover Air Force Base, Delaware

DWN: TIQ	DES.:	FILE NUMBER: 7124B006	
CHKD: RBW	APPD:	FIGURE NO.: 5	
DATE:	REV.:		

Corporate Remediation Group
An Alliance between DuPont and The Conoco Phillips Group
Barley Mill Plaza, Building 27
Wilmington, Delaware 19880-0027

TITLE:
Tetrachloroethene Isoconcentration Map
July 1996, Deep Groundwater Flow Zone
Dover Air Force Base, Delaware

DWN:	DES.:	FILE NUMBER:
TIQ		7124B021
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DATE:	REV.:	
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Corporate Remediation Group

TITLE:
Trichloroethene Isoconcentration Map
July 1996, Deep Groundwater Flow Zone
Dover Air Force Base, Delaware

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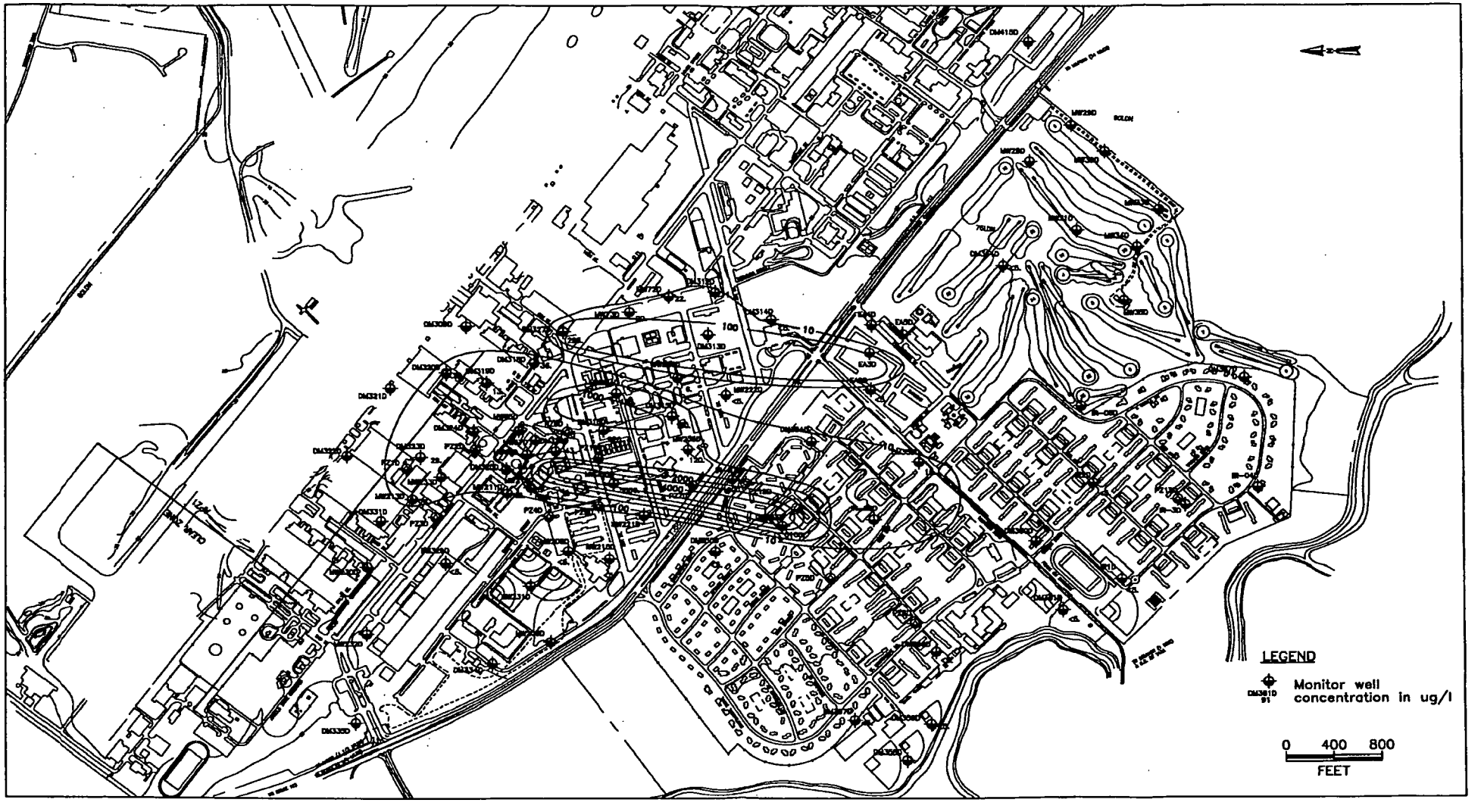
DATE: 12/17/97	REV.: 1	



Corporate Remediation Group
An Alliance between
Jacobs and the Parsons Group
Berley Mill Plaza, Building 27
Wilmington, Delaware 19807-0027

LE:
cis-1,2-Dichloroethene Isoconcentration Map
July 1996, Deep Groundwater Flow Zone
Dover Air Force Base, Delaware

DWN:	DES.:	FILE NUMBER:
TAE		7124B015
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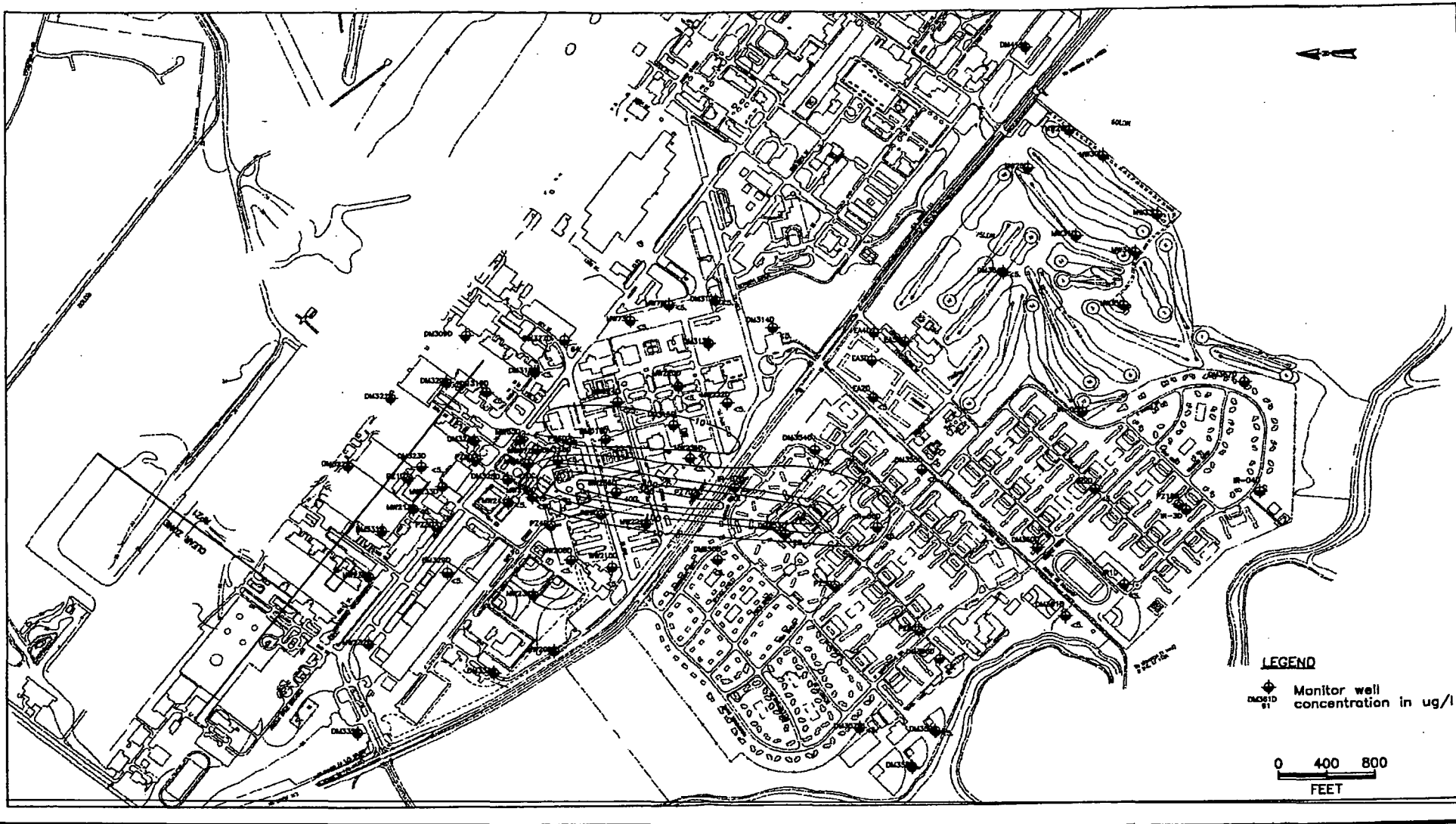

Corporate Remediation Group

TITLE:
Vinyl Chloride (ug/l) Isoconcentration Map
July 1996, Deep Groundwater Flow Zone
Dover Air Force Base, Delaware

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CHKD:	APPD:	FIGURE NO.:
DATE: 12/17/97	REV.: 1	9

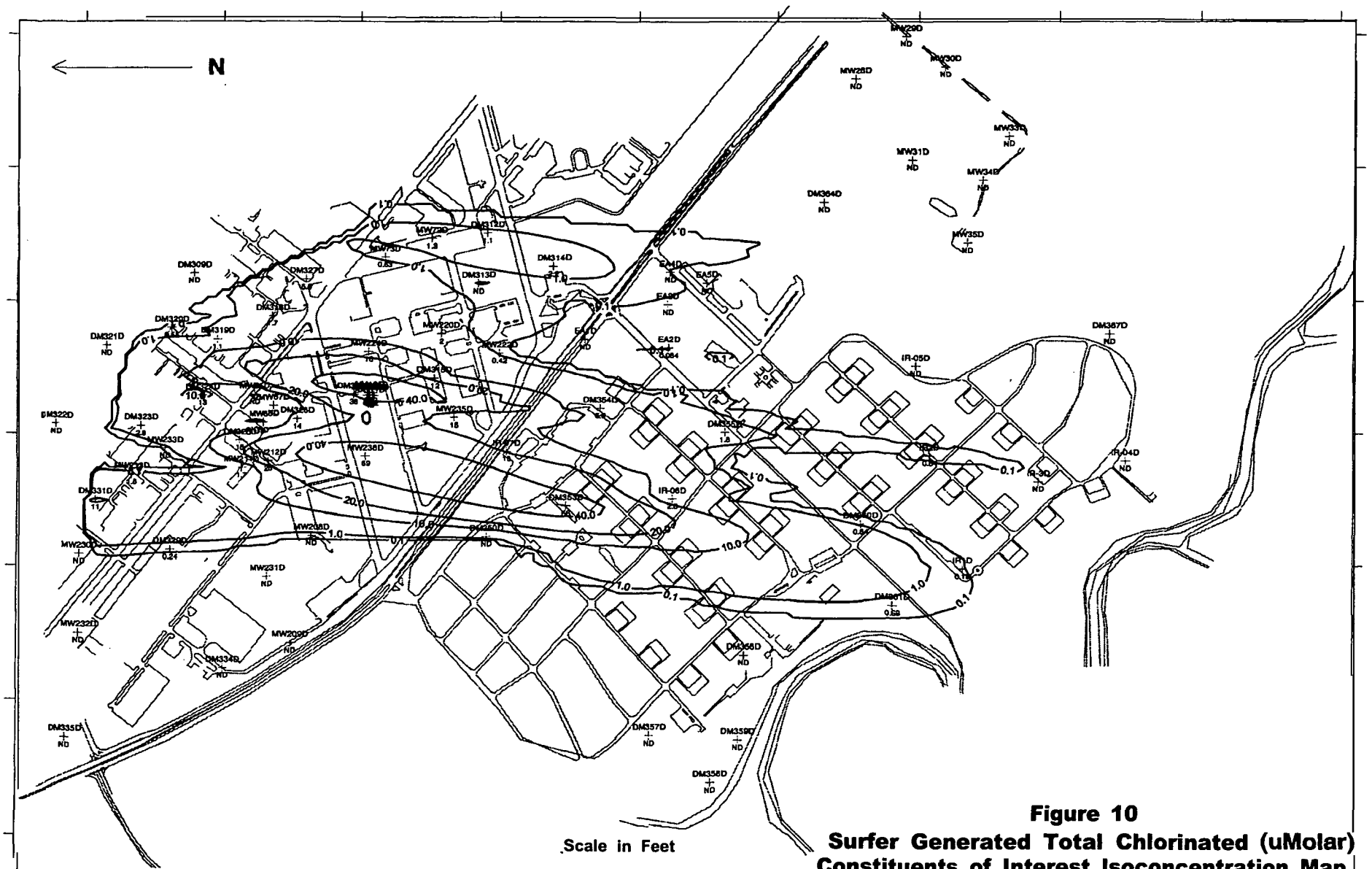


Figure 10
Surfer Generated Total Chlorinated (uMolar) Constituents of Interest Isoconcentration Map
Deep Groundwater Flow Zone - July 1996
Dower AFB, Delaware

Note: 1. Wells with No Data Were Not Sampled
2. Chlorinated Constituents are tetrachloroethene, trichloroethene, cis-1,2-dichloroethene, and vinyl chloride

File: RCL_MW1.srf

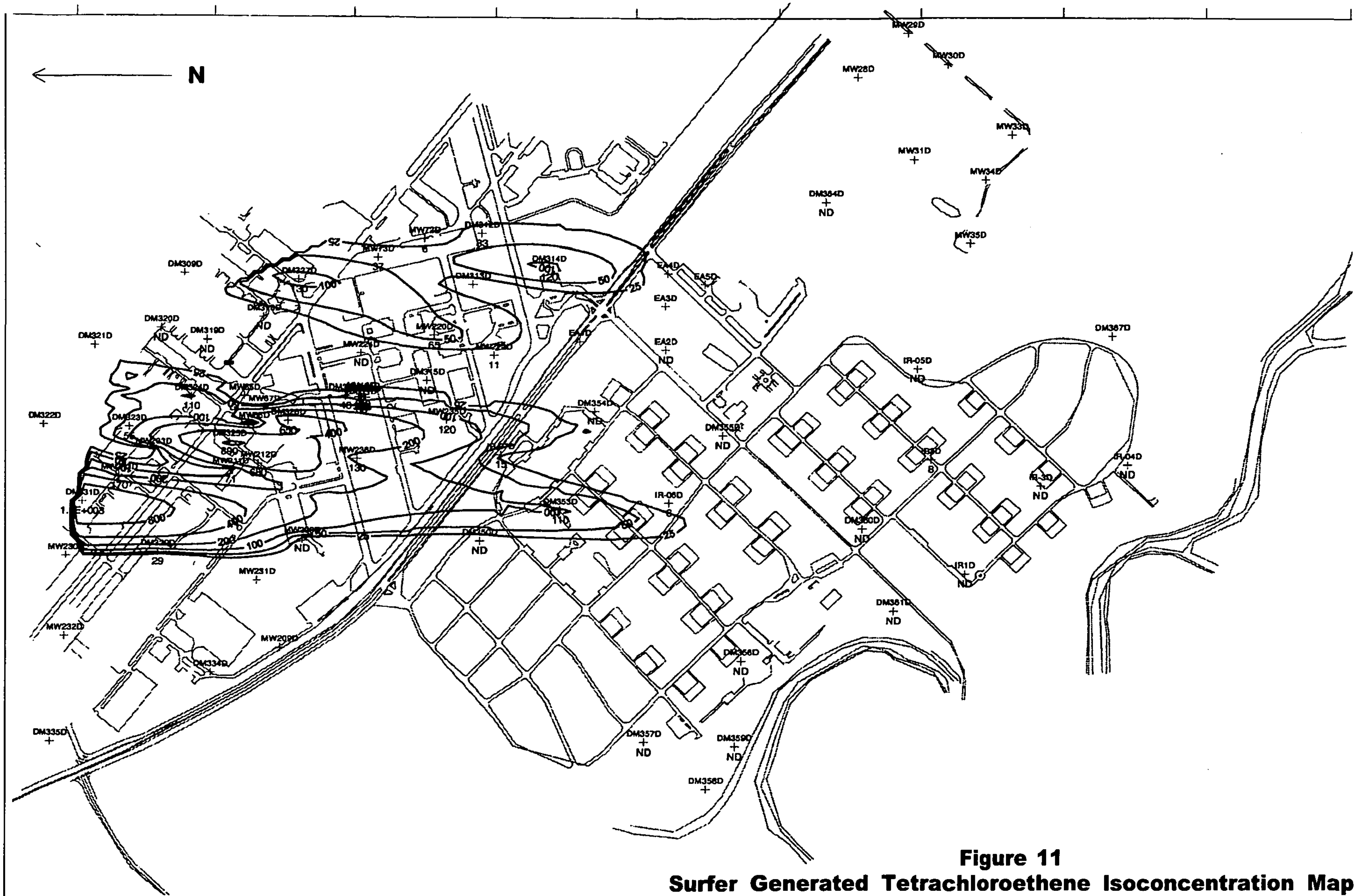


Figure 11
Surfer Generated Tetrachloroethene Isoconcentration Map
Deep Groundwater Flow Zone - July 1996
Dover AFB, Delaware

'ote1 : Wells with No Data Were Not Sampled
ote2: Concentration in ug/L

ile: D796pce1.srf

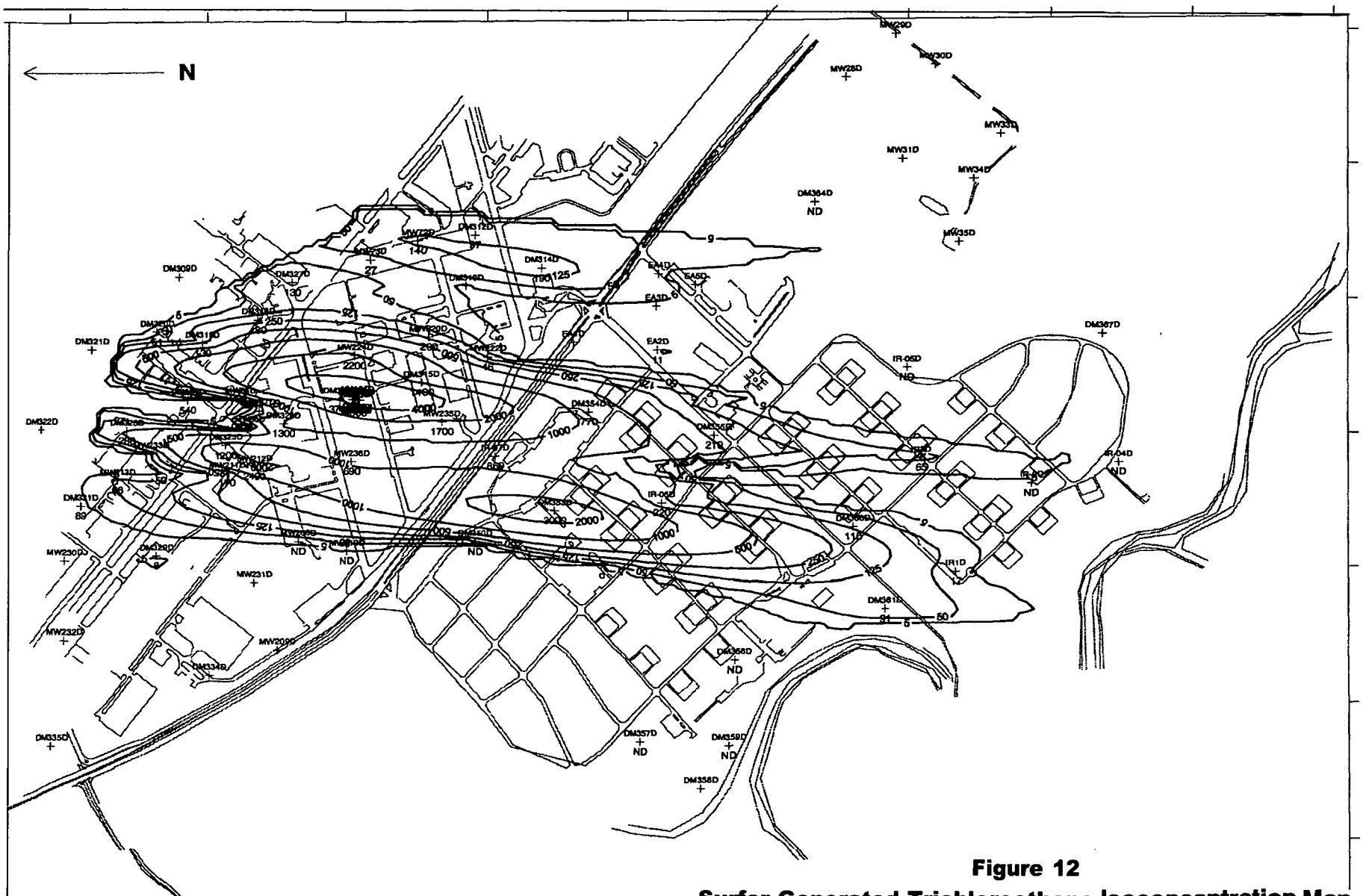


Figure 12
Surfer Generated Trichloroethene Isoconcentration Map
Deep Groundwater Flow Zone - July 1996
Dover AFB, Delaware

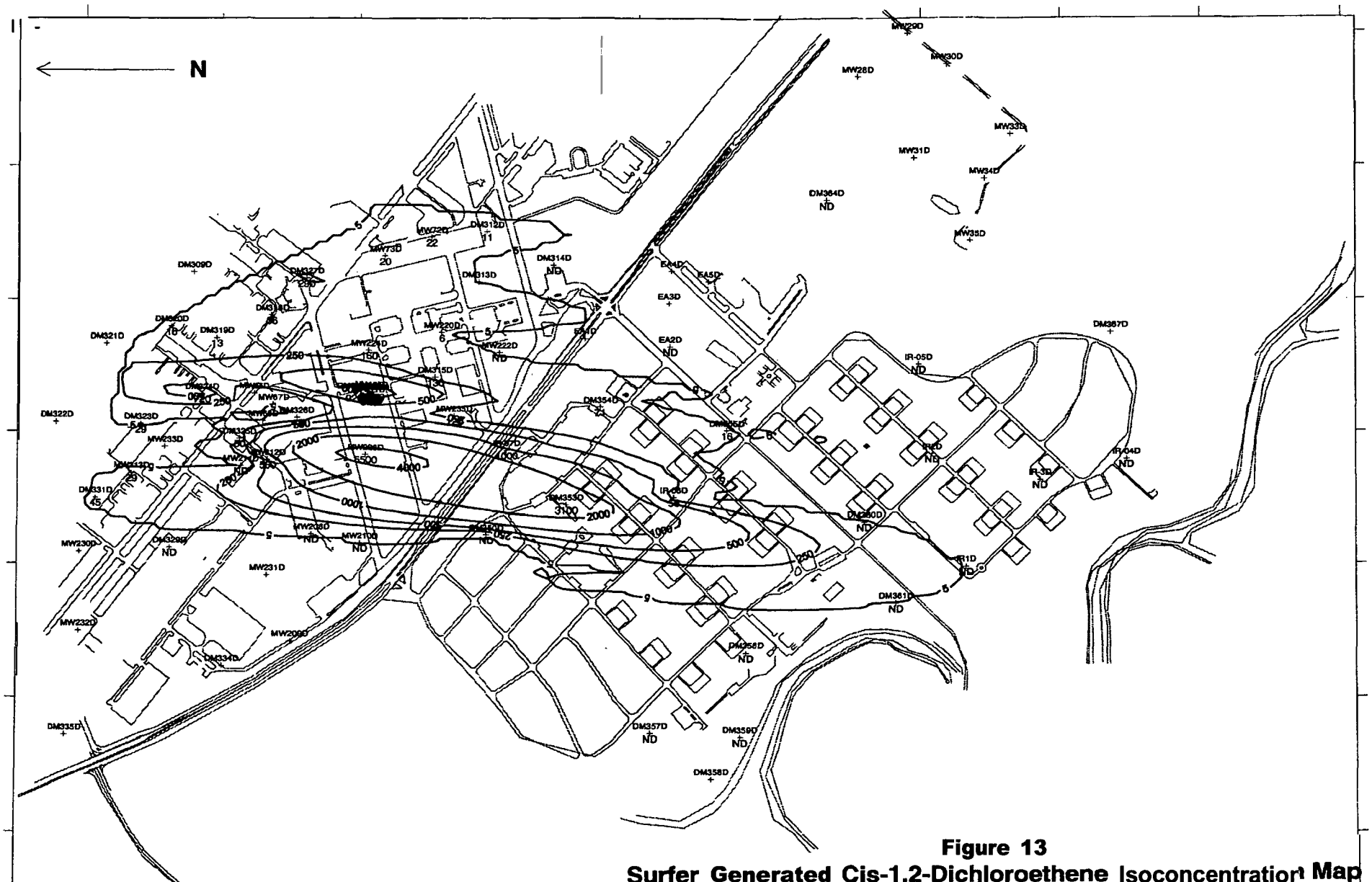


Figure 13
Surfer Generated Cis-1,2-Dichloroethene Isoconcentration Map
Deep Groundwater Flow Zone - July 1996
Dover AFB, Dover Delaware

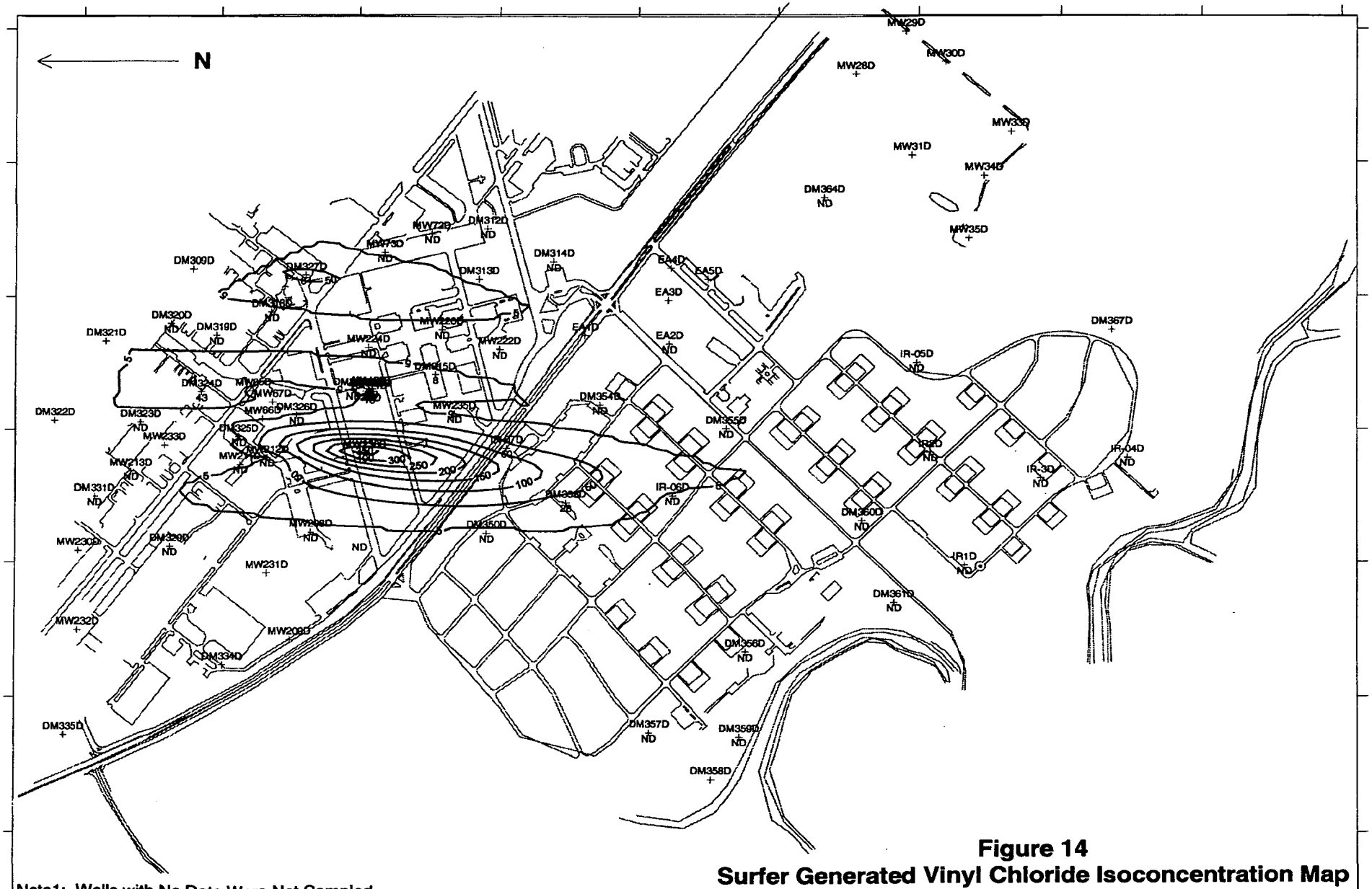
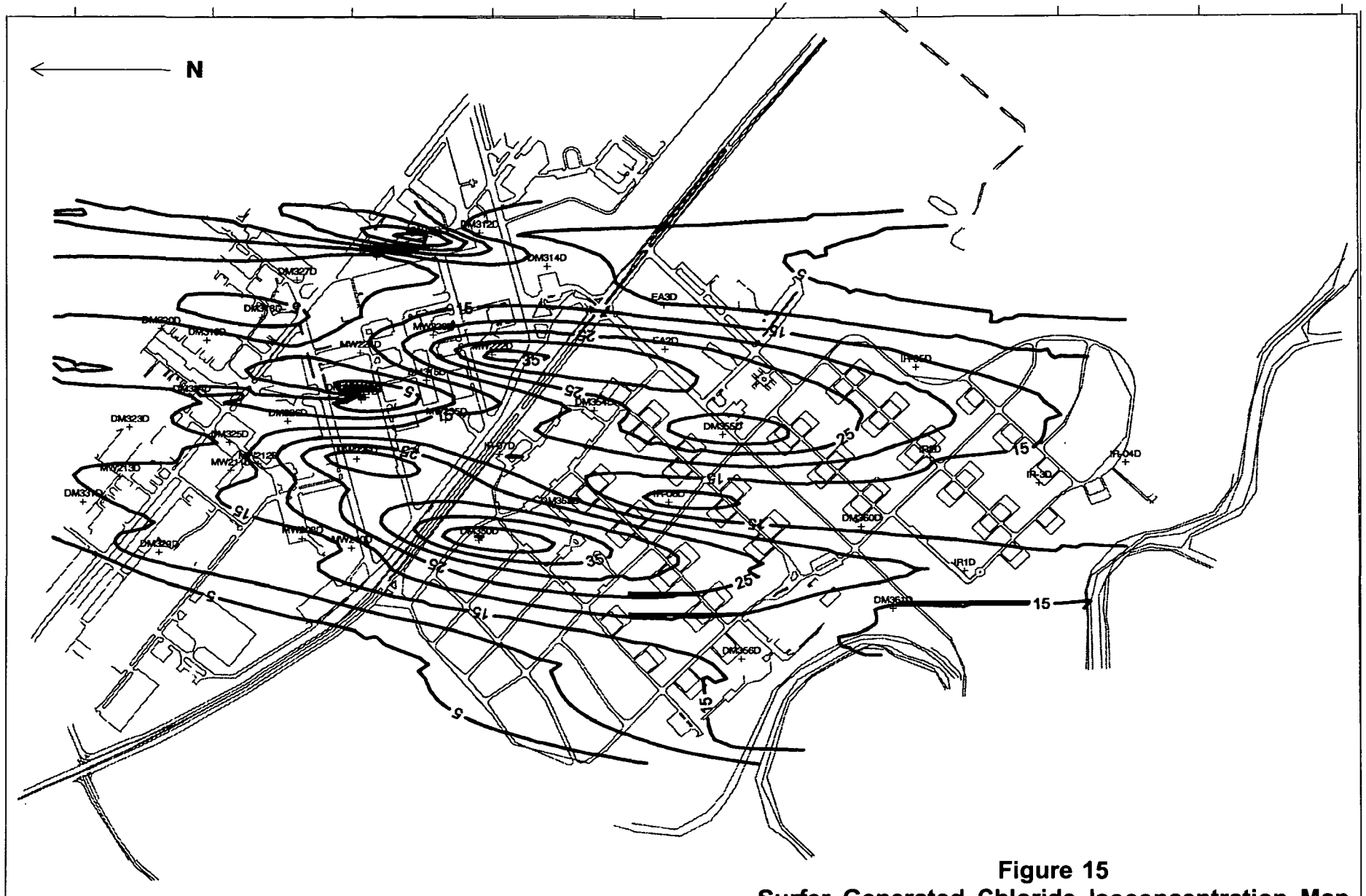


Figure 14
Surfer Generated Vinyl Chloride Isoconcentration Map
Deep Groundwater Flow Zone - July 1996
Dover AFB, Dover DE



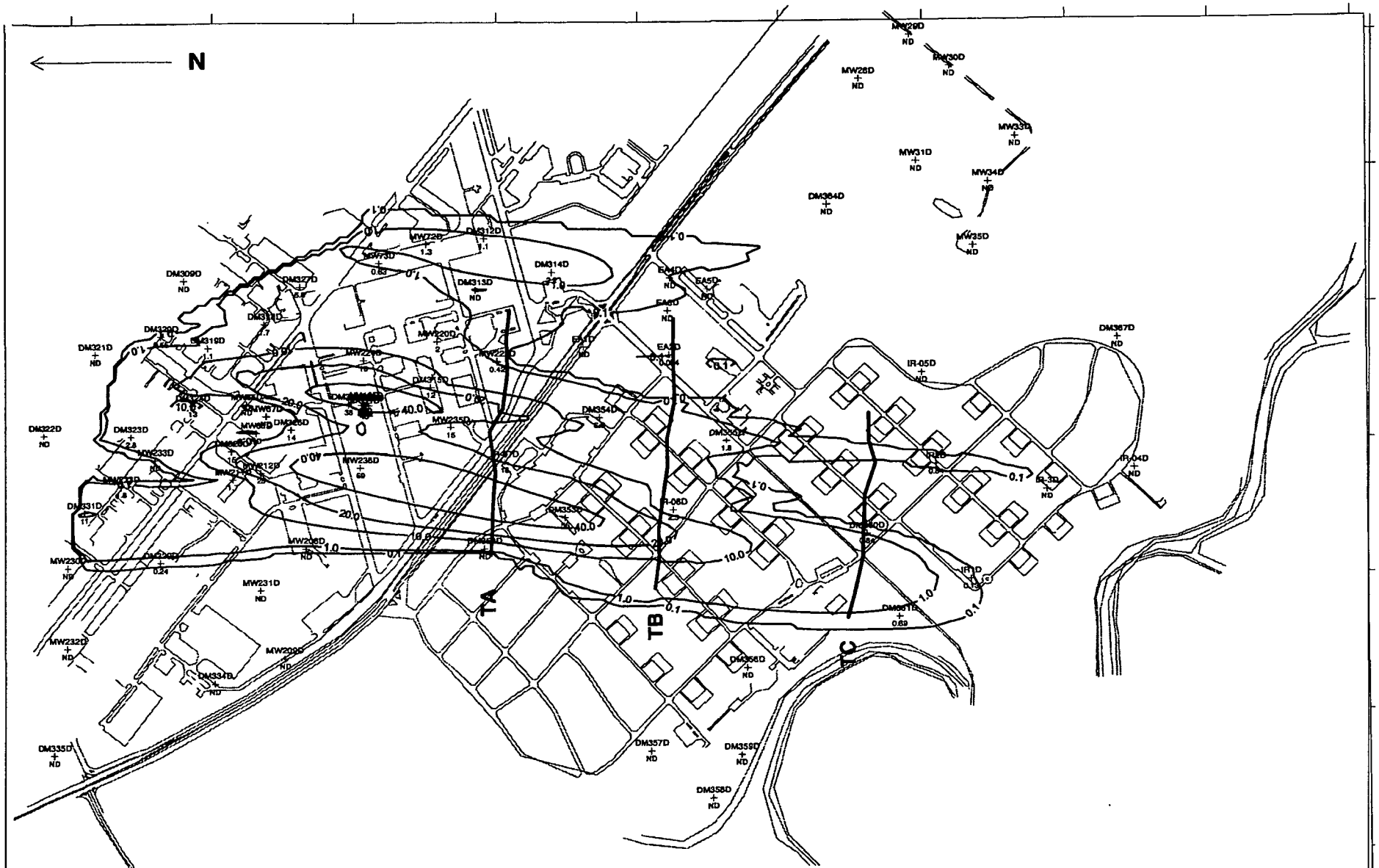
Note1 : Wells with No Data Were Not Sampled
Note2: Concentration in mg/L

File: D796cl1 .srf

Scale in Feet

0 500 1000 1500 2000

Figure 15
Surfer Generated Chloride Isoconcentration Map
Deep Groundwater Flow Zone - July 1996
Dover AFB, Delaware



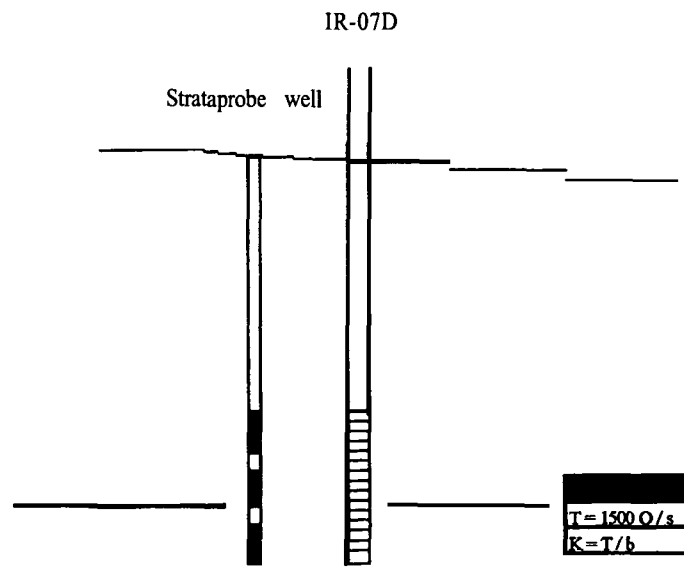
Note 1: Countours are Surfer Generated Total Chlorinated (uMolar) Constituents of Interest (PCE, TCE, cis-1 ,2-DCE, and Vinyl Chloride), July 1996 in the Deep Groundwater Flow Zone

Note 2: Wells with No Data Were Not Sampled

File: RCL_MW.srf

Figure 16
Transect Location Map
Dover AFB, Delaware

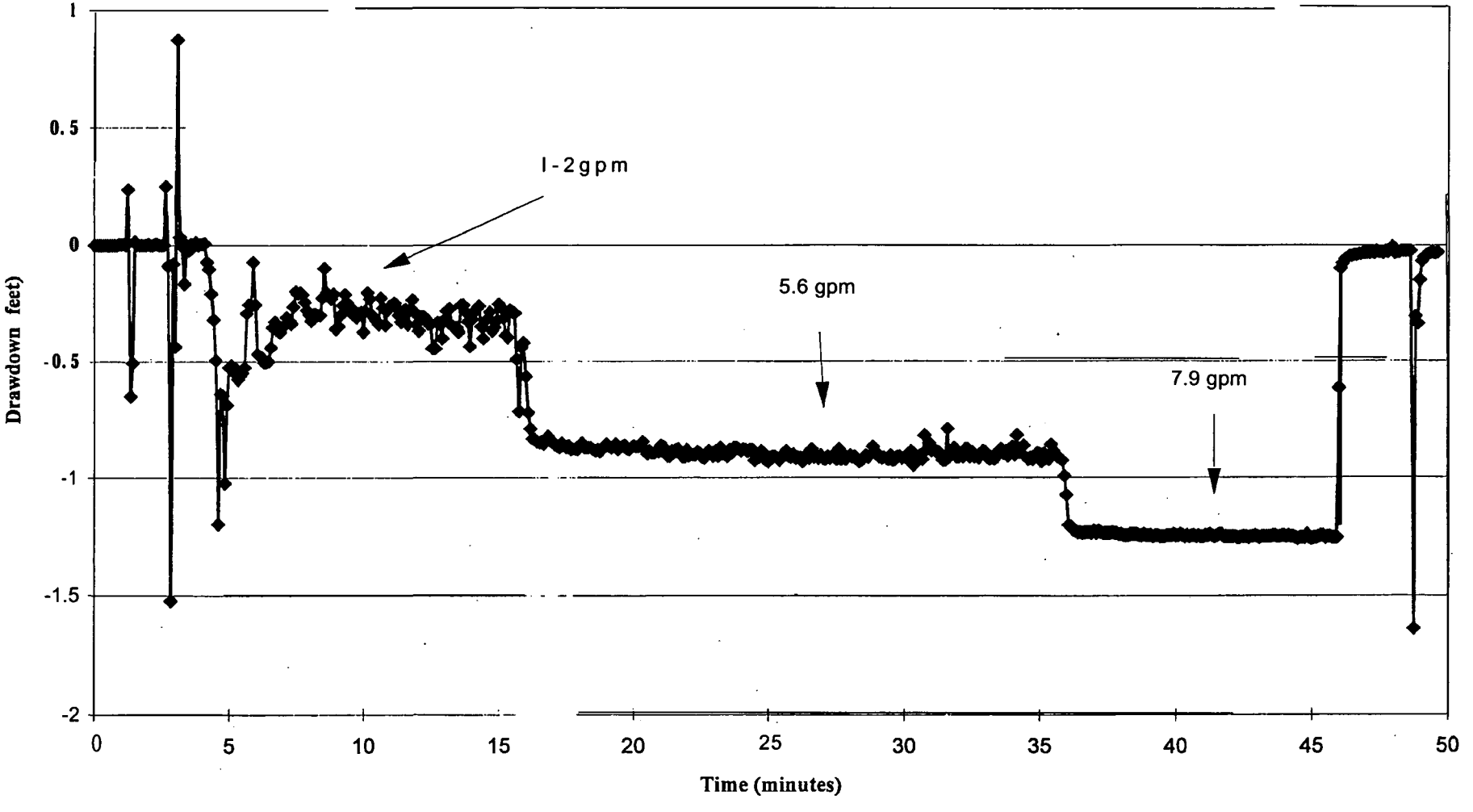
Figure 17
Specific Capacity Schematic
RTDF Transect Study, Dover AFB, Delaware
4/29/97

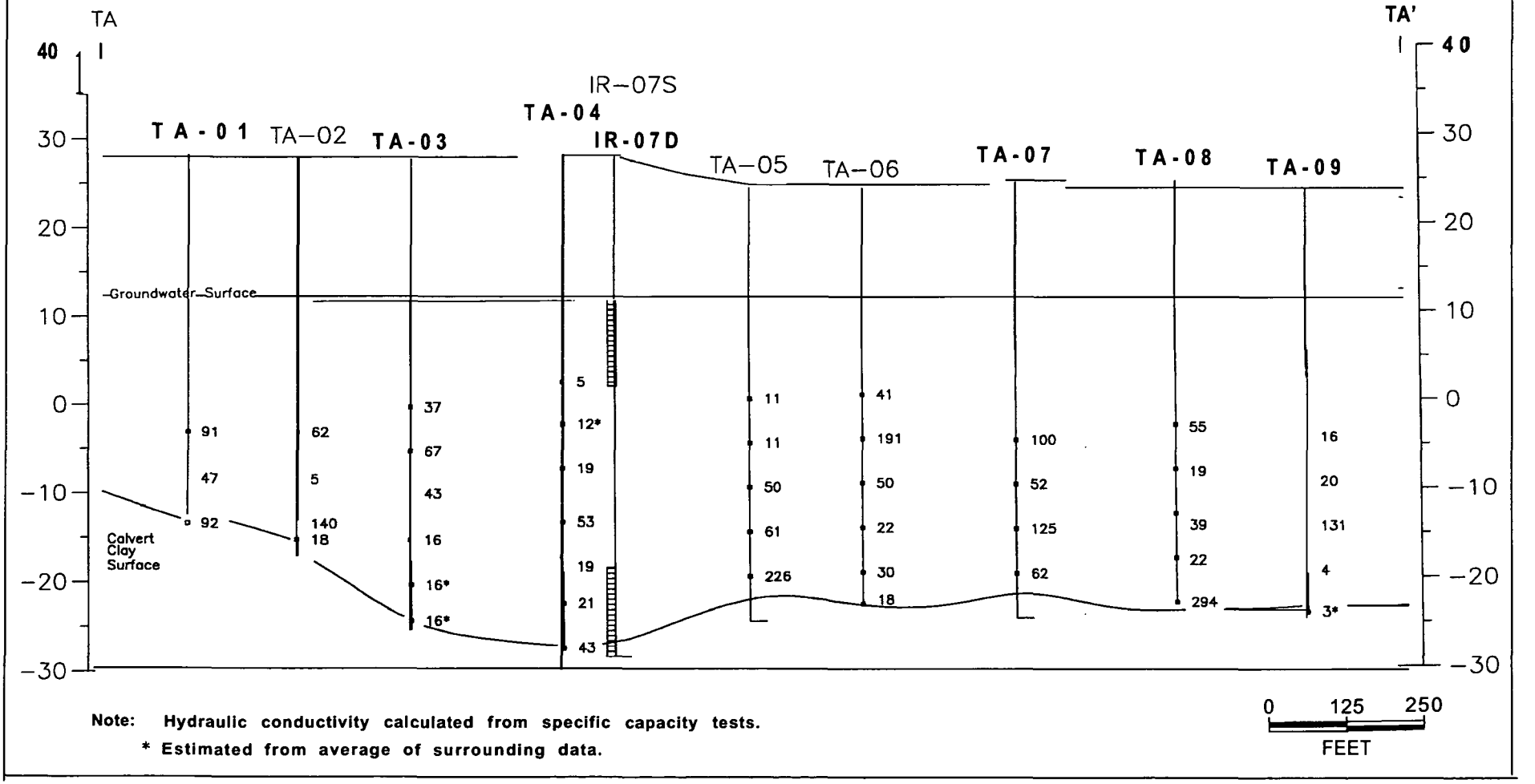


47-49 ft	1.72 ml/sec	30.48 cm	0.06 ml/sec cm
51-53 ft	27.18 ml/sec	3.65 cm	7.4 ml/sec cm
55-57 ft	11.36 ml/sec	30.48 cm	0.37 ml/sec cm
Average			2.61 ml/sec cm

T = 1500 Q/s	= (1500) (5.6 gpm) / 0.9 ft	= 9,333 gpd / ft
K = T/b	= (9,333 gpd/ft) / (40 ft)	= 233 gpd / ft2 = 1.1 x 10-2 cm / sec

Figure 18
Well IR-07D Drawdown Test
Dover Air Force Base, Delaware





Note: **Hydraulic conductivity calculated from specific capacity tests.**

*** Estimated from average of surrounding data.**

DUPONT

Corporate Remediation Group

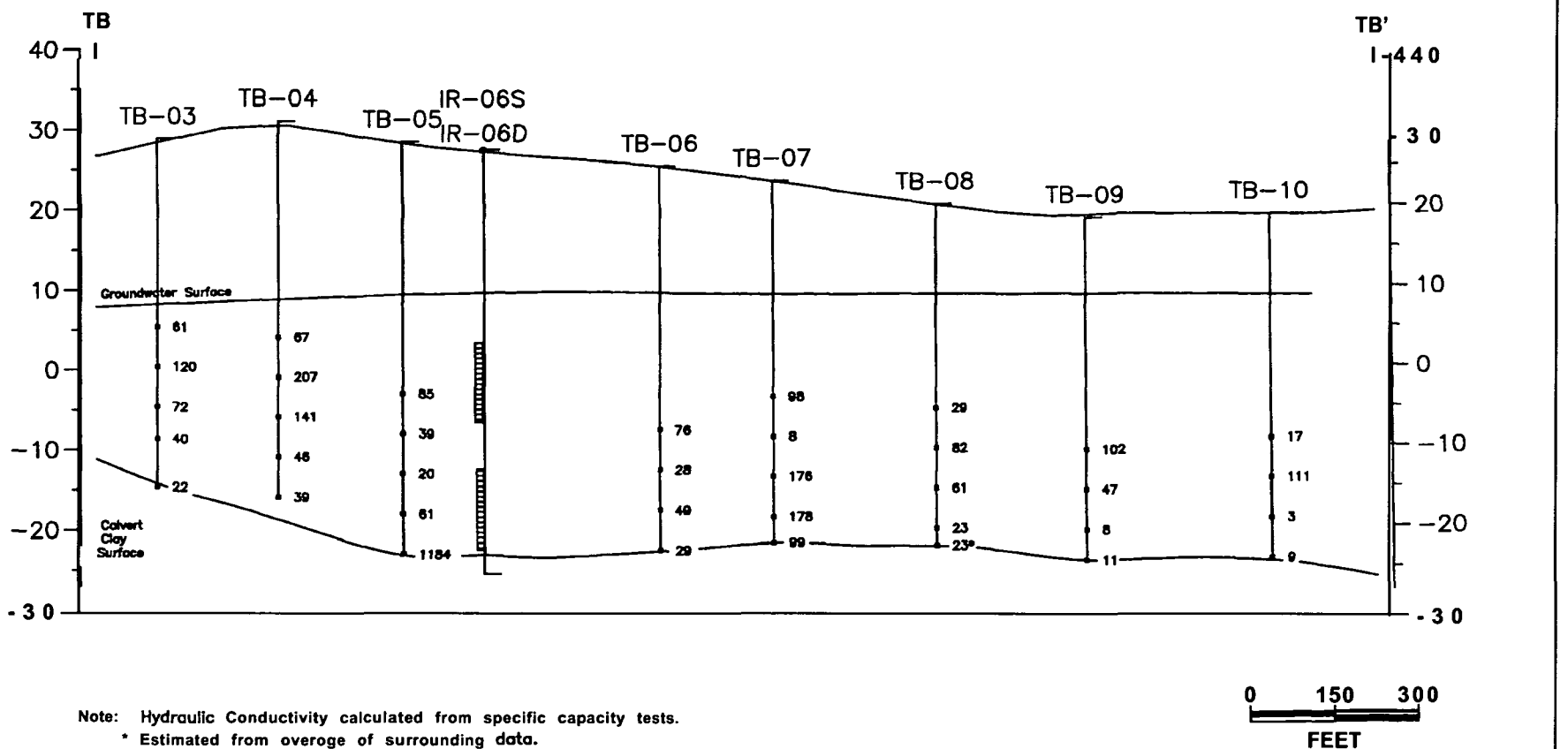
An Alliance between DuPont and The W-C Diamond Group

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

TITLE:

RTDF – Dover Air Force Base
Hydraulic Conductivity (ft/day)
Transect A

DWN:	DES.:	FILE NUMBER:
TAE		2006A019
CHKD:	APPD:	FIGURE NO.:
		19
DATE:	REV.:	
2/24/98	1	



Note: Hydraulic Conductivity calculated from specific capacity tests.
* Estimated from overoge of surrounding data.

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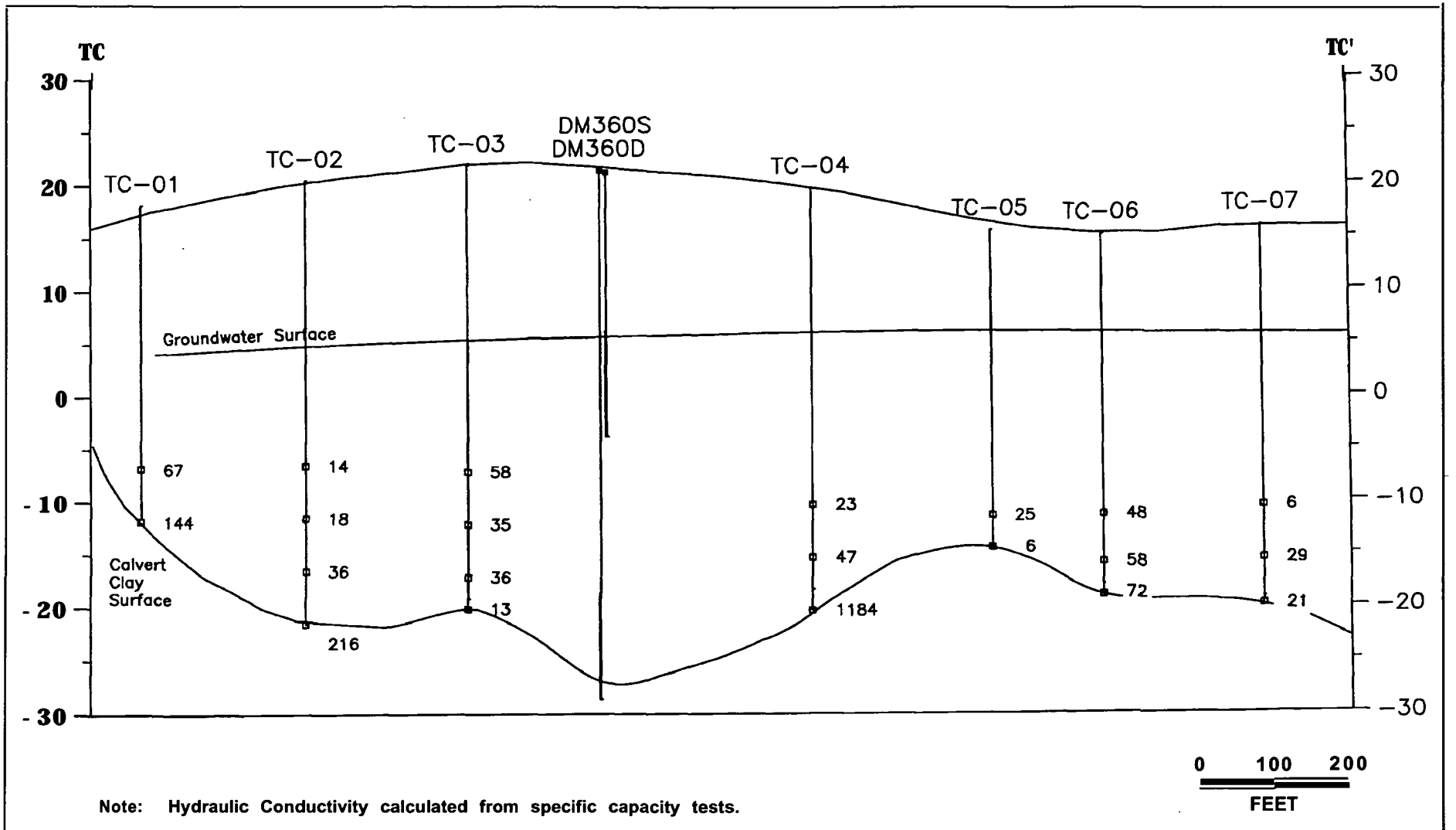
Barley Mill Plaza, Building 27
Wilmington, Delaware 19880-0027

TITLE:
RTDF – Dover Air Force Base
Hydraulic Conductivity (ft/day)
Transect B

DWN:	DES.:	FILE NUMBER:
TAE		2006A020
CHKD:	APPD:	FIGURE NO.:
DATE: 2/24/98	REV.: 1	20



Note: Hydraulic Conductivity calculated from specific capacity tests.

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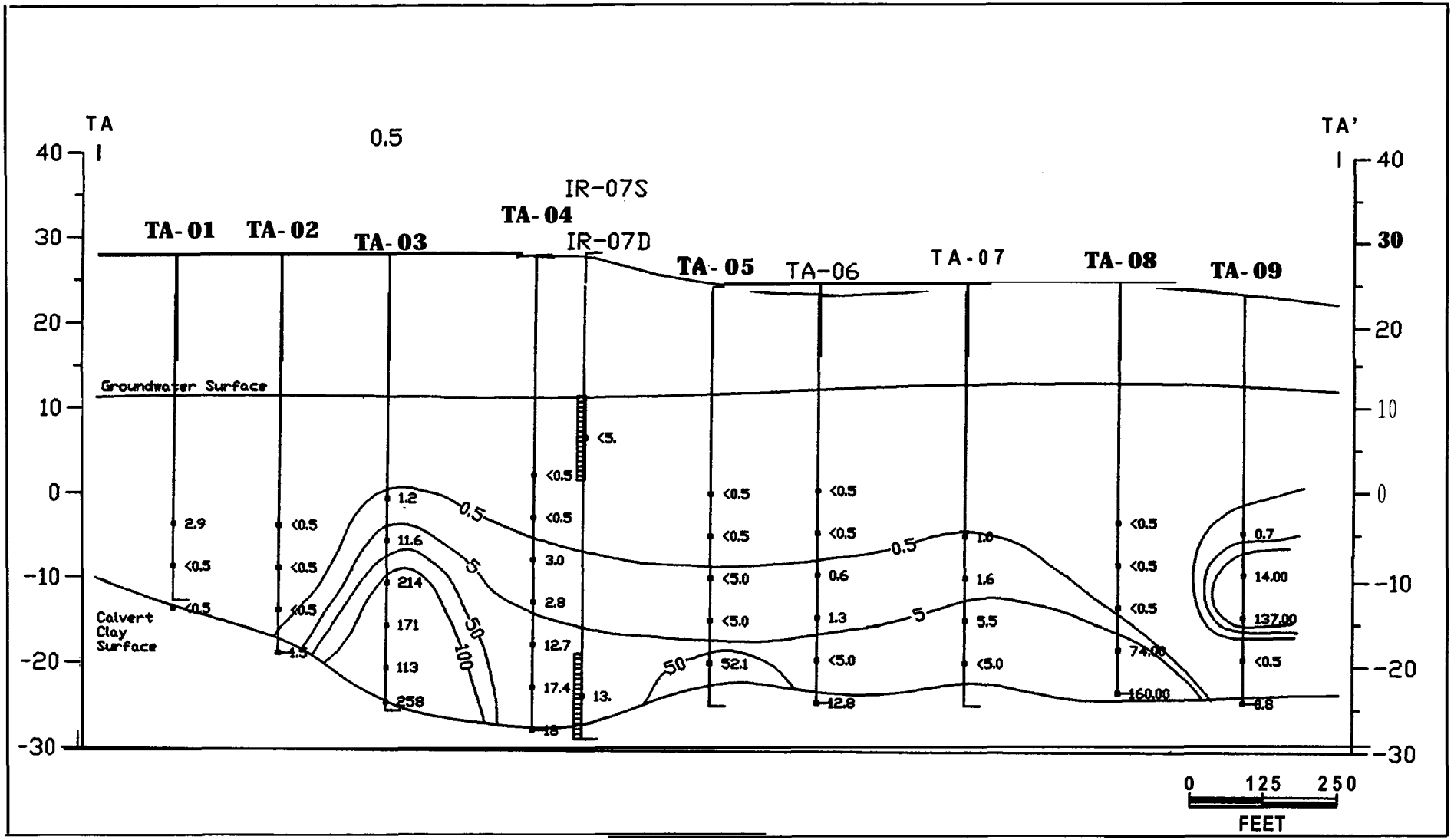
Wilmington, Delaware 19880-0027

TITLE:
RTDF – Dover Air Force Base
Hydraulic Conductivity (ft/day)
Transect C

DWN:	DES.:	FILE NUMBER:
TAE		2006A021
CHKD:	APPD:	FIGURE NO.:
DATE: 2/24/98	REV.: 1	21



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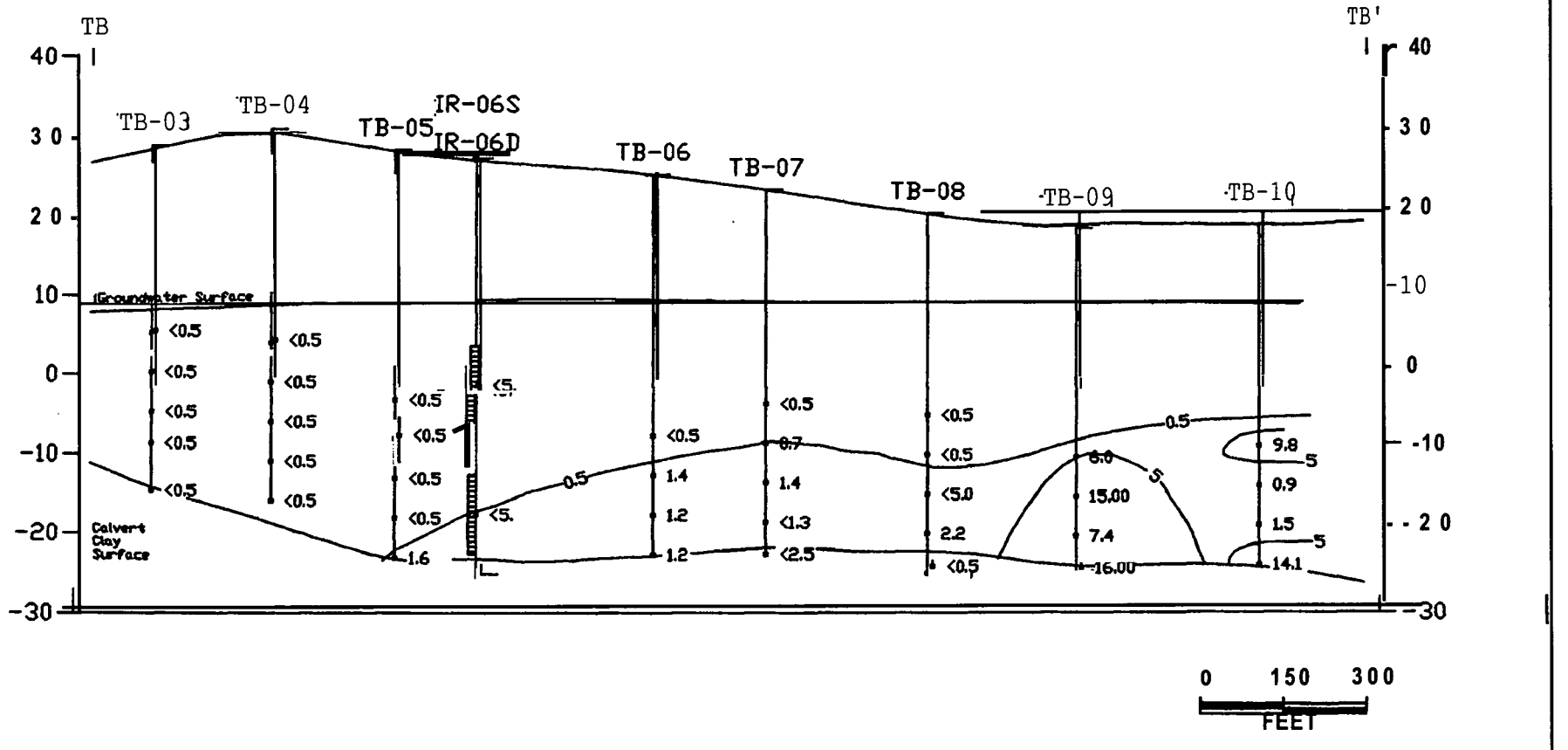
Wilmington, Delaware 19880-0027

TITLE:
RTDF – Dover Air Force Base
Tetrachloroethene in Groundwater (ug/L)
Transect A

DWN:	DES.:	FILE NUMBER:
TAE		7124a013
CHKD:	APPD:	FIGURE NO.:
		22
DATE:	REV.:	
2/17/98	0	



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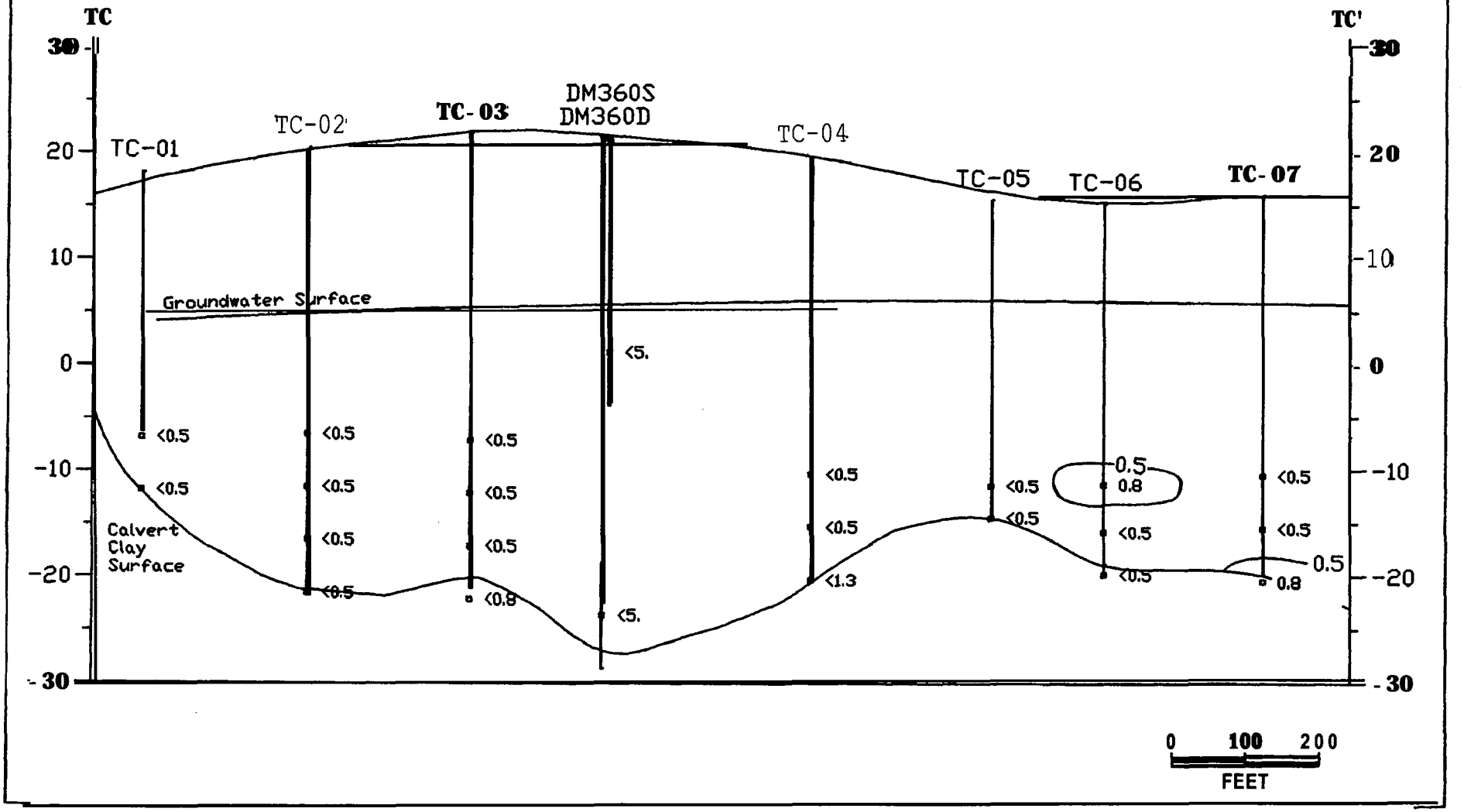
Wilmington, Delaware 19880-0027

TLE:
RTDF – Dover Air Force Base
Tetrachloroethene in Groundwater (ug/L)
Transect B

DWN:	DES.:	FILE NUMBER:
TAE		7124A017
CHKD:	APPD:	FIGURE NO.:
DATE: 2/18/98	REV.: 0	23



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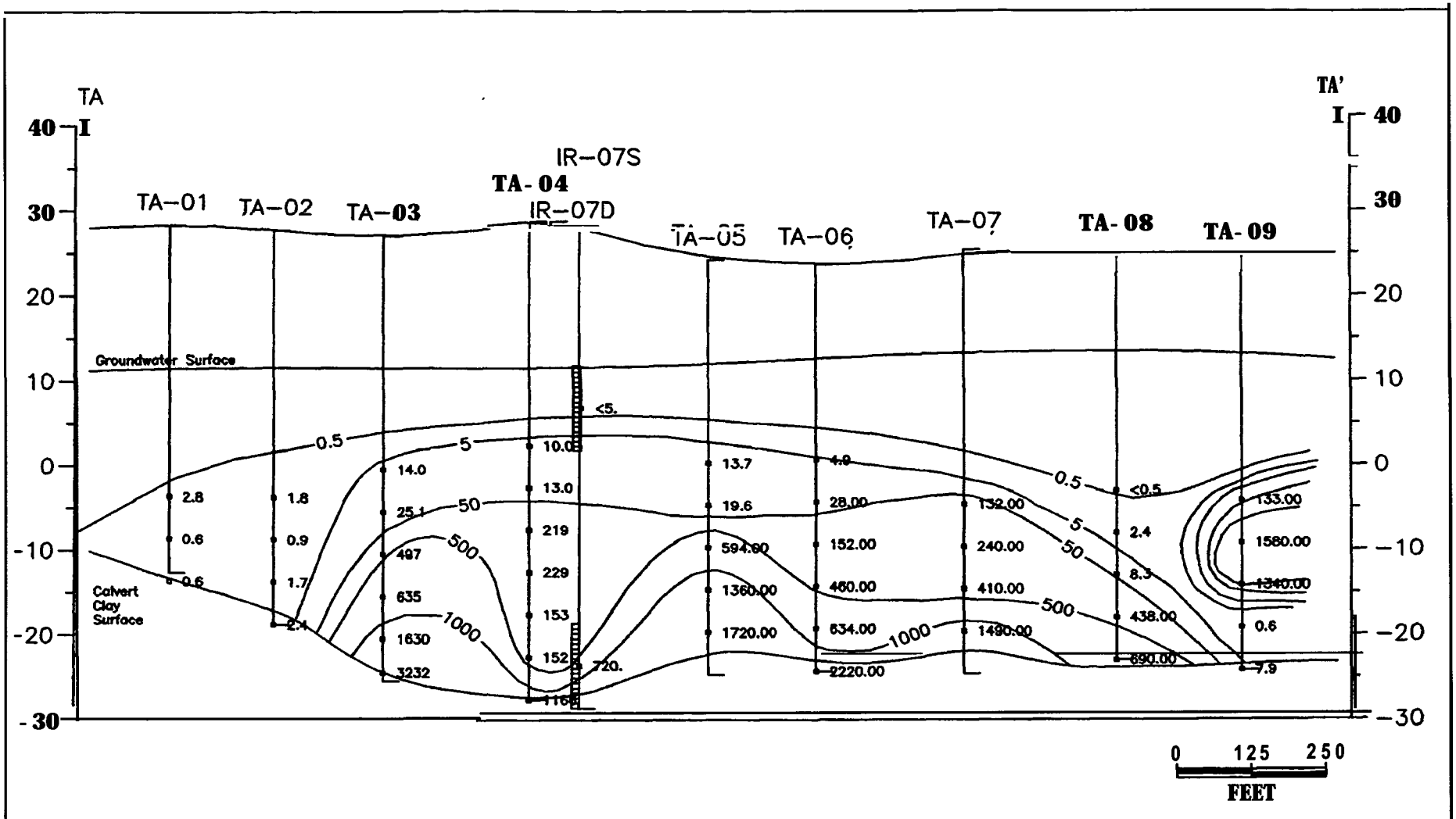
Wilmington, Delaware 19880-0027

TITLE:
RTDF – Dover Air Force Base
Tetrachloroethene in Groundwater (ug/L)
Transect C

DWN:	DES.:	FILE NUMBER:
TAE		7124A023
CHKO:	APPD:	
DATE: 2/18/98	REV.: 0	FIGURE NO.: 24



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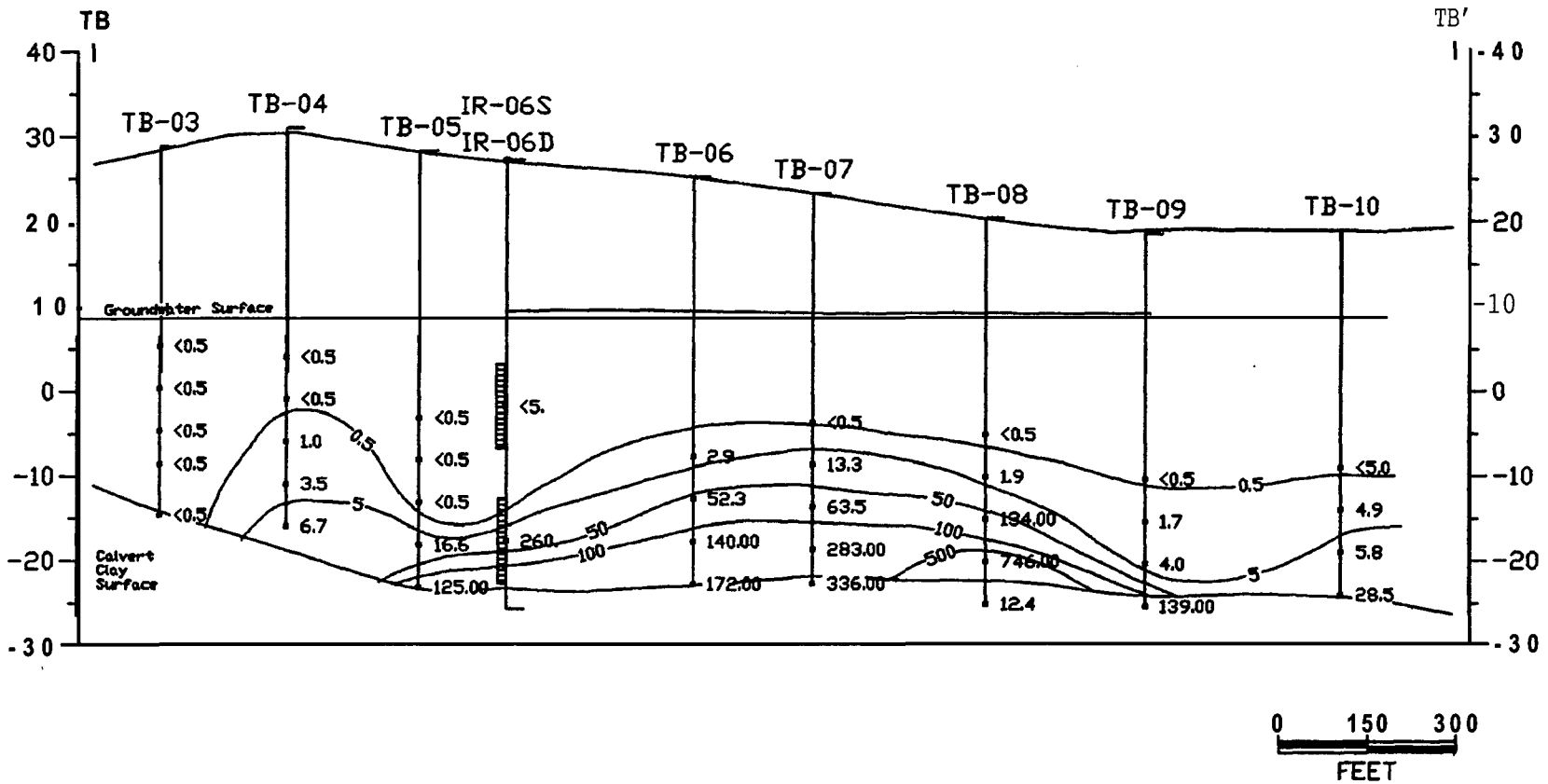
Wilmington, Delaware 19880-0027

TITLE:
RTDF – Dover Air Force Base
Trichloroethene in Groundwater (ug/L)
Transect A

DWN:	DES.:	FILE NUMBER:
DEL		2006A024
CHKD:	APPD:	FIGURE NO.:
		25
DATE: 2/17/98	REV.: 0	



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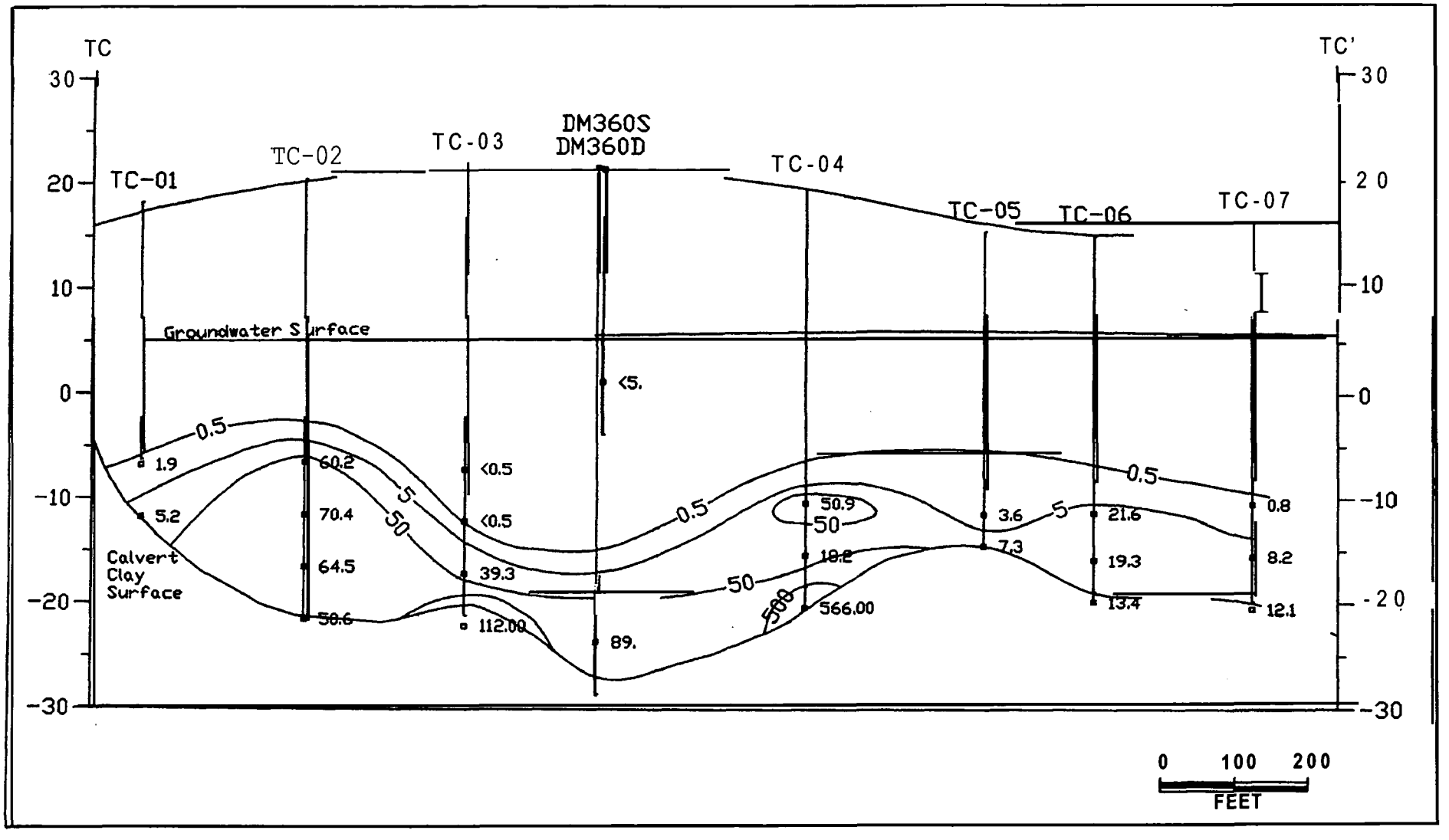
Wilmington, Delaware 19880-0027

TITLE:
RTDF – Dover Air Force Base
Trichloroethene in Groundwater (ug/L)
Transect B

DWN:	DES.:	FILE NUMBER:
TAE		7124A018
CHKD:	APPD:	
DATE: 2/18/98	REV.: 0	FIGURE NO.: 26



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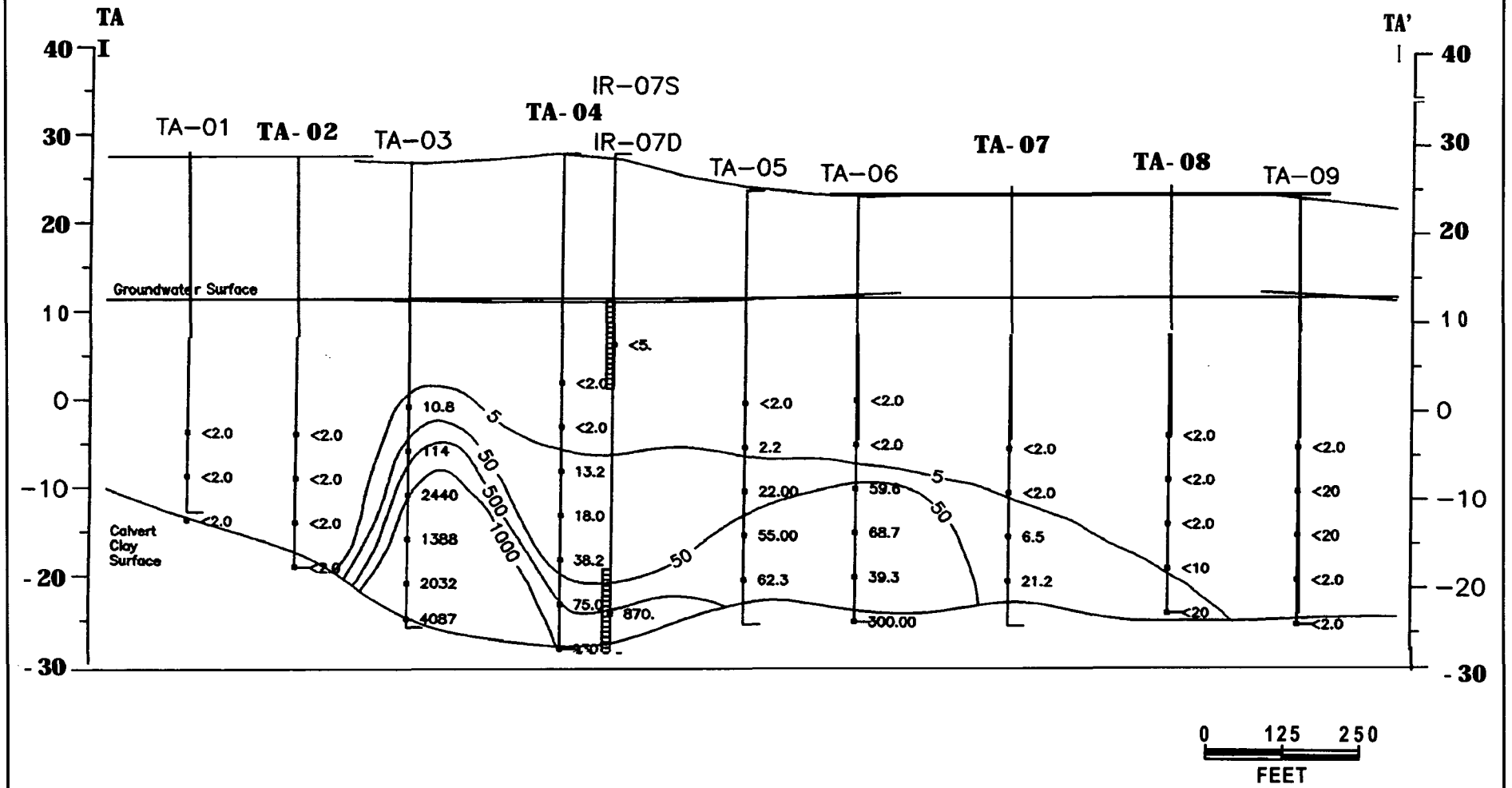
Wilmington, Delaware 19880-0027

TITLE:
RTDF – Dover Air Force Base
Trichloroethene in Groundwater (ug/L)
Transect C

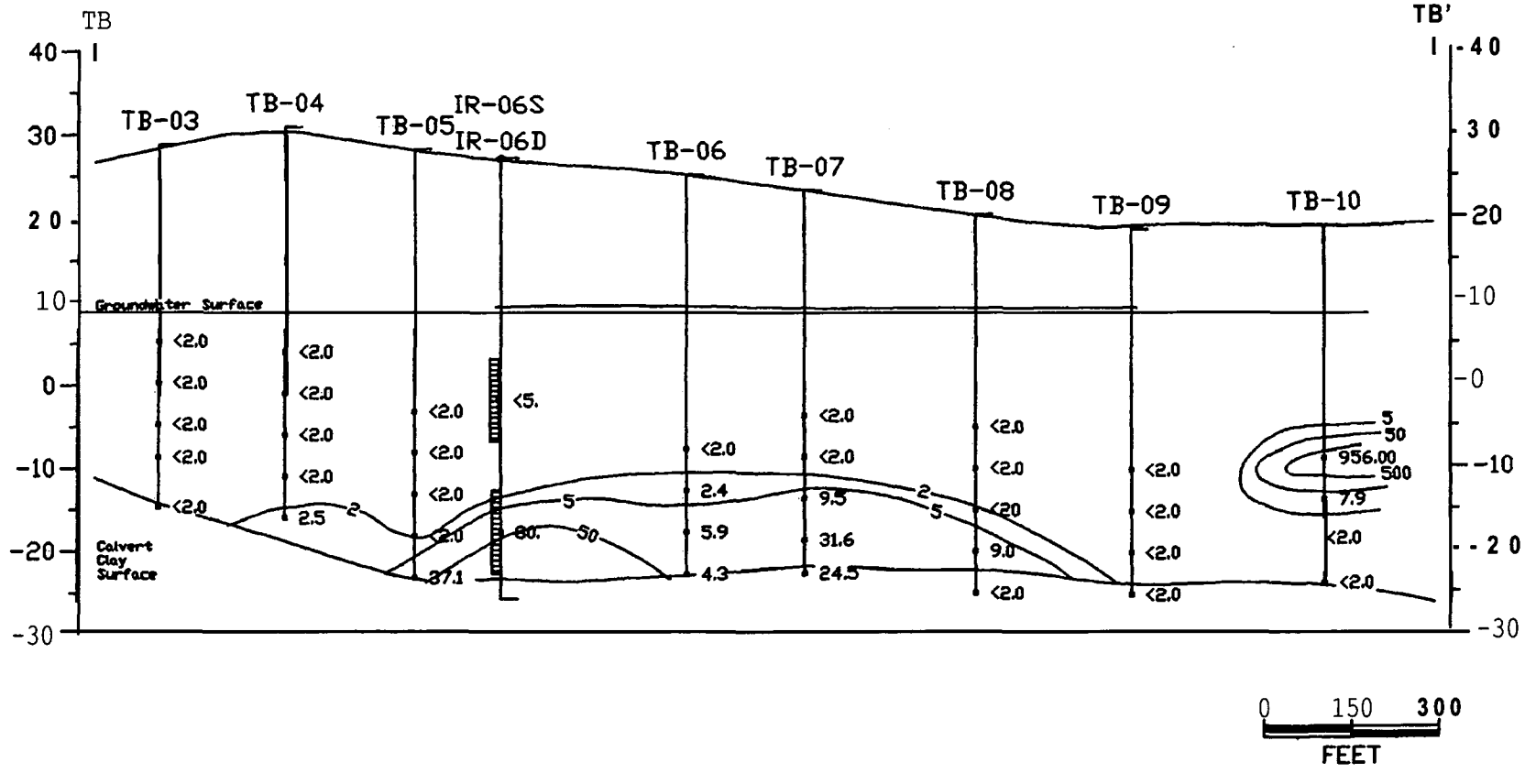
DWN:	DES.:	FILE NUMBER:
TAE		7124A024
CHKD:	APPD:	FIGURE NO.:
DATE: 2/18/98	REV.: 0	27



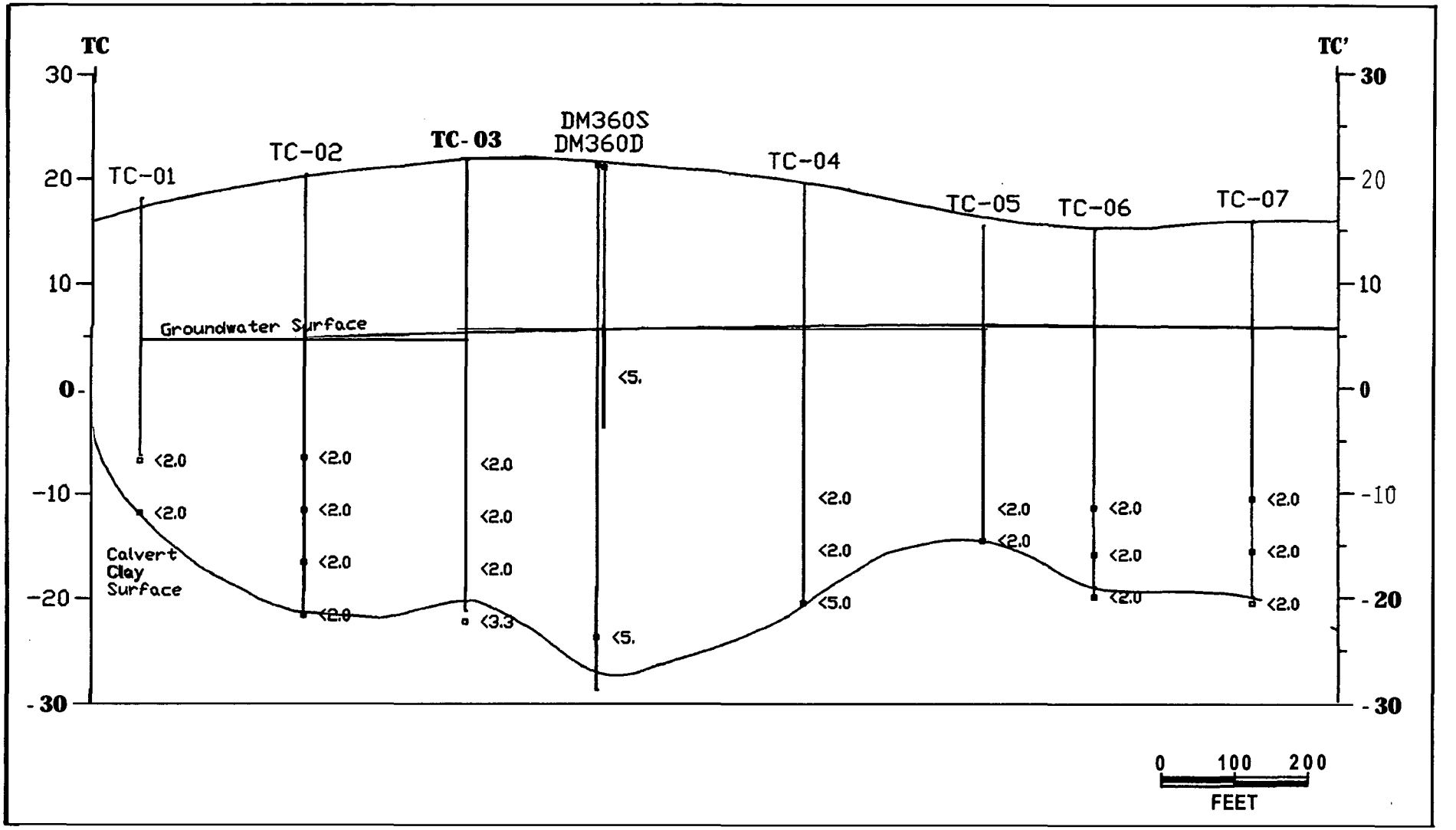
Corporate Remediation Group
A Partnership between DuPont and The E-C Diamond Group
Barley Mill Plaza, Building 27
Wilmington, Delaware 19880-0027

TITLE:
RTDF – Dover Air Force Base
cis-1,2-DCE in Groundwater (ug/L)
Transect A

DWN:	DES.:	FILE NUMBER:
TAE		2006A025
CHKD:	APPD:	FIGURE NO.:
DATE: 2/17/98	REV.: 0	28



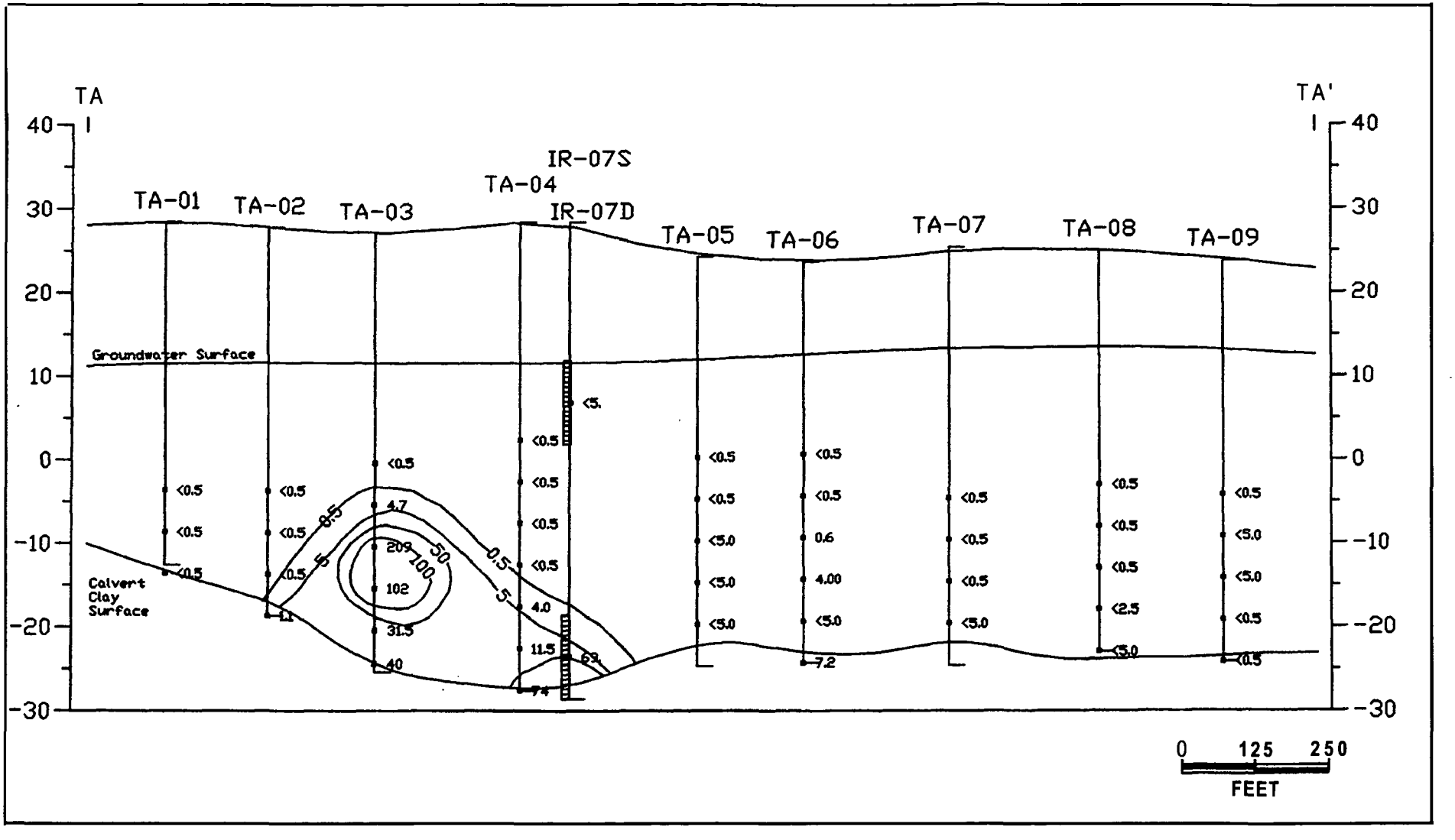
Corporate Remediation Group A Partnership between DuPont and The W-C Diamond Group Barley Mill Plaza, Building 27 Wilmington, Delaware 19880-0027	TITLE: RTDF – Dover Air Force Base cis-1,2-DCE in Groundwater (ug/L) Transect B	DWN: TAE CHKD: DATE: 2/18/98	DES.: APPD: REV.: 0	FILE NUMBER: 7124A019 FIGURE NO.: 29



Corporate Remediation Group
A Partnership between DuPont and The W-O Diamond Group
Barley Mill Plaza, Building 27
Wilmington, Delaware 19880-0027

TITLE:
RTDF – Dover Air Force Base
cis-1,2-DCE in Groundwater (ug/L)
Transect C

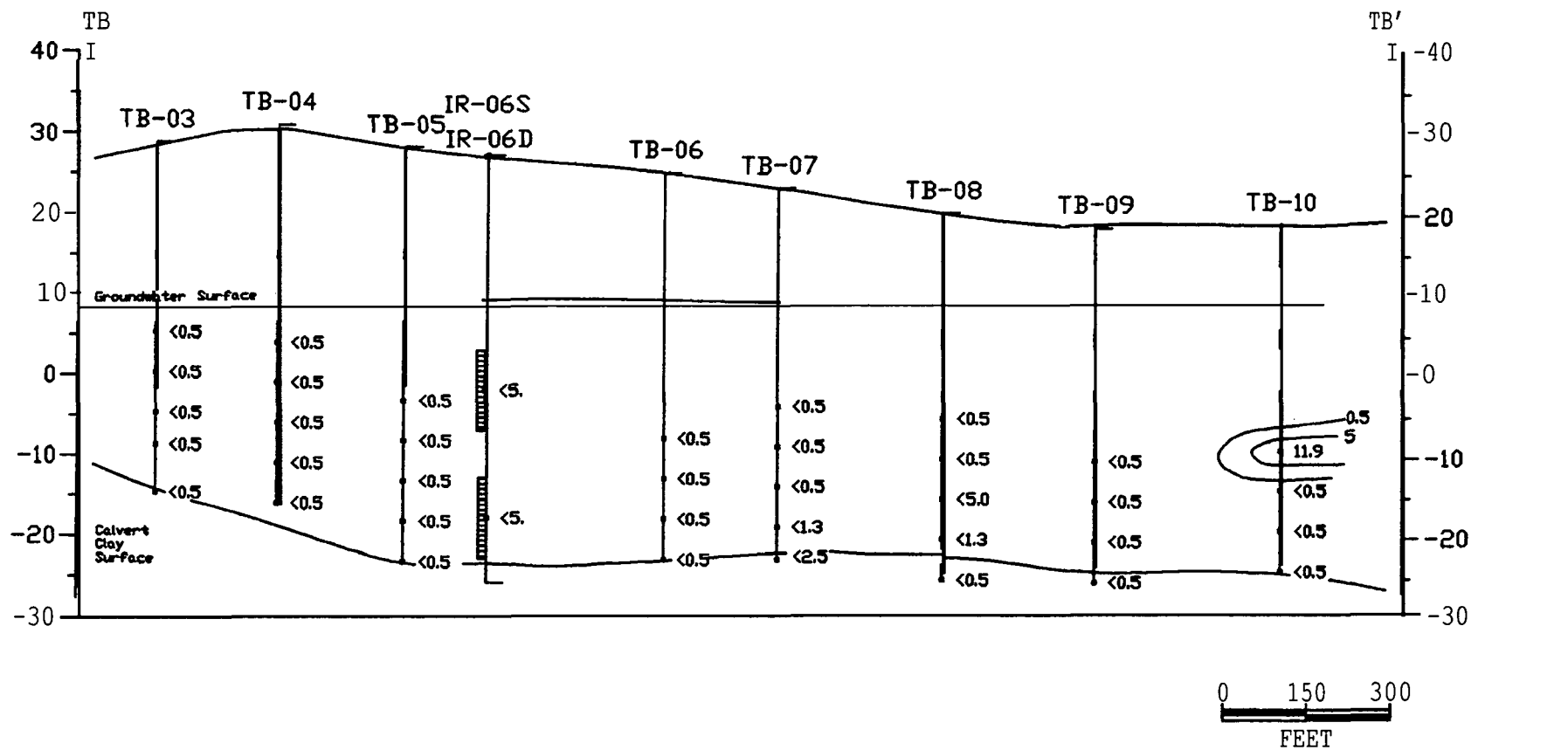
DWN:	DES:	FILE NUMBER:
TAE		7124A025
CHKD:	APPD:	FIGURE NO.:
DATE: 2/18/98	REV.: 0	30



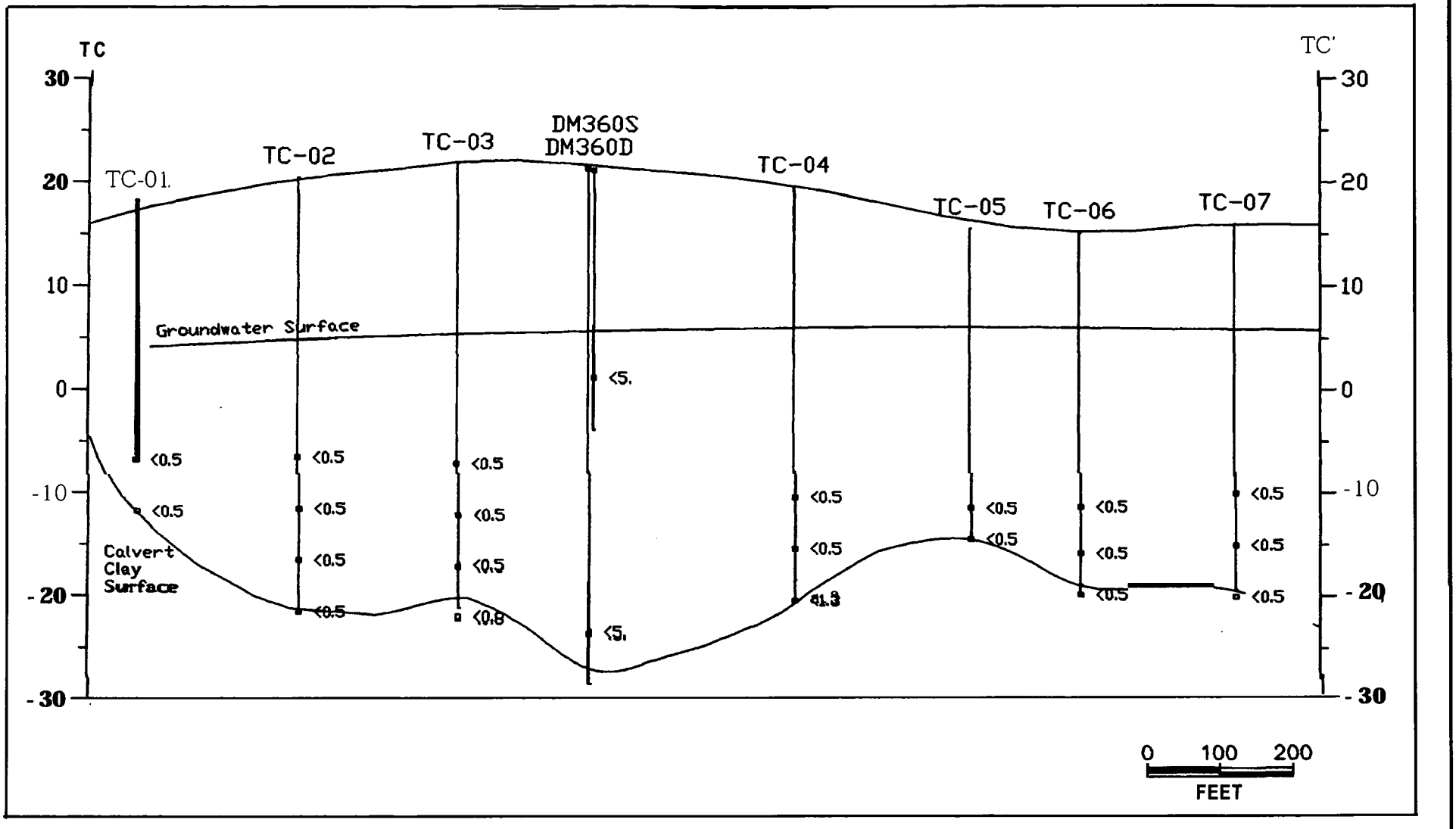
Corporate Remediation Group
A Partnership between DuPont and The E-C Diamond Group
Barley Mill Plaza, Building 27
Wilmington, Delaware 19880-0027

TITLE:
RTDF – Dover Air Force Base
Vinyl Chloride In Groundwater (ug/L)
Transect A

DWN:	DES.:	FILE NUMBER:
TAE		7124A016
CHKD:	APPD:	FIGURE NO.:
DATE: 7/18/98	REV.: 0	31



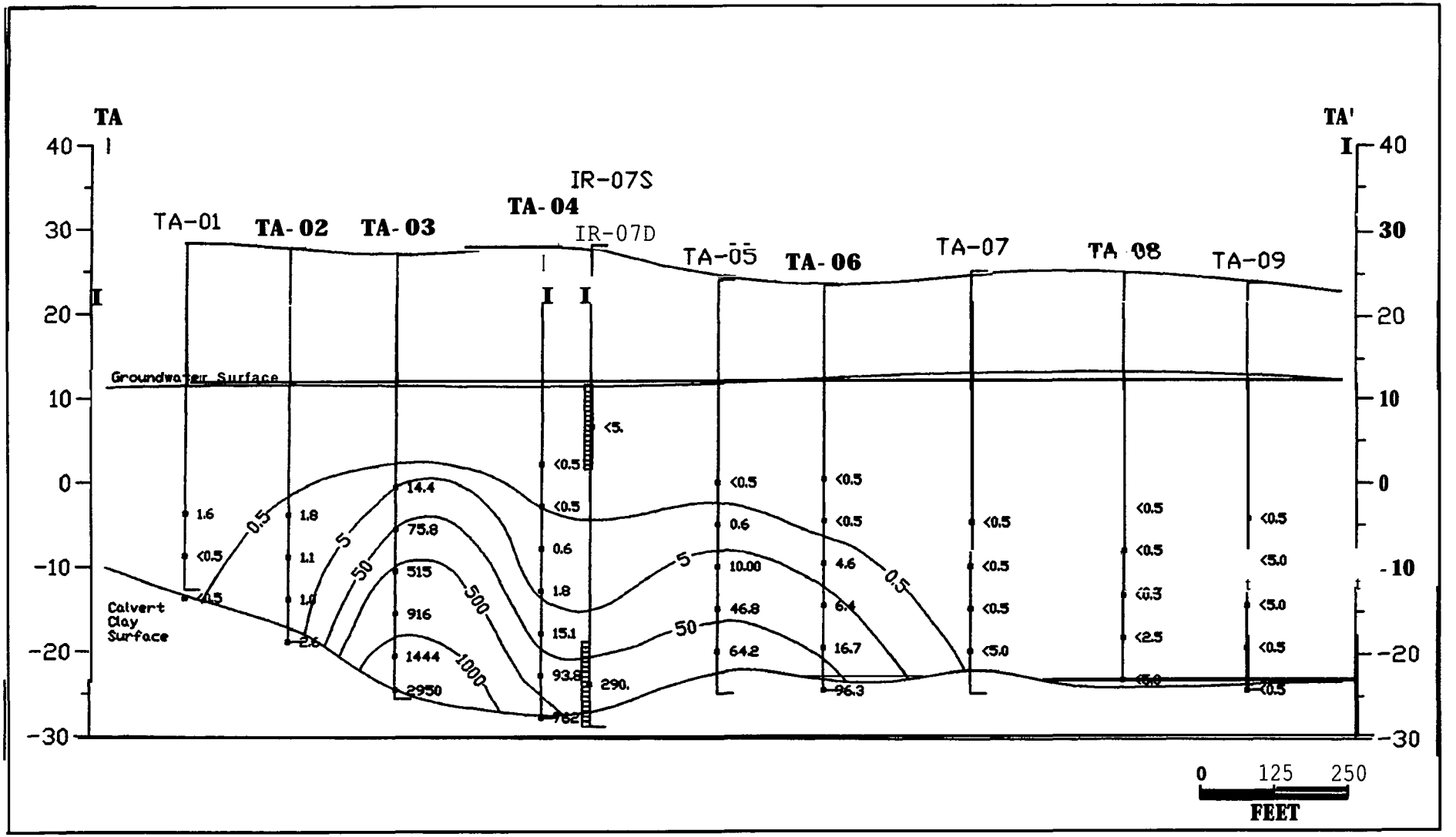
Corporate Remediation Group A Partnership between DuPont and The W-C Diamond Group Barley Mill Plaza, Building 27 Wilmington, Delaware 19880-0027	TITLE: RTDF – Dover Air Force Base Vinyl Chloride in Groundwater (ug/L) Transect B	DWN: TAE	DES.:	FILE NUMBER: 7124A020
		CHKD:	APPD:	FIGURE NO.: 32
		DATE: 2/18/98	REV.: 0	



Corporate Remediation Group
A Partnership between DuPont and The W-C Diamond Group
Barley Mill Plaza, Building 27
Wilmington, Delaware 19880-0027

TITLE:
RTDF – Dover Air Force Base
Vinyl Chloride in Groundwater (ug/L)
Transect C

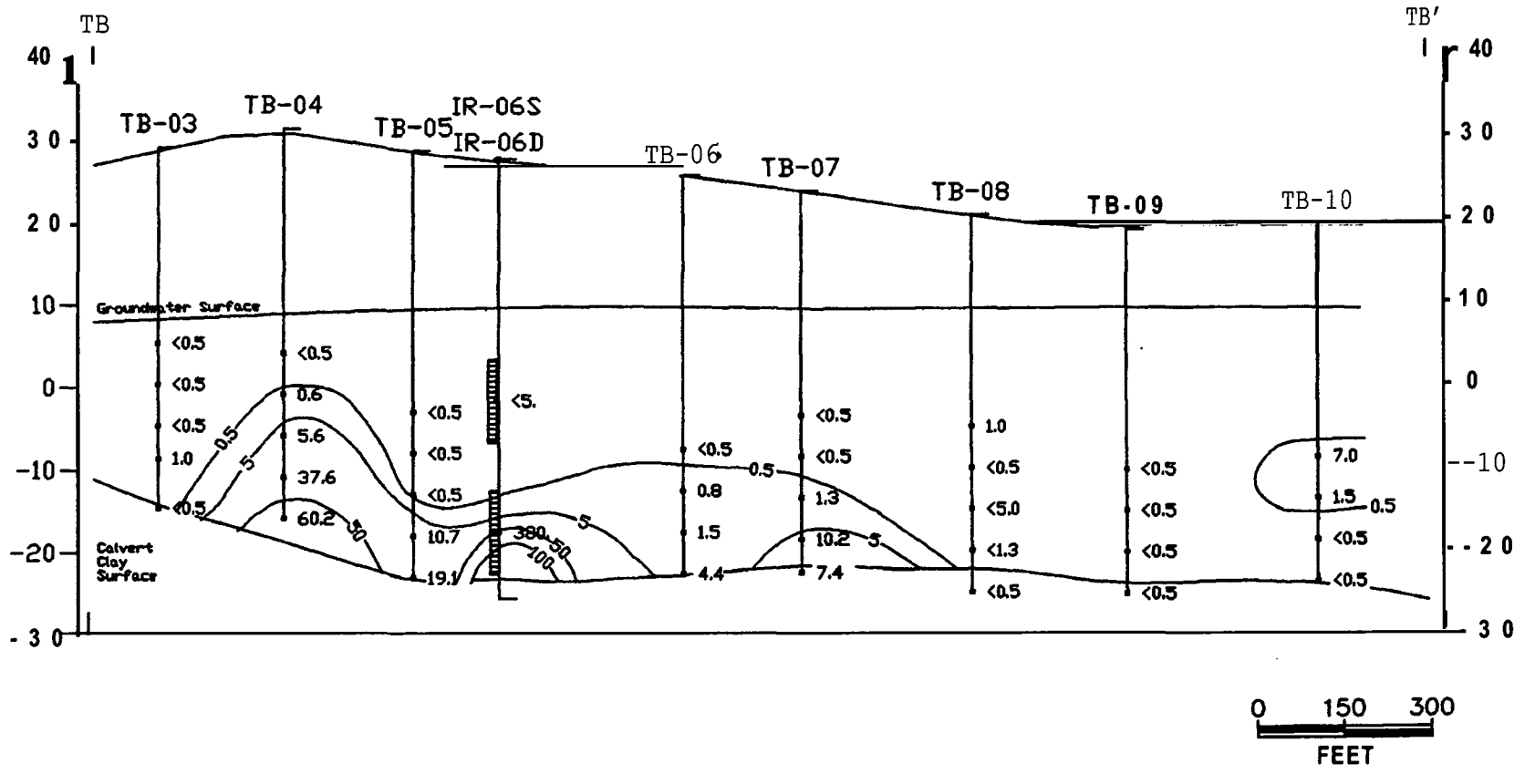
DWN: TAE	DES.:	FILE NUMBER: 7124A026	
CHKD:	APPD:	FIGURE NO.: 33	
DATE: 2/18/98	REV.: 0		



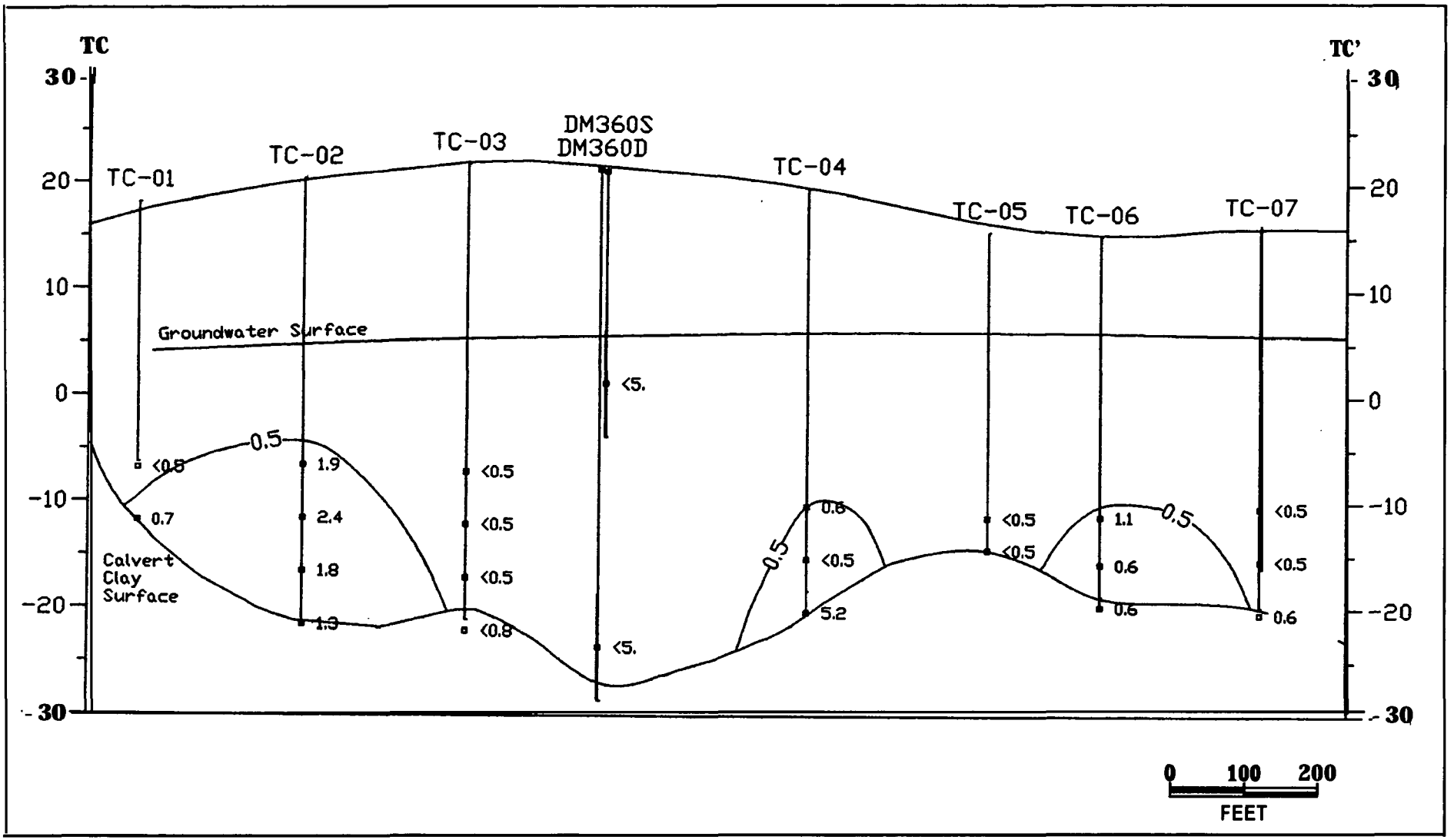
Corporate Remediation Group
A Partnership between DuPont and The E-C Diamond Group
Barley Mill Plaza, Building 27
Wilmington, Delaware 19880-0027

TITLE:
RTDF – Dover Air Force Base
1,2-dichloroethane in Groundwater (ug/L)
Transect A

DWN:	DES.:	FILE NUMBER:
TAE		7124A022
CHKD:	APPD:	FIGURE NO.:
DATE: 2/18/98	REV.: 0	34



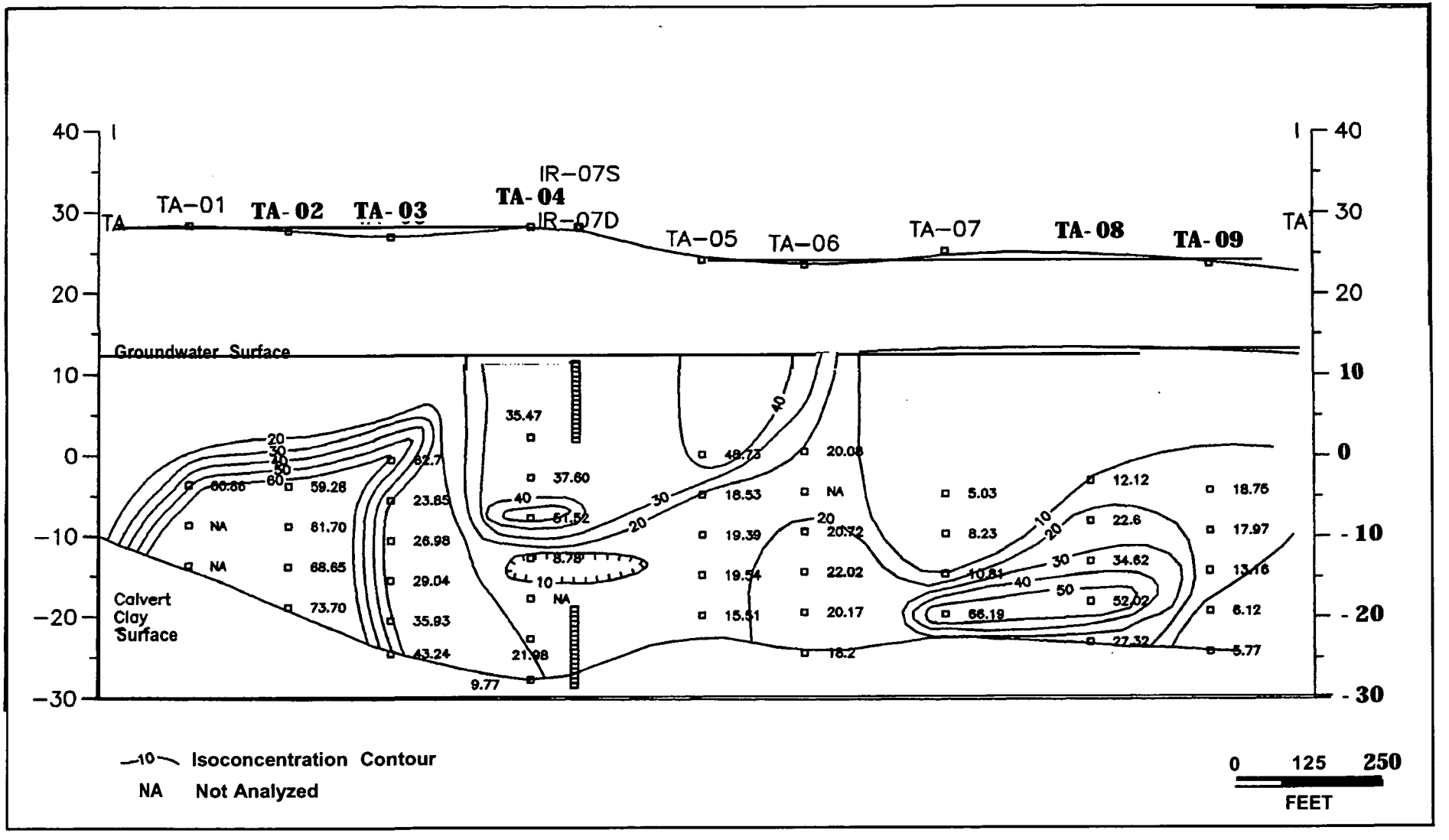
Corporate Remediation Group A Partnership between DuPont and The W-C Diamond Group Barley Mill Plaza, Building 27 Wilmington, Delaware 19880-0027	TITLE: RTDF – Dover Air Force Base 1,2-dichloroethane in Groundwater (ug/L) Transect B	DWN: TAE CHKD: DATE: 2/18/98	DES.: APPD: REV.: 0	FILE NUMBER: 7124A021 FIGURE NO.: 35



Corporate Remediation Group
A Partnership between DuPont and The V-C Diamond Group
Barley Mill Plaza, Building 27
Wilmington, Delaware 19880-0027

TITLE:
RTDF – Dover Air Force Base
1,2-dichloroethane in Groundwater (ug/L)
Transect C

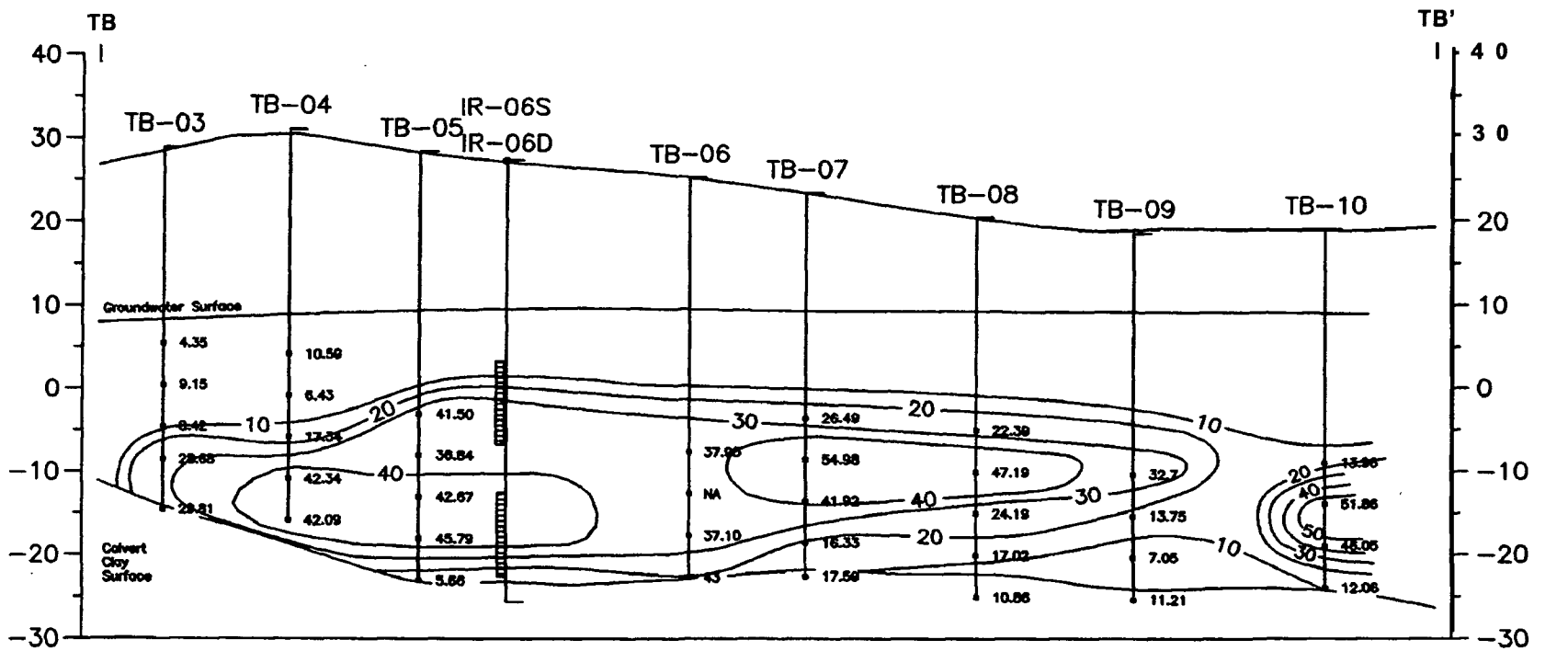
DWN:	DES.:	FILE NUMBER:
TAE		7124A027
CHKD:	APPD:	FIGURE NO.:
		36
DATE: 2/18/98	REV.: 0	



Corporate Remediation Group
An Alliance between DuPont and The T-C Diamond Group
Barley Mill Plaza, Building 27
Wilmington, Delaware 19880-0027

TITLE:
RTDF – Dover Air Force Base
Chloride in Groundwater (mg/L)
Transect A

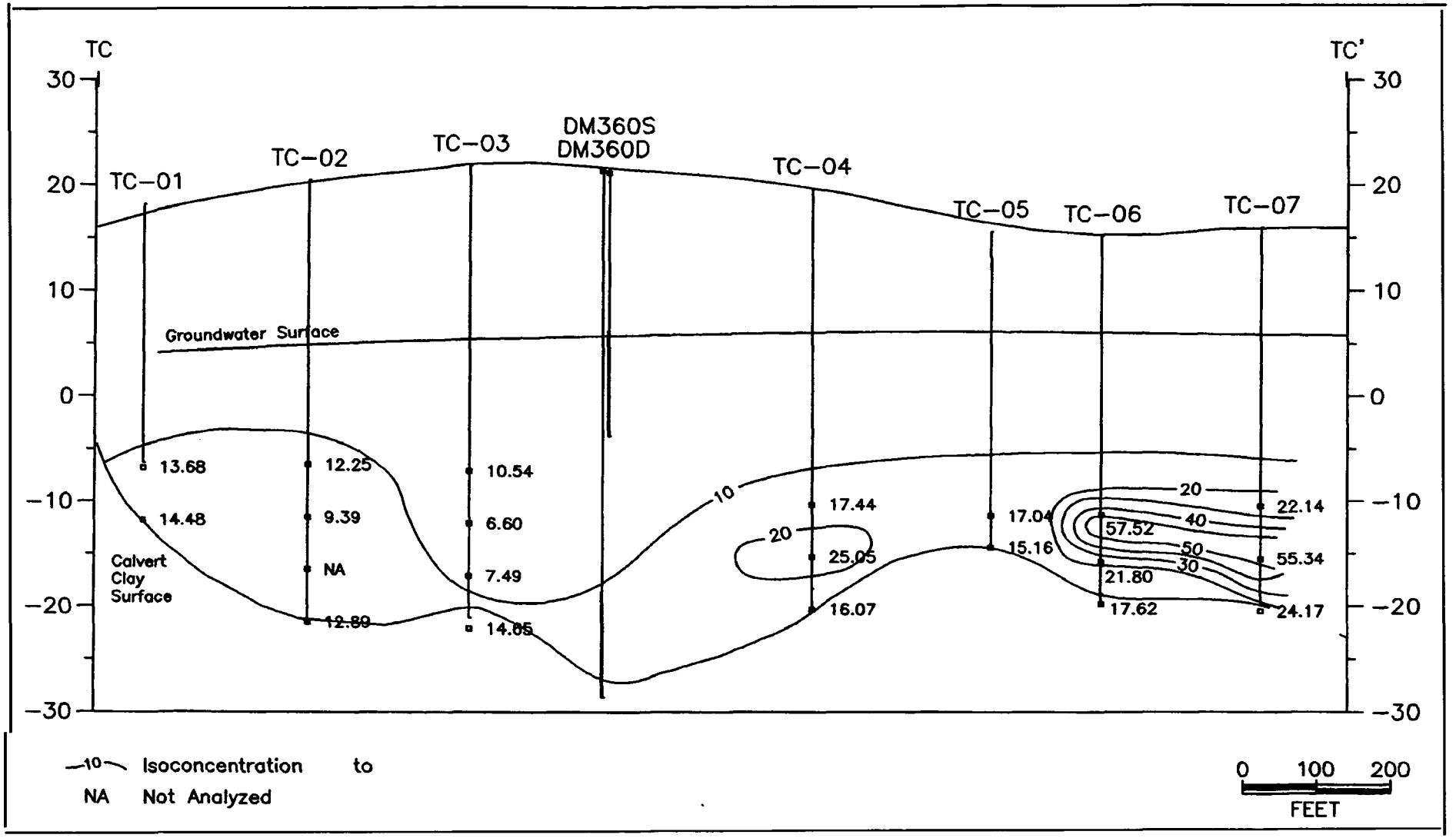
DWN: TAE	DES.:	FILE NUMBER	2006A0 10
CHKD:	APPD:	FIGURE NO.:	37
DATE: 2/24/98	REV.: 1		



Corporate Remediation Group
An Alliance between DuPont and The E-C Diamond Group
Barley Mill Plaza, Building 27
Wilmington, Delaware 19880-0027

TITLE:
RTDF - Dover Air Force Base
Chloride in Groundwater (mg/L)
Transect B

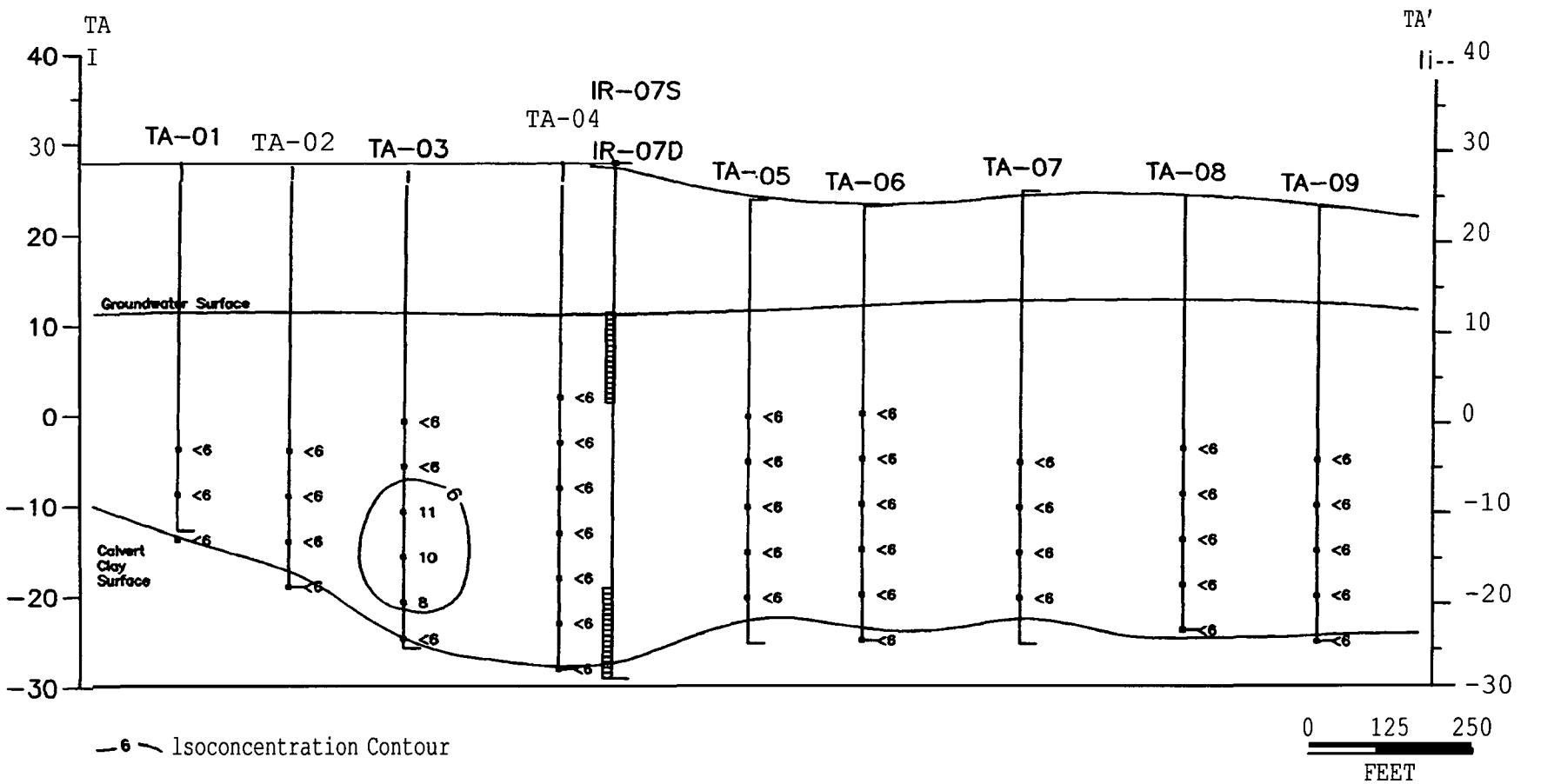
DWN:	DES.:	FILE NUMBER:
TAE		2006A011
CHKD:	APPD:	FIGURE NO.:
DATE: 2/24/98	REV.: 1	38



Corporate Remediation Group
An Alliance between DuPont and The W-C Diamond Group
Barley Mill Plaza, Building 27
Wilmington, Delaware 19880-0027

TITLE:
RTDF – Dover Air Force Base
Chloride in Groundwater (Mg/L)
Transect C

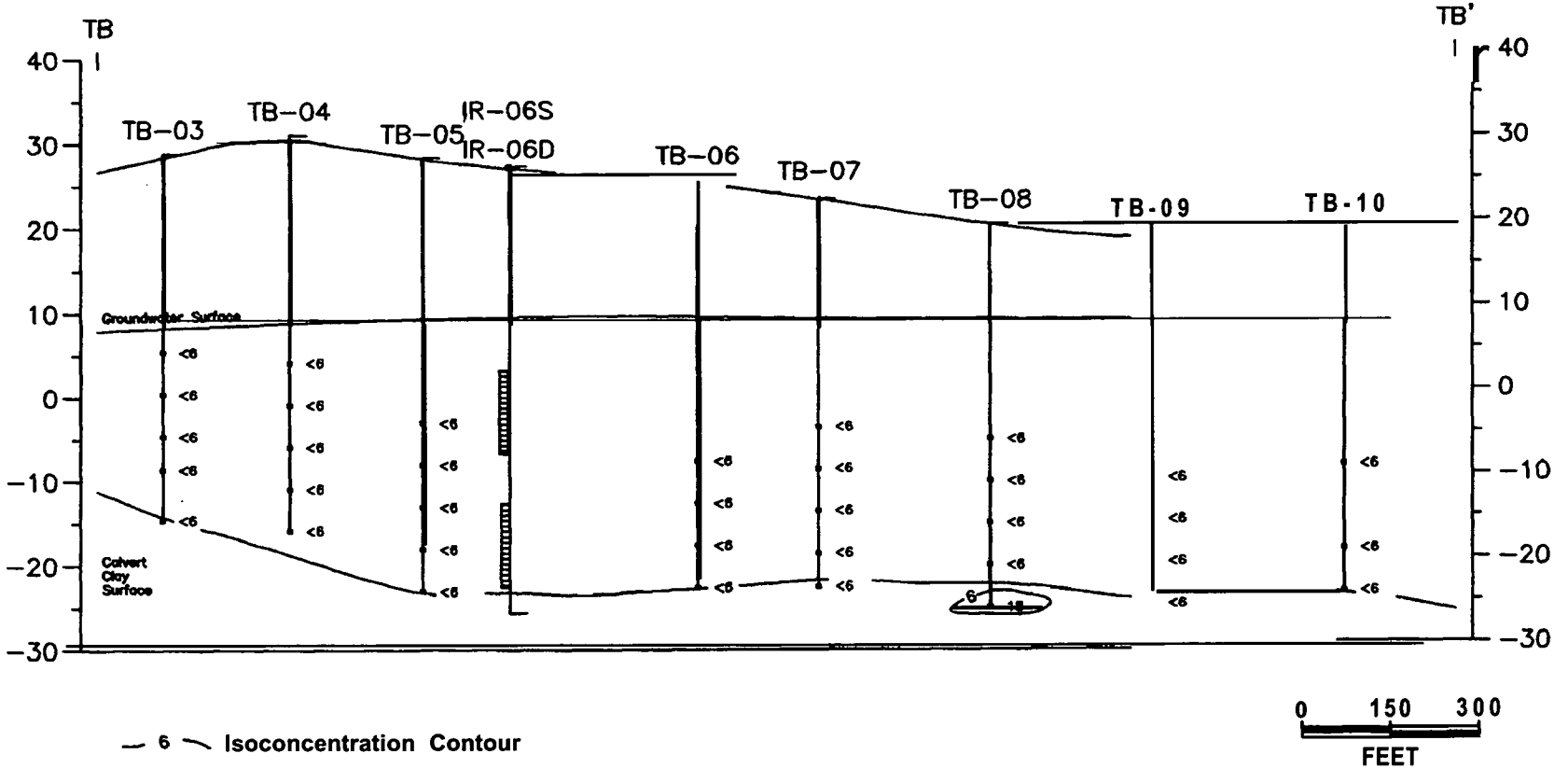
DWN:	DES.:	FILE NUMBER:
TAE		2006A012
CHKD:	APPD:	FIGURE NO.:
DATE: 2/24/98	REV.: 1	39



Corporate Remediation Group
An Alliance between DuPont and The W-C Diamond Group
Barley Mill Plaza, Building 27
Wilmington, Delaware 19880-0027

TITLE:
RTDF – Dover Air Force Base
Ethene in Groundwater (ug/L)
Transect A

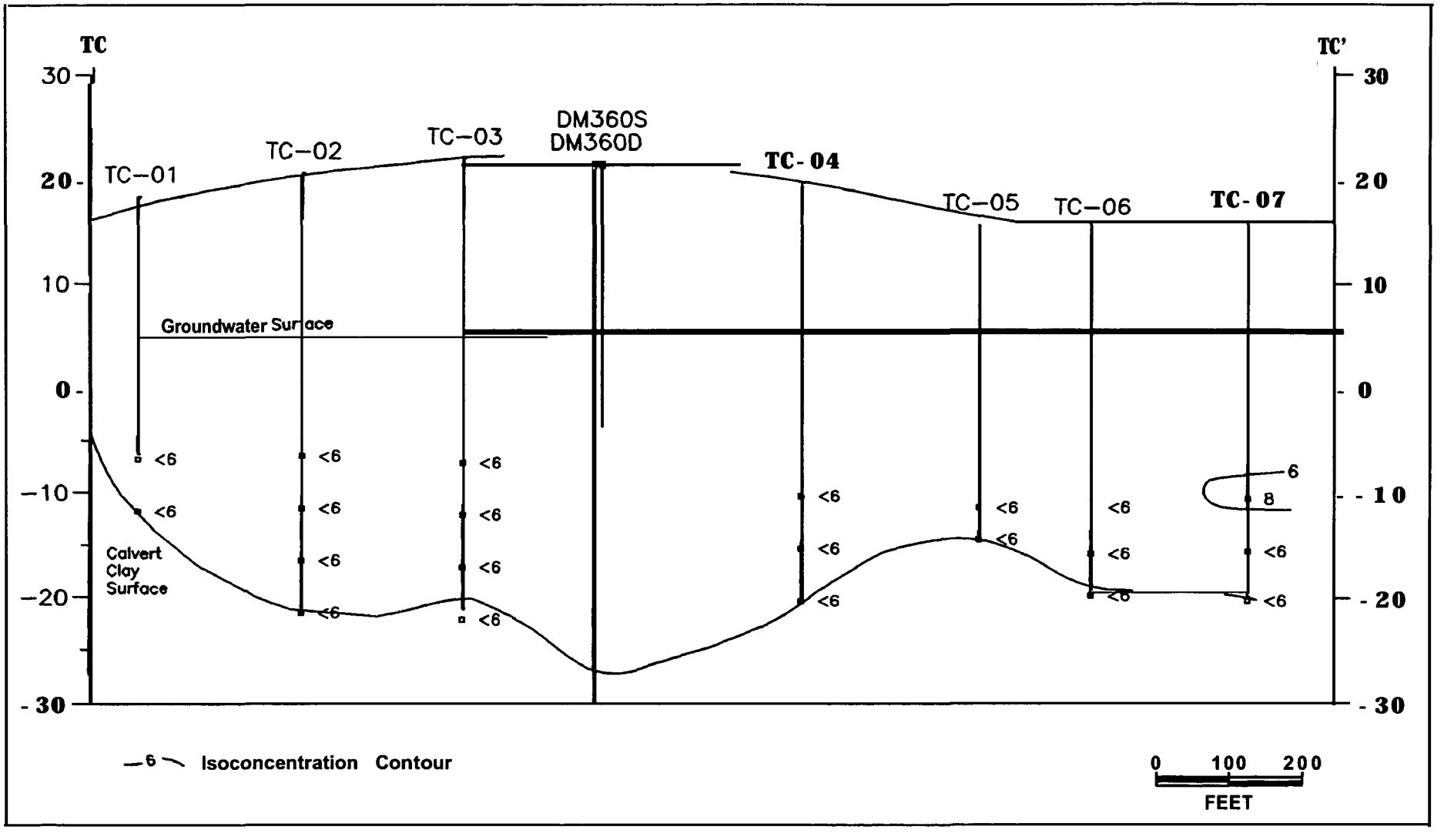
DWN:	DES.:	FILE NUMBER:
TAE		2006A0 14
CHKD:	APPD:	FIGURE NO.:
DATE: 2/24/98	REV.: 1	40



Corporate Remediation Group
An Alliance between DuPont and The E-C Diamond Group
Barley Mill Plaza, Building 27
Wilmington, Delaware 19880-0027

TITLE:
RTDF – Dover Air Force Base
Ethene in Groundwater (ug/L)
Transect B

DWN:	DES:	FILE NUMBER:
TAE		2006A0 16
CHKD:	APPD:	FIGURE NO.:
DATE: 2/24/98	REV.: 1	41



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Wilmington, Delaware 19880-0027

TITLE:
RTDF - Dover Air Force Base
Ethene in Groundwater (ug/L)
Transect C

DWN:	DES.:	FILE NUMBER:
TAE		2006A0 18
CHKD:	APPD:	FIGURE NO.:
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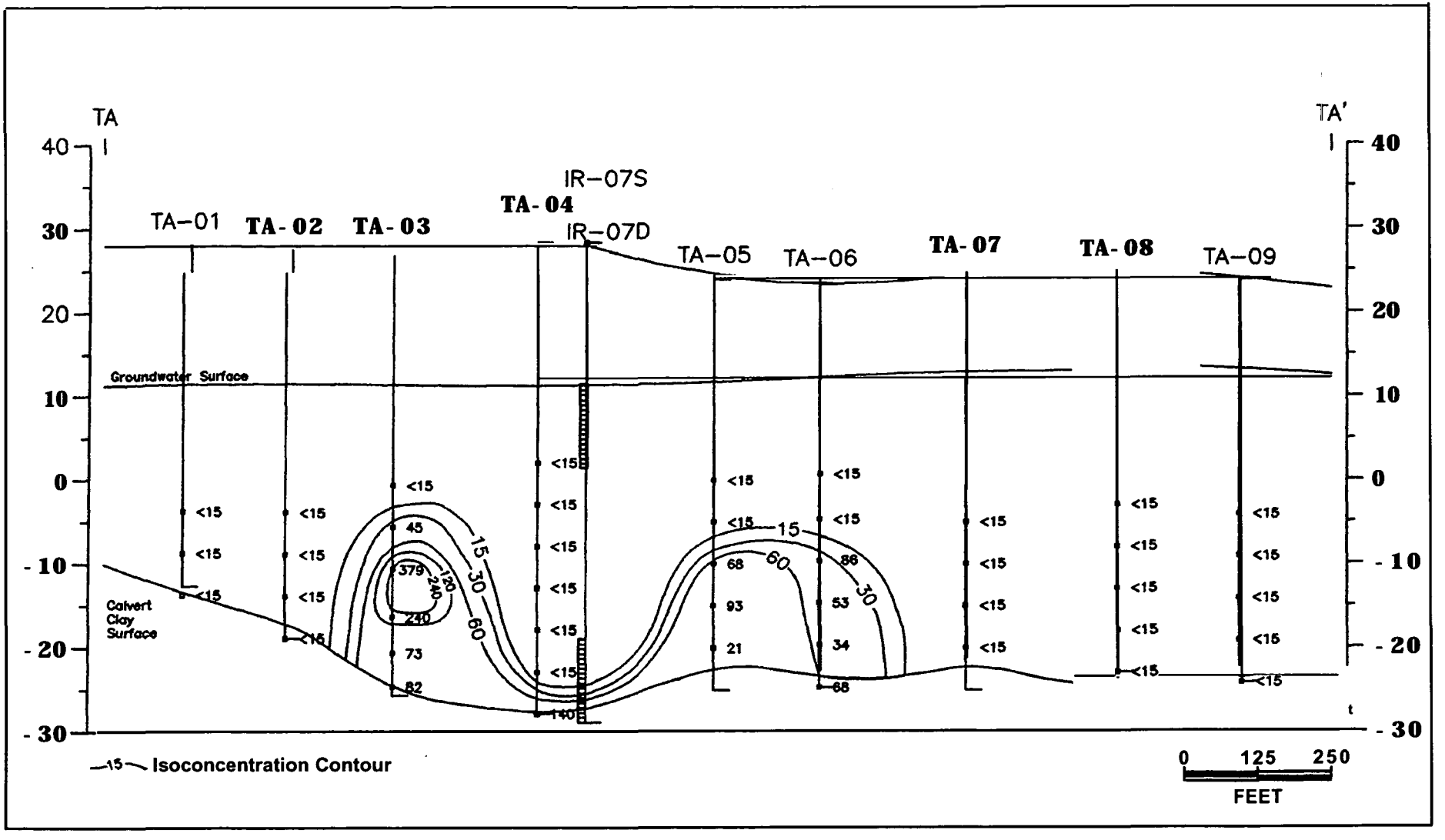
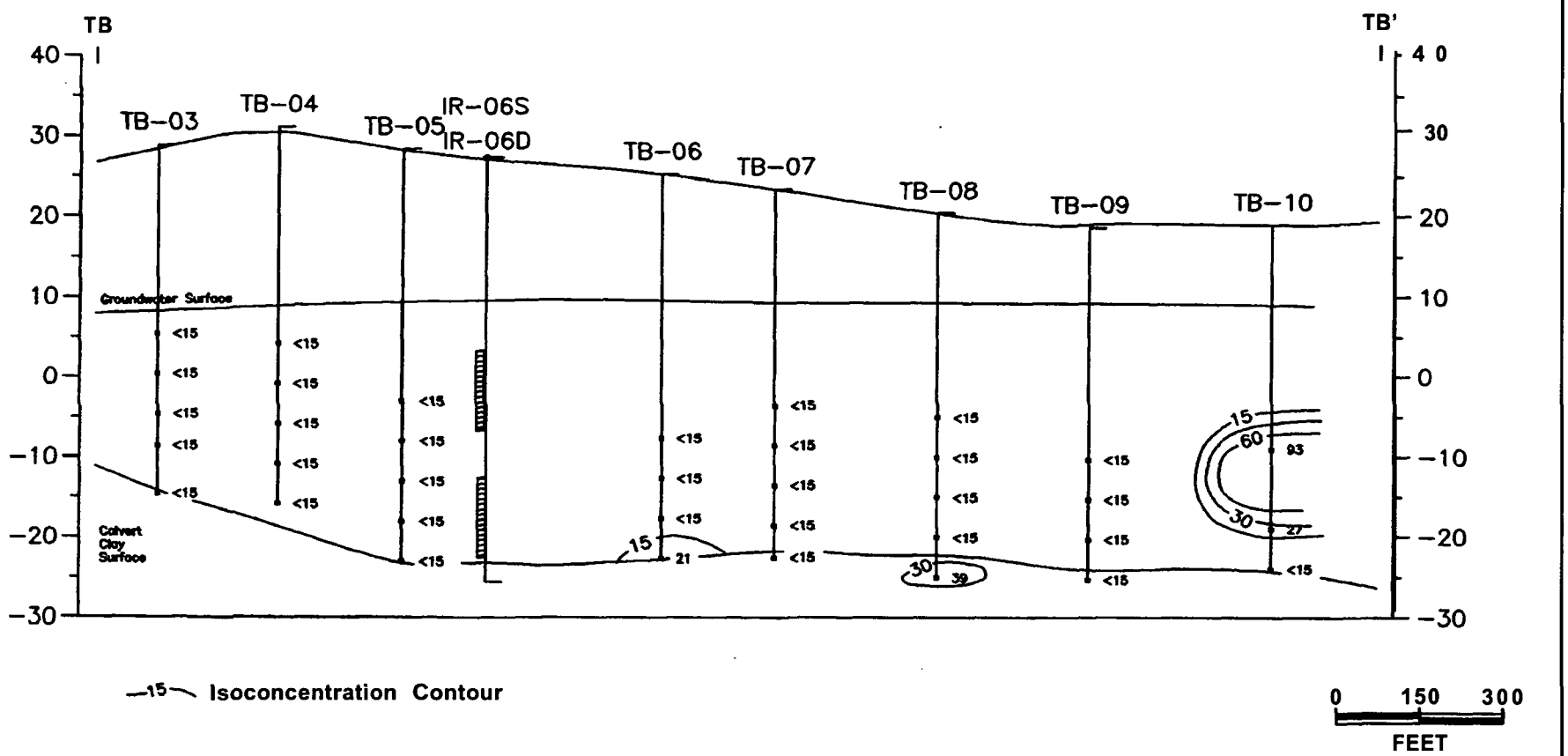


Corporate Remediation Group
A Partnership between DuPont and The T-C Diamond Group
Barley Mill Plaza, Building 27
Wilmington, Delaware 19880-0027

TITLE:
RTDF – Dover Air Force Base
Methane in Groundwater (ug/L)
Transect A

DWN:	DES.:	FILE NUMBER:
TAE		2006A013
CHKD:	APPD:	FIGURE NO.:
DATE: 2/24/98	REV.: 1	43



—15— Isoconcentration Contour

0 150 300
FEET

Corporate Remediation Group
An Alliance between DuPont and The E-C Diamond Group
Barley Mill Plaza, Building 27
Wilmington, Delaware 19880-0027

TITLE:
RTDF – Dover Air Force Base
Methane in Groundwater (ug/L)
Transect B

DWN:	DES.:	FILE NUMBER:
TAE		2006A015
CHKD:	APPD:	FIGURE NO.:
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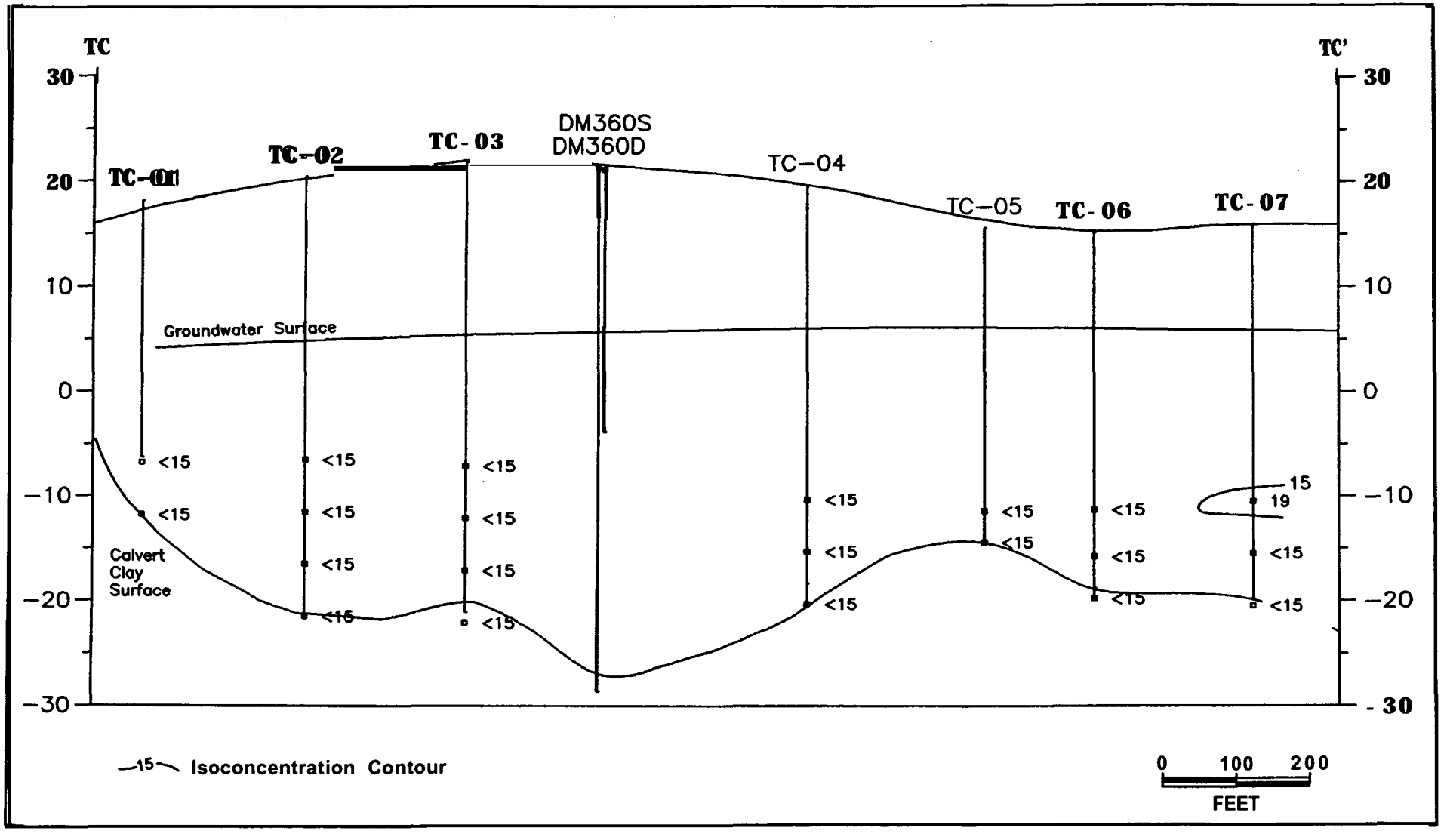
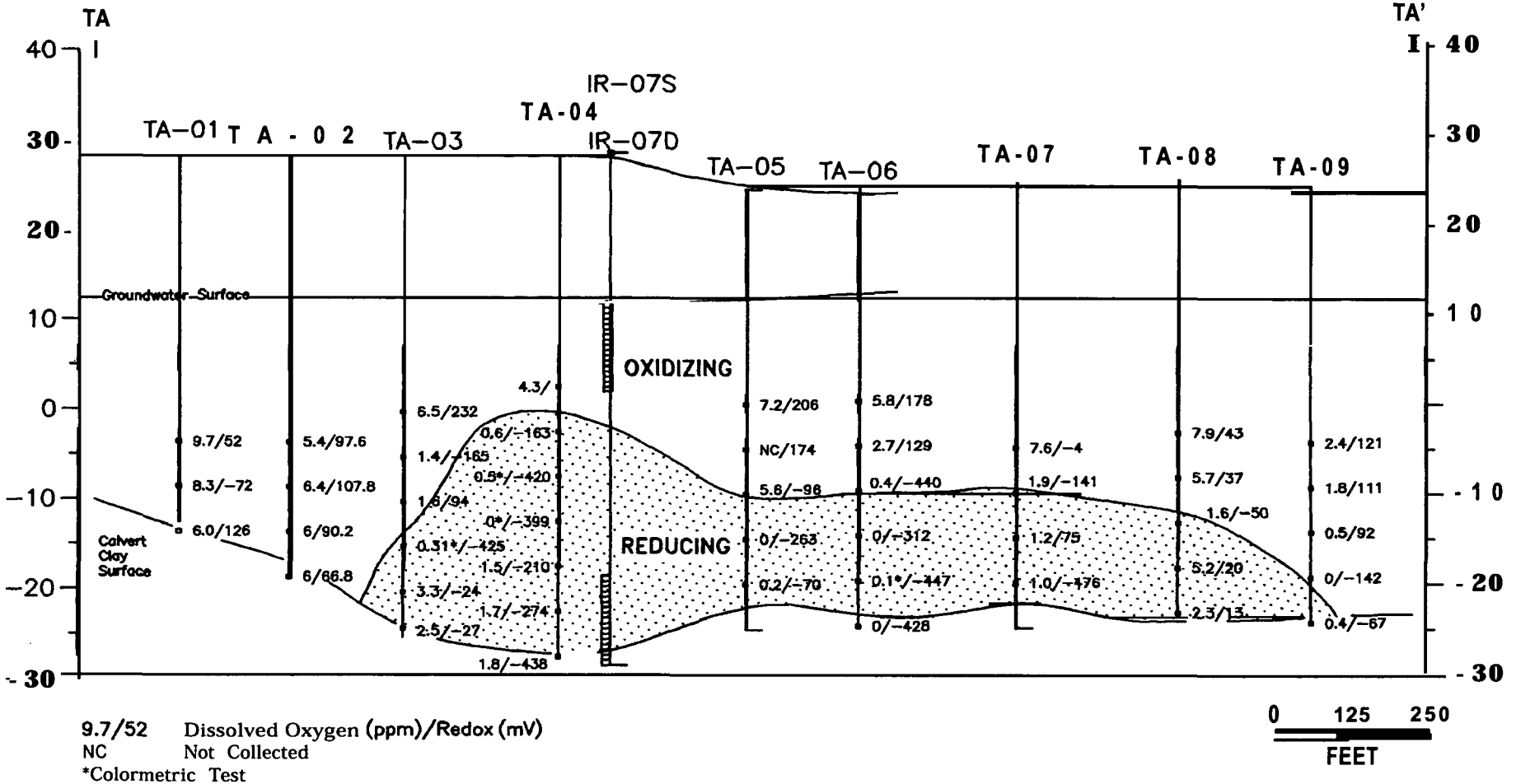


Corporate Remediation Group
An Alliance between DuPont and The E-C Diamond Group
Barley Mill Plaza, Building 27
Wilmington, Delaware 19880-0027

TITLE:
RTDF – Dover Air Force Base
Methane in Groundwater (ug/L)
Transect C

DWN:	DES.:	FILE NUMBER:
TAE		2006A0 17
CHKD:	APPD:	FIGURE NO.:
DATE: 2/24/98	REV.: 1	45

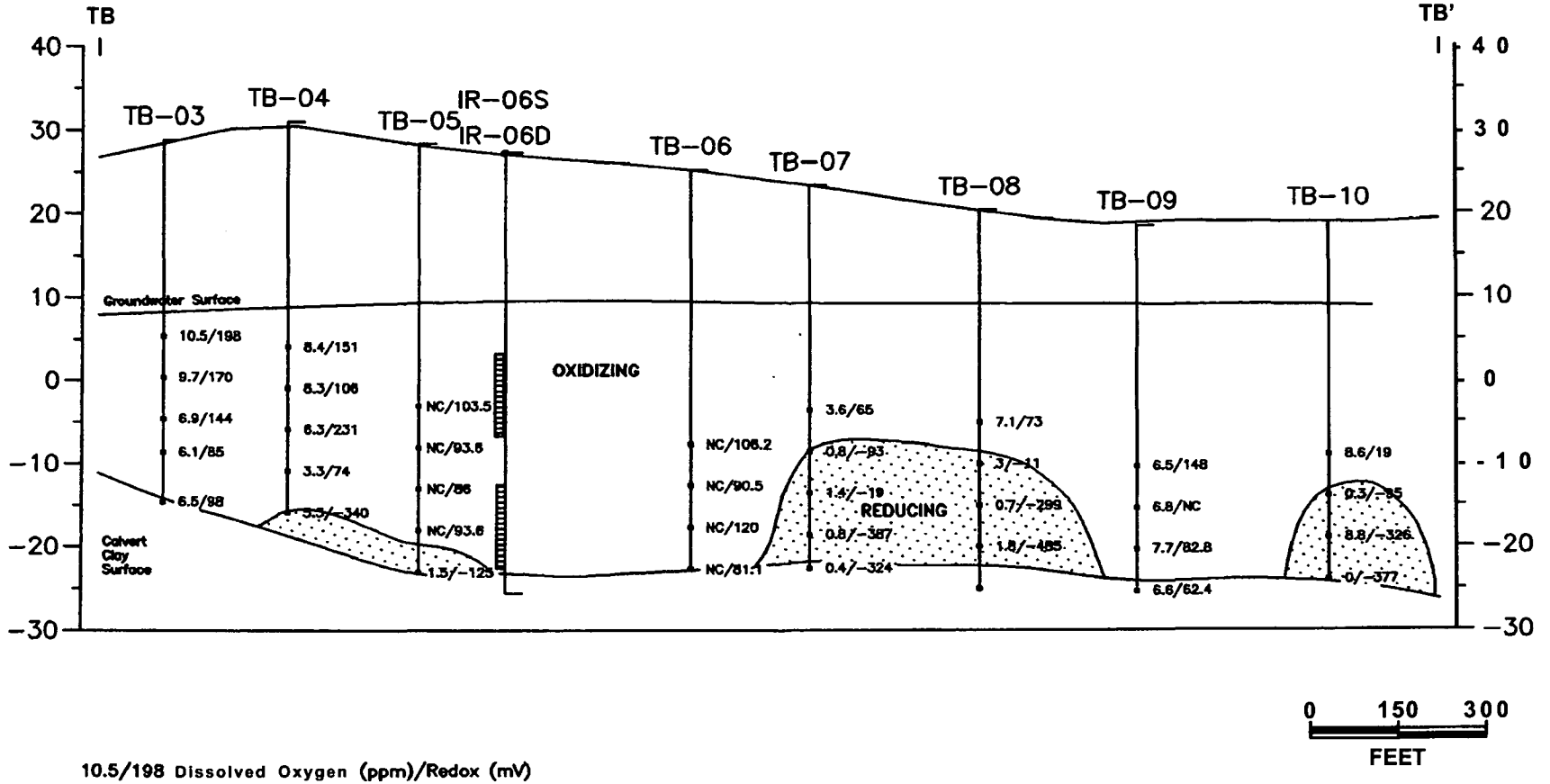


9.7/52 Dissolved Oxygen (ppm)/Redox (mV)
NC Not Collected
*Colormetric Test

Corporate Remediation Group
DuPont and The E-C Diamond Group
Barley Mill Plaza, Building 27
Wilmington, Delaware 19880-0027

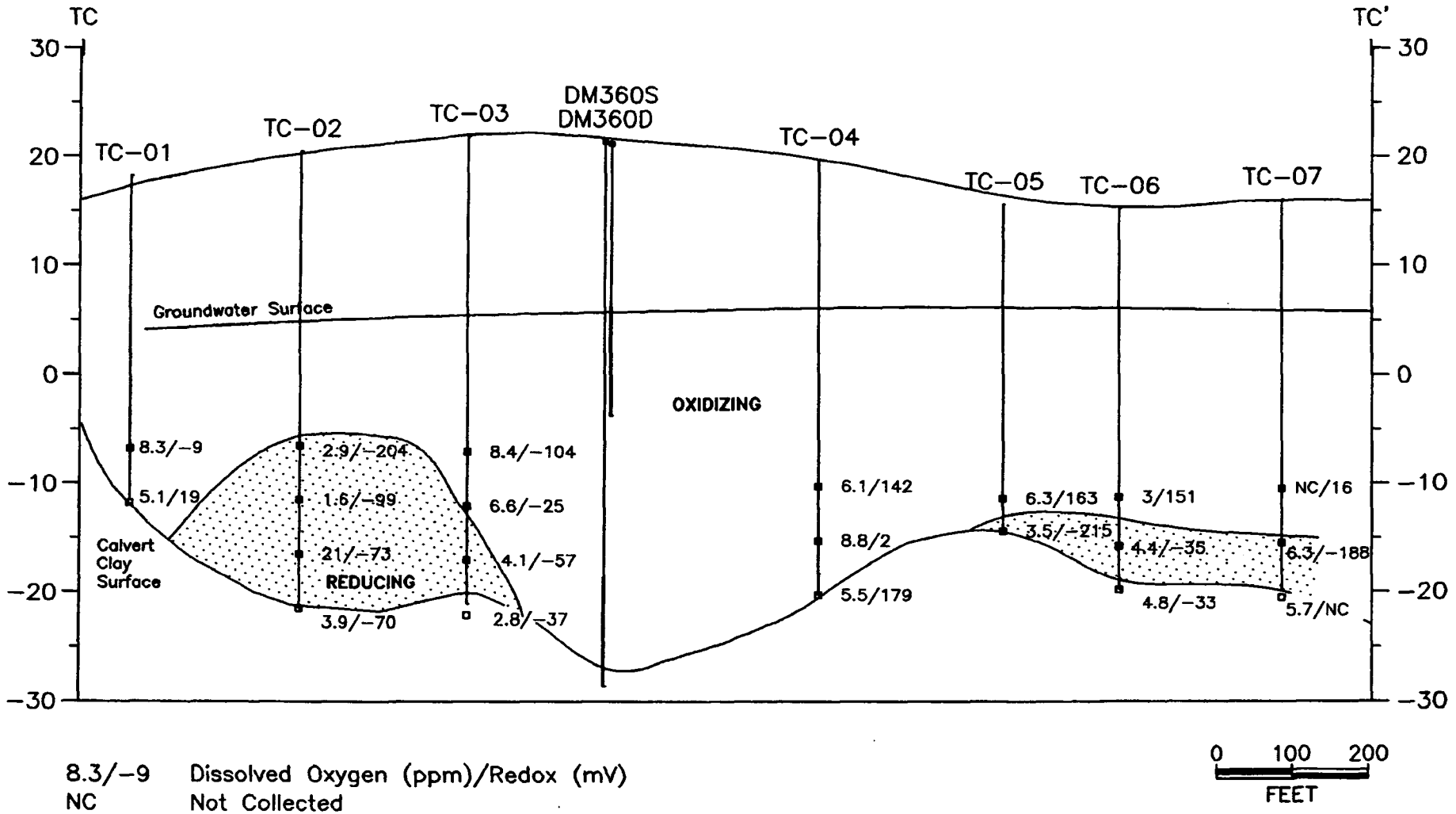
TITLE:
RTDF – Dover Air Force Base
Dissolved Oxygen and Redox Results
Transect A

DWN:	DES.:	FILE NUMBER:
TAE		2006A001
CHKD:	APPD:	
		FIGURE NO.:
DATE:	REV.:	
2/24/98	1	46



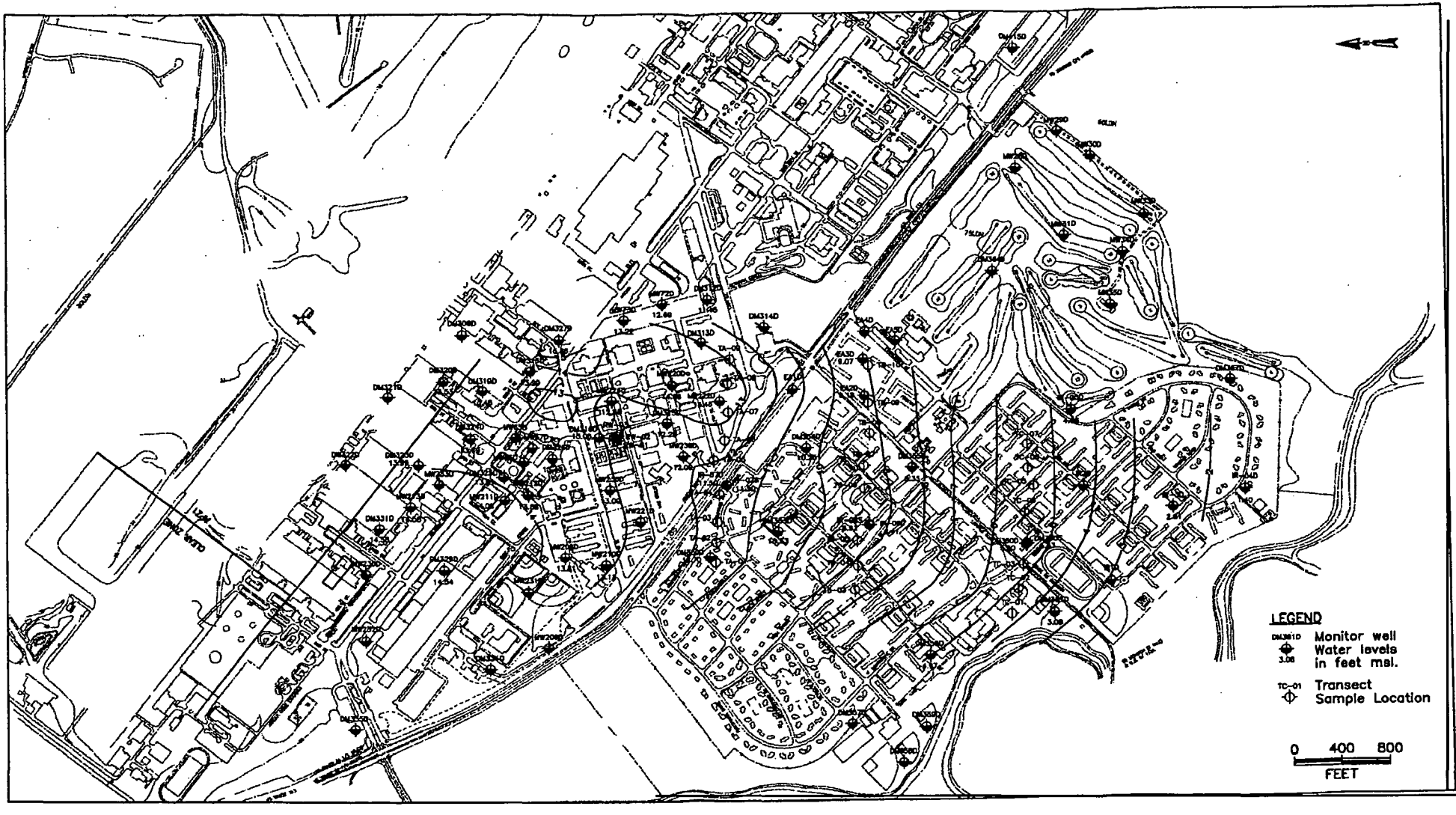
10.5/198 Dissolved Oxygen (ppm)/Redox (mV)
NC Not Collected

Corporate Remediation Group An Alliance between DuPont and The W-C Diamond Group Barley Mill Plaza, Building 27 Wilmington, Delaware 19880-0027	TITLE: RTDF – Dover Air Force Base Dissolved Oxygen and Redox Results Transect B	DWN: TAE	DES.:	FILE NUMBER: 2006A002
		CHKD:	APPD:	FIGURE NO.: 47
		DATE: 2/24/98	REV.: 1	



8.3/−9 Dissolved Oxygen (ppm)/Redox (mV)
NC Not Collected

Corporate Remediation Group An Alliance between DuPont and The E-C Diamond Group Barley Mill Plaza, Building 27 Wilmington, Delaware 19880-0027	TITLE: RTDF – Dover Air Force Base Dissolved Oxygen and Redox Results Transect C	DWN: TAE CHKD: DATE: 2/24/98	DES.: APPD: REV.: 1	FILE NUMBER: 2006A003 FIGURE NO.: 48

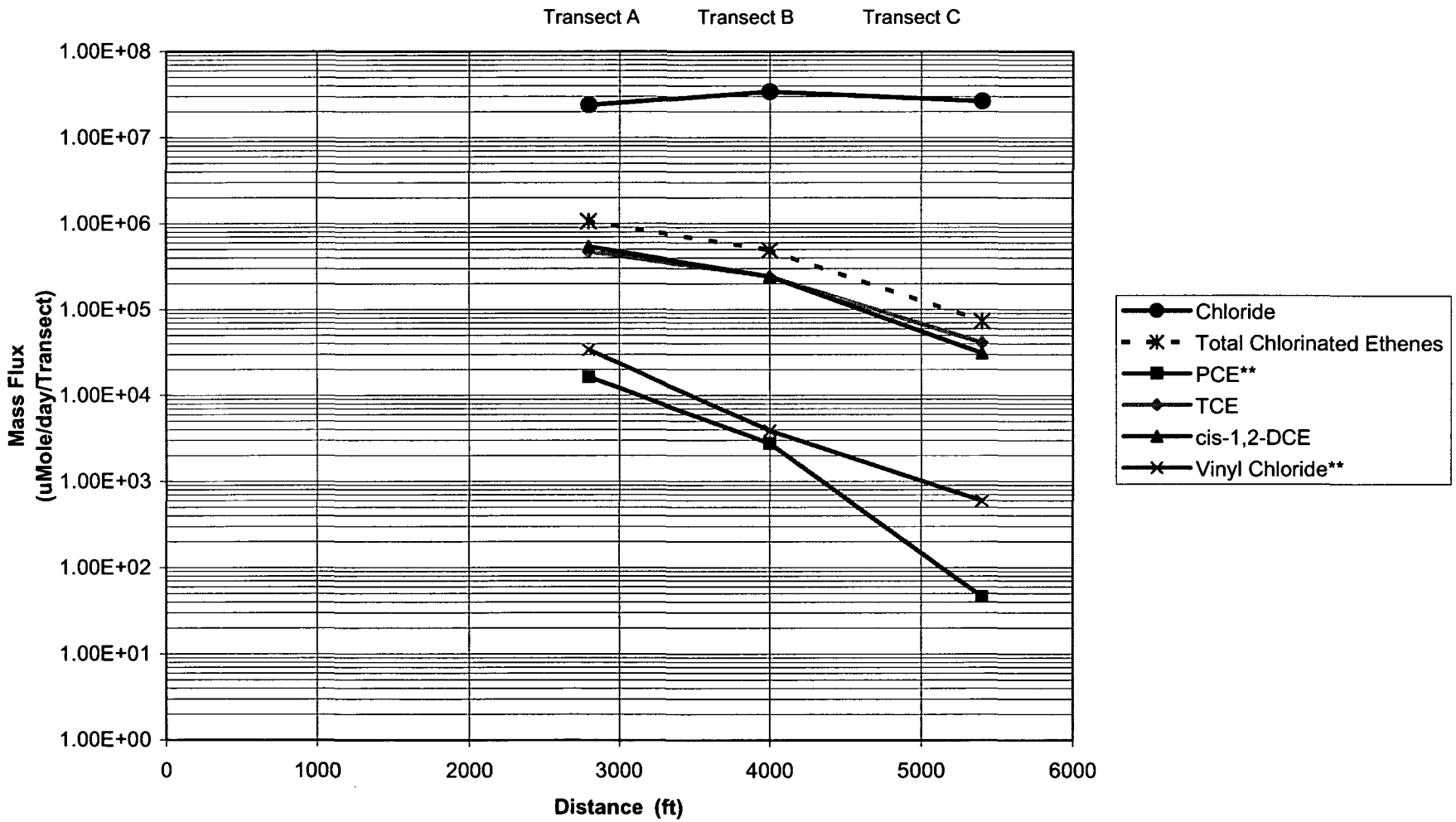


Corporate Remediation Group
An Alliance between DuPont and The P-C Diamond Group
Barley Mill Plaza, Building 27
Wilmington, Delaware 19880-0027

TITLE:
Groundwater Contour Map – Deep Zone
March 17, 1997
Dover Air Force Base, Delaware

DWN: TIQ	DES.:	FILE NUMBER: 7124B005
CHKD:	APPD:	FIGURE NO.: 49
DATE: 2/2/99	REV.: 0	

Figure 50
Mass Flux Determined from Monitoring Well Data
Dover Air Force Base, Delaware



** Vinyl Chloride was not detected at Transect C (1/2 detection limit used)
Data Source: July 1996 groundwater sampling

Figure 51
Transect A Sample Point Cross Sectional Areas
Dover AFB, Delaware

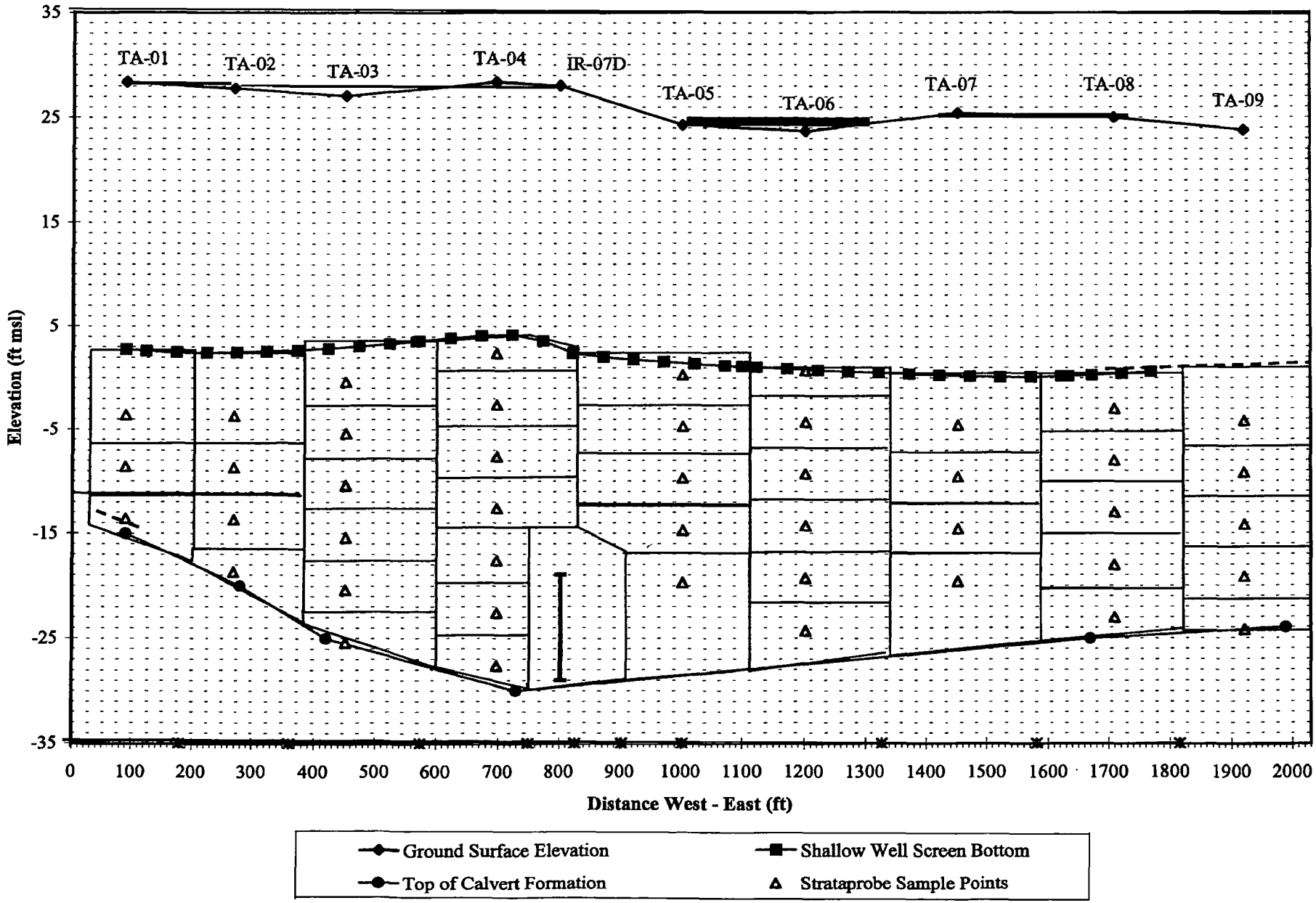


Figure 52
Transect B Sample Point Cross Sectional Areas
Dover AFB, Delaware

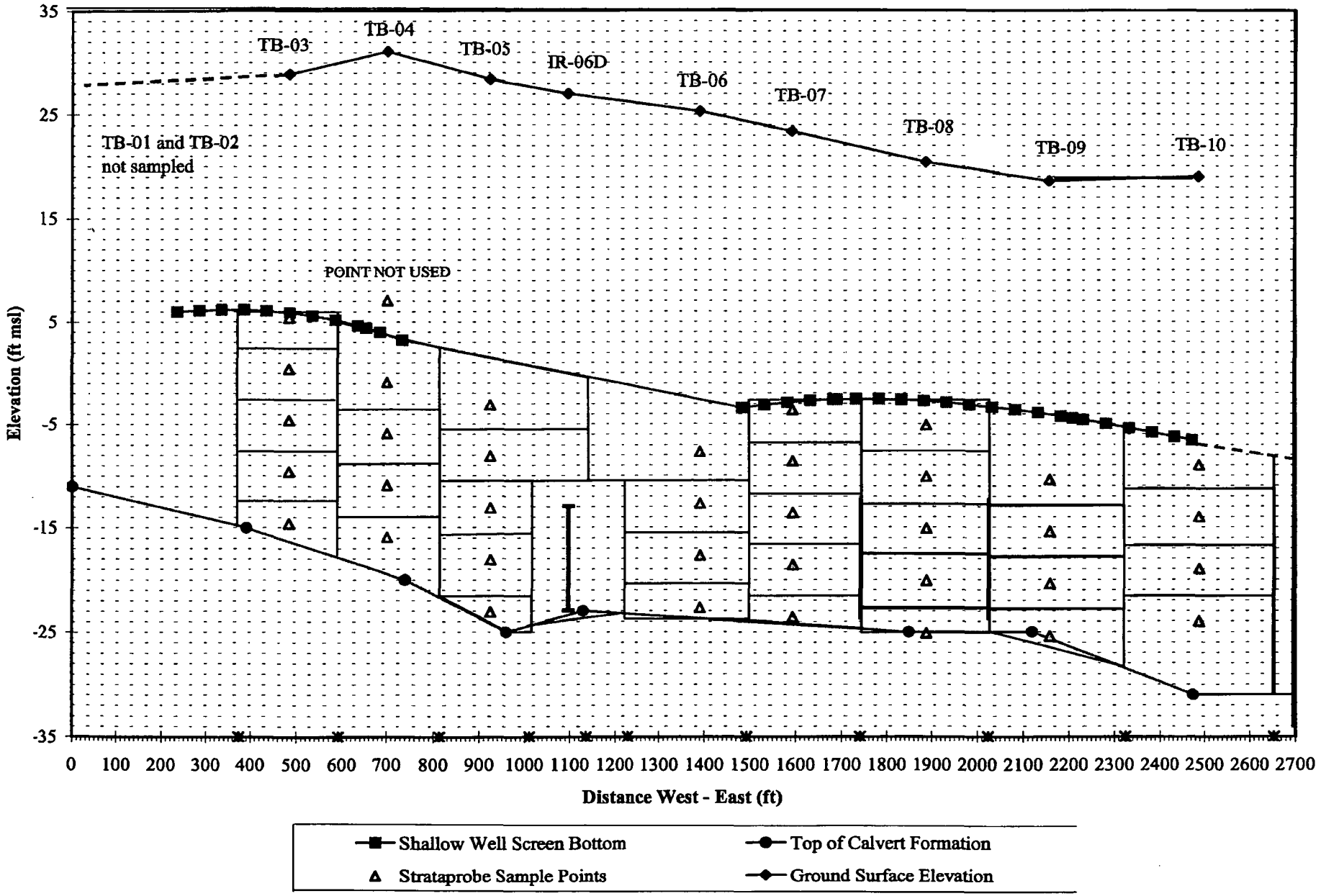


Figure 53
Transect C Sample Point Cross Sectional Areas
Dover AFB, Delaware

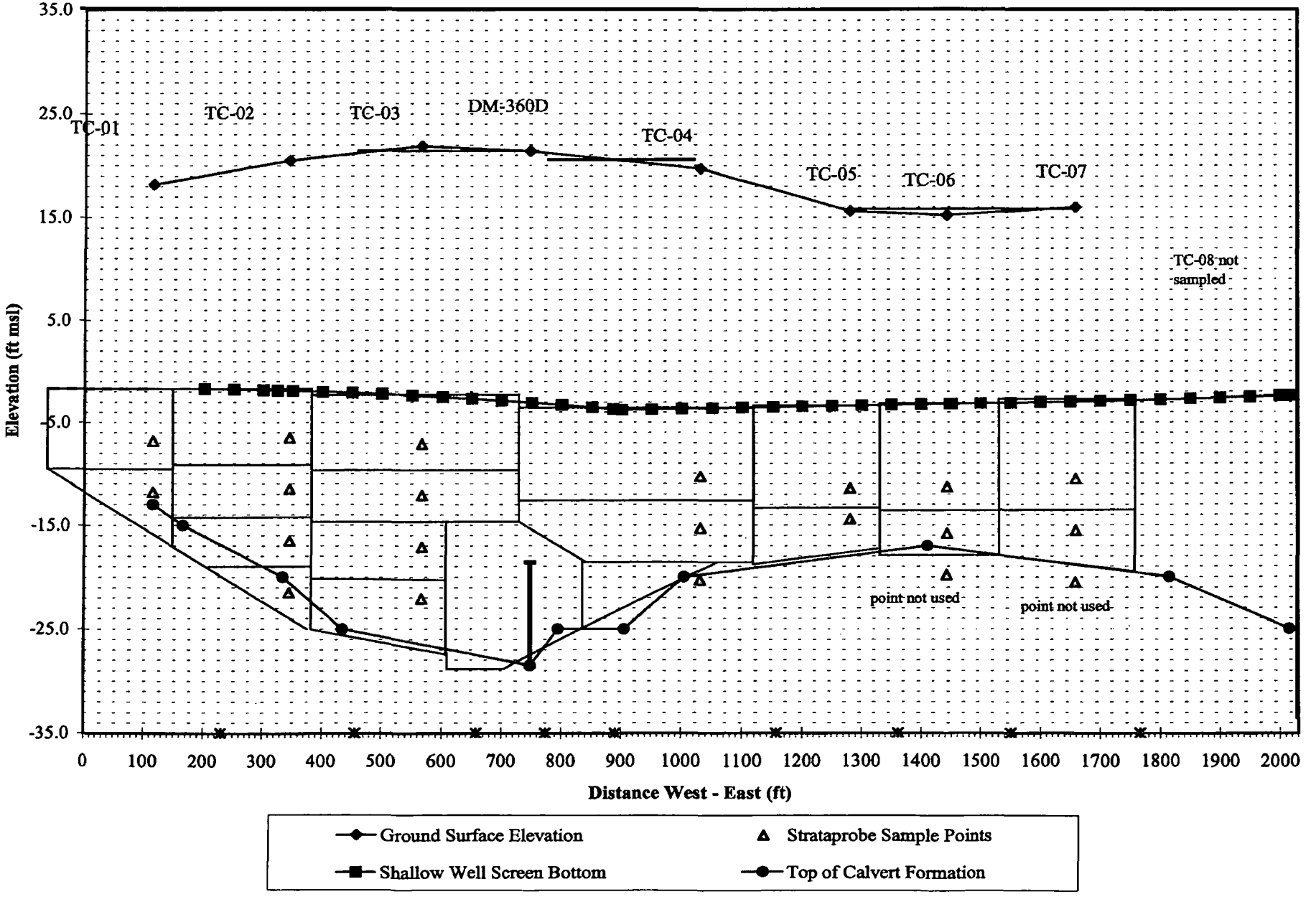
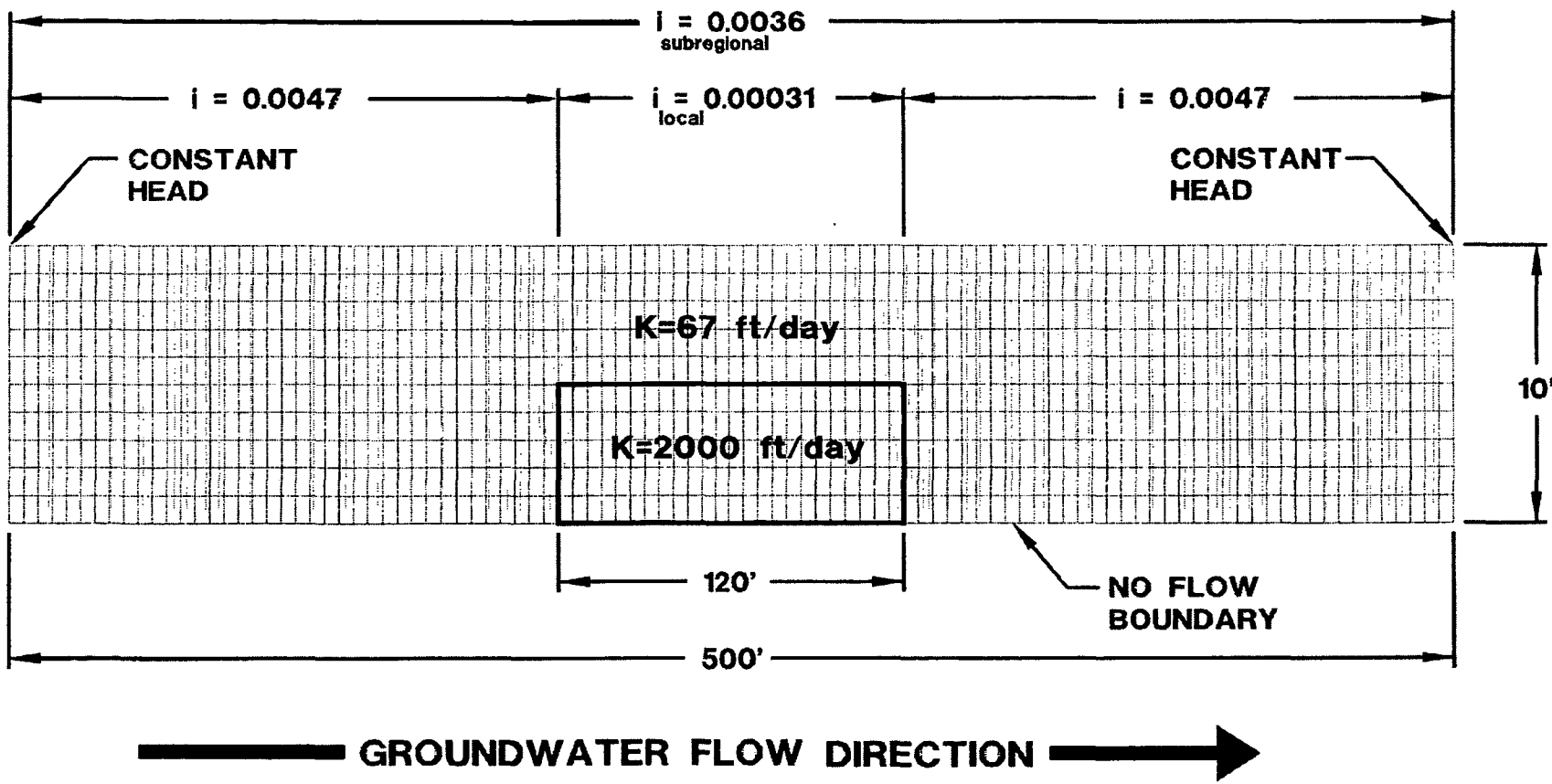


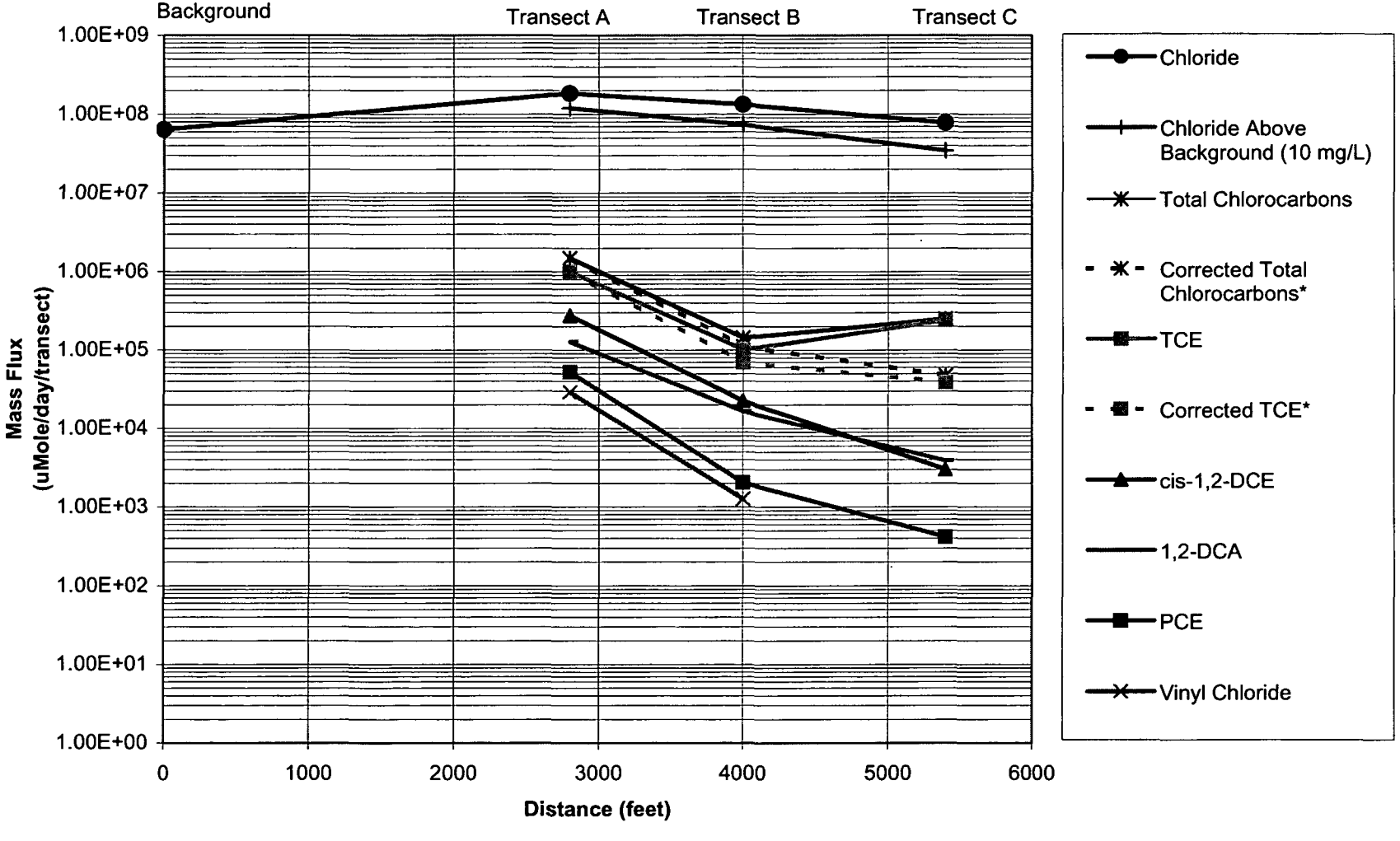
Figure 54
Example of Hydraulic Conductivity effect on Hydraulic Gradient
Dover Air Force Base, Delaware



$\text{Mass Flux}_{TCE}(i_{subregional}) = 40 \times 10^{4}$ umole/day

$\text{Mass Flux}_{TCE}(i_{local})$ ▫ 6 ⊠ $.0^{4}$ umole/day

Figure 55
Mass Flux Determined from Transect Data using Summation Method
Dover Air Force Base, Delaware



Note: Vinyl Chloride was Not Detected at Transect C or Transect B.
1/2 Detection limit used for non-detects
*Corrected for Hydraulic Conductivity Effects on gradient (1/11 of subregional gradient used)

Figure 56
Comparison of Lognormal and Normal Distributions with Actual Data from Transect A {Lin - Log Plot }

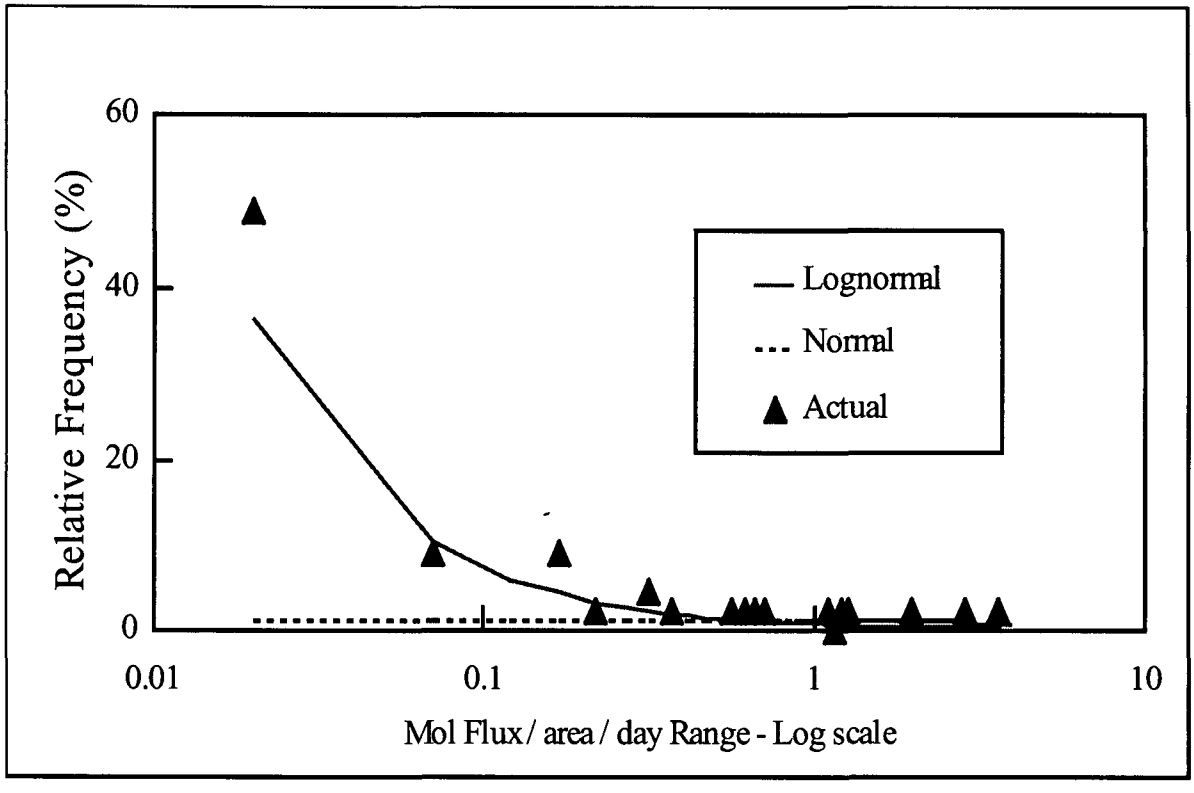
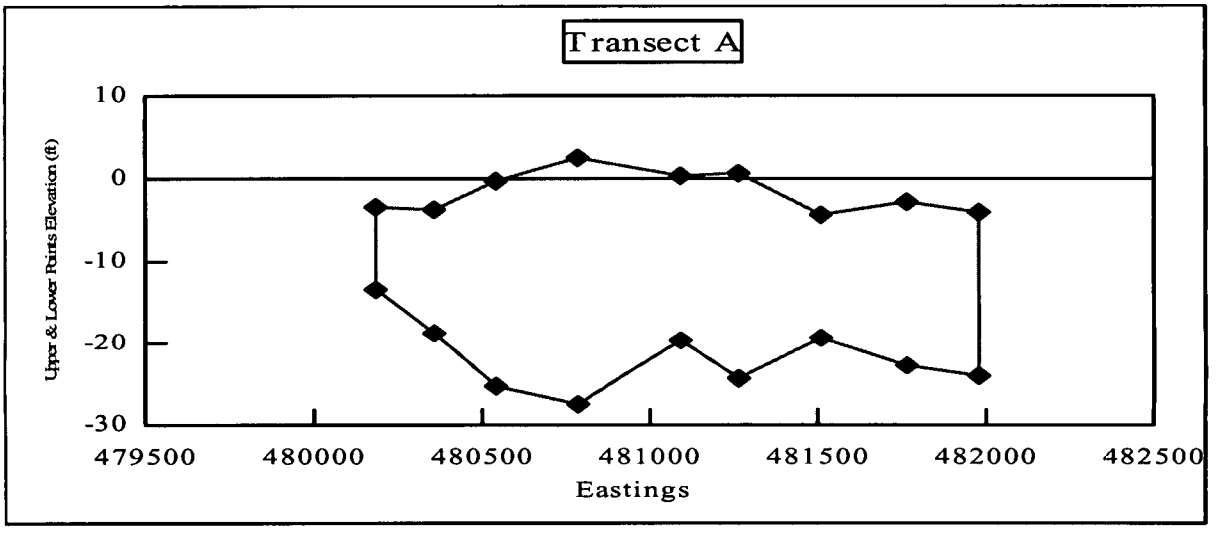
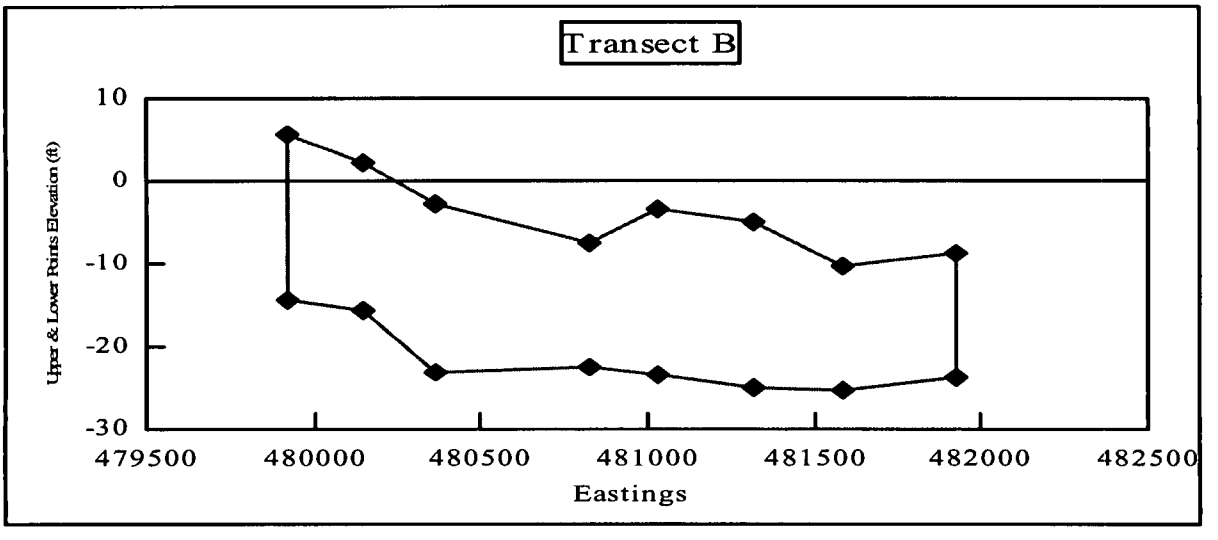


Figure 57
Sample Points Used To Calculate Transect Areas
for Statistical Analysis Mass Flux Results





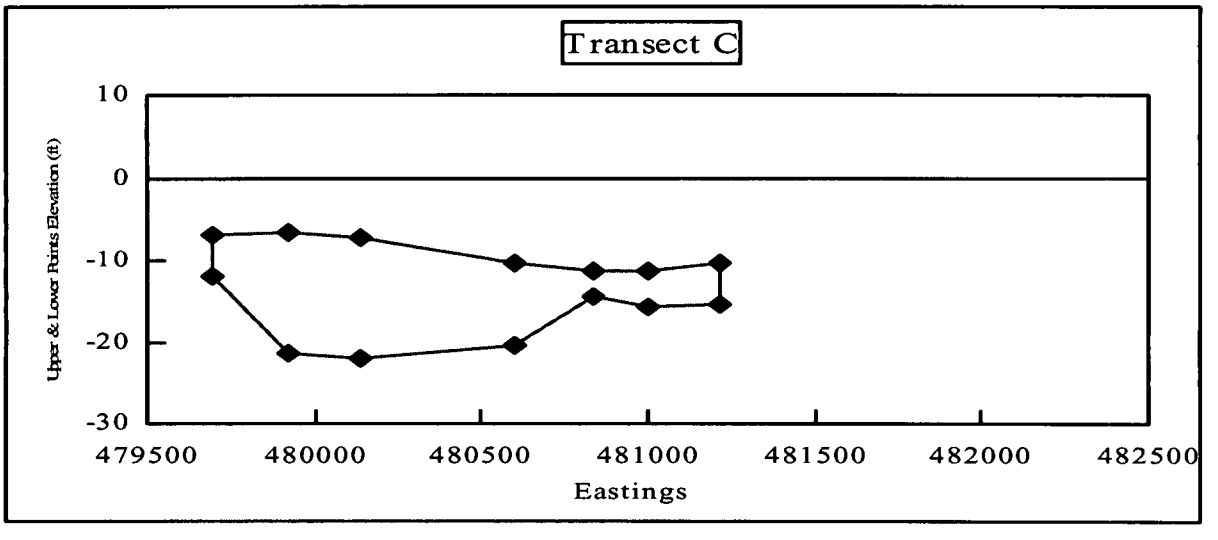
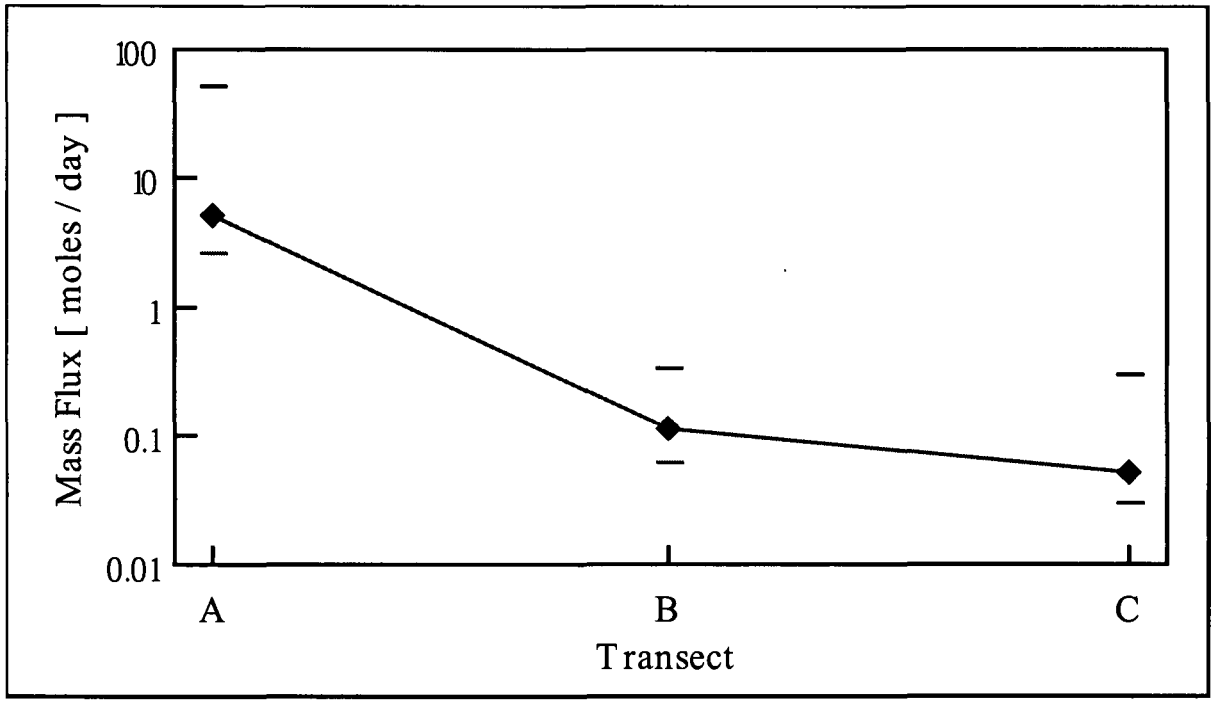


Figure 58
Mole Flux of Total Chloroethenes per Day
Through Each Transect using Lognormal Parameters



TABLES

Table 1
July 1996 Groundwater Analytical Data from Monitoring Wells
Deep Zone
Dover Air Force Base, Delaware

Well Id:	AA-06D	AA-07D	AA-08D	AA-09D	AA-10D	AA-11D	AA-14D	AA-18D	AA3D	DM312D	DM314D	DM315D	DM316D	DM318D	DM319D
Sample Date:	8/12/1996	8/12/1996	8/13/1996	8/13/1996	8/12/1996	8/13/1996	8/13/1996	8/12/1996	8/13/1996	7/29/1996	7/24/1996	7/25/1996	7/24/1996	7/26/1996	7/23/1996
Analyte (units)															
Volatile Organic Compounds															
1,1,1,2-Tetrachloroethane (ug/l)	< 5.	< 5.	< 5.	< 25.	< 25.	< 5.	< 5.	< 5.	< 25.	< 5.	< 5.	< 5.	< 25.	< 5.	< 5.
1,1,1-Trichloroethane (ug/l)	< 5.	< 5.	< 5.	< 25.	< 25.	< 5.	< 5.	< 5.	< 25.	< 5.	< 5.	< 5.	< 25.	< 5.	< 5.
1,1,2,2-Tetrachloroethane (ug/l)	< 5.	< 5.	< 5.	< 25.	< 25.	< 5.	< 5.	< 5.	< 25.	< 5.	< 5.	< 5.	< 25.	< 5.	< 5.
1,1,2-Trichloroethane (ug/l)	< 5.	< 5.	< 5.	< 25.	< 25.	< 5.	< 5.	< 5.	< 25.	< 5.	< 5.	< 5.	< 25.	< 5.	< 5.
1,1-Dichloroethane (ug/l)	< 5.	< 5.	< 5.	< 25.	< 25.	< 5.	< 5.	< 5.	< 25.	< 5.	< 5.	< 5.	< 25.	< 5.	< 5.
1,1-Dichloroethene (ug/l)	7.	7.	6.	< 25.	< 25.	6.	9.	8.	< 25.	< 5.	< 5.	< 5.	< 25.	< 5.	< 5.
1,2-Dichloroethane (ug/l)	130.	140.	93.	140.	140.	100.	150.	160.	120.	< 5.	< 5.	< 5.	71.	< 5.	< 5.
Benzene (ug/l)	31.	34.	23.	< 25.	< 25.	41.	19.	30.	< 25.	< 5.	< 5.	8.	< 25.	1500.	< 5.
Carbon tetrachloride (ug/l)	< 5.	< 5.	< 5.	< 25.	< 25.	< 5.	< 5.	< 5.	< 25.	< 5.	< 5.	< 5.	< 25.	< 5.	< 5.
Chlorobenzene (ug/l)	6.	6.	6.	< 25.	< 25.	< 5.	8.	5.	< 25.	< 5.	< 5.	< 5.	< 25.	< 5.	< 5.
Chloroethane (ug/l)	< 5.	< 5.	< 5.	< 25.	< 25.	< 5.	< 5.	< 5.	< 25.	< 5.	< 5.	< 5.	< 25.	< 5.	< 5.
Chloroform (ug/l)	< 5.	< 5.	< 5.	< 25.	< 25.	< 5.	5.	< 5.	< 25.	< 5.	< 5.	< 5.	< 25.	< 5.	< 5.
Chloromethane (ug/l)	< 5.	< 5.	< 5.	< 25.	< 25.	< 5.	< 5.	< 5.	< 25.	< 5.	< 5.	< 5.	< 25.	< 5.	< 5.
cis-1,2-Dichloroethene (ug/l)	1200.	1100.	800.	950.	1700.	990.	1600.	1200.	4700.	11.	< 5.	130.	920.	36.	13.
Ethylbenzene (ug/l)	< 5.	< 5.	< 5.	< 25.	< 25.	< 5.	< 5.	< 5.	< 25.	< 5.	< 5.	< 5.	< 25.	< 5.	< 5.
Methylene chloride (ug/l)	9.	10.	5.	< 25.	34.	< 5.	12.	13.	< 25.	< 5.	< 5.	< 5.	< 25.	< 5.	< 5.
o-Xylene (ug/l)	< 5.	< 5.	< 5.	< 25.	< 25.	< 5.	< 5.	< 5.	< 25.	< 5.	< 5.	< 5.	< 25.	7.	< 5.
Tetrachloroethene (ug/l)	32.	26.	35.	35.	31.	38.	40.	31.	< 25.	33.	120.	< 5.	46.	< 5.	< 5.
Toluene (ug/l)	< 5.	< 5.	< 5.	< 25.	< 25.	< 5.	< 5.	< 5.	< 25.	< 5.	< 5.	< 5.	< 25.	7.	< 5.
trans-1,2-Dichloroethene (ug/l)	< 5.	< 5.	< 5.	< 25.	< 25.	< 5.	< 5.	< 5.	< 25.	< 5.	< 5.	< 5.	< 25.	< 5.	< 5.
Trichloroethene (ug/l)	5700.	4600.	3900.	5500.	10000.	4500.	9800.	6100.	1700.	97.	190.	1400.	3700.	180.	130.
Vinyl chloride (ug/l)	25.	24.	21.	< 25.	42.	18.	49.	27.	26.	< 5.	< 5.	8.	< 25.	< 5.	< 5.
Gases															
Ethane (ug/l)										< 1.0	< 1.0	< 1.0	< 1.0	2.4	< 10
Ethylene (ug/l)										< 1.0	< 1.0	< 1.0	1.8	3.1	< 10
Methane (ug/l)										< 2.0	160	44	28	1100	350
Propane (ug/l)										< 1.0	< 1.0	< 1.0	< 1.0	5.1	< 10
Inorganic															
Ammonia (as N) (mg/l)										< .10	< .10	< .10	< .10	0.1	0.1
Chloride (mg/l)										10	13	13	19	< 1	13
Nitrate (as N) (mg/l)										1.1	5.6	0.5	1.3	0.9	0.8
Phosphate (mg/l)										< .1	< .1	< .1	< .1	< .1	< .1
Sulfate (mg/l)										< 1	1	62	3	36	25
Total Carbon (mg/l)										18.9	44.6	34.2	40.9	61.8	48.3
Inorganic Carbon (mg/l)										17.9	43.0	32.9	39.6	58.2	47.2
Total organic carbon (mg/l)										0.9	1.6	1.3	1.4	3.5	1.1

Table 1
July 1996 Groundwater Analytical Data from Monitoring Wells
Deep Zone
Dover Air Force Base, Delaware

Well Id:	DM320D	DM323D	DM325D	DM326D	DM327D	DM329D	DM350D	DM353D	DM354D	DM355D	DM356D	DM360D	DM361D	EA2D	IR-06D
Sample Date:	7/29/1996	8/1/1996	7/26/1996	7/25/1996	8/5/1996	7/23/1996	7/25/1996	7/25/1996	7/25/1996	7/30/1996	7/30/1996	7/30/1996	7/31/1996	8/5/1996	8/5/1996
Analyte (units)															
Volatile Organic Compounds															
1,1,1,2-Tetrachloroethane (ug/l)	< 5.	< 5.	< 10.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.
1,1,1-Trichloroethane (ug/l)	< 5.	< 5.	68.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.
1,1,2,2-Tetrachloroethane (ug/l)	< 5.	< 5.	< 10.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.
1,1,2-Trichloroethane (ug/l)	< 5.	< 5.	< 10.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.
1,1-Dichloroethane (ug/l)	< 5.	< 5.	< 10.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.
1,1-Dichloroethene (ug/l)	< 5.	< 5.	24.	< 5.	< 5.	< 5.	< 5.	< 5.	38.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.
1,2-Dichloroethane (ug/l)	< 5.	< 5.	< 10.	< 5.	< 5.	< 5.	< 5.	1900.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	330.
Benzene (ug/l)	< 5.	< 5.	< 10.	< 5.	59.	7.	< 5.	8.	< 5.	65.	< 5.	< 5.	< 5.	< 5.	< 5.
Carbon tetrachloride (ug/l)	< 5.	< 5.	< 10.	< 5.	< 5.	< 5.	< 5.	< 5.	6.	8.	< 5.	< 5.	9.	8.	< 5.
Chlorobenzene (ug/l)	< 5.	< 5.	< 10.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.
Chloroethane (ug/l)	< 5.	< 5.	< 10.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.
Chloroform (ug/l)	< 5.	< 5.	< 10.	12.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.
Chloromethane (ug/l)	< 5.	< 5.	< 10.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.
cis-1,2-Dichloroethene (ug/l)	16.	29.	50.	43.	290.	< 5.	< 5.	3100.	71.	16.	< 5.	< 5.	< 5.	< 5.	56.
Ethylbenzene (ug/l)	< 5.	< 5.	< 10.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.
Methylene chloride (ug/l)	< 5.	< 5.	< 10.	< 5.	< 5.	< 5.	< 5.	2500.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	25.
o-Xylene (ug/l)	< 5.	< 5.	< 10.	< 5.	< 5.	< 5.	< 5.	14.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.
Tetrachloroethene (ug/l)	< 5.	55.	890.	650.	130.	29.	< 5.	110.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	6.
Toluene (ug/l)	< 5.	< 5.	< 10.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.
trans-1,2-Dichloroethene (ug/l)	< 5.	< 5.	< 10.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.
Trichloroethene (ug/l)	51.	280.	1200.	1300.	130.	8.	< 5.	3000.	770.	210.	< 5.	110.	91.	11.	220.
Vinyl chloride (ug/l)	< 5.	< 5.	< 10.	< 5.	64.	< 5.	< 5.	28.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.
Gases															
Ethane (ug/l)	< 1.0	< 1.0	< 1.0	< 1.0	1.1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylene (ug/l)	< 1.0	< 1.0	< 1.0	< 1.0	14	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methane (ug/l)	220	38	< 2.0	< 2.0	1100	< 2.0	< 2.0	55	3.1	4.3	< 2.0	< 2.0	< 2.0	< 2.0	670
Propane (ug/l)	< 1.0	< 1.0	< 1.0	< 1.0	1.8	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Inorganic															
Ammonia (as N) (mg/l)	< .10	< .10	0.1	0.1	< .10	< .10	0.1	0.1	< .10	< .10	0.1	< .10	0.1	< .10	0.1
Chloride (mg/l)	13	10	10	12	9	15	47	26	21	36	16	14	14	28	7
Nitrate (as N) (mg/l)	1.5	3.6	4.6	0.7	1.6	2.9	4.2	2.7	1.7	3.4	4.9	3.3	4.2	5.1	3.0
Phosphate (mg/l)	< .1	< .1	< .1	< .1	< .1	< .1	< .1	< .1	< .1	< .1	< .1	< .1	< .1	< .1	0.2
Sulfate (mg/l)	5	4	1	3	4	2	13	1	1	< 1	14	12	4	32	5
Total Carbon (mg/l)	51.5	18.1	27.1	40.8	51.2	30.9	29.1	45.0	30.9	38.3	18.3	23.8	26.0	25.2	19.1
Inorganic Carbon (mg/l)	50.5	16.8	25.7	40.2	49.8	30.1	28.5	43.1	30.2	37.4	17.3	21.9	25.3	24.5	18.0
Total organic carbon (mg/l)	1.0	1.3	1.3	0.6	1.4	0.8	0.6	1.9	0.7	0.8	1.0	1.9	0.8	0.7	1.2

Table 1
July 1996 Groundwater Analytical Data from Monitoring Wells
Deep Zone
Dover Air Force Base, Delaware

Well Id:	IR-07D	IR1D	IR2D	MW208D	MW210D	MW211D	MW212D	MW213D	MW220D	MW222D	MW224D	MW235D	MW236D	MW72D	MW73D
Sample Date:	7/30/1996	7/29/1996	7/31/1996	7/26/1996	7/23/1996	7/26/1996	7/24/1996	7/24/1996	7/31/1996	7/24/1996	7/24/1996	7/30/1996	7/30/1996	8/1/1996	8/1/1996
Analyte (units)															
Volatile Organic Compounds															
1,1,1,2-Tetrachloroethane (ug/l)	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 20.	< 5.	< 5.	< 5.	< 25.	< 5.	< 25.	< 5.	< 5.
1,1,1-Trichloroethane (ug/l)	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	370.	< 5.	< 5.	< 5.	< 25.	< 5.	310.	< 5.	< 5.
1,1,2,2-Tetrachloroethane (ug/l)	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 20.	< 5.	< 5.	< 5.	< 25.	< 5.	< 25.	< 5.	< 5.
1,1,2-Trichloroethane (ug/l)	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 20.	< 5.	< 5.	< 5.	< 25.	< 5.	< 25.	< 5.	< 5.
1,1-Dichloroethane (ug/l)	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	44.	< 5.	< 5.	< 5.	< 25.	< 5.	100.	< 5.	< 5.
1,1-Dichloroethene (ug/l)	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	180.	< 5.	< 5.	< 5.	< 25.	< 5.	950.	< 5.	< 5.
1,2-Dichloroethane (ug/l)	400.	< 5.	< 5.	< 5.	< 5.	< 5.	< 20.	< 5.	< 5.	< 5.	< 25.	41.	84.	< 5.	< 5.
Benzene (ug/l)	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 20.	< 5.	< 5.	< 5.	< 25.	6.	< 25.	< 5.	< 5.
Carbon tetrachloride (ug/l)	< 5.	29.	11.	< 5.	< 5.	< 5.	< 20.	< 5.	36.	5.	< 25.	< 5.	< 25.	< 5.	< 5.
Chlorobenzene (ug/l)	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 20.	< 5.	< 5.	< 5.	< 25.	< 5.	< 25.	< 5.	< 5.
Chloroethane (ug/l)	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 20.	< 5.	< 5.	< 5.	< 25.	< 5.	< 25.	< 5.	< 5.
Chloroform (ug/l)	< 5.	6.	< 5.	< 5.	< 5.	< 5.	< 20.	< 5.	6.	10.	< 25.	< 5.	< 25.	< 5.	< 5.
Chloromethane (ug/l)	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 20.	< 5.	< 5.	< 5.	< 25.	< 5.	< 25.	< 5.	< 5.
cis-1,2-Dichloroethene (ug/l)	1000.	< 5.	< 5.	< 5.	< 5.	< 5.	560.	29.	6.	< 5.	160.	120.	5500.	22.	20.
Ethylbenzene (ug/l)	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 20.	< 5.	< 5.	< 5.	< 25.	< 5.	< 25.	< 5.	< 5.
Methylene chloride (ug/l)	39.	< 5.	< 5.	< 5.	< 5.	< 5.	< 20.	< 5.	< 5.	< 5.	< 25.	< 5.	70.	< 5.	< 5.
o-Xylene (ug/l)	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 20.	< 5.	< 5.	< 5.	< 25.	< 5.	27.	< 5.	< 5.
Tetrachloroethene (ug/l)	15.	< 5.	8.	< 5.	< 5.	71.	680.	170.	65.	11.	< 25.	120.	130.	6.	37.
Toluene (ug/l)	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 20.	< 5.	< 5.	< 5.	< 25.	< 5.	< 25.	< 5.	< 5.
trans-1,2-Dichloroethene (ug/l)	< 5.	< 5.	< 5.	< 5.	< 5.	< 5.	< 20.	< 5.	< 5.	< 5.	< 25.	< 5.	27.	< 5.	< 5.
Trichloroethene (ug/l)	860.	17.	65.	< 5.	< 5.	170.	2400.	66.	200.	46.	2200.	1700.	690.	140.	26.
Vinyl chloride (ug/l)	60.	< 5.	< 5.	< 5.	< 5.	< 5.	< 20.	< 5.	< 5.	< 5.	< 25.	< 5.	400.	< 5.	< 5.
Gases															
Ethane (ug/l)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylene (ug/l)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	19	< 1.0	< 1.0
Methane (ug/l)	1800	< 2.0	< 2.0	6.6	< 2.0	< 2.0	2.0	6.6	< 2.0	< 2.1	46	7.1	400	< 2.2	16
Propane (ug/l)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.1	< 1.2	< 1.0	< 1.0	< 1.2	< 1.2
Inorganic															
Ammonia (as N) (mg/l)	< .10	< .10	0.1	0.1	< .10	0.1	< .10	< .10	< .10	< .9	< .9	< .10	< .10	0.0	0.0
Chloride (mg/l)	14	20	15	10	16	11	16	12	22	37	11	19	37	40	7
Nitrate (as N) (mg/l)	1.5	4.9	4.0	4.1	3.5	3.0	4.6	4.4	3.0	< .2	0.2	2.6	1.7	2.1	1.6
Phosphate (mg/l)	< .1	< .1	< .1	< .1	< .1	< .1	< .1	< .1	< .1	< .1	< .0	< .1	< .1	< .0	< .0
Sulfate (mg/l)	4	2	5	1	3	2	< 1	9	3	1	74	4	11	22	3
Total Carbon (mg/l)	50.9	24.2	19.3	31.3	41.0	28.2	31.5	30.3	20.2	27.9	44.7	29.2	48.1	30.6	15.7
Inorganic Carbon (mg/l)	49.2	22.4	18.9	30.0	40.1	27.3	30.9	29.4	19.7	27.4	43.4	27.8	44.8	28.5	13.8
Total organic carbon (mg/l)	1.7	1.8	0.4	1.3	0.9	0.9	0.6	0.8	0.5	0.4	1.2	1.4	3.3	2.1	1.7

Table 2
D'Agostino Test Results for Specific Capacity Distributions
Normality and Lognormality Checks

Using 97 measured values of S from All 3 Transects

The null hypothesis of a normal/lognormal distribution is rejected at the 0.05 significance level if :

Y is either less than	-2.08
or greater than	1.11

	Y - statistic
Normal Distribution of S	**-42.5**
Lognormal Distribution of S	**-1.4**

Therefore:

Reject Normality
Accept Lognormality

For further information see Ref 4

Table 3
Lognormal Distribution Parameters of Specific Capacity
Using All 97 Strataprobe Tests Results

"Average" of Log (S) values =	-2.709
"Variance" of Log (S) values =	1.088
Distribution Mean S value =	0.114
90% Upper Limit of Mean S value =	0.138
90% Lower Limit of Mean S value =	0.098
Site wide Hydraulic Conductivity value of 0.024 cm/sec **Calibration Factor = 0.024 / [Mean S] = 0.211**	

Table 4
Transect Hydraulic Conductivities Estimated from Transect Specific Tests
Dover Air Force Base, Delaware

Sample	Flow Rate Q (ml/sec)	Drawdown s (cm)	Specific Capacity S (ml/sec/cm)	Hydraulic Conductivity* K (cm/sec)	Hydraulic Conductivity* K (ft/day)
TA-01-32	4.65	30.48	0.15	3.22E-02	91
TA-01-37	2.40	30.48	0.08	1.66E-02	47
TA-01-42	4.71	30.48	0.15	3.26E-02	92
TA-02-31.5	3.17	30.48	0.10	2.19E-02	62
TA-02-36.5	0.22	26.52	0.01	1.71E-03	5
TA-02-41.5	7.13	30.48	0.23	4.94E-02	140
TA-02-46.5	0.93	30.48	0.03	6.46E-03	18
TA-03-27.5	1.87	30.48	0.06	1.29E-02	37
TA-03-32.5	3.40	30.48	0.11	2.35E-02	67
TA-03-37.5	2.19	30.48	0.07	1.51E-02	43
TA-03-42.5	0.83	30.48	0.03	5.77E-03	16
TA-03-47.5	NA	NA	NA	5.77E-03**	16**
TA-03-51.5	NA	NA	NA	5.77E-03**	16**
TA-04-26	0.24	30.48	0.01	1.64E-03	5
TA-04-31	NA	NA	NA	4.21E-03**	12**
TA-04-36	0.98	30.48	0.03	6.78E-03	19
TA-04-41	2.68	30.48	0.09	1.85E-02	53
TA-04-46	0.98	30.48	0.03	6.75E-03	19
TA-04-51	1.05	30.48	0.03	7.30E-03	21
TA-04-56	2.20	30.48	0.07	1.52E-02	43
IR-07D	0.00	0.00	0.00	2.90E-02	82
TA-05-24	0.57	30.48	0.02	3.92E-03	11
TA-05-29	0.55	30.48	0.02	3.81E-03	11
TA-05-34	2.57	30.48	0.08	1.78E-02	50
TA-05-39	3.13	30.48	0.10	2.17E-02	61
TA-05-44	11.50	30.48	0.38	7.96E-02	226
TA-06-23	2.10	30.48	0.07	1.45E-02	41
TA-06-28	9.71	30.48	0.32	6.72E-02	191
TA-06-33	2.53	30.48	0.08	1.75E-02	50
TA-06-38	1.13	30.48	0.04	7.85E-03	22
TA-06-43	1.55	30.48	0.05	1.07E-02	30
TA-06-48	0.92	30.48	0.03	6.35E-03	18
TA-07-30	5.09	30.48	0.17	3.52E-02	100
TA-07-35	2.63	30.48	0.09	1.82E-02	52
TA-07-40	6.35	30.48	0.21	4.40E-02	125
TA-07-45	3.14	30.48	0.10	2.18E-02	62
TA-08-28	2.80	30.48	0.09	1.94E-02	55
TA-08-33	0.99	30.48	0.03	6.82E-03	19
TA-08-38	1.99	30.48	0.07	1.38E-02	39
TA-08-43	1.14	30.48	0.04	7.89E-03	22
TA-08-48	12.74	25.91	0.49	1.04E-01	294
TA-09-28	0.83	30.48	0.03	5.77E-03	16
TA-09-33	1.00	30.48	0.03	6.92E-03	20
TA-09-38	6.67	30.48	0.22	4.62E-02	131
TA-09-43	0.13	30.48	0.00	9.23E-04	3
TA-09-48	NA	NA	NA	9.23E-04**	3**
TB-03-23.5	3.12	30.48	0.10	2.16E-02	61
TB-03-28.5	6.10	30.48	0.20	4.23E-02	120
TB-03-33.5	3.65	30.48	0.12	2.52E-02	72
TB-03-37.5	2.03	30.48	0.07	1.40E-02	40
TB-03-43.5	1.10	30.48	0.04	7.59E-03	22
TB-04-27	3.42	30.48	0.11	2.37E-02	67
TB-04-32	10.53	30.48	0.35	7.29E-02	207
TB-04-37	7.20	30.48	0.24	4.98E-02	141
TB-04-42	2.37	30.48	0.08	1.64E-02	46

* Hydraulic Conductivity estimated from Specific Capacity by K=S*0.21

** Hydraulic Conductivity estimated from average of surrounding data

Table 4
Transect Hydraulic Conductivities Estimated from Transect Specific Tests
Dover Air Force Base, Delaware

Sample	Flow Rate Q (ml/sec)	Drawdown s (cm)	Specific Capacity S (ml/sec/cm)	Hydraulic Conductivity* K (cm/sec)	Hydraulic Conductivity* K (ft/day)
TB-04-47	1.97	30.48	0.06	1.36E-02	39
TB-05-31.5	4.33	30.48	0.14	3.00E-02	85
TB-05-36.5	1.97	30.48	0.06	1.36E-02	39
TB-05-41.5	1.00	30.48	0.03	6.92E-03	20
TB-05-46.5	3.13	30.48	0.10	2.17E-02	61
TB-05-51.5	11.47	5.79	1.98	4.18E-01	1184
IR-06D	NA	NA	NA	1.90E-03**	5**
TB-06-33	3.87	30.48	0.13	2.68E-02	76
TB-06-38	1.42	30.48	0.05	9.81E-03	28
TB-06-43	2.48	30.48	0.08	1.72E-02	49
TB-06-48	1.48	30.48	0.05	1.03E-02	29
TB-07-27	5.00	30.48	0.16	3.46E-02	98
TB-07-32	0.39	30.48	0.01	2.71E-03	8
TB-07-37	8.95	30.48	0.29	6.20E-02	176
TB-07-42	9.05	30.48	0.30	6.26E-02	178
TB-07-47	5.07	30.48	0.17	3.51E-02	99
TB-08-25.5	1.50	30.48	0.05	1.04E-02	29
TB-08-30.5	4.20	30.48	0.14	2.91E-02	82
TB-08-35.5	3.13	30.48	0.10	2.17E-02	61
TB-08-40.5	1.17	30.48	0.04	8.08E-03	23
TB-08-45.5	NA	NA	NA	8.08E-03**	23**
TB-09-29	5.21	30.48	0.17	3.61E-02	102
TB-09-34	2.40	30.48	0.08	1.66E-02	47
TB-09-39	0.38	30.48	0.01	2.65E-03	8
TB-09-44	0.58	30.48	0.02	4.03E-03	11
TB-10-28	0.85	30.48	0.03	5.88E-03	17
TB-10-33	5.67	30.48	0.19	3.92E-02	111
TB-10-38	0.17	30.48	0.01	1.15E-03	3
TB-10-43	0.43	30.48	0.01	3.00E-03	9
TC-01-25	3.42	30.48	0.11	2.37E-02	67
TC-01-30	7.33	30.48	0.24	5.08E-02	144
TC-02-27	0.70	30.48	0.02	4.85E-03	14
TC-02-32	0.92	30.48	0.03	6.35E-03	18
TC-02-37	1.83	30.48	0.06	1.27E-02	36
TC-02-42	9.70	26.82	0.36	7.63E-02	216
TC-03-29	2.93	30.48	0.10	2.03E-02	58
TC-03-34	1.78	30.48	0.06	1.23E-02	35
TC-03-39	1.83	30.48	0.06	1.27E-02	36
TC-03-44	0.68	30.48	0.02	4.71E-03	13
DM-360D	NA	NA	NA	2.68E-03**	8**
TC-04-30	1.17	30.48	0.04	8.08E-03	23
TC-04-35	2.40	30.48	0.08	1.66E-02	47
TC-04-40	MAX	0.00	0.00	4.18E-01	1184
TC-05-27	1.28	30.48	0.04	8.88E-03	25
TC-05-30	0.32	30.48	0.01	2.19E-03	6
TC-06-26.5	2.47	30.48	0.08	1.71E-02	48
TC-06-31	2.97	30.48	0.10	2.05E-02	58
TC-06-35	3.67	30.48	0.12	2.54E-02	72
TC-07-26.5	0.30	30.48	0.01	2.10E-03	6
TC-07-31.5	1.46	30.48	0.05	1.01E-02	29
TC-07-36.5	1.05	30.48	0.03	7.29E-03	21

* Hydraulic Conductivity estimated from Specific Capacity by K=S*0.21

** Hydraulic Conductivity estimated from average of surrounding data

Table 5
Transect Groundwater Sample Analytical Results
March/April 1997
Dover Air Force Base, Delaware

Transect Sample Location:	TA-01	TA-01	TA-01	TA-02	TA-02	TA-02	TA-02	TA-03
Sample Id:	TA-01-32	TA-01-37	TA-01-42	TA-02-31.5	TA-02-36.5	TA-02-41.5	TA-02-46.5	TA-03-27.5
Sample Depth (feet below grade):	32	37	42	31.5	36.5	41.5	46.5	27.5
Sample Date:	4/3/1997	4/3/1997	4/3/1997	4/14/1997	4/14/1997	4/14/1997	4/14/1997	4/10/1997
Analyte (units)								
Volatile Organic Compounds								
1,1,1-Trichloroethane (ug/l)	1.6	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.1	< 0.5
1,1,2,2-Tetrachloroethane (ug/l)	1.6	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.0	< 0.5
1,1,2-Trichloroethane (ug/l)	2.8	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.0	< 0.5
1,1-Dichloroethane (ug/l)	1.0	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.0	< 0.5
1,1-Dichloroethene (ug/l)	3.2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.8	< 0.5
1,2-Dichlorobenzene (ug/l)	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	1.4	< 0.3
1,2-Dichloroethane (ug/l)	1.6	< 0.5	< 0.5	1.8	1.1	1.0	2.6	14.4
1,2-Dichloropropane (ug/l)	2.9	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.1	< 0.5
1,3-Dichlorobenzene (ug/l)	2.1	< 0.3	0.5	< 0.3	< 0.3	< 0.3	1.5	< 0.3
1,4-Dichlorobenzene (ug/l)	1.9	< 0.3	0.5	< 0.3	< 0.3	< 0.3	1.2	< 0.3
Benzene (ug/l)	1.7	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	1.0	< 0.3
Bromodichloromethane (ug/l)	1.7	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.0	< 0.5
Bromoform (ug/l)	1.3	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane (ug/l)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Carbon tetrachloride (ug/l)	3.0	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.0	< 0.5
Chlorobenzene (ug/l)	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	1.2	< 0.3
Chloroethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.0	< 0.5
Chloroform (ug/l)	3.0	< 0.5	0.8	< 0.5	< 0.5	< 0.5	1.2	< 0.5
Chloromethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	1.8	< 0.5	1.1	< 0.5
cis-1,2-Dichloroethene (ug/l)	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	10.8
cis-1,3-Dichloropropene (ug/l)	1.3	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.9	< 0.5
Dibromochloromethane (ug/l)	2.6	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.8	< 0.5
Dichloromethane (ug/l)	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene (ug/l)	1.8	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	1.1	< 0.3
m & p Xylenes (ug/l)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene (ug/l)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethylene (ug/l)	2.9	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.5	1.2
Toluene (ug/l)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.0	< 1.0
trans-1,2-Dichloroethene (ug/l)	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
trans-1,3-Dichloropropene (ug/l)	1.3	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.9	< 0.5
Trichloroethylene (ug/l)	2.8	0.6	0.6	1.8	0.9	1.7	2.4	14.0
Trichloromonofluoromethane (ug/l)	2.9	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Vinyl chloride (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.1	< 0.5
Gases								
Ethane (ug/l)	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Ethene (ug/l)	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Methane (ug/l)	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
Propane (ug/l)	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Inorganics								
Alkalinity (mg/l)	6.00			12.73	13.69	11.20	17.39	5.11
Chloride (mg/l)	60.86			59.3	61.7	68.7	73.7	62.7
Nitrate plus Nitrite (as N) (mg/l)	3.39			3.21	2.69	2.26	2.33	9.74
Sulfate (mg/l)	2.00			61.39	19.52	2.01	2.27	25.55
Sulfide (mg/l)	0.1	< 0.1		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total Organic Carbon (mg/l)	4.8			6	8.2	6	6	7

Table 5
Transect Groundwater Sample Analytical Results
March/April 1997
Dover Air Force Base, Delaware

Transect Sample Location:	TA-03	TA-03	TA-03	TA-03	TA-03	TA-04	TA-04
Sample Id:	TA-03-32.5	TA-03-37.5	TA-03-42.5	TA-03-47.5	TA-03-51.5	TA-04-26	TA-04-31
Sample Depth (feet below grade):	32.5	37.5	42.5	47.5	51.5	26	31
Sample Date:	4/10/1997	4/11/1997	4/11/1997	4/11/1997	4/11/1997	4/9/1997	4/9/1997
Analyte (units)							
Volatile Organic Compounds							
1,1,1-Trichloroethane (ug/l)		8	< 5.0	3.4	< 5.0	< 0.5	< 0.5
1,1,2,2-Tetrachloroethane (ug/l)		< 5.0	< 5.0	2.7	< 5.0	< 0.5	< 0.5
1,1,2-Trichloroethane (ug/l)		< 5.0	< 5.0	2.8	< 5.0	< 0.5	< 0.5
1,1-Dichloroethane (ug/l)		18	< 5.0	2.0	< 5.0	< 0.5	< 0.5
1,1-Dichloroethene (ug/l)		110	20	5.1	7.3	< 0.5	< 0.5
1,2-Dichlorobenzene (ug/l)		1.0	< 3.0	1.1	< 3.0	< 0.3	< 0.3
1,2-Dichloroethane (ug/l)		515	916	1444	2950	< 0.5	< 0.5
1,2-Dichloropropane (ug/l)		< 5.0	< 5.0	2.3	10.3	< 0.5	< 0.5
1,3-Dichlorobenzene (ug/l)		3.5	< 3.0	4.5	1.7	< 0.3	< 0.3
1,4-Dichlorobenzene (ug/l)		3.3	< 3.0	4.2	1.7	< 0.3	< 0.3
Benzene (ug/l)		< 3.0	< 3.0	4.2	3.3	< 0.3	< 0.3
Bromodichloromethane (ug/l)		< 5.0	< 5.0	< 5.0	< 5.0	< 0.5	< 0.5
Bromoform (ug/l)		< 10	< 10	1.8	< 10	< 1.0	< 1.0
Bromomethane (ug/l)		< 10	< 10	< 10	< 10	< 1.0	< 1.0
Carbon tetrachloride (ug/l)		< 5.0	< 5.0	2.2	< 5.0	< 0.5	< 0.5
Chlorobenzene (ug/l)		< 3.0	< 3.0	3.4	2.7	< 0.3	< 0.3
Chloroethane (ug/l)		< 5.0	< 5.0	2.8	< 5.0	< 0.5	< 0.5
Chloroform (ug/l)		< 5.0	< 5.0	3.9	4.7	< 0.5	< 0.5
Chloromethane (ug/l)		< 5.0	< 5.0	4.1	< 5.0	< 0.5	< 0.5
cis-1,2-Dichloroethene (ug/l)		2440	1388	2032	4087	< 2.0	< 2.0
cis-1,3-Dichloropropene (ug/l)		< 5.0	< 5.0	2.7	< 5.0	< 0.5	< 0.5
Dibromochloromethane (ug/l)		< 5.0	< 5.0	1.7	< 5.0	< 0.5	< 0.5
Dichloromethane (ug/l)		< 20	< 20	24.2	113	< 2.0	< 2.0
Ethylbenzene (ug/l)		< 3.0	< 3.0	3.0	< 3.0	< 0.3	< 0.3
m & p Xylenes (ug/l)		< 10	< 10	< 10	1.3	< 1.0	< 1.0
o-Xylene (ug/l)		< 10	< 10	1.3	4.7	< 1.0	< 1.0
Tetrachloroethylene (ug/l)		214	171	113	258	< 0.5	< 0.5
Toluene (ug/l)		< 10	< 10	< 10	< 10	< 1.0	< 1.0
trans-1,2-Dichloroethene (ug/l)		< 20	< 20	3.3	9.0	< 2.0	< 2.0
trans-1,3-Dichloropropene (ug/l)		< 5.0	< 5.0	2.6	< 5.0	< 0.5	< 0.5
Trichloroethylene (ug/l)		497	635	1630	3232	10.0	13.0
Trichloromonofluoromethane (ug/l)		< 5.0	< 5.0	< 5.0	< 5.0	< 0.5	< 0.5
Vinyl chloride (ug/l)		209	102	31.5	40	< 0.5	< 0.5
Gases							
Ethane (ug/l)		< 5	< 5	< 5	< 5	< 5	< 5
Ethene (ug/l)		11	10	8	< 6	< 6	< 6
Methane (ug/l)		379	240	73	82	< 15	< 15
Propane (ug/l)		< 5	< 5	< 5	< 5	< 5	< 5
Inorganics							
Alkalinity (mg/l)	16.18	13.16	21.84	40.73	27.17	12.88	42.26
Chloride (mg/l)	23.9	27.0	29.0	35.9	43.2	35.5	37.6
Nitrate plus Nitrite (as N) (mg/l)	2.67	< 0.5	0.68	0.47	< 0.5	4.36	4.63
Sulfate (mg/l)	17.91	5.11	1.89	2.63	2.33	51.31	51.98
Sulfide (mg/l)	< 0.1	0.1	0.1	0.2	0.2	< 0.1	< 0.1
Total Organic Carbon (mg/l)	9.6	13.4	8.1	8.1	11.3	5.6	8.2

Table 5
Transect Groundwater Sample Analytical Results
March/April 1997
Dover Air Force Base, Delaware

Transect Sample Location:	TA-04	TA-04	TA-04	TA-04	TA-04	TA-05	TA-05	TA-05
Sample Id:	TA-04-36	TA-04-41	TA-04-46	TA-04-51	TA-04-56	TA-05-24	TA-05-29	TA-05-34
Sample Depth (feet below grade):	36	41	46	51	56	24	29	34
Sample Date:	4/10/1997	4/10/1997	4/10/1997	4/10/1997	4/10/1997	4/22/1997	4/22/1997	4/22/1997
Analyte (units)								
Volatile Organic Compounds								
1,1,1-Trichloroethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 5.0	< 0.5	< 0.5	< 5.0
1,1,2,2-Tetrachloroethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 5.0	< 0.5	< 0.5	< 5.0
1,1,2-Trichloroethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 5.0	< 0.5	< 0.5	< 5.0
1,1-Dichloroethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 5.0	< 0.5	< 0.5	< 5.0
1,1-Dichloroethene (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 5.0	< 0.5	< 0.5	< 5.0
1,2-Dichlorobenzene (ug/l)	< 0.3	< 0.3	< 0.3	< 0.3	2.8	< 0.3	< 0.3	< 3.0
1,2-Dichloroethane (ug/l)	0.6	1.8	15.1	93.8	762	< 0.5	0.6	10.00
1,2-Dichloropropane (ug/l)	0.6	0.6	< 0.5	< 0.5	3.7	< 0.5	< 0.5	< 5.0
1,3-Dichlorobenzene (ug/l)	0.4	< 0.3	< 0.3	< 0.3	1.9	< 0.3	< 0.3	< 3.0
1,4-Dichlorobenzene (ug/l)	0.3	< 0.3	< 0.3	0.5	2.4	< 0.3	< 0.3	< 3.0
Benzene (ug/l)	< 0.3	< 0.3	< 0.3	< 0.3	5.5	< 0.3	< 0.3	9.9
Bromodichloromethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 5.0	< 0.5	< 0.5	< 5.0
Bromoform (ug/l)	< 1.0	< 1.0	< 1.0	< 1.0	< 10	< 1.0	< 1.0	< 10
Bromomethane (ug/l)	< 1.0	< 1.0	< 1.0	< 1.0	< 10	< 1.0	< 1.0	< 10
Carbon tetrachloride (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 5.0	< 0.5	< 0.5	< 5.0
Chlorobenzene (ug/l)	< 0.3	< 0.3	< 0.3	0.5	3.8	< 0.3	< 0.3	< 3.0
Chloroethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 5.0	< 0.5	< 0.5	< 5.0
Chloroform (ug/l)	< 0.5	< 0.5	< 0.5	1.2	2.3	< 0.5	< 0.5	1.5
Chloromethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 5.0	< 0.5	< 0.5	< 5.0
cis-1,2-Dichloroethene (ug/l)	13.2	18.0	38.2	75.0	930	< 2.0	2.2	22.00
cis-1,3-Dichloropropene (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 5.0	< 0.5	< 0.5	< 5.0
Dibromochloromethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 5.0	< 0.5	< 0.5	< 5.0
Dichloromethane (ug/l)	< 2.0	< 2.0	< 2.0	< 2.0	< 20	< 2.0	< 2.0	19.00
Ethylbenzene (ug/l)	< 0.3	< 0.3	< 0.3	< 0.3	< 3.0	< 0.3	< 0.3	< 3.0
m & p Xylenes (ug/l)	< 1.0	< 1.0	< 1.0	< 1.0	< 10	< 1.0	< 1.0	< 10
o-Xylene (ug/l)	< 1.0	< 1.0	< 1.0	< 1.0	3.6	< 1.0	< 1.0	< 10
Tetrachloroethylene (ug/l)	3.0	2.8	12.7	17.4	18	< 0.5	< 0.5	< 5.0
Toluene (ug/l)	< 1.0	< 1.0	< 1.0	< 1.0	25	< 1.0	1.5	< 10
trans-1,2-Dichloroethene (ug/l)	< 2.0	< 2.0	< 2.0	< 2.0	< 20	< 2.0	< 2.0	< 20
trans-1,3-Dichloropropene (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 5.0	< 0.5	< 0.5	< 5.0
Trichloroethylene (ug/l)	219	229	153	152	1166	13.7	19.6	594.00
Trichloromonofluoromethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 5.0	< 0.5	< 0.5	< 5.0
Vinyl chloride (ug/l)	< 0.5	< 0.5	4.0	11.5	74	< 0.5	< 0.5	< 5.0
Gases								
Ethane (ug/l)	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Ethene (ug/l)	< 6	< 6	6	< 6	< 6	< 6	< 6	< 6
Methane (ug/l)	< 15	< 15	< 15	< 15	140	< 15	< 15	68
Propane (ug/l)	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Inorganics								
Alkalinity (mg/l)	24.78	29.63		28.59	23.43	5.92	9.78	14.17
Chloride (mg/l)	51.5	8.8		22.0	9.8	48.7	18.5	19.4
Nitrate plus Nitrite (as N) (mg/l)	2.60	2.51		3.37	2.69	5.53	5.76	0.90
Sulfate (mg/l)	2.89	3.66		1.66	1.85	57.88	67.67	7.95
Sulfide (mg/l)	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total Organic Carbon (mg/l)	10.2	9.5	9.9	9.7	13.1	< 3.00	5	12.8

Table 5
Transect Groundwater Sample Analytical Results
March/April 1997
Dover Air Force Base, Delaware

Transect Sample Location:	TA-05	TA-05	TA-06	TA-06	TA-06	TA-06	TA-06	TA-06
Sample Id:	TA-05-39	TA-05-41	TA-06-23	TA-06-28	TA-06-33	TA-06-38	TA-06-43	TA-06-48
Sample Depth (feet below grade):	39	44	23	28	33	38	43	48
Sample Date:	4/22/1997	4/22/1997	4/21/1997	4/21/1997	4/21/1997	4/21/1997	4/22/1997	4/22/1997
Analyte (units)								
Volatile Organic Compounds								
1,1,1-Trichloroethane (ug/l)	< 5.0	< 5.0	< 0.5	< 0.5	1.0	1.4	< 5.0	0.8
1,1,2,2-Tetrachloroethane (ug/l)	< 5.0	< 5.0	< 0.5	< 0.5	< 0.5	< 0.5	< 5.0	< 5.0
1,1,2-Trichloroethane (ug/l)	< 5.0	< 5.0	< 0.5	< 0.5	< 0.5	0.6	< 5.0	< 5.0
1,1-Dichloroethane (ug/l)	< 5.0	< 5.0	< 0.5	0.5	9.4	5.6	< 5.0	1.7
1,1-Dichloroethene (ug/l)	< 5.0	0.9	0.6	3.4	15.4	16.9	4.5	5.9
1,2-Dichlorobenzene (ug/l)	< 3.0	7.8	< 0.3	< 0.3	0.6	2.00	2.7	5.8
1,2-Dichloroethane (ug/l)	46.8	64.2	< 0.5	0.5	4.6	6.4	16.7	96.3
1,2-Dichloropropane (ug/l)	< 5.0	1.6	< 0.5	< 0.5	< 0.5	< 0.5	< 5.0	7.9
1,3-Dichlorobenzene (ug/l)	< 3.0	1.2	< 0.3	< 0.3	0.8	0.6	0.8	2.7
1,4-Dichlorobenzene (ug/l)	< 3.0	2.3	< 0.3	1.1	1.8	1.1	1.9	1.7
Benzene (ug/l)	15.6	7.4	< 0.3	< 0.3	87.1	25.7	119.00	16.1
Bromodichloromethane (ug/l)	< 5.0	< 5.0	< 0.5	< 0.5	< 0.5	< 0.5	< 5.0	< 5.0
Bromoform (ug/l)	< 10	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 10	< 10
Bromomethane (ug/l)	< 10	< 10	< 1.0	< 1.0	< 1.0	1.1	< 10	< 10
Carbon tetrachloride (ug/l)	< 5.0	< 5.0	< 0.5	< 0.5	0.7	2.6	1.5	< 5.0
Chlorobenzene (ug/l)	< 3.0	1.2	< 0.3	0.6	3.8	1.2	2.8	0.7
Chloroethane (ug/l)	< 5.0	< 5.0	< 0.5	< 0.5	< 0.5	< 0.5	< 5.0	< 5.0
Chloroform (ug/l)	2.2	3.6	< 0.5	1.9	3.3	2.8	1.2	1.9
Chloromethane (ug/l)	< 5.0	< 5.0	< 0.5	< 0.5	< 0.5	< 0.5	< 5.0	1.6
cis-1,2-Dichloroethene (ug/l)	55.00	62.3	< 2.0	< 2.0	59.6	68.7	39.3	300.00
cis-1,3-Dichloropropene (ug/l)	< 5.0	< 5.0	< 0.5	< 0.5	< 0.5	< 0.5	< 5.0	< 5.0
Dibromochloromethane (ug/l)	< 5.0	< 5.0	< 0.5	< 0.5	< 0.5	< 0.5	< 5.0	< 5.0
Dichloromethane (ug/l)	< 20	< 20	< 2.0	< 2.0	< 2.0	< 2.0	< 20	2.3
Ethylbenzene (ug/l)	< 3.0	< 3.0	< 0.3	< 0.3	< 0.3	< 0.3	< 3.0	< 3.0
m & p Xylenes (ug/l)	< 10	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 10	< 10
o-Xylene (ug/l)	< 10	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 10	< 10
Tetrachloroethylene (ug/l)	< 5.0	52.1	< 0.5	< 0.5	0.6	1.3	1.7	12.8
Toluene (ug/l)	< 10	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 10	< 10
trans-1,2-Dichloroethene (ug/l)	< 20	< 20	< 2.0	< 2.0	< 2.0	< 2.0	< 20	< 20
trans-1,3-Dichloropropene (ug/l)	< 5.0	< 5.0	< 0.5	< 0.5	< 0.5	< 0.5	< 5.0	< 5.0
Trichloroethylene (ug/l)	1360.00	1720.00	4.9	28.00	152.00	460.00	634.00	2220.00
Trichloromonofluoromethane (ug/l)	< 5.0	< 5.0	< 0.5	< 0.5	< 0.5	< 0.5	< 5.0	< 5.0
Vinyl chloride (ug/l)	< 5.0	2.7	< 0.5	< 0.5	0.6	4.00	4.3	7.2
Gases								
Ethane (ug/l)	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Ethene (ug/l)	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Methane (ug/l)	93	21	< 15	< 15	86	53	34	68
Propane (ug/l)	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Inorganics								
Alkalinity (mg/l)	15.57	9.99	2.95		19.29	23.44	18.60	31.91
Chloride (mg/l)	19.5	15.5	20.1		20.7	22.0	20.2	18.2
Nitrate plus Nitrite (as N) (mg/l)	0.59	2.35	5.47		< 0.5	1.20	1.04	1.27
Sulfate (mg/l)	2.20	1.93	34.23		10.53	1.83	1.73	1.99
Sulfide (mg/l)	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total Organic Carbon (mg/l)	12.7	5.9	7.8	14.3	RBB	17	11.2	11.8

Table 5
Transect Groundwater Sample Analytical Results
March/April 1997
Dover Air Force Base, Delaware

Transect Sample Location:	TA-07	TA-07	TA-07	TA-07	TA-08	TA-08	TA-08	TA-08
Sample Id:	TA-07-30	TA-07-35	TA-07-40	TA-07-45	TA-08-28	TA-08-33	TA-08-38	TA-08-43
Sample Depth (feet below grade):	30	35	40	45	28	33	38	43
Sample Date:	4/8/1997	4/8/1997	4/8/1997	4/9/1997	4/1/1997	4/1/1997	4/2/1997	4/2/1997
Analyte (units)								
Volatile Organic Compounds								
1,1,1-Trichloroethane (ug/l)	< 0.5	< 0.5	< 0.5	< 5.0	< 0.5	< 0.5	< 0.5	< 2.5
1,1,2,2-Tetrachloroethane (ug/l)	< 0.5	< 0.5	< 0.5	< 5.0	< 0.5	< 0.5	< 0.5	< 2.5
1,1,2-Trichloroethane (ug/l)	< 0.5	< 0.5	< 0.5	< 5.0	< 0.5	< 0.5	< 0.5	< 2.5
1,1-Dichloroethane (ug/l)	< 0.5	< 0.5	< 0.5	< 5.0	< 0.5	< 0.5	< 0.5	< 2.5
1,1-Dichloroethene (ug/l)	1.8	0.9	< 0.5	< 5.0	< 0.5	< 0.5	< 0.5	< 2.5
1,2-Dichlorobenzene (ug/l)	< 0.3	< 0.3	< 0.3	0.7	< 0.3	< 0.3	< 0.3	< 1.5
1,2-Dichloroethane (ug/l)	< 0.5	< 0.5	< 0.5	1.9	< 0.5	< 0.5	< 0.5	< 2.5
1,2-Dichloropropane (ug/l)	< 0.5	0.6	0.9	3.9	< 0.5	< 0.5	< 0.5	< 2.5
1,3-Dichlorobenzene (ug/l)	< 0.3	< 0.3	< 0.3	6.8	< 0.3	< 0.3	0.3	< 1.5
1,4-Dichlorobenzene (ug/l)	< 0.3	< 0.3	< 0.3	5.9	< 0.3	< 0.3	0.3	< 1.5
Benzene (ug/l)	< 0.3	< 0.3	< 0.3	< 3.0	< 0.3	< 0.3	< 0.3	0.8
Bromodichloromethane (ug/l)	< 0.5	< 0.5	< 0.5	< 5.0	< 0.5	< 0.5	< 0.5	< 2.5
Bromoform (ug/l)	< 1.0	< 1.0	< 1.0	< 10	< 1.0	< 1.0	< 1.0	< 5.0
Bromomethane (ug/l)	< 1.0	< 1.0	< 1.0	< 10	< 1.0	< 1.0	< 1.0	< 5.0
Carbon tetrachloride (ug/l)	0.8	0.8	0.9	< 5.0	< 0.5	1.1	< 0.5	248.00
Chlorobenzene (ug/l)	< 0.3	0.3	< 0.3	0.8	< 0.3	< 0.3	< 0.3	< 1.5
Chloroethane (ug/l)	< 0.5	< 0.5	< 0.5	< 5.0	< 0.5	< 0.5	< 0.5	< 2.5
Chloroform (ug/l)	3.5	2.2	1.0	< 5.0	< 0.5	1.5	5.8	37.00
Chloromethane (ug/l)	< 0.5	< 0.5	< 0.5	< 5.0	< 0.5	< 0.5	< 0.5	< 2.5
cis-1,2-Dichloroethene (ug/l)	< 2.0	< 2.0	6.5	21.2	< 2.0	< 2.0	< 2.0	< 10
cis-1,3-Dichloropropene (ug/l)	< 0.5	< 0.5	< 0.5	< 5.0	< 0.5	< 0.5	< 0.5	< 2.5
Dibromochloromethane (ug/l)	< 0.5	< 0.5	< 0.5	< 5.0	< 0.5	< 0.5	< 0.5	< 2.5
Dichloromethane (ug/l)	< 2.0	< 2.0	< 2.0	4.8	< 2.0	< 2.0	< 2.0	< 10
Ethylbenzene (ug/l)	< 0.3	< 0.3	< 0.3	< 3.0	< 0.3	< 0.3	< 0.3	< 1.5
m & p Xylenes (ug/l)	< 1.0	< 1.0	< 1.0	< 10	< 1.0	< 1.0	< 1.0	< 5.0
o-Xylene (ug/l)	< 1.0	< 1.0	< 1.0	< 10	< 1.0	< 1.0	< 1.0	< 5.0
Tetrachloroethylene (ug/l)	1.0	1.6	5.5	2.8	< 0.5	< 0.5	0.5	74.00
Toluene (ug/l)	< 1.0	< 1.0	< 1.0	< 10	< 1.0	< 1.0	< 1.0	< 5.0
trans-1,2-Dichloroethene (ug/l)	< 2.0	< 2.0	< 2.0	< 20	< 2.0	< 2.0	< 2.0	< 10
trans-1,3-Dichloropropene (ug/l)	< 0.5	< 0.5	< 0.5	< 5.0	< 0.5	< 0.5	< 0.5	< 2.5
Trichloroethylene (ug/l)	132.00	240.00	410.00	1490.00	< 0.5	2.4	8.3	438.00
Trichloromonofluoromethane (ug/l)	< 0.5	< 0.5	< 0.5	< 5.0	< 0.5	< 0.5	< 0.5	< 2.5
Vinyl chloride (ug/l)	< 0.5	< 0.5	< 0.5	< 5.0	< 0.5	< 0.5	< 0.5	< 2.5
Gases								
Ethane (ug/l)	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Ethene (ug/l)	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Methane (ug/l)	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
Propane (ug/l)	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Inorganics								
Alkalinity (mg/l)	11.23	9.19	11.88	19.33	12.00	12.40	23.30	14.50
Chloride (mg/l)	5.0	8.2	10.8	66.2	12.1	22.6	34.6	52.0
Nitrate plus Nitrite (as N) (mg/l)	2.85	2.91	2.51	1.60	7.00	6.57	4.63	2.82
Sulfate (mg/l)	3.24	4.21	3.68	4.40	79.31	63.48	29.84	< 1
Sulfide (mg/l)	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total Organic Carbon (mg/l)	4.9	5	< 3.00	5.7	3.2	4.1	9.6	6.8

Table 5
Transect Groundwater Sample Analytical Results
March/April 1997
Dover Air Force Base, Delaware

Transect Sample Location:	TA-08	TA-09	TA-09	TA-09	TA-09	TA-09	TB-03	TB-03
Sample Id:	TA-08-48	TA-09-28	TA-09-33	TA-09-38	TA-09-43	TA-09-48	TB-03-23.5	TB-03-28.5
Sample Depth (feet below grade):	48	28	33	38	43	48	23.5	28.5
Sample Date:	4/2/1997	4/28/1997	4/28/1997	4/29/1997	4/29/1997	4/29/1997	4/3/1997	4/3/1997
Analyte (units)								
Volatile Organic Compounds								
1,1,1-Trichloroethane (ug/l)	< 5.0	< 0.5	< 5.0	< 5.0	< 0.5	< 0.5	< 0.5	< 0.5
1,1,2,2-Tetrachloroethane (ug/l)	< 5.0	< 0.5	< 5.0	< 5.0	< 0.5	< 0.5	< 0.5	< 0.5
1,1,2-Trichloroethane (ug/l)	< 5.0	< 0.5	< 5.0	< 5.0	< 0.5	< 0.5	< 0.5	< 0.5
1,1-Dichloroethane (ug/l)	< 5.0	0.6	< 5.0	< 5.0	< 0.5	< 0.5	< 0.5	< 0.5
1,1-Dichloroethene (ug/l)	< 5.0	< 0.5	< 5.0	< 5.0	< 0.5	< 0.5	< 0.5	< 0.5
1,2-Dichlorobenzene (ug/l)	< 3.0	< 0.3	1.2	< 3.0	< 0.3	< 0.3	< 0.3	< 0.3
1,2-Dichloroethane (ug/l)	< 5.0	< 0.5	< 5.0	< 5.0	< 0.5	< 0.5	< 0.5	< 0.5
1,2-Dichloropropane (ug/l)	< 5.0	< 0.5	4.6	4.00	< 0.5	< 0.5	< 0.5	< 0.5
1,3-Dichlorobenzene (ug/l)	310.00	< 0.3	1.4	< 3.0	< 0.3	< 0.3	< 0.3	< 0.3
1,4-Dichlorobenzene (ug/l)	320.00	< 0.3	2.2	< 3.0	< 0.3	< 0.3	0.3	< 0.3
Benzene (ug/l)	200.00	< 0.3	< 3.0	< 3.0	< 0.3	< 0.3	< 0.3	< 0.3
Bromodichloromethane (ug/l)	< 5.0	< 0.5	< 5.0	< 5.0	< 0.5	< 0.5	< 0.5	< 0.5
Bromoform (ug/l)	< 10	< 1.0	< 10	< 10	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane (ug/l)	< 10	< 1.0	< 10	< 10	< 1.0	< 1.0	< 1.0	< 1.0
Carbon tetrachloride (ug/l)	1040.00	< 0.5	3.2	12.00	< 0.5	< 0.5	< 0.5	< 0.5
Chlorobenzene (ug/l)	< 3.0	< 0.3	0.6	< 3.0	< 0.3	< 0.3	< 0.3	< 0.3
Chloroethane (ug/l)	< 5.0	< 0.5	< 5.0	< 5.0	< 0.5	< 0.5	< 0.5	< 0.5
Chloroform (ug/l)	< 5.0	< 0.5	2.4	39.8	< 0.5	< 0.5	0.6	< 0.5
Chloromethane (ug/l)	< 5.0	< 0.5	2.2	< 5.0	< 0.5	< 0.5	< 0.5	< 0.5
cis-1,2-Dichloroethene (ug/l)	< 20	< 2.0	14.00	< 20	< 2.0	< 2.0	< 2.0	< 2.0
cis-1,3-Dichloropropene (ug/l)	< 5.0	< 0.5	< 5.0	< 5.0	< 0.5	< 0.5	< 0.5	< 0.5
Dibromochloromethane (ug/l)	< 5.0	< 0.5	< 5.0	< 5.0	< 0.5	< 0.5	< 0.5	< 0.5
Dichloromethane (ug/l)	< 20	< 2.0	< 20	< 20	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene (ug/l)	< 3.0	< 0.3	0.4	0.6	< 0.3	< 0.3	< 0.3	< 0.3
m & p Xylenes (ug/l)	< 10	< 1.0	< 10	1.4	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene (ug/l)	< 10	< 1.0	< 10	< 10	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethylene (ug/l)	160.00	0.7	14.00	137.00	< 0.5	0.8	< 0.5	< 0.5
Toluene (ug/l)	< 10	3.6	5.00	3.0	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene (ug/l)	< 20	< 2.0	< 20	< 20	< 2.0	< 2.0	< 2.0	< 2.0
trans-1,3-Dichloropropene (ug/l)	< 5.0	< 0.5	< 5.0	< 5.0	< 0.5	< 0.5	< 0.5	< 0.5
Trichloroethylene (ug/l)	690.00	133.00	1580.00	1340.00	0.6	7.9	< 0.5	< 0.5
Trichloromonofluoromethane (ug/l)	201.00	< 0.5	< 5.0	< 5.0	< 0.5	< 0.5	< 0.5	< 0.5
Vinyl chloride (ug/l)	< 5.0	< 0.5	2.00	< 5.0	< 0.5	< 0.5	< 0.5	< 0.5
Gases								
Ethane (ug/l)	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Ethene (ug/l)	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Methane (ug/l)	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
Propane (ug/l)	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Inorganics								
Alkalinity (mg/l)	10.00	11.90	11.35	8.90	8.46	10.07	4.70	5.30
Chloride (mg/l)	27.3	18.7	18.0	13.2	6.1	5.8	4.4	9.2
Nitrate plus Nitrite (as N) (mg/l)	2.60	7.75	5.38	2.67	< 0.5	< 0.5	2.08	3.59
Sulfate (mg/l)	3.27	33.16	2.09	40.88	5.37	8.64	34.88	42.66
Sulfide (mg/l)	< 0.1	< 0.1	< 0.1	< 0.1			< 0.1	< 0.1
Total Organic Carbon (mg/l)	4.8	9	8.4	4.6	< 3.00	< 3.00	< 3.00	< 3.00

Table 5
Transect Groundwater Sample Analytical Results
March/April 1997
Dover Air Force Base, Delaware

Transect Sample Location:	TB-03	TB-03	TB-03	TB-04	TB-04	TB-04	TB-04
Sample Id:	TB-03-33.5	TB-03-37.5	TB-03-43.5	TB-04-27	TB-04-32	TB-04-37	TB-04-42
Sample Depth (feet below grade):	33.5	37.5	43.5	27	32	37	42
Sample Date:	4/4/1997	4/4/1997	4/4/1997	4/17/1997	4/17/1997	4/17/1997	4/17/1997
Analyte (units)							
Volatile Organic Compounds							
1,1,1-Trichloroethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,1,2,2-Tetrachloroethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,1,2-Trichloroethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,1-Dichloroethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,1-Dichloroethene (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,2-Dichlorobenzene (ug/l)	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
1,2-Dichloroethane (ug/l)	< 0.5	1.0	< 0.5	< 0.5	0.6	5.6	37.6
1,2-Dichloropropane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,3-Dichlorobenzene (ug/l)	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
1,4-Dichlorobenzene (ug/l)	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Benzene (ug/l)	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Bromodichloromethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Bromoform (ug/l)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane (ug/l)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Carbon tetrachloride (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chlorobenzene (ug/l)	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Chloroethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chloroform (ug/l)	0.9	< 0.5	< 0.5	2.0	< 0.5	< 0.5	< 0.5
Chloromethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
cis-1,2-Dichloroethene (ug/l)	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
cis-1,3-Dichloropropene (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Dibromochloromethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Dichloromethane (ug/l)	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene (ug/l)	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
m & p Xylenes (ug/l)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene (ug/l)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethylene (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Toluene (ug/l)	< 1.0	< 1.0	< 1.0	37.0	< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene (ug/l)	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
trans-1,3-Dichloropropene (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Trichloroethylene (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.0	3.5
Trichloromonofluoromethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Vinyl chloride (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Gases							
Ethane (ug/l)	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Ethene (ug/l)	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Methane (ug/l)	< 15	< 15	< 15	< 15	< 15	< 15	< 15
Propane (ug/l)	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Inorganics							
Alkalinity (mg/l)	8.80	15.10	11.40	3.91	5.10	9.99	12.92
Chloride (mg/l)	8.4	28.7	29.8	10.6	6.4	17.3	42.3
Nitrate plus Nitrite (as N) (mg/l)	5.22	5.81	5.33	4.54	6.10	7.00	7.39
Sulfate (mg/l)	53.72	2.68	2.58	32.12	27.79	4.51	1.56
Sulfide (mg/l)	< 0.1	0.2	< 0.1		< 0.1	< 0.1	< 0.1
Total Organic Carbon (mg/l)	9.5	7.1	6.1	4	4.6	7.9	10

Table 5
Transect Groundwater Sample Analytical Results
March/April 1997
Dover Air Force Base, Delaware

Transect Sample Location:	TB-04	TB-05	TB-05	TB-05	TB-05	TB-05	TB-06
Sample Id:	TB-04-47	TB-05-31.5	TB-05-36.5	TB-05-41.5	TB-05-46.5	TB-05-51.5	TB-06-33
Sample Depth (feet below grade):	47	31.5	36.5	41.5	46.5	51.5	33
Sample Date:	4/17/1997	4/15/1997	4/15/1997	4/15/1997	4/15/1997	4/16/1997	4/15/1997
Analyte (units)							
Volatile Organic Compounds							
1,1,1-Trichloroethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,1,2,2-Tetrachloroethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,1,2-Trichloroethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,1-Dichloroethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,1-Dichloroethene (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,2-Dichlorobenzene (ug/l)	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
1,2-Dichloroethane (ug/l)	60.2	< 0.5	< 0.5	< 0.5	10.7	19.1	< 0.5
1,2-Dichloropropane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,3-Dichlorobenzene (ug/l)	< 0.3	< 0.3	0.6	< 0.3	0.6	< 0.3	< 0.3
1,4-Dichlorobenzene (ug/l)	< 0.3	< 0.3	0.5	< 0.3	0.5	< 0.3	< 0.3
Benzene (ug/l)	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Bromodichloromethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Bromoform (ug/l)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane (ug/l)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Carbon tetrachloride (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.9	< 0.5
Chlorobenzene (ug/l)	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Chloroethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chloroform (ug/l)	0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.6	< 0.5
Chloromethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
cis-1,2-Dichloroethene (ug/l)	2.5	< 2.0	< 2.0	< 2.0	1.8	37.1	< 2.0
cis-1,3-Dichloropropene (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Dibromochloromethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Dichloromethane (ug/l)	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene (ug/l)	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
m & p Xylenes (ug/l)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene (ug/l)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethylene (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	0.5	1.6	< 0.5
Toluene (ug/l)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene (ug/l)	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
trans-1,3-Dichloropropene (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Trichloroethylene (ug/l)	6.7	< 0.5	< 0.5	< 0.5	16.6	125.00	2.9
Trichloromonofluoromethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Vinyl chloride (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Gases							
Ethane (ug/l)	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Ethene (ug/l)	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Methane (ug/l)	< 15	< 15	< 15	< 15	< 15	< 15	< 15
Propane (ug/l)	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Inorganics							
Alkalinity (mg/l)	14.49	4.73	9.37	12.75	10.37	13.72	7.16
Chloride (mg/l)	42.1	41.5	36.8	42.7	45.8	5.7	37.9
Nitrate plus Nitrite (as N) (mg/l)	6.10	4.63	4.20	4.65	4.99	2.39	3.95
Sulfate (mg/l)	1.56	5.44	3.17	3.00	3.66	2.05	1.80
Sulfide (mg/l)	< 0.1	< 0.1		< 0.1	< 0.1	< 0.1	< 0.1
Total Organic Carbon (mg/l)	11.1	6.4	0	8.2	7.1	6.9	6.9

Table 5
Transect Groundwater Sample Analytical Results
March/April 1997
Dover Air Force Base, Delaware

Transect Sample Location:	TB-06	TB-06	TB-06	TB-07	TB-07	TB-07	TB-07
Sample Id:	TB-06-38	TB-06-43	TB-06-48	TB-07-27	TB-07-32	TB-07-37	TB-07-42
Sample Depth (feet below grade):	38	43	48	27	32	37	42
Sample Date:	4/15/1997	4/15/1997	4/15/1997	4/16/1997	4/16/1997	4/16/1997	4/16/1997
Analyte (units)							
Volatile Organic Compounds							
1,1,1-Trichloroethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 1.3
1,1,2,2-Tetrachloroethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 1.3
1,1,2-Trichloroethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 1.3
1,1-Dichloroethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	2.0	1.3
1,1-Dichloroethene (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	1.0	3.3	4.8
1,2-Dichlorobenzene (ug/l)	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	1.0
1,2-Dichloroethane (ug/l)	0.8	1.5	4.4	< 0.5	< 0.5	1.3	10.2
1,2-Dichloropropane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.2
1,3-Dichlorobenzene (ug/l)	0.4	< 0.3	< 0.3	< 0.3	< 0.3	0.5	1.3
1,4-Dichlorobenzene (ug/l)	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	0.5	1.1
Benzene (ug/l)	< 0.3	< 0.3	< 0.3	< 0.3	2.0	1.4	548.00
Bromodichloromethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 1.3
Bromoform (ug/l)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
Bromomethane (ug/l)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
Carbon tetrachloride (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	2.6	18.2
Chlorobenzene (ug/l)	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	2.1
Chloroethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 1.3
Chloroform (ug/l)	1.5	2.4	1.5	< 0.5	0.9	13.6	9.8
Chloromethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 1.3
cis-1,2-Dichloroethene (ug/l)	2.4	5.9	4.3	< 2.0	1.6	9.5	31.6
cis-1,3-Dichloropropene (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 1.3
Dibromochloromethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 1.3
Dichloromethane (ug/l)	< 2.0	< 2.0	< 2.0	8.7	< 2.0	28.9	< 5.0
Ethylbenzene (ug/l)	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.8
m & p Xylenes (ug/l)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
o-Xylene (ug/l)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	2.2
Tetrachloroethylene (ug/l)	1.4	1.2	1.2	< 0.5	0.7	1.4	1.0
Toluene (ug/l)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	72.5	< 2.5
trans-1,2-Dichloroethene (ug/l)	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0
trans-1,3-Dichloropropene (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 1.3
Trichloroethylene (ug/l)	52.3	140.00	172.00	< 0.5	13.3	63.5	283.00
Trichloromonofluoromethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 1.3
Vinyl chloride (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.2
Gases							
Ethane (ug/l)	< 5	< 5	8	< 5	< 5	< 5	< 5
Ethene (ug/l)	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Methane (ug/l)	< 15	< 15	21	< 15	< 15	< 15	< 15
Propane (ug/l)	< 5	< 5	6	< 5	< 5	< 5	< 5
Inorganics							
Alkalinity (mg/l)		26.69	39.93	25.01	12.90	12.43	12.98
Chloride (mg/l)		37.1	43.0	26.5	55.0	41.9	16.3
Nitrate plus Nitrite (as N) (mg/l)		2.33	3.91	6.96	10.35	4.47	1.47
Sulfate (mg/l)		3.60	4.93	28.89	3.83	2.05	2.31
Sulfide (mg/l)	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total Organic Carbon (mg/l)	5.8	11.2	10.5	11.5	0	13.8	13.5

Table 5
Transect Groundwater Sample Analytical Results
March/April 1997
Dover Air Force Base, Delaware

Transect Sample Location:	TB-07	TB-08	TB-08	TB-08	TB-08	TB-08	TB-09
Sample Id:	TB-07-46	TB-08-25.5	TB-08-30.5	TB-08-35.5	TB-08-40.5	TB-08-45.5	TB-09-29
Sample Depth (feet below grade):	46	25.5	30.5	35.5	40.5	45.5	29
Sample Date:	4/16/1997	4/18/1997	4/18/1997	4/18/1997	4/18/1997	4/18/1997	4/7/1997
Analyte (units)							
Volatile Organic Compounds							
1,1,1-Trichloroethane (ug/l)	< 2.5	< 0.5	< 0.5	1.1	1.0	< 0.5	< 0.5
1,1,2,2-Tetrachloroethane (ug/l)	< 2.5	< 0.5	< 0.5	< 5.0	< 1.3	< 0.5	< 0.5
1,1,2-Trichloroethane (ug/l)	< 2.5	< 0.5	< 0.5	< 5.0	< 1.3	< 0.5	< 0.5
1,1-Dichloroethane (ug/l)	0.5	< 0.5	< 0.5	1.7	< 1.3	< 0.5	< 0.5
1,1-Dichloroethene (ug/l)	3.8	< 0.5	1.9	30.9	22.8	0.5	< 0.5
1,2-Dichlorobenzene (ug/l)	< 1.5	< 0.3	< 0.3	0.8	< 0.8	< 0.3	< 0.3
1,2-Dichloroethane (ug/l)	7.4	1.0	< 0.5	0.6	0.8	< 0.5	< 0.5
1,2-Dichloropropane (ug/l)	1.1	< 0.5	< 0.5	< 5.0	1.7	< 0.5	< 0.5
1,3-Dichlorobenzene (ug/l)	0.6	< 0.3	< 0.3	0.8	< 0.8	< 0.3	< 0.3
1,4-Dichlorobenzene (ug/l)	0.4	< 0.3	< 0.3	0.7	< 0.8	< 0.3	< 0.3
Benzene (ug/l)	494.00	14.4	< 0.3	< 3.0	< 0.8	< 0.3	< 0.3
Bromodichloromethane (ug/l)	< 2.5	< 0.5	< 0.5	< 5.0	< 1.3	< 0.5	< 0.5
Bromoform (ug/l)	< 5.0	< 1.0	< 1.0	< 10	< 2.5	< 1.0	< 1.0
Bromomethane (ug/l)	< 5.0	< 1.0	< 1.0	< 10	< 2.5	< 1.0	< 1.0
Carbon tetrachloride (ug/l)	15.8	< 0.5	1.2	23.2	5.6	< 0.5	< 0.5
Chlorobenzene (ug/l)	1.4	< 0.3	< 0.3	0.3	0.4	< 0.3	< 0.3
Chloroethane (ug/l)	< 2.5	< 0.5	< 0.5	< 5.0	< 1.3	< 0.5	< 0.5
Chloroform (ug/l)	8.0	< 0.5	1.2	9.0	4.0	0.7	0.8
Chloromethane (ug/l)	< 2.5	< 0.5	< 0.5	< 5.0	< 1.3	< 0.5	< 0.5
cis-1,2-Dichloroethene (ug/l)	24.5	< 2.0	< 2.0	< 20	9.0	< 2.0	< 2.0
cis-1,3-Dichloropropene (ug/l)	< 2.5	< 0.5	< 0.5	< 5.0	< 1.3	< 0.5	< 0.5
Dibromochloromethane (ug/l)	< 2.5	< 0.5	< 0.5	< 5.0	< 1.3	< 0.5	< 0.5
Dichloromethane (ug/l)	< 10	5.0	3.3	< 20	< 5.0	< 2.0	< 2.0
Ethylbenzene (ug/l)	< 1.5	< 0.3	< 0.3	< 3.0	< 0.8	< 0.3	< 0.3
m & p Xylenes (ug/l)	< 5.0	< 1.0	< 1.0	< 10	< 2.5	< 1.0	< 1.0
o-Xylene (ug/l)	1.0	< 1.0	< 1.0	< 10	< 2.5	< 1.0	< 1.0
Tetrachloroethylene (ug/l)	0.7	< 0.5	< 0.5	1.3	2.2	< 0.5	6.0
Toluene (ug/l)	< 5.0	< 1.0	< 1.0	< 10	< 2.5	< 1.0	< 1.0
trans-1,2-Dichloroethene (ug/l)	< 10	< 2.0	< 2.0	< 20	< 5.0	< 2.0	< 2.0
trans-1,3-Dichloropropene (ug/l)	< 2.5	< 0.5	< 0.5	< 5.0	< 1.3	< 0.5	< 0.5
Trichloroethylene (ug/l)	336.00	< 0.5	1.9	134.00	746.00	12.4	< 0.5
Trichloromonofluoromethane (ug/l)	< 2.5	< 0.5	< 0.5	< 5.0	< 1.3	< 0.5	< 0.5
Vinyl chloride (ug/l)	0.8	< 0.5	< 0.5	< 5.0	0.8	< 0.5	< 0.5
Gases							
Ethane (ug/l)	< 5	< 5	< 5	< 5	< 5	29	< 5
Ethene (ug/l)	< 6	< 6	< 6	< 6	< 6	18	< 6
Methane (ug/l)	< 15	< 15	< 15	< 15	< 15	39	< 15
Propane (ug/l)	< 5	< 5	< 5	< 5	< 5	9	< 5
Inorganics							
Alkalinity (mg/l)	15.90	7.56	7.32	9.05	19.51	77.72	13.10
Chloride (mg/l)	17.6	22.4	47.2	24.2	17.0	10.9	32.7
Nitrate plus Nitrite (as N) (mg/l)	1.56	3.73	4.72	4.81	2.58	< 0.5	6.28
Sulfate (mg/l)	2.57	40.24	6.70	2.14	1.99	13.75	31.86
Sulfide (mg/l)	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1		0.1
Total Organic Carbon (mg/l)	12.4	10.1	13.2	10.4	9.1	5.5	8.6

Table 5
Transect Groundwater Sample Analytical Results
March/April 1997
Dover Air Force Base, Delaware

Transect Sample Location:	TB-09	TB-09	TB-09	TB-10	TB-10	TB-10	TB-10	TC-01
Sample Id:	TB-09-34	TB-09-39	TB-09-44	TB-10-28	TB-10-33	TB-10-38	TB-10-43	TC-01-25
Sample Depth (feet below grade):	34	39	44	28	33	38	43	25
Sample Date:	4/8/1997	4/8/1997	4/8/1997	4/23/1997	4/25/1997	4/28/1997	4/28/1997	4/4/1997
Analyte (units)								
Volatile Organic Compounds								
1,1,1-Trichloroethane (ug/l)	< 0.5	< 0.5	< 0.5	< 5.0	< 0.5	< 0.5	< 0.5	< 0.5
1,1,2,2-Tetrachloroethane (ug/l)	< 0.5	< 0.5	< 0.5	< 5.0	< 0.5	< 0.5	< 0.5	< 0.5
1,1,2-Trichloroethane (ug/l)	< 0.5	< 0.5	< 0.5	9.3	< 0.5	< 0.5	< 0.5	< 0.5
1,1-Dichloroethane (ug/l)	< 0.5	< 0.5	< 0.5	6.2	0.7	< 0.5	< 0.5	< 0.5
1,1-Dichloroethene (ug/l)	< 0.5	< 0.5	< 0.5	< 5.0	< 0.5	< 0.5	< 0.5	< 0.5
1,2-Dichlorobenzene (ug/l)	< 0.3	< 0.3	< 0.3	< 3.0	< 0.3	< 0.3	< 0.3	< 0.3
1,2-Dichloroethane (ug/l)	< 0.5	< 0.5	< 0.5	7.0	1.5	< 0.5	< 0.5	< 0.5
1,2-Dichloropropane (ug/l)	< 0.5	< 0.5	< 0.5	< 5.0	0.5	< 0.5	< 0.5	< 0.5
1,3-Dichlorobenzene (ug/l)	< 0.3	< 0.3	< 0.3	< 3.0	< 0.3	< 0.3	< 0.3	< 0.3
1,4-Dichlorobenzene (ug/l)	< 0.3	< 0.3	< 0.3	< 3.0	< 0.3	< 0.3	< 0.3	< 0.3
Benzene (ug/l)	0.7	3.5	< 0.3	1810.00	654.00	82.8	6.1	< 0.3
Bromodichloromethane (ug/l)	< 0.5	< 0.5	< 0.5	< 5.0	< 0.5	< 0.5	< 0.5	< 0.5
Bromoform (ug/l)	< 1.0	< 1.0	< 1.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane (ug/l)	< 1.0	< 1.0	< 1.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0
Carbon tetrachloride (ug/l)	< 0.5	0.7	72.00	< 5.0	< 0.5	< 0.5	50.8	< 0.5
Chlorobenzene (ug/l)	< 0.3	< 0.3	< 0.3	< 3.0	< 0.3	< 0.3	< 0.3	< 0.3
Chloroethane (ug/l)	< 0.5	< 0.5	< 0.5	< 5.0	< 0.5	< 0.5	< 0.5	< 0.5
Chloroform (ug/l)	< 0.5	2.1	16.00	< 5.0	< 0.5	0.8	14.7	< 0.5
Chloromethane (ug/l)	< 0.5	< 0.5	< 0.5	< 5.0	< 0.5	< 0.5	< 0.5	< 0.5
cis-1,2-Dichloroethene (ug/l)	< 2.0	< 2.0	< 2.0	956.00	7.9	< 2.0	< 2.0	< 2.0
cis-1,3-Dichloropropene (ug/l)	< 0.5	< 0.5	< 0.5	< 5.0	< 0.5	< 0.5	< 0.5	< 0.5
Dibromochloromethane (ug/l)	< 0.5	< 0.5	< 0.5	< 5.0	< 0.5	< 0.5	< 0.5	< 0.5
Dichloromethane (ug/l)	< 2.0	< 2.0	< 2.0	82.00	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene (ug/l)	1.0	4.7	< 0.3	1700.00	1.6	5.5	12.7	< 0.3
m & p Xylenes (ug/l)	1.0	6.1	< 1.0	3650.00	7.7	22.7	54.2	< 1.0
o-Xylene (ug/l)	< 1.0	2.7	< 1.0	2120.00	3.4	10.3	19.2	< 1.0
Tetrachloroethylene (ug/l)	15.00	7.4	16.00	9.8	0.9	1.5	14.1	< 0.5
Toluene (ug/l)	1.0	4.7	< 1.0	2400.00	9.0	10.6	30.0	< 1.0
trans-1,2-Dichloroethene (ug/l)	< 2.0	< 2.0	< 2.0	< 20	< 2.0	< 2.0	< 2.0	< 2.0
trans-1,3-Dichloropropene (ug/l)	< 0.5	< 0.5	< 0.5	< 5.0	< 0.5	< 0.5	< 0.5	< 0.5
Trichloroethylene (ug/l)	1.7	4.0	139.00	< 5.0	4.9	5.8	28.5	1.9
Trichloromonofluoromethane (ug/l)	< 0.5	< 0.5	< 0.5	< 5.0	< 0.5	< 0.5	< 0.5	< 0.5
Vinyl chloride (ug/l)	< 0.5	< 0.5	< 0.5	11.9	< 0.5	< 0.5	< 0.5	< 0.5
Gases								
Ethane (ug/l)	< 5	< 5	< 5	< 5		< 5	< 5	< 5
Ethene (ug/l)	< 6	< 6	< 6	< 6		< 6	< 6	< 6
Methane (ug/l)	< 15	< 15	< 15	93		27	< 15	< 15
Propane (ug/l)	< 5	< 5	< 5	< 5		< 5	< 5	< 5
Inorganics								
Alkalinity (mg/l)	13.30	18.55	27.58	93.43	18.99	27.41	27.65	10.30
Chloride (mg/l)	13.7	7.0	11.2	14.0	51.9	46.1	12.1	13.7
Nitrate plus Nitrite (as N) (mg/l)	6.62	6.23	4.90	< 0.5	1.13	6.91	5.47	4.68
Sulfate (mg/l)	66.01	37.90	6.54	0.05	46.66	2.97	6.48	5.34
Sulfide (mg/l)	< 0.1	< 0.1	< 0.1		< 0.1	< 0.1	0.1	< 0.1
Total Organic Carbon (mg/l)	5.7	5.2	3.5	0	14.8	8.9	0	4.5

Table 5
Transect Groundwater Sample Analytical Results
March/April 1997
Dover Air Force Base, Delaware

Transect Sample Location:	TC-01	TC-02	TC-02	TC-02	TC-02	TC-03	TC-03	TC-03
Sample Id:	TC-01-30	TC-02-27	TC-02-32	TC-02-37	TC-02-42	TC-03-29	TC-03-34	TC-03-39
Sample Depth (feet below grade):	30	27	32	37	42	29	34	39
Sample Date:	4/4/1997	4/24/1997	4/24/1997	4/24/1997	4/24/1997	4/24/1997	4/24/1997	4/24/1997
Analyte (units)								
Volatile Organic Compounds								
1,1,1-Trichloroethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,1,2,2-Tetrachloroethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,1,2-Trichloroethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,1-Dichloroethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,1-Dichloroethene (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,2-Dichlorobenzene (ug/l)	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
1,2-Dichloroethane (ug/l)	0.7	1.9	2.4	1.8	1.3	< 0.5	< 0.5	< 0.5
1,2-Dichloropropane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,3-Dichlorobenzene (ug/l)	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
1,4-Dichlorobenzene (ug/l)	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Benzene (ug/l)	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Bromodichloromethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Bromoform (ug/l)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane (ug/l)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Carbon tetrachloride (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chlorobenzene (ug/l)	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Chloroethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chloroform (ug/l)	< 0.5	0.6	0.6	0.6	0.5	< 0.5	< 0.5	1.1
Chloromethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
cis-1,2-Dichloroethene (ug/l)	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
cis-1,3-Dichloropropene (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Dibromochloromethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Dichloromethane (ug/l)	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene (ug/l)	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
m & p Xylenes (ug/l)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene (ug/l)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethylene (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Toluene (ug/l)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene (ug/l)	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
trans-1,3-Dichloropropene (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Trichloroethylene (ug/l)	5.2	60.2	70.4	64.5	50.6	< 0.5	< 0.5	39.3
Trichloromonofluoromethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Vinyl chloride (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Gases								
Ethane (ug/l)	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Ethene (ug/l)	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Methane (ug/l)	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
Propane (ug/l)	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Inorganics								
Alkalinity (mg/l)	8.70	15.61	11.28	0.00	11.28	6.19	8.02	15.70
Chloride (mg/l)	14.5	12.3	9.4	0.0	12.9	10.5	6.6	7.5
Nitrate plus Nitrite (as N) (mg/l)	5.04	4.02	4.09	0.00	3.75	3.03	3.30	4.25
Sulfate (mg/l)	2.38	1.56	1.56	0.00	1.69	27.49	20.93	1.56
Sulfide (mg/l)	0.2	< 0.1		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total Organic Carbon (mg/l)	5.3	< 3.00	< 3.00	< 3.00	< 3.00	< 3.00	< 3.00	< 3.00

Table 5
Transect Groundwater Sample Analytical Results
March/April 1997
Dover Air Force Base, Delaware

Transect Sample Location:	TC-03	TC-04	TC-04	TC-04	TC-05	TC-05	TC-06	TC-06
Sample Id:	TC-03-44	TC-04-30	TC-04-35	TC-04-40	TC-05-27	TC-05-30	TC-06-26.5	TC-06-31
Sample Depth (feet below grade):	44	30	35	40	27	30	26.5	31
Sample Date:	4/24/1997	4/23/1997	4/23/1997	4/23/1997	4/23/1997	4/23/1997	4/25/1997	4/25/1997
Analyte (units)								
Volatile Organic Compounds								
1,1,1-Trichloroethane (ug/l)	< 0.8	< 0.5	< 0.5	< 1.3	< 0.5	< 0.5	< 0.5	< 0.5
1,1,2,2-Tetrachloroethane (ug/l)	< 0.8	< 0.5	< 0.5	< 1.3	< 0.5	< 0.5	< 0.5	< 0.5
1,1,2-Trichloroethane (ug/l)	< 0.8	< 0.5	< 0.5	< 1.3	< 0.5	< 0.5	< 0.5	< 0.5
1,1-Dichloroethane (ug/l)	< 0.8	< 0.5	< 0.5	< 1.3	< 0.5	< 0.5	< 0.5	< 0.5
1,1-Dichloroethene (ug/l)	< 0.8	< 0.5	< 0.5	< 1.3	< 0.5	< 0.5	< 0.5	< 0.5
1,2-Dichlorobenzene (ug/l)	< 0.5	< 0.3	< 0.3	< 0.8	< 0.3	< 0.3	< 0.3	< 0.3
1,2-Dichloroethane (ug/l)	0.6	0.6	< 0.5	5.2	< 0.5	< 0.5	1.1	0.6
1,2-Dichloropropane (ug/l)	< 0.8	< 0.5	< 0.5	1.5	< 0.5	< 0.5	< 0.5	< 0.5
1,3-Dichlorobenzene (ug/l)	< 0.5	< 0.3	< 0.3	< 0.8	< 0.3	< 0.3	< 0.3	< 0.3
1,4-Dichlorobenzene (ug/l)	< 0.5	< 0.3	< 0.3	< 0.8	< 0.3	< 0.3	< 0.3	< 0.3
Benzene (ug/l)	4.4	< 0.3	< 0.3	< 0.8	< 0.3	< 0.3	< 0.3	< 0.3
Bromodichloromethane (ug/l)	< 0.8	< 0.5	< 0.5	< 1.3	< 0.5	< 0.5	< 0.5	< 0.5
Bromoform (ug/l)	< 1.7	< 1.0	< 1.0	< 2.5	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane (ug/l)	< 1.7	< 1.0	< 1.0	< 2.5	< 1.0	< 1.0	< 1.0	< 1.0
Carbon tetrachloride (ug/l)	0.8	< 0.5	< 0.5	1.2	< 0.5	< 0.5	4.6	4.6
Chlorobenzene (ug/l)	< 0.5	< 0.3	< 0.3	< 0.8	< 0.3	< 0.3	< 0.3	< 0.3
Chloroethane (ug/l)	< 0.8	< 0.5	< 0.5	< 1.3	< 0.5	< 0.5	< 0.5	< 0.5
Chloroform (ug/l)	1.2	< 0.5	< 0.5	1.6	< 0.5	< 0.5	3.5	3.5
Chloromethane (ug/l)	< 0.8	< 0.5	< 0.5	< 1.3	< 0.5	< 0.5	< 0.5	< 0.5
cis-1,2-Dichloroethene (ug/l)	< 3.3	< 2.0	< 2.0	3.6	< 2.0	< 2.0	< 2.0	< 2.0
cis-1,3-Dichloropropene (ug/l)	< 0.8	< 0.5	< 0.5	< 1.3	< 0.5	< 0.5	< 0.5	< 0.5
Dibromochloromethane (ug/l)	< 0.8	< 0.5	< 0.5	< 1.3	< 0.5	< 0.5	< 0.5	< 0.5
Dichloromethane (ug/l)	< 3.3	< 2.0	< 2.0	< 5.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene (ug/l)	< 0.5	< 0.3	< 0.3	< 0.8	< 0.3	< 0.3	< 0.3	< 0.3
m & p Xylenes (ug/l)	< 1.7	< 1.0	< 1.0	< 2.5	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene (ug/l)	< 1.7	< 1.0	< 1.0	< 2.5	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethylene (ug/l)	< 0.8	< 0.5	< 0.5	< 1.3	< 0.5	< 0.5	0.8	< 0.5
Toluene (ug/l)	< 1.7	< 1.0	< 1.0	< 2.5	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene (ug/l)	< 3.3	< 2.0	< 2.0	< 5.0	< 2.0	< 2.0	< 2.0	< 2.0
trans-1,3-Dichloropropene (ug/l)	< 0.8	< 0.5	< 0.5	< 1.3	< 0.5	< 0.5	< 0.5	< 0.5
Trichloroethylene (ug/l)	112.00	50.9	18.2	566.00	3.6	7.3	21.6	19.3
Trichloromonofluoromethane (ug/l)	< 0.8	< 0.5	< 0.5	< 1.3	< 0.5	< 0.5	< 0.5	< 0.5
Vinyl chloride (ug/l)	< 0.8	< 0.5	< 0.5	< 1.3	< 0.5	< 0.5	< 0.5	< 0.5
Gases								
Ethane (ug/l)	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Ethene (ug/l)	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Methane (ug/l)	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
Propane (ug/l)	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Inorganics								
Alkalinity (mg/l)	8.96	5.43	5.94	8.47	10.30	17.33	8.05	10.52
Chloride (mg/l)	14.7	17.4	25.0	16.1	17.0	15.2	57.5	21.8
Nitrate plus Nitrite (as N) (mg/l)	3.19	2.33	2.01	2.60	3.37	3.57	5.58	6.08
Sulfate (mg/l)	1.91	10.02	5.39	4.74	18.98	20.69	11.96	1.69
Sulfide (mg/l)	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1		< 0.1	< 0.1
Total Organic Carbon (mg/l)	3.9	< 3.00	< 3.00	0	< 3.00	3.6	5.9	6.2

Table 5
Transect Groundwater Sample Analytical Results
March/April 1997
Dover Air Force Base, Delaware

Transect Sample Location:	TC-06	TC-07	TC-07	TC-07
Sample Id:	TC-06-35	TC-07-26.5	TC-07-31.5	TC-07-36.5
Sample Depth (feet below grade):	35	26.5	31.5	36.5
Sample Date:	4/23/1997	4/7/1997	4/7/1997	4/7/1997
Analyte (units)				
Volatile Organic Compounds				
1,1,1-Trichloroethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5
1,1,2,2-Tetrachloroethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5
1,1,2-Trichloroethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5
1,1-Dichloroethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5
1,1-Dichloroethene (ug/l)	< 0.5	< 0.5	4.4	8.8
1,2-Dichlorobenzene (ug/l)	< 0.3	< 0.3	< 0.3	< 0.3
1,2-Dichloroethane (ug/l)	0.6	< 0.5	< 0.5	0.6
1,2-Dichloropropane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5
1,3-Dichlorobenzene (ug/l)	< 0.3	0.3	< 0.3	< 0.3
1,4-Dichlorobenzene (ug/l)	< 0.3	0.3	< 0.3	< 0.3
Benzene (ug/l)	< 0.3	< 0.3	< 0.3	< 0.3
Bromodichloromethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5
Bromoform (ug/l)	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane (ug/l)	< 1.0	< 1.0	< 1.0	< 1.0
Carbon tetrachloride (ug/l)	1.1	1.0	3.3	16.6
Chlorobenzene (ug/l)	< 0.3	< 0.3	< 0.3	< 0.3
Chloroethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5
Chloroform (ug/l)	1.1	0.8	2.8	4.9
Chloromethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5
cis-1,2-Dichloroethene (ug/l)	< 2.0	< 2.0	< 2.0	< 2.0
cis-1,3-Dichloropropene (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5
Dibromochloromethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5
Dichloromethane (ug/l)	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene (ug/l)	< 0.3	< 0.3	< 0.3	< 0.3
m & p Xylenes (ug/l)	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene (ug/l)	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethylene (ug/l)	< 0.5	< 0.5	0.5	0.8
Toluene (ug/l)	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene (ug/l)	< 2.0	< 2.0	< 2.0	< 2.0
trans-1,3-Dichloropropene (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5
Trichloroethylene (ug/l)	13.4	0.8	8.2	12.1
Trichloromonofluoromethane (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5
Vinyl chloride (ug/l)	< 0.5	< 0.5	< 0.5	< 0.5
Gases				
Ethane (ug/l)	< 5	8	< 5	< 5
Ethene (ug/l)	< 6	8	< 6	< 6
Methane (ug/l)	< 15	19	< 15	< 15
Propane (ug/l)	< 5	< 5	< 5	< 5
Inorganics				
Alkalinity (mg/l)	13.85	18.20	16.90	23.90
Chloride (mg/l)	17.6	22.1	55.3	24.2
Nitrate plus Nitrite (as N) (mg/l)	4.56	6.82	6.64	6.46
Sulfate (mg/l)	1.64	< 1	< 1	< 1
Sulfide (mg/l)	< 0.1	0.1	< 0.1	0.1
Total Organic Carbon (mg/l)	4.5	7.9	9.6	9.6

Table 6
Transect Location TC-04 Additional Investigation Groundwater Sample Analytical Results
Dover Air Force Base, Delaware

		SITE:	TC-04	TC-04-A	TC-04-A	TC-04-B	TC-04-B
		SAMPLE ID:	TC-04-40	TC-04-A-33	TC-04-A-38	TC-04-B-33	TC-04-B-38
		DATE:	4/23/97	9/30/97	9/30/97	9/30/97	9/30/97
Analyte (units)							
Volatile Organic Compounds							
1,1,1-Trichloroethane	(ug/l)		<1.3	<0.5	<0.5	<0.5	<0.5
1,1,2,2,-Tetrachloroethane	(ug/l)		<1.3	<0.5	<0.5	<0.5	<0.5
1,1,2-Trichloroethane	(ug/l)		<1.3	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethane	(ug/l)		<1.3	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethene	(ug/l)		<1.3	<0.5	<0.5	<0.5	<0.5
1,2-Dichloroethane	(ug/l)		5.2	<0.5	2.3	<0.5	3.2
1,2-Dichloropropane	(ug/l)		1.5	<0.5	<0.5	<0.5	<0.5
Benzene	(ug/l)		<0.8	<0.5	<0.5	<0.5	<0.5
Bromodichloromethane	(ug/l)		<1.3	<0.5	<0.5	<0.5	<0.5
Bromoform	(ug/l)		<2.5	<1.0	<1.0	<1.0	<1.0
Carbon tetrachloride	(ug/l)		<1.3	<0.5	0.7	<0.5	0.8
Chlorobenzene	(ug/l)		<0.8	<0.3	<0.3	<0.3	<0.3
Chloroethane	(ug/l)		<1.3	<0.5	<0.5	<0.5	<0.5
Chloroform	(ug/l)		1.6	<0.5	<0.5	<0.5	<0.5
cis-1,2-Dichloroethene	(ug/l)		<5.0	<2.0	5.7	<2.0	7.7
cis-1,3-Dichloropropene	(ug/l)		<1.3	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	(ug/l)		<1.3	<0.5	<0.5	<0.5	<0.5
trans-1,2-Dichloroethene	(ug/l)		<5.0	<2.0	<2.0	<2.0	<2.0
Ethylbenzene	(ug/l)		<0.8	<0.3	<0.3	<0.3	<0.3
m &p Xylene	(ug/l)		<2.5	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	(ug/l)		<0.8	<0.3	<0.3	<0.3	<0.3
Bromomethane	(ug/l)		<2.5	<1.0	<1.0	<1.0	<1.0
Chloromethane	(ug/l)		<1.3	<0.5	<0.5	<0.5	<0.5
Dichloromethane	(ug/l)		<5.0	<0.5	<0.5	<0.5	<0.5
1,2-Dichlorobenzene	(ug/l)		<0.8	<0.3	<0.3	<0.3	<0.3
o-Xylene	(ug/l)		<2.5	<1.0	<1.0	<1.0	<1.0
1,4-Dichlorobenzene	(ug/l)		<0.8	<0.3	<0.3	<0.3	<0.3
Tetrachloroethylene	(ug/l)		<1.3	<0.5	<0.5	<0.5	<0.5
Toluene	(ug/l)		<2.5	<1.0	<1.0	<1.0	<1.0
trans-1,3-Dichloropropene	(ug/l)		<1.3	<0.5	<0.5	<0.5	<0.5
Trichloroethylene	(ug/l)		566	<0.5	256	16.5	306
Trichloromonoflouromethane	(ug/l)		<1.3	<0.5	<0.5	<0.5	<0.5
Vinyl chloride	(ug/l)		<1.3	<0.5	<0.5	<0.5	<0.5
Gases							
Ethane	(ug/l)		<5	<5	<5	<5	<5
Ethene	(ug/l)		<6	<5	<5	<5	<5
Methane	(ug/l)		<15	<15	<15	<15	<15
Propane	(ug/l)		<5	<5	<5	<5	<5
Inorganics							
Alkalinity	(mg/l)		8.47				
Chloride	(mg/l)		16.06				
Nitrate plus Nitrite (as N)	(mg/l)		2.59				
Sulfate	(mg/l)		4.74				
Sulfide	(mg/l)		<0.1				
Total Organic Carbon	(mg/l)		ND				

Table 7
Summary of Chloride/Chloroethene Plume Mass Balance
Dover Air Force Base, Delaware

Constituent	Surfer Value (mg*f2/L)	Mass (mg)	Cl Molecular weight (g/mol)	Mass (mol)
Chloride (background = 5)*	7.8E+08	7.7E+10	35.45	2.2E+06
Cloride (background = 10)*	1.6E+08	1.6E+10	35.45	4.5E+05
Tetrachloroethene	1.0E+06	1.0E+08	165.83	6.0E+02
Trichloroethene	7.0E+06	6.9E+08	131.39	5.3E+03
cis-1,2-dichloroethene	4.8E+06	4.8E+08	96.94	4.9E+03
Vinyl Chloride	2.1E+05	2.0E+07	62.50	3.3E+02
Total Cl in Chlorocarbons				**1.1E+04**
% Cl in Chlorocarbons/Chloride (background = 5)				**0.51%**
% Cl in Chlorocarbons/Chloride (background = 10)				**2.45%**

Aquifer Thickness (ft) 10
porosity 0.35
*Subtracted background value over all non zero data points

Table 8
Summary of Monitoring Well Data Mass Flux and Apparent Biodegradation Rates
Dover Air Force Base, Deleware

Tetrachloroethene					
Transect	Distance between Transects (feet)	Travel Time between Transects (day)	Mass Flux (umole/day)	Attenuation Rate (/day)	Attenuation half life (year)
TA			1.6E+04		
	1200	4606		-0.00039	4.9
TB			2.8E+03		
	1400	3151		-0.00130	1.5
TC			4.6E+01		

Trichloroethene					
Transect	Distance between Transects (feet)	Travel Time between Transects (day)	Mass Flux (umole/day)	Attenuation Rate (/day)	Attenuation half life (year)
TA			4.7E+05		
	1200	4252		-0.00016	12.0
TB			2.4E+05		
	1400	2908		-0.00061	3.1
TC			4.1E+04		

cis-1,2-Dichloroethene					
Transect	Distance between Transects (feet)	Travel Time between Transects (day)	Mass Flux (umole/day)	Attenuation Rate (/day)	Attenuation half life (year)
TA			5.4E+05		
	1200	3897		-0.00021	9.3
TB			2.4E+05		
	1400	2666		-0.00077	2.5
TC*			3.1E+04		

* Not Detected (1/2 detection limit used)
** Vinyl Chloride was Not Detected in Transect C or B so attenuation rate between Transects B and C not calculated

Table 8
Summary of Monitoring Well Data Mass Flux and Apparent Biodegradation Rates
Dover Air Force Base, Deleware

Vinyl Chloride					
Transect	Distance between Transects (feet)	Travel Time between Transects (day)	Mass Flux (umole/day)	Attenuation Rate (/day)	Attenuation half life (year)
TA			3.4E+04		
	1200	3543		-0.00061	3.1
TB*			3.9E+03		
	1400	2424		**	**
TC**			5.9E+02		

1,2-Dichloroethane					
Transect	Distance between Transects (feet)	Travel Time between Transects (day)	Mass Flux (umole/day)	Attenuation Rate (/day)	Attenuation half life (year)
TA					
	1200	3602		NA	NA
TB					
	1400	2464		NA	NA
TC					

Note: The following variables were used in calculating travel times

Transect	Average Hydraulic Conductivity (K) (ft/day)	Average hydraulic gradient (i)	Groundwater Flow velocity* (ft/day)
TA - TB	71.50	0.0018	0.34
TB - TC	73.17	0.003	0.58

*Porosity (n) = 0.38

*Calculated from V=Ki/n

Retardation Factor (foc = 0.00025)	
PCE	1.3
TCE	1.2
cis-1,2-DCE	1.1
Vinyl Chloride	1
1,2-DCA	1

* Not Detected (1/2 detection limit used)

** Vinyl Chloride was Not Detected in Transect C or B so attenuation rate between Transects B and C not calculated

Table 9
Groundwater Flow Rate Determined from Transect Data
Dover Air Force Base, Delaware

Sample	Hydraulic Conductivity K (cm/sec)	Cross Sectional Cell Width (ft)	Cross Sectional Cell Depth (ft)	Cross Sectional Area (ft2)	Hydraulic Gradient Along Flowlines (i)	Angle btw Flowline & Perpendicular to Transect (θ)	Hydraulic Gradient Perpendicular to Transect (i_c)	Flow Through Cross Sectional Transect Cell (l/day)
TA-01-32	3.22E-02	179	9	1611	0.0029	28	0.0026	10663
TA-01-37	1.66E-02	179	5	895	0.0029	28	0.0026	3061
TA-01-42	3.26E-02	179	6	671	0.0029	28	0.0026	4500
TA-02-31.5	2.19E-02	181	9	1610	0.0022	14	0.0021	6048
TA-02-36.5	1.71E-03	181	5	905	0.0022	14	0.0021	265
TA-02-41.5	4.94E-02	181	5	905	0.0022	14	0.0021	7654
TA-02-46.5	6.46E-03	181	7	724	0.0022	14	0.0021	801
TA-03-27.5	1.29E-02	215	6	1288	0.0022	0	0.0022	2944
TA-03-32.5	2.35E-02	215	5	1073	0.0022	0	0.0022	4460
TA-03-37.5	1.51E-02	215	5	1073	0.0022	0	0.0022	2871
TA-03-42.5	5.77E-03	215	5	1073	0.0022	0	0.0022	1093
TA-03-47.5	5.77E-03	215	5	1073	0.0022	0	0.0022	1093
TA-03-51.5	5.77E-03	215	5	644	0.0022	0	0.0022	656
TA-04-26	1.64E-03	248	3	743	0.0018	5	0.0018	176
TA-04-31	4.21E-03	248	5	1239	0.0018	5	0.0018	751
TA-04-36	6.78E-03	248	5	1239	0.0018	5	0.0018	1210
TA-04-41	1.85E-02	248	5	1239	0.0018	5	0.0018	3304
TA-04-46	6.75E-03	171	5	855	0.0018	5	0.0018	831
TA-04-51	7.30E-03	171	5	855	0.0018	5	0.0018	898
TA-04-56	1.52E-02	171	5	684	0.0018	5	0.0018	1500
IR-07D	2.90E-02	154	15	2146	0.0018	5	0.0018	8957
TA-05-24	3.92E-03	301	5	1507	0.0025	47	0.0017	809
TA-05-29	3.81E-03	301	5	1507	0.0025	47	0.0017	785
TA-05-34	1.78E-02	301	5	1507	0.0025	47	0.0017	3664
TA-05-39	2.17E-02	301	5	1413	0.0025	47	0.0017	4194
TA-05-44	7.96E-02	225	11	2471	0.0025	47	0.0017	26920
TA-06-23	1.45E-02	220	3	660	0.0036	56	0.0020	1551
TA-06-28	6.72E-02	220	5	1100	0.0036	56	0.0020	11953
TA-06-33	1.75E-02	220	5	1100	0.0036	56	0.0020	3117
TA-06-38	7.85E-03	220	5	1100	0.0036	56	0.0020	1395
TA-06-43	1.07E-02	220	5	1100	0.0036	56	0.0020	1907
TA-06-48	6.35E-03	220	7	1430	0.0036	56	0.0020	1466
TA-07-30	3.52E-02	254	8	2032	0.0037	27	0.0033	18949
TA-07-35	1.82E-02	254	5	1270	0.0037	27	0.0033	6115
TA-07-40	4.40E-02	254	5	1270	0.0037	27	0.0033	14782
TA-07-45	2.18E-02	254	10	2515	0.0037	27	0.0033	14481
TA-08-28	1.94E-02	235	6	1409	0.0037	19	0.0035	7669

Note: $i_c = i\cos(\theta)$

*Corrected for hydraulic conductivity effect on gradient (estimated at $1/11^{th}$ of uncorrected flow)

Table 9
Groundwater Flow Rate Determined from Transect Data
Dover Air Force Base, Delaware

Sample	Hydraulic Conductivity K (cm/sec)	Cross Sectional Cell Width (ft)	Cross Sectional Cell Depth (ft)	Cross Sectional Area (ft2)	Hydraulic Gradient Along Flowlines (i)	Angle btw Flowline & Perpendicular to Transect (θ)	Hydraulic Gradient Perpendicular to Transect (i_c)	Flow Through Cross Sectional Transect Cell (l/day)
TA-08-33	6.82E-03	235	5	1174	0.0037	19	0.0035	2248
TA-08-38	1.38E-02	235	5	1174	0.0037	19	0.0035	4546
TA-08-43	7.89E-03	235	5	1174	0.0037	19	0.0035	2602
TA-08-48	1.04E-01	235	5	1174	0.0037	19	0.0035	34200
TA-09-28	5.77E-03	212	8	1672	0.005	60	0.0025	1935
TA-09-33	6.92E-03	212	5	1058	0.005	60	0.0025	1470
TA-09-38	4.62E-02	212	5	1058	0.005	60	0.0025	9799
TA-09-43	9.23E-04	212	5	1058	0.005	60	0.0025	196
TA-09-48	9.23E-04	212	3	635	0.005	60	0.0025	118
TB-03-23.5	2.16E-02	218	4	850	0.0036	52	0.0022	3269
TB-03-28.5	4.23E-02	218	5	1090	0.0036	52	0.0022	8195
TB-03-33.5	2.52E-02	218	5	1090	0.0036	52	0.0022	4896
TB-03-37.5	1.40E-02	218	5	1090	0.0036	52	0.0022	2719
TB-03-43.5	7.59E-03	218	6	872	0.0036	52	0.0022	1178
TB-04-27	2.37E-02	221	4	884	0.0031	49	0.0020	3415
TB-04-32	7.29E-02	221	9	1625	0.0031	49	0.0020	19348
TB-04-37	4.98E-02	221	5	1106	0.0031	49	0.0020	8996
TB-04-42	1.64E-02	221	5	1106	0.0031	49	0.0020	2957
TB-04-47	1.36E-02	221	8	1327	0.0031	49	0.0020	2949
TB-05-31.5	3.00E-02	324	8	2104	0.0027	39	0.0021	10630
TB-05-36.5	1.36E-02	324	5	1618	0.0027	39	0.0021	3710
TB-05-41.5	6.92E-03	198	5	992	0.0027	39	0.0021	1156
TB-05-46.5	2.17E-02	198	5	992	0.0027	39	0.0021	3623
TB-05-51.5*	4.18E-01	198	4	536	0.0027	39	0.0002	3428*
IR-06D	1.90E-03	215	13	2688	0.0027	39	0.0021	862
TB-06-33	2.68E-02	355	10	2929	0.0021	0	0.0021	13217
TB-06-38	9.81E-03	280	5	1400	0.0021	0	0.0021	2315
TB-06-43	1.72E-02	280	5	1400	0.0021	0	0.0021	4057
TB-06-48	1.03E-02	280	4	1092	0.0021	0	0.0021	1890
TB-07-27	3.46E-02	249	5	1119	0.0018	21	0.0017	5224
TB-07-32	2.71E-03	249	5	1243	0.0018	21	0.0017	455
TB-07-37	6.20E-02	249	5	1243	0.0018	21	0.0017	10391
TB-07-42	6.26E-02	249	5	1243	0.0018	21	0.0017	10507
TB-07-47	3.51E-02	249	3	796	0.0018	21	0.0017	3765
TB-08-25.5	1.04E-02	282	5	1410	0.0022	10	0.0022	2547
TB-08-30.5	2.91E-02	282	5	1410	0.0022	10	0.0022	7130
TB-08-35.5	2.17E-02	282	5	1410	0.0022	10	0.0022	5319

Note: $i_c = i\cos(\theta)$

*Corrected for hydraulic conductivity effect on gradient (estimated at $1/11^{th}$ of uncorrected flow)

Table 9
Groundwater Flow Rate Determined from Transect Data
Dover Air Force Base, Delaware

Sample	Hydraulic Conductivity K (cm/sec)	Cross Sectional Cell Width (ft)	Cross Sectional Cell Depth (ft)	Cross Sectional Area (ft2)	Hydraulic Gradient Along Flowlines (i)	Angle btw Flowline & Perpendicular to Transect (θ)	Hydraulic Gradient Perpendicular to Transect (i_c)	Flow Through Cross Sectional Transect Cell (l/day)
TB-08-40.5	8.08E-03	282	5	1410	0.0022	10	0.0022	1981
TB-08-45.5	8.08E-03	282	2	620	0.0022	10	0.0022	871
TB-09-29	3.61E-02	300	10	2641	0.0024	9	0.0024	18120
TB-09-34	1.66E-02	300	5	1501	0.0024	9	0.0024	4741
TB-09-39	2.65E-03	300	5	1501	0.0024	9	0.0024	758
TB-09-44	4.03E-03	300	6	1216	0.0024	9	0.0024	931
TB-10-28	5.88E-03	345	6	1604	0.0028	11	0.0027	2083
TB-10-33	3.92E-02	345	5	1725	0.0028	11	0.0027	14930
TB-10-38	1.15E-03	345	5	1725	0.0028	11	0.0027	439
TB-10-43	3.00E-03	345	10	2760	0.0028	11	0.0027	1827
TC-01-25	2.37E-02	230	8	1844	0.0048	50	0.0031	10818
TC-01-30	5.08E-02	230	8	864	0.0048	50	0.0031	10868
TC-02-27	4.85E-03	226	7	1627	0.0048	43	0.0035	2221
TC-02-32	6.35E-03	226	5	1130	0.0048	43	0.0035	2020
TC-02-37	1.27E-02	226	5	1130	0.0048	43	0.0035	4040
TC-02-42	7.63E-02	165	6	495	0.0048	43	0.0035	10644
TC-03-29	2.03E-02	318	7	2064	0.0042	37	0.0034	11286
TC-03-34	1.23E-02	318	5	1588	0.0042	37	0.0034	5278
TC-03-39	1.27E-02	202	5	1008	0.0042	37	0.0034	3443
TC-03-44	4.71E-03	202	7	1108	0.0042	37	0.0034	1405
DM-360D	2.68E-03	232	14	2723	0.0042	37	0.0034	1966
TC-04-30	8.08E-03	380	9	3420	0.0036	27	0.0032	7112
TC-04-35	1.66E-02	380	5	1700	0.0036	27	0.0032	7273
TC-04-40*	4.18E-01	160	6	480	0.0036	27	0.0003	4694*
TC-05-27	8.88E-03	206	10	2016	0.0031	13	0.0030	4342
TC-05-30	2.19E-03	206	5	874	0.0031	13	0.0030	465
TC-06-26.5	1.71E-02	189	10	1925	0.0031	0	0.0031	8181
TC-06-31	2.05E-02	189	5	849	0.0031	0	0.0031	4341
TC-06-35	2.54E-02	189	2	377	0.0031	0	0.0031	2384
TC-07-26.5	2.10E-03	216	11	2267	0.0026	16	0.0025	955
TC-07-31.5	1.01E-02	216	6	1295	0.0026	16	0.0025	2620
TC-07-36.5	7.29E-03	216	2	432	0.0026	16	0.0025	632

Note: $i_c = i\cos(\theta)$

*Corrected for hydraulic conductivity effect on gradient (estimated at $1/11^{th}$ of uncorrected flow)

Table 10
Mass Flux Calculated by Summation of Transect Data
Dover Air Force Base, Delaware

Sample	Flow Through Cross Sectional Transect Cell (l/day)	Tetrachloroethene Concentration (ug/L)			Trichloroethene Concentration (ug/L)			cis-1,2-dichloroethene Concentration (ug/L)			Vinyl Chloride Concentration (ug/L)			1,2-dichloroethane Concentration (ug/L)			Chloride Concentration (mg/L)			Tetrachloroethene (uM)	Trichloroethene (uM)	cis-1,2-dichloroethene (uM)
		value	PQL	Flag	value	PQL	Flag	value	PQL	Flag	value	PQL	Flag	value	PQL	Flag	value	PQL	Flag			
TA-01-32	10663	2.9			2.8			1	2.0	<	0.25	0.5	<	1.6			60.86			1.75E-02	2.13E-02	1.03E-02
TA-01-37	3061	0.25	0.5	<	0.6			1	2.0	<	0.25	0.5	<	0.25	0.50	<	60.07**			1.51E-03	4.57E-03	1.03E-02
TA-01-42	4500	0.25	0.5	<	0.6			1	2.0	<	0.25	0.5	<	0.25	0.50	<	60.07**			1.51E-03	4.57E-03	1.03E-02
TA-02-31.5	6048	0.25	0.5	<	1.8			1	2.0	<	0.25	0.5	<	1.8			59.28			1.51E-03	1.37E-02	1.03E-02
TA-02-36.5	265	0.25	0.5	<	0.9			1	2.0	<	0.25	0.5	<	1.1			61.70			1.51E-03	6.85E-03	1.03E-02
TA-02-41.5	7654	0.25	0.5	<	1.7			1	2.0	<	0.25	0.5	<	1			68.65			1.51E-03	1.29E-02	1.03E-02
TA-02-46.5	801	1.5			2.4			1	2.0	<	1.1			2.6			73.70			9.05E-03	1.83E-02	1.03E-02
TA-03-27.5	2944	1.2			14.0			10.8	2.0		0.25	0.5	<	14.4			62.7			7.24E-03	1.07E-01	1.11E-01
TA-03-32.5	4460	11.6			25.1			114	2.0		4.7			75.8			23.85			7.00E-02	1.91E-01	1.18E+00
TA-03-37.5	2871	214			497			2440	20		209			515			26.98			1.29E+00	3.78E+00	2.52E+01
TA-03-42.5	1093	171			635			1388	20		102			916			29.04			1.03E+00	4.83E+00	1.43E+01
TA-03-47.5	1093	113			1630			2032	20		31.5			1444			35.93			6.81E-01	1.24E+01	2.10E+01
TA-03-51.5	656	258			3232			4087	20		40			2950			43.24			1.56E+00	2.46E+01	4.22E+01
TA-04-26	176	0.25	0.5	<	10.0			1	2.0	<	0.25	0.5	<	0.25	0.50	<	35.47			1.51E-03	7.61E-02	1.03E-02
TA-04-31	751	0.25	0.5	<	13.0			1	2.0	<	0.25	0.5	<	0.25	0.50	<	37.60			1.51E-03	9.89E-02	1.03E-02
TA-04-36	1210	3.0			219			13.2	2.0		0.25	0.5	<	0.6			51.52			1.81E-02	1.67E+00	1.36E-01
TA-04-41	3304	2.8			229			18.0	2.0		0.25	0.5	<	1.8			8.78			1.69E-02	1.74E+00	1.86E-01
TA-04-46	831	12.7			153			38.2	2.0		4.0			15.1			15.38**			7.66E-02	1.16E+00	3.94E-01
TA-04-51	898	17.4			152			75.0	2.0		11.5			93.8			21.98			1.05E-01	1.16E+00	7.74E-01
TA-04-56	1500	18			1166			930	20		74			762			9.77			1.09E-01	8.87E+00	9.59E+00
IR-07D	8957	13			720			870			69			290			14***			7.84E-02	5.48E+00	8.97E+00
TA-05-24	809	0.25	0.5	<	13.7			1	2.0	<	0.25	0.5	<	0.25	0.50	<	48.73			1.51E-03	1.04E-01	1.03E-02
TA-05-29	785	0.25	0.5	<	19.6			2.2	2.0		0.25	0.5	<	0.6			18.53			1.51E-03	1.49E-01	2.27E-02
TA-05-34	3664	2.5	5.0	<	594			22	20		2.50	5.0	<	10			19.39			1.51E-02	4.52E+00	2.27E-01
TA-05-39	4194	2.5	5.0	<	1360			55	20		2.50	5.0	<	46.8			19.54			1.51E-02	1.04E+01	5.67E-01
TA-05-44	26920	52.1			1720			62.3	20		2.70			64.2			15.51			3.14E-01	1.31E+01	6.43E-01
TA-06-23	1551	0.25	0.5	<	4.9			1	2.0	<	0.25	0.5	<	0.25	0.50	<	20.08			1.51E-03	3.73E-02	1.03E-02
TA-06-28	11953	0.25	0.5	<	28			1	2.0	<	0.25	0.5	<	0.25	0.50	<	20.40**			1.51E-03	2.13E-01	1.03E-02
TA-06-33	3117	0.6			152			59.6	2.0		0.60			4.6			20.72			3.62E-03	1.16E+00	6.15E-01
TA-06-38	1395	1.3			460			68.7	2.0		4.00			6.4			22.02			7.84E-03	3.50E+00	7.09E-01
TA-06-43	1907	1.7			634			39.3	20		4.30			16.7			20.17			1.03E-02	4.83E+00	4.05E-01
TA-06-48	1466	12.8			2220			300	20		7.20			96.3			18.2			7.72E-02	1.69E+01	3.09E+00
TA-07-30	18949	1.0			132			1	2.0	<	0.25	0.5	<	0.25	0.50	<	5.03			6.03E-03	1.00E+00	1.03E-02
TA-07-35	6115	1.6			240			1	2.0	<	0.25	0.5	<	0.25	0.50	<	8.23			9.65E-03	1.83E+00	1.03E-02
TA-07-40	14782	5.5			410			6.5	2.0		0.25	0.5	<	0.25	0.50	<	10.81			3.32E-02	3.12E+00	6.71E-02
TA-07-45	14481	2.8			1490			21.2	20		2.50	5.0	<	2.5	5.00	<	66.19			1.69E-02	1.13E+01	2.19E-01
TA-08-28	7669	0.25	0.5	<	0.25	0.5	<	1	2.0	<	0.25	0.5	<	0.25	0.50	<	12.12			1.51E-03	1.90E-03	1.03E-02
TA-08-33	2248	0.25	0.5	<	2.4			1	2.0	<	0.25	0.5	<	0.25	0.50	<	22.6			1.51E-03	1.83E-02	1.03E-02
TA-08-38	4546	0.5			8.3			1	2.0	<	0.25	0.5	<	0.25	0.50	<	34.62			3.02E-03	6.32E-02	1.03E-02
TA-08-43	2602	74			438			1	10	<	1.25	2.5	<	1.25	2.50	<	52.02			4.46E-01	3.33E+00	1.03E-02
TA-08-48	34200	160			690			1	20	<	2.50	5.0	<	2.5	5.00	<	27.32			9.65E-01	5.25E+00	1.03E-02

*Corrected for hydraulic conductivity effect on gradient (estimated at 1/11th of regional gradient)
** Estimated from average of surrounding data
*** From 1996 groundwater monitoring data

Table 10
Mass Flux Calculated by Summation of Transect Data
Dover Air Force Base, Delaware

Sample	Vinyl Chloride (uM)	1,2-dichloroethane (uM)	Total Chlorinated Ethenes (uM)	Chloride (uM)	Tetrachloroethene Mass Flux (umoles/day)	Trichloroethene Mass Flux (umoles/day)	cis-1,2-dichloroethene Mass Flux (umoles/day)	Vinyl Chloride Mass Flux (umoles/day)	1,2-dichloroethane Mass Flux (umoles/day)	Chloride Mass Flux (umoles/day)	Total Chlorinated Ethenes Mass Flux (umoles/day)
TA-01-32	4.00E-03	1.62E-02	5.31E-02	1.72E+03	1.86E+02	2.27E+02	1.10E+02	4.27E+01	1.72E+02	1.83E+07	5.66E+02
TA-01-37	4.00E-03	2.53E-03	2.04E-02	1.69E+03	4.61E+00	1.40E+01	3.16E+01	1.22E+01	7.73E+00	5.19E+06	6.24E+01
TA-01-42	4.00E-03	2.53E-03	2.04E-02	1.69E+03	6.78E+00	2.05E+01	4.64E+01	1.80E+01	1.14E+01	7.62E+06	9.18E+01
TA-02-31.5	4.00E-03	1.82E-02	2.95E-02	1.67E+03	9.12E+00	8.29E+01	6.24E+01	2.42E+01	1.10E+02	1.01E+07	1.79E+02
TA-02-36.5	4.00E-03	1.11E-02	2.27E-02	1.74E+03	4.00E-01	1.82E+00	2.74E+00	1.06E+00	2.95E+00	4.61E+05	6.01E+00
TA-02-41.5	4.00E-03	1.01E-02	2.88E-02	1.94E+03	1.15E+01	9.90E+01	7.90E+01	3.06E+01	7.73E+01	1.48E+07	2.20E+02
TA-02-46.5	1.76E-02	2.63E-02	5.52E-02	2.08E+03	7.25E+00	1.46E+01	8.26E+00	1.41E+01	2.10E+01	1.67E+06	4.42E+01
TA-03-27.5	4.00E-03	1.46E-01	2.29E-01	1.77E+03	2.13E+01	3.14E+02	3.28E+02	1.18E+01	4.28E+02	5.21E+06	6.75E+02
TA-03-32.5	7.52E-02	7.66E-01	1.51E+00	6.73E+02	3.12E+02	8.52E+02	5.25E+03	3.35E+02	3.42E+03	3.00E+06	6.74E+03
TA-03-37.5	3.34E+00	5.20E+00	3.36E+01	7.61E+02	3.70E+03	1.09E+04	7.23E+04	9.60E+03	1.49E+04	2.18E+06	9.64E+04
TA-03-42.5	1.63E+00	9.26E+00	2.18E+01	8.19E+02	1.13E+03	5.28E+03	1.57E+04	1.78E+03	1.01E+04	8.95E+05	2.38E+04
TA-03-47.5	5.04E-01	1.46E+01	3.46E+01	1.01E+03	7.45E+02	1.36E+04	2.29E+04	5.51E+02	1.60E+04	1.11E+06	3.78E+04
TA-03-51.5	6.40E-01	2.98E+01	6.90E+01	1.22E+03	1.02E+03	1.61E+04	2.77E+04	4.20E+02	1.96E+04	8.00E+05	4.52E+04
TA-04-26	4.00E-03	2.53E-03	9.19E-02	1.00E+03	2.65E-01	1.34E+01	1.81E+00	7.02E-01	4.43E-01	1.76E+05	1.61E+01
TA-04-31	4.00E-03	2.53E-03	1.15E-01	1.06E+03	1.13E+00	7.43E+01	7.75E+00	3.00E+00	1.90E+00	7.97E+05	8.62E+01
TA-04-36	4.00E-03	6.06E-03	1.83E+00	1.45E+03	2.19E+01	2.02E+03	1.65E+02	4.84E+00	7.33E+00	1.76E+06	2.21E+03
TA-04-41	4.00E-03	1.82E-02	1.95E+00	2.48E+02	5.58E+01	5.76E+03	6.14E+02	1.32E+01	6.01E+01	8.18E+05	6.44E+03
TA-04-46	6.40E-02	1.53E-01	1.70E+00	4.34E+02	6.36E+01	9.67E+02	3.27E+02	5.32E+01	1.27E+02	3.60E+05	1.41E+03
TA-04-51	1.84E-01	9.48E-01	2.22E+00	6.20E+02	9.42E+01	1.04E+03	6.95E+02	1.65E+02	8.51E+02	5.57E+05	1.99E+03
TA-04-56	1.18E+00	7.70E+00	1.98E+01	2.76E+02	1.63E+02	1.33E+04	1.44E+04	1.78E+03	1.15E+04	4.13E+05	2.96E+04
IR-07D	1.10E+00	2.93E+00	1.56E+01	3.95E+02	7.02E+02	4.91E+04	8.04E+04	9.89E+03	2.62E+04	3.54E+06	1.40E+05
TA-05-24	4.00E-03	2.53E-03	1.20E-01	1.37E+03	1.22E+00	8.44E+01	8.35E+00	3.24E+00	2.04E+00	1.11E+06	9.72E+01
TA-05-29	4.00E-03	6.06E-03	1.77E-01	5.23E+02	1.18E+00	1.17E+02	1.78E+01	3.14E+00	4.76E+00	4.10E+05	1.39E+02
TA-05-34	4.00E-02	1.01E-01	4.80E+00	5.47E+02	5.52E+01	1.66E+04	8.32E+02	1.47E+02	3.70E+02	2.00E+06	1.76E+04
TA-05-39	4.00E-02	4.73E-01	1.10E+01	5.51E+02	6.32E+01	4.34E+04	2.38E+03	1.68E+02	1.98E+03	2.31E+06	4.60E+04
TA-05-44	4.32E-02	6.49E-01	1.41E+01	4.38E+02	8.46E+03	3.52E+05	1.73E+04	1.16E+03	1.75E+04	1.18E+07	3.79E+05
TA-06-23	4.00E-03	2.53E-03	5.31E-02	5.66E+02	2.34E+00	5.78E+01	1.60E+01	6.20E+00	3.92E+00	8.78E+05	8.24E+01
TA-06-28	4.00E-03	2.53E-03	2.29E-01	5.75E+02	1.80E+01	2.55E+03	1.23E+02	4.78E+01	3.02E+01	6.88E+06	2.74E+03
TA-06-33	9.60E-03	4.65E-02	1.78E+00	5.84E+02	1.13E+01	3.61E+03	1.92E+03	2.99E+01	1.45E+02	1.82E+06	5.56E+03
TA-06-38	6.40E-02	6.47E-02	4.28E+00	6.21E+02	1.09E+01	4.88E+03	9.88E+02	8.93E+01	9.02E+01	8.66E+05	5.97E+03
TA-06-43	6.88E-02	1.69E-01	5.31E+00	5.69E+02	1.96E+01	9.20E+03	7.73E+02	1.31E+02	3.22E+02	1.08E+06	1.01E+04
TA-06-48	1.15E-01	9.73E-01	2.02E+01	5.13E+02	1.13E+02	2.48E+04	4.54E+03	1.69E+02	1.43E+03	7.53E+05	2.96E+04
TA-07-30	4.00E-03	2.53E-03	1.02E+00	1.42E+02	1.14E+02	1.90E+04	1.95E+02	7.58E+01	4.79E+01	2.69E+06	1.94E+04
TA-07-35	4.00E-03	2.53E-03	1.85E+00	2.32E+02	5.90E+01	1.12E+04	6.31E+01	2.45E+01	1.54E+01	1.42E+06	1.13E+04
TA-07-40	4.00E-03	2.53E-03	3.22E+00	3.05E+02	4.90E+02	4.61E+04	9.91E+02	5.91E+01	3.73E+01	4.51E+06	4.77E+04
TA-07-45	4.00E-02	2.53E-02	1.16E+01	1.87E+03	2.45E+02	1.64E+05	3.17E+03	5.79E+02	3.66E+02	2.70E+07	1.68E+05
TA-08-28	4.00E-03	2.53E-03	1.77E-02	3.42E+02	1.16E+01	1.46E+01	7.91E+01	3.07E+01	1.94E+01	2.62E+06	1.36E+02
TA-08-33	4.00E-03	2.53E-03	3.41E-02	6.37E+02	3.39E+00	4.11E+01	2.32E+01	8.99E+00	5.68E+00	1.43E+06	7.66E+01
TA-08-38	4.00E-03	2.53E-03	8.05E-02	9.77E+02	1.37E+01	2.87E+02	4.69E+01	1.82E+01	1.15E+01	4.44E+06	3.66E+02
TA-08-43	2.00E-02	1.26E-02	3.81E+00	1.47E+03	1.16E+03	8.67E+03	2.68E+01	5.20E+01	3.29E+01	3.82E+06	9.91E+03
TA-08-48	4.00E-02	2.53E-02	6.27E+00	7.71E+02	3.30E+04	1.80E+05	3.53E+02	1.37E+03	8.64E+02	2.64E+07	2.14E+05

*Corrected for hydraulic conductivity effect on gradient (estimated at 1/11th of regional gradient)
** Estimated from average of surrounding data
*** From 1996 groundwater monitoring data

Table 10
Mass Flux Calculated by Summation of Transect Data
Dover Air Force Base, Delaware

Sample	Flow Through Cross Sectional Transect Cell (l/day)	Tetrachloroethene Concentration (ug/L)			Trichloroethene Concentration (ug/L)			cis-1,2-dichloroethene Concentration (ug/L)			Vinyl Chloride Concentration (ug/L)			1,2-dichloroethane Concentration (ug/L)			Chloride Concentration (mg/L)			Tetrachloroethene (uM)	Trichloroethene (uM)	cis-1,2-dichloroethene (uM)
TA-09-28	1935	0.7			133			1	2.0	<	0.25	0.5	<	0.25	0.50	<	18.74			4.22E-03	1.01E+00	1.03E-02
TA-09-33	1470	14			1580			14	20		2.00			2.5	5.00	<	17.97			8.44E-02	1.20E+01	1.44E-01
TA-09-38	9799	137			1340			1	20	<	2.50	5.0	<	2.5	5.00	<	13.16			8.26E-01	1.02E+01	1.03E-02
TA-09-43	196	0.25	0.5	<	0.6			1	2.0	<	0.25	0.5	<	0.25	0.50	<	6.12			1.51E-03	4.57E-03	1.03E-02
TA-09-48	118	0.8			7.9			1	2.0	<	0.25	0.5	<	0.25	0.50	<	5.77			4.82E-03	6.01E-02	1.03E-02
TB-03-23.5	3269	0.25	0.5	<	0.25	0.5	<	1	2.0	<	0.25	0.5	<	0.25	0.50	<	4.35			1.51E-03	1.90E-03	1.03E-02
TB-03-28.5	8195	0.25	0.5	<	0.25	0.5	<	1	2.0	<	0.25	0.5	<	0.25	0.50	<	9.15			1.51E-03	1.90E-03	1.03E-02
TB-03-33.5	4896	0.25	0.5	<	0.25	0.5	<	1	2.0	<	0.25	0.5	<	0.25	0.50	<	8.42			1.51E-03	1.90E-03	1.03E-02
TB-03-37.5	2719	0.25	0.5	<	0.25	0.5	<	1	2.0	<	0.25	0.5	<	0.5	1.00		28.68			1.51E-03	1.90E-03	1.03E-02
TB-03-43.5	1178	0.25	0.5	<	0.25	0.5	<	1	2.0	<	0.25	0.5	<	0.25	0.50	<	29.81			1.51E-03	1.90E-03	1.03E-02
TB-04-27	3415	0.25	0.5	<	0.25	0.5	<	1	2.0	<	0.25	0.5	<	0.25	0.50	<	10.59			1.51E-03	1.90E-03	1.03E-02
TB-04-32	19348	0.25	0.5	<	0.25	0.5	<	1	2.0	<	0.25	0.5	<	0.6			6.43			1.51E-03	1.90E-03	1.03E-02
TB-04-37	8996	0.25	0.5	<	1.0			1	2.0	<	0.25	0.5	<	5.6			17.34			1.51E-03	7.61E-03	1.03E-02
TB-04-42	2957	0.25	0.5	<	3.5			1	2.0	<	0.25	0.5	<	37.6			42.34			1.51E-03	2.66E-02	1.03E-02
TB-04-47	2949	0.25	0.5	<	6.7			2.5	2.0		0.25	0.5	<	60.2			42.09			1.51E-03	5.10E-02	2.58E-02
TB-05-31.5	10630	0.25	0.5	<	0.25	0.5	<	1	2.0	<	0.25	0.5	<	0.25	0.50	<	41.50			1.51E-03	1.90E-03	1.03E-02
TB-05-36.5	3710	0.25	0.5	<	0.25	0.5	<	1	2.0	<	0.25	0.5	<	0.25	0.50	<	36.84			1.51E-03	1.90E-03	1.03E-02
TB-05-41.5	1156	0.25	0.5	<	0.25	0.5	<	1	2.0	<	0.25	0.5	<	0.25	0.50	<	42.67			1.51E-03	1.90E-03	1.03E-02
TB-05-46.5	3623	0.5			16.6			1.8	2.0		0.25	0.5	<	10.7			45.79			3.02E-03	1.26E-01	1.86E-02
TB-05-51.5	37710	1.6	0.5		125			37.1	2.0		0.25	0.5	<	19.1			5.66			9.65E-03	9.51E-01	3.83E-01
TB-05-51.5*	3428*	1.6	0.5		125			37.1	2.0		0.25	0.5	<	19.1			6			9.65E-03	9.51E-01	3.83E-01
IR-06D	862	2.5	5.0	<	260			80			2.50	5.0	<	380			7.00***			1.51E-02	1.98E+00	8.25E-01
TB-06-33	13217	0.25	0.5	<	2.9			1	2.0	<	0.25	0.5	<	0.25	0.50	<	37.95			1.51E-03	2.21E-02	1.03E-02
TB-06-38	2315	1.4			52.3			2.4	2.0		0.25	0.5	<	0.8			37.52			8.44E-03	3.98E-01	2.48E-02
TB-06-43	4057	1.2			140			5.9	2.0		0.25	0.5	<	1.5			37.10			7.24E-03	1.07E+00	6.09E-02
TB-06-48	1890	1.2			172			4.3	2.0		0.25	0.5	<	4.4			43.00			7.24E-03	1.31E+00	4.44E-02
TB-07-27	5224	0.25	0.5	<	0.25	0.5	<	1	2.0	<	0.25	0.5	<	0.25	0.50	<	26.49			1.51E-03	1.90E-03	1.03E-02
TB-07-32	455	0.7			13.3			1.6	2.0		0.25	0.5	<	0.25	0.50	<	54.98			4.22E-03	1.01E-01	1.65E-02
TB-07-37	10391	1.4			63.5			9.5	2.0		0.25	0.5	<	1.3			41.92			8.44E-03	4.83E-01	9.80E-02
TB-07-42	10507	1.0			283			31.6	5.0		1.20			10.2			16.33			6.03E-03	2.15E+00	3.26E-01
TB-07-47	3765	0.7			336			24.5	10		0.80			7.4			17.59			4.22E-03	2.56E+00	2.53E-01
TB-08-25.5	2547	0.25	0.5	<	0.25	0.5	<	1	2.0	<	0.25	0.5	<	1			22.39			1.51E-03	1.90E-03	1.03E-02
TB-08-30.5	7130	0.25	0.5	<	1.9			1	2.0	<	0.25	0.5	<	0.25	0.50	<	47.19			1.51E-03	1.45E-02	1.03E-02
TB-08-35.5	5319	1.3			134			1	20	<	2.50	5.0	<	2.5	5.00	<	24.19			7.84E-03	1.02E+00	1.03E-02
TB-08-40.5	1981	2.2			746			9.0	5.0		0.80			0.65	1.30	<	17.02			1.33E-02	5.68E+00	9.28E-02
TB-08-45.5	871	0.25	0.5	<	12.4			1	2.0	<	0.25	0.5	<	0.25	0.50	<	10.86			1.51E-03	9.44E-02	1.03E-02
TB-09-29	18120	6.0			0.25	0.5	<	1	2.0	<	0.25	0.5	<	0.25	0.50	<	32.70			3.62E-02	1.90E-03	1.03E-02
TB-09-34	4741	15			1.7			1	2.0	<	0.25	0.5	<	0.25	0.50	<	13.75			9.05E-02	1.29E-02	1.03E-02
TB-09-39	758	7.4			4.0			1	2.0	<	0.25	0.5	<	0.25	0.50	<	7.05			4.46E-02	3.04E-02	1.03E-02
TB-09-44	931	16			139			1	2.0	<	0.25	0.5	<	0.25	0.50	<	11.21			9.65E-02	1.06E+00	1.03E-02
TB-10-28	2083	9.8			2.5	5.0	<	956	20		11.90			7			13.96			5.91E-02	1.90E-02	9.86E+00
TB-10-33	14930	0.9			4.9			7.9	2.0		0.25	0.5	<	1.5			51.86			5.43E-03	3.73E-02	8.15E-02

*Corrected for hydraulic conductivity effect on gradient (estimated at 1/11th of regional gradient)
** Estimated from average of surrounding data
*** From 1996 groundwater monitoring data

Table 10
Mass Flux Calculated by Summation of Transect Data
Dover Air Force Base, Delaware

Sample	Vinyl Chloride (uM)	1,2-dichloroethane (uM)	Total Chlorinated Ethenes (uM)	Chloride (uM)	Tetrachloroethene Mass Flux (umoles/day)	Trichloroethene Mass Flux (umoles/day)	cis-1,2-dichloroethene Mass Flux (umoles/day)	Vinyl Chloride Mass Flux (umoles/day)	1,2-dichloroethane Mass Flux (umoles/day)	Chloride Mass Flux (umoles/day)	Total Chlorinated Ethenes Mass Flux (umoles/day)
TA-09-28	4.00E-03	2.53E-03	1.03E+00	5.29E+02	8.17E+00	1.96E+03	2.00E+01	7.74E+00	4.89E+00	1.02E+06	1.99E+03
TA-09-33	3.20E-02	2.53E-02	1.23E+01	5.07E+02	1.24E+02	1.77E+04	2.12E+02	4.70E+01	3.71E+01	7.45E+05	1.81E+04
TA-09-38	4.00E-02	2.53E-02	1.11E+01	3.71E+02	8.10E+03	9.99E+04	1.01E+02	3.92E+02	2.48E+02	3.64E+06	1.09E+05
TA-09-43	4.00E-03	2.53E-03	2.04E-02	1.73E+02	2.95E-01	8.95E-01	2.02E+00	7.84E-01	4.95E-01	3.38E+04	4.00E+00
TA-09-48	4.00E-03	2.53E-03	7.93E-02	1.63E+02	5.67E-01	7.07E+00	1.21E+00	4.70E-01	2.97E-01	1.91E+04	9.32E+00
TB-03-23.5	4.00E-03	2.53E-03	1.77E-02	1.23E+02	4.93E+00	6.22E+00	3.37E+01	1.31E+01	8.26E+00	4.01E+05	5.79E+01
TB-03-28.5	4.00E-03	2.53E-03	1.77E-02	2.58E+02	1.24E+01	1.56E+01	8.45E+01	3.28E+01	2.07E+01	2.11E+06	1.45E+02
TB-03-33.5	4.00E-03	2.53E-03	1.77E-02	2.37E+02	7.38E+00	9.32E+00	5.05E+01	1.96E+01	1.24E+01	1.16E+06	8.68E+01
TB-03-37.5	4.00E-03	5.05E-03	1.77E-02	8.09E+02	4.10E+00	5.17E+00	2.80E+01	1.09E+01	1.37E+01	2.20E+06	4.82E+01
TB-03-43.5	4.00E-03	2.53E-03	1.77E-02	8.41E+02	1.78E+00	2.24E+00	1.22E+01	4.71E+00	2.98E+00	9.90E+05	2.09E+01
TB-04-27	4.00E-03	2.53E-03	1.77E-02	2.99E+02	5.15E+00	6.50E+00	3.52E+01	1.37E+01	8.63E+00	1.02E+06	6.05E+01
TB-04-32	4.00E-03	6.06E-03	1.77E-02	1.81E+02	2.92E+01	3.68E+01	2.00E+02	7.74E+01	1.17E+02	3.51E+06	3.43E+02
TB-04-37	4.00E-03	5.66E-02	2.34E-02	4.89E+02	1.36E+01	6.85E+01	9.28E+01	3.60E+01	5.09E+02	4.40E+06	2.11E+02
TB-04-42	4.00E-03	3.80E-01	4.25E-02	1.19E+03	4.46E+00	7.88E+01	3.05E+01	1.18E+01	1.12E+03	3.53E+06	1.26E+02
TB-04-47	4.00E-03	6.08E-01	8.23E-02	1.19E+03	4.45E+00	1.50E+02	7.61E+01	1.18E+01	1.79E+03	3.50E+06	2.43E+02
TB-05-31.5	4.00E-03	2.53E-03	1.77E-02	1.17E+03	1.60E+01	2.02E+01	1.10E+02	4.25E+01	2.69E+01	1.24E+07	1.88E+02
TB-05-36.5	4.00E-03	2.53E-03	1.77E-02	1.04E+03	5.59E+00	7.06E+00	3.83E+01	1.48E+01	9.37E+00	3.86E+06	6.58E+01
TB-05-41.5	4.00E-03	2.53E-03	1.77E-02	1.20E+03	1.74E+00	2.20E+00	1.19E+01	4.62E+00	2.92E+00	1.39E+06	2.05E+01
TB-05-46.5	4.00E-03	1.08E-01	1.52E-01	1.29E+03	1.09E+01	4.58E+02	6.73E+01	1.45E+01	3.92E+02	4.68E+06	5.50E+02
TB-05-51.5	4.00E-03	1.93E-01	1.35E+00	1.60E+02	3.64E+02	3.59E+04	1.44E+04	1.51E+02	7.28E+03	6.02E+06	5.08E+04
TB-05-51.5*	4.00E-03	1.93E-01	1.35E+00	1.60E+02	3.31E+01*	3.26E+03*	1.31E+03*	1.37E+01*	6.62E+02*	5.47E+05*	4.62E+03*
IR-06D	4.00E-02	3.84E+00	2.86E+00	1.97E+02	1.30E+01	1.71E+03	7.12E+02	3.45E+01	3.31E+03	1.70E+05	2.47E+03
TB-06-33	4.00E-03	2.53E-03	3.79E-02	1.07E+03	1.99E+01	2.92E+02	1.36E+02	5.29E+01	3.34E+01	1.41E+07	5.01E+02
TB-06-38	4.00E-03	8.08E-03	4.35E-01	1.06E+03	1.95E+01	9.21E+02	5.73E+01	9.26E+00	1.87E+01	2.45E+06	1.01E+03
TB-06-43	4.00E-03	1.52E-02	1.14E+00	1.05E+03	2.94E+01	4.32E+03	2.47E+02	1.62E+01	6.15E+01	4.25E+06	4.62E+03
TB-06-48	4.00E-03	4.45E-02	1.36E+00	1.21E+03	1.37E+01	2.47E+03	8.38E+01	7.56E+00	8.40E+01	2.29E+06	2.58E+03
TB-07-27	4.00E-03	2.53E-03	1.77E-02	7.47E+02	7.88E+00	9.94E+00	5.39E+01	2.09E+01	1.32E+01	3.90E+06	9.26E+01
TB-07-32	4.00E-03	2.53E-03	1.26E-01	1.55E+03	1.92E+00	4.60E+01	7.51E+00	1.82E+00	1.15E+00	7.05E+05	5.73E+01
TB-07-37	4.00E-03	1.31E-02	5.94E-01	1.18E+03	8.77E+01	5.02E+03	1.02E+03	4.16E+01	1.36E+02	1.23E+07	6.17E+03
TB-07-42	1.92E-02	1.03E-01	2.51E+00	4.61E+02	6.34E+01	2.26E+04	3.42E+03	2.02E+02	1.08E+03	4.84E+06	2.63E+04
TB-07-47	1.28E-02	7.48E-02	2.83E+00	4.96E+02	1.59E+01	9.63E+03	9.51E+02	4.82E+01	2.82E+02	1.87E+06	1.06E+04
TB-08-25.5	4.00E-03	1.01E-02	1.77E-02	6.31E+02	3.84E+00	4.85E+00	2.63E+01	1.02E+01	2.57E+01	1.61E+06	4.51E+01
TB-08-30.5	4.00E-03	2.53E-03	3.03E-02	1.33E+03	1.07E+01	1.03E+02	7.36E+01	2.85E+01	1.80E+01	9.49E+06	2.16E+02
TB-08-35.5	4.00E-02	2.53E-02	1.08E+00	6.82E+02	4.17E+01	5.43E+03	5.49E+01	2.13E+02	1.34E+02	3.63E+06	5.73E+03
TB-08-40.5	1.28E-02	6.57E-03	5.80E+00	4.80E+02	2.63E+01	1.12E+04	1.84E+02	2.54E+01	1.30E+01	9.51E+05	1.15E+04
TB-08-45.5	4.00E-03	2.53E-03	1.10E-01	3.06E+02	1.31E+00	8.22E+01	8.99E+00	3.49E+00	2.20E+00	2.67E+05	9.60E+01
TB-09-29	4.00E-03	2.53E-03	5.24E-02	9.22E+02	6.56E+02	3.45E+01	1.87E+02	7.25E+01	4.58E+01	1.67E+07	9.49E+02
TB-09-34	4.00E-03	2.53E-03	1.18E-01	3.88E+02	4.29E+02	6.13E+01	4.89E+01	1.90E+01	1.20E+01	1.84E+06	5.58E+02
TB-09-39	4.00E-03	2.53E-03	8.94E-02	1.99E+02	3.38E+01	2.31E+01	7.82E+00	3.03E+00	1.91E+00	1.51E+05	6.77E+01
TB-09-44	4.00E-03	2.53E-03	1.17E+00	3.16E+02	8.99E+01	9.85E+02	9.61E+00	3.73E+00	2.35E+00	2.94E+05	1.09E+03
TB-10-28	1.90E-01	7.07E-02	1.01E+01	3.94E+02	1.23E+02	3.96E+01	2.05E+04	3.97E+02	1.47E+02	8.20E+05	2.11E+04
TB-10-33	4.00E-03	1.52E-02	1.28E-01	1.46E+03	8.10E+01	5.57E+02	1.22E+03	5.97E+01	2.26E+02	2.18E+07	1.91E+03

*Corrected for hydraulic conductivity effect on gradient (estimated at 1/11th of regional gradient)
** Estimated from average of surrounding data
*** From 1996 groundwater monitoring data

Table 10
Mass Flux Calculated by Summation of Transect Data
Dover Air Force Base, Delaware

Sample	Flow Through Cross Sectional Transect Cell (l/day)	Tetrachloroethene Concentration (ug/L)			Trichloroethene Concentration (ug/L)			cis-1,2-dichloroethene Concentration (ug/L)			Vinyl Chloride Concentration (ug/L)			1,2-dichloroethane Concentration (ug/L)			Chloride Concentration (mg/L)			Tetrachloroethene (uM)	Trichloroethene (uM)	cis-1,2-dichloroethene (uM)
TB-10-38	439	1.5			5.8			1	2.0	<	0.25	0.5	<	0.25	0.50	<	46.05			9.05E-03	4.41E-02	1.03E-02
TB-10-43	1827	14.1			28.5			1	2.0	<	0.25	0.5	<	0.25	0.50	<	12.06			8.50E-02	2.17E-01	1.03E-02
TC-01-25	10818	0.25	0.5	<	1.9			1	2.0	<	0.25	0.5	<	0.25	0.50	<	13.68			1.51E-03	1.45E-02	1.03E-02
TC-01-30	10868	0.25	0.5	<	5.2			1	2.0	<	0.25	0.5	<	0.7			14.48			1.51E-03	3.96E-02	1.03E-02
TC-02-27	2221	0.25	0.5	<	60.2			1	2.0	<	0.25	0.5	<	1.9			12.25			1.51E-03	4.58E-01	1.03E-02
TC-02-32	2020	0.25	0.5	<	70.4			1	2.0	<	0.25	0.5	<	24			9.40			1.51E-03	5.36E-01	1.03E-02
TC-02-37	4040	0.25	0.5	<	64.5			1	2.0	<	0.25	0.5	<	1.8			11.15			1.51E-03	4.91E-01	1.03E-02
TC-02-42	10644	0.25	0.5	<	50.6			1	2.0	<	0.25	0.5	<	1.3			12.90			1.51E-03	3.85E-01	1.03E-02
TC-03-29	11286	0.25	0.5	<	0.25	0.5	<	1	2.0	<	0.25	0.5	<	0.25	0.50	<	10.54			1.51E-03	1.90E-03	1.03E-02
TC-03-34	5278	0.25	0.5	<	0.25	0.5	<	1	2.0	<	0.25	0.5	<	0.25	0.50	<	6.60			1.51E-03	1.90E-03	1.03E-02
TC-03-39	3443	0.25	0.5	<	39.3			1	2.0	<	0.25	0.5	<	0.25	0.50	<	7.49			1.51E-03	2.99E-01	1.03E-02
TC-03-44	1405	0.4	0.8	<	112			1.65	3.3	<	0.40	0.8	<	0.4	0.80	<	14.65			2.41E-03	8.52E-01	1.70E-02
DM-360D	1966	2.5	5.0	<	89			2.5	5.0	<	2.50	5.0	<	2.5	5.00	<	14.00***			1.51E-02	6.77E-01	2.58E-02
TC-04-30	7112	0.25	0.5	<	50.9			1	2.0	<	0.25	0.5	<	0.6			17.44			1.51E-03	3.87E-01	1.03E-02
TC-04-35	7273	0.25	0.5	<	18.2			1	2.0	<	0.25	0.5	<	0.25	0.50	<	25.05			1.51E-03	1.39E-01	1.03E-02
TC-04-40	51637	0.65	1.3	<	566			3.6	5.0		0.65	1.3	<	5.2			16.07			3.92E-03	4.31E+00	3.71E-02
TC-04-40*	4694*	0.65	1.3	<	566			3.6	5.0		0.65	1.3	<	5.2			16.07			0.003919677	4.307786	0.0371364
TC-05-27	4342	0.25	0.5	<	3.6			1	2.0	<	0.25	0.5	<	0.25	0.50	<	17.04			1.51E-03	2.74E-02	1.03E-02
TC-05-30	465	0.25	0.5	<	7.3			1	2.0	<	0.25	0.5	<	0.25	0.50	<	15.16			1.51E-03	5.56E-02	1.03E-02
TC-06-26.5	8181	0.8			21.6			1	2.0	<	0.25	0.5	<	1.1			57.52			4.82E-03	1.64E-01	1.03E-02
TC-06-31	4341	0.25	0.5	<	19.3			1	2.0	<	0.25	0.5	<	0.6			21.80			1.51E-03	1.47E-01	1.03E-02
TC-06-35	2384	0.25	0.5	<	13.4			1	2.0	<	0.25	0.5	<	0.6			17.62			1.51E-03	1.02E-01	1.03E-02
TC-07-26.5	955	0.25	0.5	<	0.8			1	2.0	<	0.25	0.5	<	0.25	0.50	<	22.14			1.51E-03	6.09E-03	1.03E-02
TC-07-31.5	2620	0.5			8.2			1	2.0	<	0.25	0.5	<	0.25	0.50	<	55.34			3.02E-03	6.24E-02	1.03E-02
TC-07-36.5	632	0.8			12.1			1	2.0	<	0.25	0.5	<	0.6			24.17			4.82E-03	9.21E-02	1.03E-02

*Corrected for hydraulic conductivity effect on gradient (estimated at 1/11th of regional gradient)
** Estimated from average of surrounding data
*** From 1996 groundwater monitoring data

Table 10
Mass Flux Calculated by Summation of Transect Data
Dover Air Force Base, Delaware

Sample	Vinyl Chloride (uM)	1,2-dichloroethane (uM)	Total Chlorinated Ethenes (uM)	Chloride (uM)	Tetrachloroethene Mass Flux (umoles/day)	Trichloroethene Mass Flux (umoles/day)	cis-1,2-dichloroethene Mass Flux (umoles/day)	Vinyl Chloride Mass Flux (umoles/day)	1,2-dichloroethane Mass Flux (umoles/day)	Chloride Mass Flux (umoles/day)	Total Chlorinated Ethenes Mass Flux (umoles/day)
TB-10-38	4.00E-03	2.53E-03	6.75E-02	1.30E+03	3.97E+00	1.94E+01	4.53E+00	1.76E+00	1.11E+00	5.70E+05	2.96E+01
TB-10-43	4.00E-03	2.53E-03	3.16E-01	3.40E+02	1.55E+02	3.96E+02	1.88E+01	7.31E+00	4.61E+00	6.21E+05	5.78E+02
TC-01-25	4.00E-03	2.53E-03	3.03E-02	3.86E+02	1.63E+01	1.56E+02	1.12E+02	4.33E+01	2.73E+01	4.17E+06	3.28E+02
TC-01-30	4.00E-03	7.07E-03	5.54E-02	4.08E+02	1.64E+01	4.30E+02	1.12E+02	4.35E+01	7.69E+01	4.44E+06	6.02E+02
TC-02-27	4.00E-03	1.92E-02	4.74E-01	3.46E+02	3.35E+00	1.02E+03	2.29E+01	8.89E+00	4.27E+01	7.68E+05	1.05E+03
TC-02-32	4.00E-03	2.43E-01	5.52E-01	2.65E+02	3.05E+00	1.08E+03	2.08E+01	8.08E+00	4.90E+02	5.36E+05	1.11E+03
TC-02-37	4.00E-03	1.82E-02	5.07E-01	3.14E+02	6.09E+00	1.98E+03	4.17E+01	1.62E+01	7.35E+01	1.27E+06	2.05E+03
TC-02-42	4.00E-03	1.31E-02	4.01E-01	3.64E+02	1.60E+01	4.10E+03	1.10E+02	4.26E+01	1.40E+02	3.87E+06	4.27E+03
TC-03-29	4.00E-03	2.53E-03	1.77E-02	2.97E+02	1.70E+01	2.15E+01	1.16E+02	4.51E+01	2.85E+01	3.36E+06	2.00E+02
TC-03-34	4.00E-03	2.53E-03	1.77E-02	1.86E+02	7.96E+00	1.00E+01	5.44E+01	2.11E+01	1.33E+01	9.83E+05	9.36E+01
TC-03-39	4.00E-03	2.53E-03	3.15E-01	2.11E+02	5.19E+00	1.03E+03	3.55E+01	1.38E+01	8.70E+00	7.27E+05	1.08E+03
TC-03-44	6.40E-03	4.04E-03	8.78E-01	4.13E+02	3.39E+00	1.20E+03	2.39E+01	8.99E+00	5.68E+00	5.81E+05	1.23E+03
DM-360D	4.00E-02	2.53E-02	7.58E-01	3.95E+02	2.96E+01	1.33E+03	5.07E+01	7.86E+01	4.97E+01	7.76E+05	1.49E+03
TC-04-30	4.00E-03	6.06E-03	4.03E-01	4.92E+02	1.07E+01	2.76E+03	7.34E+01	2.84E+01	4.31E+01	3.50E+06	2.87E+03
TC-04-35	4.00E-03	2.53E-03	1.54E-01	7.06E+02	1.10E+01	1.01E+03	7.50E+01	2.91E+01	1.84E+01	5.14E+06	1.12E+03
TC-04-40	1.04E-02	5.25E-02	4.36E+00	4.53E+02	2.02E+02	2.22E+05	1.92E+03	5.37E+02	2.71E+03	2.34E+07	2.25E+05
TC-04-40*	0.0104	0.052546	4.35924203	453.23104	1.84E+01*	2.02E+04*	1.74E+02*	4.88E+01*	2.47E+02*	2.13E+06*	2.05E+04*
TC-05-27	4.00E-03	2.53E-03	4.32E-02	4.81E+02	6.55E+00	1.19E+02	4.48E+01	1.74E+01	1.10E+01	2.09E+06	1.88E+02
TC-05-30	4.00E-03	2.53E-03	7.14E-02	4.28E+02	7.01E-01	2.58E+01	4.79E+00	1.86E+00	1.17E+00	1.99E+05	3.32E+01
TC-06-26.5	4.00E-03	1.11E-02	1.84E-01	1.62E+03	3.95E+01	1.34E+03	8.44E+01	3.27E+01	9.09E+01	1.33E+07	1.50E+03
TC-06-31	4.00E-03	6.06E-03	1.63E-01	6.15E+02	6.54E+00	6.38E+02	4.48E+01	1.74E+01	2.63E+01	2.67E+06	7.06E+02
TC-06-35	4.00E-03	6.06E-03	1.18E-01	4.97E+02	3.59E+00	2.43E+02	2.46E+01	9.54E+00	1.45E+01	1.19E+06	2.81E+02
TC-07-26.5	4.00E-03	2.53E-03	2.19E-02	6.24E+02	1.44E+00	5.82E+00	9.85E+00	3.82E+00	2.41E+00	5.96E+05	2.09E+01
TC-07-31.5	4.00E-03	2.53E-03	7.97E-02	1.56E+03	7.90E+00	1.63E+02	2.70E+01	1.05E+01	6.62E+00	4.09E+06	2.09E+02
TC-07-36.5	4.00E-03	6.06E-03	1.11E-01	6.82E+02	3.05E+00	5.82E+01	6.52E+00	2.53E+00	3.83E+00	4.31E+05	7.03E+01

*Corrected for hydraulic conductivity effect on gradient (estimated at 1/11th of regional gradient)
** Estimated from average of surrounding data
*** From 1996 groundwater monitoring data

Table 11
Summary of Mass Flux Calculated by Summation of Transect Data
Dover Air Force Base, Delaware

Transect	Tetrachloroethene Mass Flux (umole/day)	Trichloroethene Mass Flux (umole/day)	cis-1,2-Dichloroethene Mass Flux (umole/day)	Vinyl Chloride Mass Flux (umole/day)	1,2-Dichloroethane Mass Flux (umole/day)	Chloride Mass Flux (umole/day)
TA	5.2E+04	1.0E+06	2.7E+05	2.9E+04	1.3E+05	1.84E+08
TB	2.0E+03	1.02E+05 6.9E+04***	9.5E+03	1.3E+03*	1.7E+04	1.33E+08
TC	4.2E+02	2.41E+05 3.9E+04***	1.3E+03*	**	3.9E+03	7.81E+07

* Not detected (1/2 detection limit used)
** Not calculated because compound not detected in Transect B or C
*** Corrected to demonstrate possible Hydraulic Conductivity effects on gradient

Table 12
Apparent Biodegradation Rates Calculated from Transect Data Mass Flux
Dover Air Force Base, Deleware

Tetrachloroethene					
Transect	Mass Flux (umole/day)	Distance between Transects (feet)	Travel Time between Transects (day)	Attenuation Rate (/day)	Attenuation half life (year)
TA	5.2E+04				
		1200	4606	-0.00070	2.7
TB	2.0E+03				
		1400	3150.706231	-0.00050	3.8
TC	4.2E+02				

Trichloroethene					
Transect	Mass Flux (umole/day)	Distance between Transects (feet)	Travel Time between Transects (day)	Attenuation Rate (/day)	Attenuation half life (year)
TA	1.0E+06				
		1200	4252		
TB	1.0E+05			-0.00054	3.5
TB***	6.9E+04			-0.00063	3.0
		1400	2908		
TC	2.4E+05			NC****	NC****
TC***	3.9E+04			-0.0002	9.6

cis-1,2-Dichloroethene					
Transect	Mass Flux (umole/day)	Distance between Transects (feet)	Travel Time between Transects (day)	Attenuation Rate (/day)	Attenuation half life (year)
TA	2.7E+05				
		1200	3897		
TB	2.3E+04			-0.00064	3.0
TB***	9.5E+03			-0.00086	2.2
		1400	2666		
TC	3.0E+03*			-0.00043	4.4
TC***	1.3E+03*			-0.00075	2.5

* Not Detected (1/2 limit used)
** Not calculated - compound not detected in Transect B or C
*** Corrected to demonstrate possible Hydraulic Conductivity effects on gradient
**** Not calculated due to increase in mass flux

Table 12
Apparent Biodegradation Rates Calculated from Transect Data Mass Flux
Dover Air Force Base, Deleware

Vinyl Chloride					
Transect	Mass Flux (umole/day)	Distance between Transects (feet)	Travel Time between Transects (day)	Attenuation Rate (/day)	Attenuation half life (year)
TA	2.9E+04				
		1200	3543		
TB	1.3E+03*			-0.00088	2.2
		1400	2424		
TC				**	**

1,2-Dichloroethane					
Transect	Mass Flux (umole/day)	Distance between Transects (feet)	Travel Time between Transects (day)	Attenuation Rate (/day)	Attenuation half life (year)
TA	1.3E+05				
		1200	3602	-0.00056	3.4
TB	1.7E+04				
		1400	2464	-0.00059	3.2
TC	3.9E+03				

Note: The following variables were used in calculating travel times

Transect	Average Hydraulic Conductivity (K) (ft/day)	Average hydraulic gradient (i)	Groundwater Flow velocity[1] (ft/day)
TA - TB	71.50	0.0018	0.34
TB - TC	73.17	0.003	0.58

0.38

(1) Calculated from V=Ki/n where porosity (n) = 0.38

Retardation Factor (foc = 0.00025)	
PCE	1.3
TCE	1.2
cis-1,2-DCE	1.1
Vinyl Chloride	1
1,2-DCA	1

* Not Detected (1/2 limit used)
** Not calculated - compound not detected in Transect B or C
*** Corrected to demonstrate possible Hydraulic Conductivity effects on gradient
**** Not calculated due to increase in mass flux

Table 13
Total Chloroethenes Molar Flow per Unit Area per Day
Dover Air Force Base, Delaware

Sample	Total molar flow per unit area per day [µmoles/sq.m./day]	Sample	Total molar flow per unit area per day [µmoles/sq.m./day]	Sample	Total molar flow per unit area per day [µmoles/sq.m./day]
TA-01-32	4	TB-03-23.5	1	TC-01-25	2
TA-01-37	1	TB-03-28.5	1	TC-01-30	7
TA-01-42	1	TB-03-33.5	1	TC-02-27	7
TA-02-31.5	1	TB-03-37.5	0	TC-02-32	11
TA-02-36.5	0	TB-03-43.5	0	TC-02-37	19
TA-02-41.5	3	TB-04-27	1	TC-02-42	92
TA-02-46.5	1	TB-04-32	2	TC-03-29	1
TA-03-27.5	6	TB-04-37	2	TC-03-34	1
TA-03-32.5	67	TB-04-42	1	TC-03-39	12
TA-03-37.5	962	TB-04-47	2	TC-03-44	12
TA-03-42.5	238	TB-05-31.5	1	DM-360D	3
TA-03-47.5	636	TB-05-36.5	0	TC-04-30	9
TA-03-51.5	1270	TB-05-41.5	0	TC-04-35	7
TA-04-26	0	TB-05-46.5	6	TC-04-40	5024
TA-04-31	0	TB-05-51.5	92	TC-05-27	1
TA-04-36	19	IR-06D	3	TC-05-30	0
TA-04-41	56	TB-06-33	2	TC-06-26.5	8
TA-04-46	18	TB-06-38	8	TC-06-31	9
TA-04-51	25	TB-06-43	35	TC-06-35	8
TA-04-56	464	TB-06-48	25	TC-07-26.5	0
IR-07D	416	TB-07-27	1	TC-07-31.5	2
TA-05-24	1	TB-07-32	0	TC-07-36.5	2
TA-05-29	1	TB-07-37	53		
TA-05-34	125	TB-07-42	227		
TA-05-39	349	TB-07-47	143		
TA-05-44	1645	TB-08-25.5	0		
TA-06-23	1	TB-08-30.5	2		
TA-06-28	27	TB-08-35.5	44		
TA-06-33	54	TB-08-40.5	87		
TA-06-38	58	TB-08-45.5	2		
TA-06-43	99	TB-09-29	4		
TA-06-48	222	TB-09-34	4		
TA-07-30	102	TB-09-39	0		
TA-07-35	95	TB-09-44	10		
TA-07-40	402	TB-10-28	141		
TA-07-45	717	TB-10-33	12		
TA-08-28	1	TB-10-38	0		
TA-08-33	1	TB-10-43	2		
TA-08-38	3				
TA-08-43	90				
TA-08-48	1956				
TA-09-28	13				
TA-09-33	183				
TA-09-38	1099				
TA-09-43	0				
TA-09-48	0				

Table 14
Frequency Distribution of Total Chloroethenes Molar Flow
Dover Air Force Base, Delaware

Range of Molar Flow [Moles/sq.m/day]			Transect A No. in Range	Transect B No. in Range	Transect C No. in Range
0	-	10	18	28	15
10	-	20	3	1	4
20	-	30	2	1	0
30	-	40	0	1	0
40	-	50	0	1	0
50	-	60	3	1	0
60	-	70	1	0	0
70	-	80	0	0	0
80	-	90	0	1	0
90	-	100	3	1	1
100	-	200	3	2	0
200	-	300	2	1	0
300	-	400	1	0	0
400	-	500	3	0	0
500	-	600	0	0	0
600	-	700	1	0	0
700	-	800	1	0	0
800	-	900	0	0	0
900	-	1000	1	0	0
1000	-	2000	4	0	0
2000	-	3000	0	0	0
3000	-	4000	0	0	0
4000	-	5000	0	0	0
5000	-	6000	0	0	1

Table 15
Shapiro-Wilk's Test for Normal and Lognormal Distribution
Molar Flow of Total Chloroethenes per Unit Area per Day

TRANSECT A	W - reference value for the 0.01 quantile	0.927
	W - value for Lognormal Distribution	0.937
Using 46 values	W - value for Normal Distribution	0.618
TRANSECT B	W - reference value for the 0.01 quantile	0.916
	W - value for Lognormal Distribution	0.919
Using 38 values	W - value for Normal Distribution	0.552
TRANSECT C	W - reference value for the 0.01 quantile	0.878
	W - value for Lognormal Distribution	0.885
Using 22 values	W - value for Normal Distribution	0.317

Table 16
Mean Molar Flows of Total Chloroethenes
Through unit Area per Day for Each Transect
Dover Air Force Base, Delaware

	TRANSECT A	TRANSECT B	TRANSECT C
Number of Samples	46	38	22
Mean Value Property	1457	32	40
90% Lower Limit of Mean [µmoles/sq.m/day]	771	20	23
90% Upper Limit of Mean [µmoles/sq.m/day]	14843	104	215

Table 17
Molar Flux of Total Chloroethenes per Day through Each Transect
Dover Air Force Base, Delaware

{Transect areas calculated from extremities of probe locations}

	Area [sq. m]	**Mole Flux per Day** [Moles/day]		
		Lower 90% Limit	Mean Value	Upper 90%Limit
Transect A	3517	2.71	5.12	52.2
Transect B	3295	0.06	0.11	0.34
Transect C	1341	0.03	0.05	0.29

Table 18
Comparison of Molar Flux of Total Chloroethenes per Day through Each Transect
Derived from the Different Calculation Methods
Dover Air Force Base, Delaware

	Mass Flux of Total Chloroethenes [Moles/day]				
	Lower 90% Limit	Mean Value	Upper 90%Limit	By Summation	Well Data
Transect A	2.71	5.12	52.20	1.4	1.06
Transect B	0.06	0.11	0.34	0.08	0.49
Transect C	0.03	0.05	0.29	0.04	0.07

N.B. Mass Flux Values in Both Datasets were calculated using a factor of 0.211

Table 19
Comparison of First Order Decay Rates calculated from Transect and Monitoirng Well Data
Dover Air Force Base, Deleware

	Tetrachloroethene (/year)		Trichloroethene (/year)		cis-1,2-Dichloroethene (/year)		Vinyl Chloride (/year)		1,2-Dichloroethane (/year)	
Transect	Transect Data	Well Data	Transect Data	Well Data	Transect Data	Well Data	Transect Data	Well Data	Transect Data	Well Data
TA to TB	2.7	4.5	3.5 3.0***	11.1	3.0 2.2***	8.5	2.2	2.9	3.4	NC
TB To TC	3.8	2.3	* 9.6***	4.9	2.5 2.5***	3.8	**	3.8	3.2	NC

Maybe half-lives?

NC Not Calculated
* Not calculated due to increase in mass flux
** Vinyl Chloride was Not Detected in Transect C or B
*** Corrected to demonstrate possible Hydraulic Conductivity effects on gradient

APPENDIX A

FIELD MEASUREMENTS

Sample Data Sheet

Hydraulic Conductivity Pumping Test

Monitoring well IR-07D

Well screened 47 - 57 feet BGS.

Pump Tube inlet set @ ~ 47' BGS.

Prior to start of pump, water level @ 16.81' below TOC.

Start Pump @ 16:30.

Time	Flow Rate	Drawdown
16:30	2 gpm	
16:40	2 gpm	**17.16** (.35)
16:41	**5.5 gpm**	
16:50	**5.6 gpm**	**17.73** (.92)
17:oo	**5.6 gpm**	17.73 (.92)
17:01	**7.9 gpm**	
17:10	**7.9 gpm**	**18.07** (1.26)

Sample Data Sheet

Hydraulic Conductivity Calibration Test

Lcoation Number:	IR-07-49
Date:	4/29/97

SAMPLE DEPTH

Time:	14:00	
Total Depth Drilled:	49	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	1.13	ft
Static Water Level (TOP):	18.25	ft
Static Water Level (BGS):	17.12	ft

HYDRAULIC CONDUCTIVITY

Time:	14:14	
Drawdown:	1	ft
Flow Rate	103.4	mlimin

OBSERVATIONS / COMMENTS:

Water level in well IR-07D - 17.2' BGS.

Sample Data Sheet

Hydraulic Conductivity Calibration Test

Lcoation Number:	IR-07-53
Date:	4/29/97

SAMPLE DEPTH

Time:	14:32	
Total Depth Drilled:	53	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	1.16	ft
Static Water Level (TOP):	18.38	ft
Static Water Level (BGS):	17.22	ft

HYDRAULIC CONDUCTIVITY

Time:	15:00	
Drawdown:	0.12	ft
Flow Rate	1630.8	mlimin

OBSERVATIONS / COMMENTS:

Could not pump water down 1'. Used both peristaltic pumps at the same time.

Drawdown: 18.38 - 18.5'

Sample Data Sheet

Hydraulic Conductivity Calibration Test

Lcoation Number:	I R-07-59
Date:	4/29/97

SAMPLE DEPTH

Time:	15:40	
Total Depth Drilled:	59	ft
Pull Back:	4	ft
Screen Extended:	3	ft
Pipe Stick Up Above Surface:	1.6	ft
Static Water Level (TOP):	18.87	ft
Static Water Level (BGS):	17.27	ft

HYDRAULIC CONDUCTIVITY

Time:	15:47	
Drawdown:	1	ft
Flow Rate	681.8	mlimin

OBSERVATIONS / COMMENTS:

Initially pulled back 2' - no water. Fulled back an additional 1', no water.

Pulled back 1 more foot - water imediatly charged to 18'.

SAMPLE DATA SHEET

Location Number: TA-01-32
Date: 4-3-97

SAMPLE DEPTH

Time:	0841	
Total Depth Drilled:	32	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	2.27	ft
Static Water Level (TOP):	19.11	ft
Static Water Level (BGS):	16.84	ft

HYDRAULIC CONDUCTIVITY

Drawdown:	1	ft
Time:	0935	
Flow Rate	279.1	ml/min

FLOW CELL READINGS

Time:	9:52	
pH:	4.24	
red/ox:	52	mV
Dissolved Oxygen:	9.7	ppm
Conductivity	325	µS/ms
Temperature:	66.2	°F

COLORMETRIC TESTS

Time:	10:00	
Water Clarity	CLEAR	
Soluble Iron (0-6ppm/un-filtered):	2.8	ppm
Total iron (0-6ppm/un-filtered):	2.85	ppm
Soluble Iron (0-12ppm/un-filtered):	—	ppm
Total iron (0-12ppm/un-filtered):	—	ppm
Soluble Iron (0-6ppm/filtered):	—	ppm
Total iron (0-6ppm/filtered):	—	ppm
Soluble Iron (0-12ppm/filtered):	—	ppm
Total iron (0-12ppm/filtered):	—	ppm
Sulfide (un-filtered):	.08	ppm
Sulfide (filtered):	—	ppm
Dissolved Oxygen:	>2	ppm
Manganese (filtered):	Ø	ppm

GRQUNDWATER HEADSPACE TEST

Time:	10:45	
FID Headspace:	Ø	ppm

Sample Collection.

Time	0955
1 Liter Amber Jars	3
40 ml VOA	4

SAMPLE DATA SHEET

Lcoatian Number: TA-01-37

Date: 4-3-97

SAMPLE DEPTH

Time:	10:43	
Total Depth Drilled:	37	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	.42	ft
Static Water Level (TOP):	17.88	ft
Static Water Levet (BGS):	17.06	ft

HYDRAULIC CONDUCTIVITY

Drawdown:	1	ft
Time:	11:10	
Flow Rate	ml 44.2	

FLOW CELL READINGS

Time:	1132	
pH:	4.79	
red/ox:	-72	mV
Dissolved Oxygen:	8.3 ~~ppm~~	
Conductivity	387 ~~ppm~~	µS/mS
Temperature:	67.3	°F

COLORMETRIC TESTS

Time:	11:40	
Water Clarity	Cloudy	
Soluble Iron (0-6ppm/un-filtered)	p 7 6p	m
Total Iron (0-6ppm/un-filtered):	7 6	ppm
Soluble h-on (0-12ppm/un-filtered):	5.4	ppm
Total Iron (0-12ppm/un-filtered):	7.0	ppm
Soluble Iron (0-6ppm/filtered):	3.85 p	p m
Total Iron (0-6ppm/filtered):	4.75	ppm
Soluble Iran (0-12ppm/filtered):	— p	p m
Total Iron (0-1 2ppm/filtered):	—	ppm
Sulfide (on-filtered):	.63	ppm
Sulfide (filtered):	Ø	ppm
Dissolved Oxygen:	ppr 2.0	
Manganese (filtered):	p Ø	

GROUNDWATER HEADSPACE TEST

Time:	12:10	
FID Meadspace:	.4	ppm

Sample Collection

Time	11:34
1 Liter Amber Jars	3
40 ml VOA	4

TARGET ENVIRONMENTAL SERVICES, INC.

SAMPLE DATA SHEET

Location Number: TA-01-42
Date: 4-3-97

SAMPLE DEPTH

Time:	13:23	
Total Depth Drilled:	42	ft
Pull Back:	2	ft
Screen Extended:	1	ft
Pipe Stick Up Above Surface:	2.2	ft
Static Water Level (TOP):	19.42	ft
Static Water Level (BGS):	17.22	ft

HYDRAULIC CONDUCTIVITY

Drawdown:	1	ft
Time:	1348	
Flow Rate	282.67	ml/min

FLOW CELL READINGS

Time:	1354	
pH:	5.07	
red/ox:	-126	mV
Dissolved Oxygen:	6.0	ppm
Conductivity	.124	µS/mS
Temperature:	68.0	°F

COLORMETRIC TESTS

Time:	13:59	
Water Clarity	CLOUDY	
Soluble Iron (0-6ppm/un-filtered):	>6	ppm
Total Iron (0-6ppm/un-filtered):	>6	ppm
Soluble Iron (0-12ppm/un-filtered):	5.7	ppm
Total Iron (0-12ppm/un-filtered):	5.8	ppm
Soluble Iron (0-6ppm/filtered):	3.65	ppm
Total Iron (0-6ppm/filtered):	3.75	ppm
Soluble Iron (0-12ppm/filtered):	—	ppm
Total Iron (0-12ppm/filtered):	—	ppm
Sulfide (un-filtered):	.4	ppm
Sulfide (filtered):	0	ppm
Dissolved Oxygen:	>2.0	ppm
Manganese (filtered):	0	ppm

GROUNDWATER HEADSPACE TEST

Time:	14:35	
FID Headspace:	.4	ppm

Sample Collection

Time	13:50
1 Liter Amber Jars	3
40 ml VOA	4

Sample Data Sheet

Lcoation Number: TA-02-31.5

Date: 4/14/97

SAMPLE DEPTH

Time:	9:35	
Total Depth Drilled:	31.5	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	2.61	ft
Static Water Level (TOP):	19.4	ft
Static Water Level (BGS):	16.79	ft

HYDRAULIC CONDUCTIVITY

Time:	10:22	
Drawdown:	1	ft
Flow Rate	190	ml/min

FLOW CELL READINGS

Time:	10:39	
pH:	4.94	
red/ox:	97.6	mV
Dissolved Oxygen:	5.4	ppm
Conductivity		uS/mS
Temperature:	11.1	°C

Sample Collection

Time	10:41
1 Liter Amber Jars	3
40 ml VOA	A

COLORMETRIC TESTS

Time: 10:50

Water Clarity: SEMI-CLEAR

	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	4.35	ppm	0.8	ppm
Total Iron (6ppm):	5	ppm	1.45	ppm
Soluble tron (12ppm):	-	ppm	-	ppm
Total Iron (12ppm):	-	ppm	-	ppm
Sulfide:	0.37	ppm	0	ppm
Dissolved Oxygen:	>2	ppm	>2	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time:

FID Headspace: ppm

OBSERVATIONS / COMMENTS:

FID flame out - no reading.

Sample zero - 25% clear / 75% sample water,

Sample Data Sheet

Lcoation Number: TA-0236.5

Date: 4/14/97

SAMPLE DEPTH

Time:	12:25	
Total Depth Drilled:	36.5	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	2.06	ft
Static Water Level (TOP):	18.57	ft
Static Water Level (BGS):	16.51	ft

HYDRAULIC CONDUCTIVITY

Time:	1230	
Drawdown:	0.8787	ft
Flow Rate	12.9	ml/min

FLOW CELL READINGS

Time:	12:42	
pH:	4.76	
red/ox:	107.8	mV
Dissolved Oxygen:	6.4	ppm
Conductivity		uS/mS
Temperature:	15.6	°C

Sample Collection

Time	12:44
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time: 13:oo

Water Clarity: Clear

	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	1.7	ppm	0.55	ppm
Total Iron (6ppm):	2	ppm	0.85	ppm
Sotuble Iron (12ppm):	-	ppm	-	ppm
Total Iron (12ppm):	-	ppm	-	ppm
Sulfide:	0.09	ppm	0	ppm
Dissolved Oxygen:	>2	ppm	>2	ppm
Manganese (filtered):	0.3	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time: 13:30

FID Headspace: 0 ppm

OBSERVATIONS I COMMENTS:

Drawdown: 19.45' - 18.57' = .88

Sample zero - 25% clear / 75% sample water,

Sample Data Sheet

Lcoation Number: TA-02-41.5

Date: 4/14/97

SAMPLE DEPTH

Time:	11:41	
Total Depth Drilled:	41.5	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	0.65	ft
Static Water Level (TOP):	17.05	ft
Static Water Level (BGS):	16.4	ft

HYDRAULIC CONDUCTIVITY

	Pre-purge	Post-purge	
Time:	11:42	11:57	
Drawdown:	1	1	ft
Flow Rate	296	428	ml/min

FLOW CELL READINGS

Time:	12:08	
pH:	5.09	
red/ox:	90.2	mV
Dissolved Oxygen:	6	ppm
Conductivity		uS/mS
Temperature:	15.9	"c

Sample Collection

Time	12:10
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time:	12:18			
Water Clarity	Clear			
	Clear		Sample	
	Zero		Zero	
Soluble Iron (6ppm):	4.15	ppm	2.2	ppm
Total Iron (6ppm):	5.05	ppm	3.05	ppm
Soluble Iron (12ppm):	-	ppm	-	ppm
Total Iron (12ppm):	-	ppm	-	ppm
Sulfide:	0.25	ppm	0	ppm
Dissolved Oxygen:	2.05	ppm	1.49	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time:

FID Headspace: ppm

OBSERVATIONS / COMMENTS:

FID flame out - no reading.

Sample zero - 25% clear / 75% sample water.

Sample Data Sheet

Lcoation Number: TA-02-46.5

Date: 4/14/97

SAMPLE DEPTH

Time:	14:59	
Total Depth Drilled:	46.5	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	2.57	ft
Static Water Level (TOP):	19.83	ft
Static Water Level (BGS):	17.16	ft

HYDRAULIC CONDUCTIVITY

Time:	15:04	
Drawdown:	1	ft
Flow Rate	56	ml/min

FLOW CELL READINGS

Time:	15:19	
pH:	5.52	
red/ox:	66.8	mV
Dissolved Oxygen:	6	ppm
Conductivity		uS/mS
Temperature	16.2	°C

Sample Collection

Time	14:25
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time: 15:30

Water Clarity: CLOUDY

	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	>6	ppm	>6	ppm
Total Iron (6ppm):	>6	ppm	>6	ppm
Soluble Iron (12ppm):	>12	ppm	13	ppm
Total Iron (12ppm):	>12	ppm	>12	ppm
Sulfide:	1.13	ppm	0.65	ppm
Dissolved Oxygen:	>2	ppm	>2	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time: 16:29

FID Headspace: 0 ppm

OBSERVATIONS/ COMMENTS:

Sample zero - 75% clear / 25% sample water.

Water did not reach static level. very slow recharge.

SAMPLEDATA SHEET

Location Number: TA-03-27.5'

Date: 4-10-97

SAMPLE DEPTH

Time:	15:30	
Total Depth Drilled:	27.5	ft
Pull Back:	2	ft
Screen Mended:	2	ft
Pipe Stick. Up Above Surface:	2.67	ft
Static Water Level (TOP):	18.27	ft
Static Water Level (BGS):	15.6	ft

HYCONDUCTIVITY

Time:	15:37	
Drawdown:	1	ft
Flow Rate 187 ml/100s	112.2	ml/min

FLOW CELL READINGS

Time:	1550	
pH:	4.7	
red/ox:	232	mV
Dissolved Oxygen:	6.5	ppm
Conductivity	460	uS/mS
Temperature:	62.6	°F

Sample Collection

Time	1552
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time:	16 18			
Water Clarity	Crystal Clear			
		Clear Zero	Sample Zero	
Soluble Iron (6ppm)	ppm.95		.95	ppm
Total Iron (6ppm):	1.10	ppm	.80	ppm
Soluble Iron (12ppm):	—	ppm	—	ppm
Total Iron (12ppm):		ppm	—	ppm
Sulfide:	0	ppm	Ø	ppm
Dissolved Oxygen:	72	ppm	72	ppm
Manganese (filtered):	Ø	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time:	1647	
FID Headspace:	.2	ppm

OBSERVATIONS / COMMENTS:

RIDING HEAD TEST:

1503:40 PURGED 480 POINT (OPENED SCREEN)

15:05:05	26.32'	15:13	21.36'
15:06:00	25.53'	15:14	21.02
15:07:00	24.66'	15:16	20.39
15:08:00	23.72'	15:18	19.92'
15:09:00	23.27'	15:20	19.44'
15:10:00	22.73'	15:22	18.9
15:11:00	22.22'	15:24	18.38
15:12:00	21.75'	15:26	18.29

SAMPLE DATA SHEET

Location Number: TA-03-32.5'
Date: 4-10-97

SAMPLE DEPTH

Time:	15:	
Total Depth Drilled:	325	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	1.03	ft
Static Water Level (TOP):	ft 17.54	
Static Water Level (BGS):	15.91	ft

HYDRAULIC CONDUCTIVITY

Time:	16:10	
Drawdown:	1	ft
flow Rate	204	ml/min

FLOW CELL READINGS

Time:	1622	
pH:	5.16	
red/ox:	-165	mV
Dissolved Oxygen:	1.4	ppm
Conductivity	204	uS/mS
Temperature:	63.5	°F

Sample Collection

Time	1624
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time: 16:28
Water Clarity: Cloudy

	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	4.10	ppm	.90	ppm
Total Iron (6ppm):	4.55	ppm	1.35	ppm
Soluble Iron (12ppm):	—	ppm	—	ppm
Total Iron (12ppm):	—	ppm	—	ppm
Sulfide:	40	ppm	Ø	ppm
Dissolved Oxygen:	1.38	ppm	.32	ppm
Manganese (filtered):	Ø	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time: 1648
FID Headspace: 6.2 ppm

OBSERVATIONS / COMMENTS:

SAMPLE DATA SHEET

Location Number: TA-03 – 37.5

Date: 4-11-97

SAMPLE DEPTH

Time:	0930	
Total Depth Drilled:	37.5	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	2.13	ft
Static Water Level (TOP):	18.29	ft
Static Water Level (BGS):	16.16	ft

HYDRAULIC CONDUCTIVITY

Time:	10:42	
Drawdown:	1	ft
Flow Rate (97mL/90s)	131.3	ml/min

FLOW CELL READINGS

Time:	11:05
pH:	5.25
red/ox:	94 mV
Dissolved Oxygen:	1.6 ppm
Conductivity	117 uS/mS
Temperature:	62.5 °F

Sample Collection

Time	11:06
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time: 11:13

Water Clarity: Cloudy

	Clear Zero	Sample Zero
Soluble Iron (6ppm):	>6 ppm	4.4 ppm
Total iron (6ppm):	>6 ppm	5.6 ppm
Soluble Iron (12ppm):	5.6 ppm	0 ppm
Total Iron (12ppm):	8.4 ppm	5 ppm
Sulfide:	.62 ppm	.13 ppm
Dissolved Oxygen:	1.85 ppm	ppm
Manganese (filtered):	ppm 0	ppm

GROUNDWATER HEADSPACE TEST

Time: 11:44

FID Headspace: 600 ppm

OBSERVATIONS / COMMENTS:

TARGET ENVIRONMENTAL SERVICES, INC.

SAMPLE DATA SHEET

Location Number: TA-83 - 42.5

Date: 4-4-97

SAMPLE DEPTH

Time:	0945	
Total Depth Drilled:	42.5	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	3.67	ft
Static Water Level (TOP):	19.45	ft
Static Water Level (BGS):	15.78	ft

HYDRAULIC CONDUCTIVITY

Time:	10:22	
Drawdown:	1	ft
Flow Rate 150mL/180 s	50	ml/min

FLOW CELL READINGS

Time:	10:41	
pH:	5.54	
red/ox:	-425	mV
Dissolved Oxygen:	3.3	ppm
Conductivity	131	uS/mS
Temperature:	62.6	°F

Sample Collection

Time	10:43
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time: 10:50

Water Clarity: Cloudy

	Clear Zero	Sample Zero
Soluble Iron (8ppm):	>6 ppm	3.9 ppm
Total Iron (8ppm):	76 ppm	7.25 ppm
Soluble Iron (12ppm)	ppm 9	TOO ppm
Total Iron (12ppm):	ppm 3	BRIGHT ppm
Sulfide:	.42 ppm	0 ppm
Dissolved Oxygen:	1.29 ppm	ppm
Manganese (filtered):	pp 0	ppm

GROUNDWATER HEADSPACE TEST

Time: 11:43

FID Headspace: 110 ppm

OBSERVATIONS / COMMENTS:

SAMPLE DATA SHEET

Location Number: TA-03-47.5

Date: 4-11-97

SAMPLE DEPTH

Time:	13:15	
Total Depth Drilled:	47.5	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	2.60	ft
Static Water Level (TOP'):	20.2	ft
Static Water Level (BGS):	19.55	ft

HYDRAULIC CONDUCTIVITY

No Draw Down Test - Recharge too Slow

Time:	X	
Drawdown:	X	ft
Flow Rate	X	ml/min

FLOW CELL READINGS

Time:	13:53	
pH:	5.5	
red/ox:	-24	mV
Dissolved Oxygen:	3.3	ppm
Conductivity	230	uS/mS
Temperature:	63.4	°F

Sample Collection

Time	14:01	
1 Liter Amber Jars	3	
40 ml VOA	4	

COLORMETRIC

Time: 1415

Water Clarity: Very Cloudy

	Clear Zero	Sample Zero
Soluble Iron (6ppm):	>6 ppm	>6 ppm
Total Iron (6ppm):	>6 ppm	>6 ppm
Soluble Iron (12ppm):	12 ppm	12 ppm
Total Iron (12ppm):	>12 ppm	>12 ppm
Sulfide:	ppm	.22 ppm
Dissolved Oxygen:	>2 ppm	>2 ppm
Manganese (filtered)	ppm 0	ppm

GROUNDWATER HEADSPACE TEST

Time: 14:55

FID Headspace: 17 ppm

OBSERVATIONS / COMMENTS:

Rising Head Test

Min	Level (TOP)
0	30.89
1	30.51
2	30.04
3	29.70
4	29.32
5	28.92
6	28.61
7	28.27
8	27.93
9	27.63
10	27.35
12	26.79
14	26.15
16	25.74
18	25.31
20	24.94

TARGET ENVIRONMENTAL SERVICES, INC.

Sample 2000 - 25% Sample Water 75% Clear Water

SAMPLE DATA SHEET

Lcoation Number: TA-03-57.5

Date: 4-11-97

SAMPLE DEPTH

Time: 1400

Total Depth Drilled: 52.5 ft

Pull Back: 3 ft

Screen Extended: 3 ft

Pipe Stick Up Above Surface: 2.73 ft

Static Water Level (TOP): — ft

Static Water Level (BGS): — ft

HYDRAULIC CONDUCTIVITY

Time: Very Slow Recharge

Drawdown: ft

Flow Rate ml/min

FLOW CELL READINGS

Time: 14:22

pH: 5.36

red/ox: -27 mV

Dissolved Oxygen: 2.5 ppm

Conductivity 2216 uS/mS

Temperature: 64 °F

Samplee c t i o n

Time 14:24

1 Liter Amber Jars 3

40 ml VOA 4

COLORMETRIC TESTS

Time: 14:36

Water Clarity Very Cloudy

	Clear Zero	Sample Zero
Soluble Iron (6ppm):	ppm	> 6 ppm
Total Iron (6ppm):	76 ppm	76 ppm
Soluble Iron (12ppm)	ppm.9 ppm	7.2
T o t a l Iron (12ppm:	12 ppm	8.8
Sulfide:	.83 ppm	.15 ppm
Dissolved Oxygen:	> 2 ppm	[illegible] ppm
Manganese (filtered):	0 ppm	[illegible] ppm

GROUNDWATER HEADSPACE TEST

Time: 1456

FID Headspace: 37 ppm

OBSERVATIONS / COMMENTS:

Drove To 52.5 - No Water Recharge

Pulled Pipe Back 1 Ft.

Very Slow Recharge - No Hg Drawdown

Cond Test

Sample Zero - 25% Sample

Water - 75% Clear Water.

SAMPLE DATA SWEET

Location Number: TA-04-26'

Date: 4-9-97

SAMPLE DEPTH

Time:	12:00	
Total Depth Drilled:	26	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	2.25	ft
Static Water Level (TOP):	20.3 *	ft
Static Water Level (BGS):	18.05	ft

HYDRAULIC CONDUCTIVITY

Time:	13:37	
Drawdown:	1	ft
Flow Rate 600ml/270sec	14.22	ml/min

FLOW CELL READINGS

Time:	1405	
pH:	5.23	
red/ox:	—	mV
DissolvedOxygen:	4.3	ppm
Conductivity	209	uS/mS
Temper ature:	60.5	°F

Sample Collection

Time	14:25
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time: 14:26

Water Clarity Clear

	Clear. Zero	Sample Zero
Soluble Iron (6ppm):	p 4.45 ppmp	3.5 m
Total Iron (6ppm):	4.7 ppm	3.8 ppm
Soluble Iron (12ppm):	— ppm	— ppm
Total Iron (12ppm):	— ppm	— ppm
Sulfide:	ppm11	Ø ppm
Dissolved Oxygen:	72.0 ppm	72.0 ppm
Mangancse (filtered)	ppmØ	ppm

GROUNDWATER HEADSPACE TEST

Time: 15:32

FID Headspace: .2 ppm

OBSERVATIONS / COMMENTS:

* Not static water level still rising very slow.

SAMPLE DATA SHEET

Location Number: TA-04-31'

Date: 4-9-96

DEPTHE

Time: 12:34

Total Depth Drilled: 31 ft

Pull Back: 2 ft

Screen Extended: 2 ft

Pipe Stick Up Above Surface: 36½" ft

Static Water Level (TOP): — ft

Static Water Level (BGS): — ft

HYDRAULIC CONDUCTIVITY

Time: X

Drawdown: X ft

Flow Rate X ml/min

FLOW CELL READINGS

Time: 1455

pH: 5.4

red/ox -163 mV

Dissolved Oxygen: .6 ppm

Conductivity 225 uS/mS

Temperature: 59.1 °F

Sample Collection

Time 1500

1 Liter Amber Jars 3

40 ml VOA 4

COLORMETRIC TESTS

Time: 15:09

Water Clarity Semi Cloudy

	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	7 6	ppm	7 6	ppm
fatal Iron (6ppm):	7 6	ppm	7 6	ppm
Soluble Iron (12ppm):	9.3	ppm	4.1	ppm
Total Iron (12ppm):	9 .0	ppm	4. 3	ppm
Sulfide:	.25	ppm	Ø	ppm
Dissolved Oxygen:	72.0	ppm	72.0	ppm
Manganese (filtered):	Ø	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time: 15:33

FID Headspace: .3 ppm

OBSERVATIONS / COMMENTS:

WATER DID NOT REACH STATIC LEVEL

VERY SLOW RECHARGE

NO HYDRAULIC CONDUCTIVITY TEST

D.O. READINGS ARE SUSPECT!

TARGET ENVIRONMENTAL SERVICES, INC.

SAMPLE DATA SHEET

Location Number: TA-04-36'

Date: 4-10-97

SAMPLE DEPTH

Time:	0840	
Total Depth Drilled:	36	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	2.08	ft
Static Water Level (TOP):	19.05	ft
Static Water Level (BGS):	16.97	ft

HYDRAULIC CONDUCTIVITY

Time:	9:07	
Drawdown:	1	ft
Flow Rate 149ml/152s	58.8	ml/min

FLOW CELL READINGS

Time:	9:28	
pH:	5.29	
red/ox:	-420	mV
Dissolved Oxygen:	3.0	ppm
Conductivity	183	uS/mS
Temperature:	60.9	°F

Sample Collection

Time	0930
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time: 09:42

Water Clarity: SEMI CLEAR

	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	76	ppm	> a	ppm
Total Iron (6ppm):	76	ppm	> 0	ppm
Soluble Iron (12ppm):	12.3	ppm	5.5	ppm
Total Iron (12ppm):	12.5		5.9	ppm
Sulfide:	.59	ppm	.05	ppm
Dissolved Oxygen:	2.0	ppm	.9	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time: 10:43

FID Headspace: .18 ppm

OBSERVATIONS / COMMENTS:

SAMPLE TOLD - 50% SAMPLE WATER
50% CLEAR.

STRAIGHT SAMPLE WATER WAS TOO DARK

PROBE DRIVEN INTO GROUND ON 4-9-97
LEFT OVERNIGHT TO FILL W/ WATER.

SAMPLE DATA SHEET

Location Number: TA-GH-41'

Date: 4-10-97

SAMPLE DEPTH

Time:	0845	
Total Depth Drilled:	41	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	1.15	ft
Static Water Level (TOP):	18.2	ft
Static Water Level (BGS):	17.05	ft

HYDRAULIC CONDUCTIVITY

Time:	0920	
Drawdown:	1	ft
Flow Rate 170ml/7½	160.56	ml/min

FLOW CELL READINGS

Time:	9:48	
pH:	5.0	
red/ox:	~399	mV
Dissolved Oxygen:	2.1	ppm
Conductivity	130	uS/mS
Temperature:	62.8	°F

Sample Collection

Time	0950
1 liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time: 9:55

Water Clarity: Semi Clean

	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	76	ppm	76	ppm
Total Iron (6ppm):	76	ppm	76	ppm
Soluble Iron (12ppm):	90	ppm	3	ppm
Total Iron (12ppm):	13.1	ppm	3.4	ppm
Sulfide:	.52	ppm	0	ppm
Dissolved Oxygen:	1.5	ppm	.39	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time: 10:44

FID Headspace: 3.4 ppm

OBSERVATIONS / COMMENTS:

Probe Driven on 4-9-97. Left overnight to fill w/ water.

SAMPLE DATA SHEET

Location Number: TA-04-46'

Date: 4-10-96

SAMPLE DEPTH

Time:	10:45	
Total Depth Drilled:	46	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	2.27	ft
Static Water Level (TOP):	19.65	ft
Static Water Level (BGS):	17.38	ft

HYDRAULIC CONDUCTIVITY

Time:	11:02	
Drawdown:	1	ft
Flow Rate 1.17 gallons	58.5	ml/min

FLOW CELL READINGS

Time:	11:23	
pH:	5.26	
red/ox:	210	mV
Dissolved Oxygen:	1.5	ppm
Conductivity	10.7	uS/mS
Temperature:	63.1	°F

Sample Collection

Time	11:25
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time: 11:33

Water Clarity Semi Cloudy

	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	76	ppm	76	ppm
Total Iron (6ppm):	76	ppm	76	ppm
Soluble Iron (12ppm):	9.0	ppm	2.9	ppm
Total Iron (12ppm):	11.1	ppm	4.4	ppm
Sulfide:	.7	ppm	.31	ppm
Dissolved Oxygen:	1.1	ppm	*	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time: 12:26

FID Headspace: 1.0 ppm

OBSERVATIONS / COMMENTS:

* TOO BRIGHT

SAMPLE ZERO - 50% CLEAR WATER
50% SAMPLE WATER.

TARGET ENVIRONMENTAL SERVICES, INC.

SAMPLE DATA SHEET

Location Number: TA-07-SD
Date: 4-9-97

SAMPLE DEPTH

Time: 09:30
Total Depth Drilled: 50 ft
Pull Back: 3 ft
Screen Extended: 2 ft
Pipe Stick Up Above Surface: 10" ft
Static Water Level (TOP): N/A ft
Static Water Level (BGS): _____ ft

HYDRAULIC CONDUCTIVITY

Time: _____
Drawdown: _____ ft
Flow Rate _____ ml/min

REDOX CELL

Time: _____
pH: _____
red/ox: _____ mV
Dissolved Oxygen: _____ ppm
Conductivity _____ uS/mS
Temperature: _____ °F

Sample Collection

Time _____
1 Liter Amber Jars _____
40 ml VOA _____

COLORMETRIC TESTS

Time: _____
Water Clarity _____

	Clear Zero	Sample Zero
Soluble Iron (6ppm):	_____ ppm	_____ ppm
Total Iron (6ppm):	_____ ppm	_____ ppm
Soluble Iron (12ppm):	_____ ppm	_____ ppm
Total Iron (12ppm):	_____ ppm	_____ ppm
Sulfide:	_____ ppm	_____ ppm
Dissolved Oxygen:	_____ ppm	_____ ppm
Manganese (filtered):	_____ ppm	_____ ppm

GROUNDWATER HEADSPACE TEST

Time: _____
FID Headspace: _____ ppm

OBSERVATIONS / COMMENTS:

DRILLED TO 50' - NO WATER, POSSIBLY IN CLAY. PULLED BACK TO 49'
SCREEN OPEN 47'-49'
NO SAMPLE OR DATA COLLECTED
VERY SLOW RECHARGE.

SAMPLE DATA SHEET

Lcoation Number: TA-04- 57'

Date: 4-10-97

SAMPLE DEPTH

Time:	10:48	
Total Depth Drilled;	57'	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	3.13	ft
Static Water Level (TOP):	20.59	ft
Static Water Level (BGS):	17.46	ft

HYDRAULIC CONDUCTIVITY

Time:	11 25	
Drawdown: 9	1	ft
Flow Rate 245 ml/ 203 s	63.25	ml/min

FLOW CELL READINGS

Time:	11:42	
pH:	5.39	
red/ox	-274	mV
Dissolved Oxygen:	1.7	ppm
Conductivity	125	uS/mS
Temperature:	63.7	°F

Samplee c t i o n

Time	11:45
1 Liler Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time: 11:55

Water Clarity Cloudy

	Clear Zero	Sample Zero
Soluble Iron (6ppm):	>6 ppm	>6 ppm
Total Iron (6ppm):	>6 ppm	>6 ppm
Soluble Iron (12ppm)	20.5 ppm	0 ppm
Total Iron (12ppm):	12.1 ppm	3.6 ppm
Sulfide:	.75 ppm	.09 ppm
Dissolved Oxygen:	>2.0 ppm	1.56 ppm
Manganese (filtered):	0 ppm	ppm

GROUNDWATER HEADSPACE TEST

Time: 12:28

FID Headspace: 4.8 ppm

OBSERVATIONS / COMMENTS:

SAMPLE DATA SHEET

Lcoatinn Number: TA-04-56'

Date: 4-10-97

SAMPLE DEPTH

Time:	12:27	
Total Depth Drilled:	56'	ft
Pull Back;	2	ft
Screen Extended:	1.5	ft
Pipe Stick Up Above Surface:	2.15	ft
Static Water Level (TOP):	20.25	ft
Static Water Level (BGS):	18.1	ft

10.05

HYDRAULIC CONDUCTIVITY

Time:	13:30	
Drawdown:	1	ft
Flow Rate 198mL/90s	132	ml/min

FLOW CELL READINGS

Time:	1351	
pH:	5.1	
red/ox	-438	mV
Dissolved Oxygen:	1.8	ppm
Conductivity	99.4	uS/mS
Temperature:	64.1	°F

Sample Collection

Time	1353
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time: 1401

Water Clarity: Cloudy

	Clear Zero	Sample Zero
Soluble Iron (6ppm):	0 6 p m	4.65 ppm
Total iron (6ppm):	76 ppm	5.0 ppm
Soluble Iron (12ppm):	6.0 ppm	1.8 ppm
Total Iron (12ppm):	6.5 ppm	1.82 ppm
Sulfide:	.49 ppm	0 ppm
Dissolved Oxygen:	1.98 ppm	1.84 ppm
Manganese (filtered):	0 ppm	ppm

GROUNDWATER HEADSPACE TEST

Time: 1457

FID Headspace: 60. ppm

OBSERVATIONS / COMMENTS:

SAMPLE ZERO - 50% CLEAR 50% SAMPLE

Data sheet

Lcoation Number: TA-05-24

Date: 4/22/97

SAMPLE DEPTH

Time:	10:40	
Total Depth Drilled:	24	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	2.17	ft
Static Water Level (TOP):	15.93	ft
Static Water Level (BGS):	13.76	ft

HYDRAULIC CONDUCTIVITY

Time:	10:45	
Drawdown:	1	ft
Flow Rate	34	ml/min

FLOW CELL READINGS

Time:	10:59	
pH:	4.91	
red/ox:	206	mV
Dissolved Oxygen:	7.2 *	ppm
Conductivity	373	uS/mS
Temperature:	62.5	°F

Sample Collection

Time	11:02
1 Liter Amber Jars	^
40 ml VOA	4

COLORMETRIC TESTS

Time:	11:08			
Water Clarity	Semi-clear			
	Clear		Sample	
	Zero		Zero	
Soluble Iron (6ppm):	4.4	ppm	2.25	ppm
Total Iron (6ppm):	4.4	ppm	2.3	ppm
Soluble Iron (12ppm):	-	ppm	-	ppm
Total Iron (12ppm):	-	ppm	-	ppm
Sulfide:	0.24	ppm	0	ppm
Dissolved Oxygen:	>2	ppm	>2	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time:	12:23	
FID Headspace:	0	ppm

OBSERVATIONS / COMMENTS:

Slow recharge, water not at static level.

Pumped probe dry during sampling.

* - D.O. reading taken after pumping probe dry. Air in sample line.

Water has a whitish color.

Sample zero 100% sample water.

Data sheet

Lcoation Number: TA-05-29

Date: 4/22/97

SAMPLE DEPTH

Time:	11:18	
Total Depth Drilled:	29	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	1.21	ft
Static Water Level (TOP):	15.69	ft
Static Water Level (BGS):	14.48	ft

HYDRAULIC CONDUCTIVITY

Time:	11:21	
Drawdown:	1	ft
Flow Rate	33	ml/min

FLOW CELL READINGS

Time:	11:30	
pH:	5.58	
red/ox:	174	mV
Dissolved Oxygen:	9.8 *	ppm
Conductivity	295	uS/mS
Temperature:	63.9	°F

Sample Collection

Time	11:32
1 Liter Amber Jars	^
40 ml VOA	4

COLORMETRIC TESTS

Time: 11:35

Water Clarity: Semi-clear

	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	3.55	ppm	2.1	ppm
Total Iron (6ppm):	4.1	ppm	2.75	ppm
Soluble Iron (12ppm):	-	ppm	-	ppm
Total Iron (12ppm):	-	ppm	-	ppm
Sulfide:	0.14	ppm	0	ppm
Dissolved Oxygen:	*	ppm	*	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time: 12:25

FID Headspace: 0.2 ppm

OBSERVATIONS / COMMENTS:

Slow recharge, water not at static level.

Pumped probe dry during sampling.

* - D.O. reading taken after pumping probe dry. Air in sample line.

Sample zero 100% sample water.

Data sheet

Lcoation Number: TA-05-34

Date: 4/22/97

SAMPLE DEPTH

Time:	13:36	
Total Depth Drilled:	34	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	0.29	ft
Static Water Level (TOP):	13.48	ft
Static Water Level (BGS):	13.19	ft

HYDRAULIC CONDUCTIVITY

Time:	13:40	
Drawdown:	1	ft
Flow Rate	154	ml/min

FLOW CELL READINGS

Time:	13:54	
pH:	4.39	
fed/ox:	-96	mV
Dissolved Oxygen:	5.6	ppm
Conductivity	122	uS/mS
Temperature:	66.5	°F

Sample Collection

Time	13:56
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time:	14:01			
Water Clarity	Cloudy			
	Clear		Sample	
	Zero		Zero	
Soluble Iron (6ppm):	4.6	ppm	1.25	ppm
Total Iron (6ppm):	4.85	ppm	1.5	ppm
Soluble Iron (12ppm):	-	ppm	-	ppm
Total Iron (12ppm):	-	ppm	-	ppm
Sulfide:	0.37	ppm	0	ppm
Dissolved Oxygen:	1.26	ppm	0.38	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time:	14:43	
FID Headspace:	0.2	ppm

OBSERVATIONS / COMMENTS:

Sample zero 100% sample water.

Data sheet

Lcoation Number: TA-05-39

Date: 4/22/97

SAMPLE DEPTH

Time:	13:42	
Total Depth Drilled:	39	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	0.31	ft
Static Water Level (TOP):	13.67	ft
Static Water Level (BGS):	13.36	ft

HYDRAULIC CONDUCTIVITY

Time:	13:48	
Drawdown:	1	ft
Flow Rate	188	ml/min

FLOW CELL READINGS

Time:	14:08	
pH:	4.63	
red/ox:	-263	mV
Dissolved Oxygen:	cl	ppm
Conductivity	117	uS/mS
Temperature:	66.3	°F

Sample Collection

Time	14:10
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time: 14:20

Water Clarity: Cloudy

	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	4.1	ppm	1.2	ppm
Total Iron (6ppm):	4.55	ppm	1.6	ppm
Soluble Iron (12ppm):	-	ppm	-	ppm
Total Iron (12ppm):	-	ppm	-	ppm
Sulfide:	0.36	ppm	0	ppm
Dissolved Oxygen:	1.73	ppm	0.87	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time: 14:45

FID Headspace: 0.8 ppm

OBSERVATIONS / COMMENTS:

Sample zero 100% sample water,

Data sheet

Lcoation Number: TA-05-44

Date: 4/22/97

SAMPLE DEPTH

Time:	15:12	
Total Depth Drilled:	44	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	2.25	ft
Static Water Level (TOP):	16	ft
Static Water Level (BGS):	13.75	ft

HYDRAULIC CONDUCTIVITY

Time:	15.16	
Drawdown:	1	ft
Flow Rate	690	mlimin

FLOW CELL READINGS

Time:	15:24	
pH:	4.37	
red/ox:	-70	mV
Dissolved Oxygen:	0.2	ppm
Conductivity	96.8	uS/mS
Temperature:	67.1	°F

Sample Collection

Time	15:26
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time: 15:33

Water Clarity: Semi-clear

	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	1.85	ppm	0.7	ppm
Total Iron (6ppm):	2.1	ppm	0.85	ppm
Soluble Iron (12ppm):	-	ppm	-	ppm
Total Iron (12ppm):	-	ppm	-	ppm
Sulfide:	cl.12	ppm	0	ppm
Dissolved Oxygen:	0.77	ppm	0.42	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time: 16:45

FID Headspace: 0 ppm

OBSERVATIONS / COMMENTS:

Sample zero 100% sample water.

Data sheet

Lcoation Number: TA-05-49

Date: 4/22/97

SAMPLE DEPTH

Time: 16:30

Total Depth Drilled: 49 ft

Pull Back: 3 ft

Screen Extended: 3 ft

Pipe Stick Up Above Surface: _____ ft

Static Water Level (TOP): _____ ft

Static Water Level (BGS): _____ ft

HYDRAULIC CONDUCTIVITY

Time: _____

Drawdown: _____ ft

Flow Rate _____ ml/min

FLOW CELL READINGS

Time: _____

pH: _____

red/ox: _____ mV

Dissolved Oxygen: _____ ppm

Conductivity _____ uS/mS

Temperature: _____ °F

Sample Collection

Time _____

1 Liter Amber Jars _____

40 ml VOA _____

COLORMETRIC TESTS

Time: _____

Water Clarity _____

	Clear Zero	Sample Zero
Soluble Iron (6ppm):	_____ ppm	_____ ppm
Total Iron (6ppm):	_____ ppm	_____ ppm
Soluble Iron (12ppm):	_____ ppm	_____ ppm
Total Iron (12ppm):	_____ ppm	_____ ppm
Sulfide:	_____ ppm	_____ ppm
Dissolved Oxygen:	_____ ppm	_____ ppm
Manganese (filtered):	_____ ppm	_____ ppm

GROUNDWATER HEADSPACE TEST

Time: _____

FID Headspace: _____ ppm

OBSERVATIONS / COMMENTS:

Next to no recharge. Pulled back an extra 1 foot.

Waited 1.5 hours - water recharged to only 27 feet.

Attempted to collect samples - pumped water down to level beyond pumps capability after collecting only 50 - 100 ml.

Sample Data Sheet

Lcoation Number: TA-06-23

Date: 4/21/97

SAMPLE DEPTH

Time:	11 10	
Total Depth Drilled:	23	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	3.18	ft
Static Water Level (TOP):	15.67	ft
Static Water Level (BGS):	12.49	ft

HYDRAULIC CONDUCTIVITY

Time:	11:15	
Drawdown:	1	ft
Flow Rate	126	mlimin

FLOW CELL READINGS

Time:	11:24	
pH:	4.62	
red/ox:	178	mV
Dissolved Oxygen:	5.8	ppm
Conductivity	228	uS/mS
Temperature:	62.2	°F

Sample Collection

Time	11:26
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time: 11:40

Water Clarity: Crystal Clear

	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	0.65	ppm	0.05	ppm
Total Iron (6ppm):	0.65	ppm	0.05	ppm
Soluble Iron (12ppm):	-	ppm	-	ppm
Total Iron (12ppm):	-	ppm	-	ppm
Sulfide:	0	ppm	0	ppm
Dissolved Oxygen:	>2	ppm	>2	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time: 13:03

FID Headspace: 0 ppm

OBSERVATIONS /COMMENTS:

On first attempt - broke pipe, left 3 rods, 1 screen, 1 point holder in ground. Three failed attempts to retrieve.

Sample zero 100% sample water,

Sample Data Sheet

Lcoation Number: TA-06-28

Date: 4/21/97

SAMPLE DEPTH

Time:	12:05	
Total Depth Drilled:	28	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	2.1	ft
Static Water Level (TOP):	14.55	ft
Static Water Level (BGS):	12.45	ft

HYDRAULIC CONDUCTIVITY

Time:	12:12	
Drawdown:	1	ft
Flow Rate	582.8	ml/min

FLOW CELL READINGS

Time:	12:25	
pH:	4.72	
red/ox:	129	mV
Dissolved Oxygen:	2.7	ppm
Conductivity	264	uS/mS
Temperature:	64.3	°F

Sample Collection

Time	12:23
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time:	12:33			
Water Clarity	Semi-Clear			
	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	1.85	ppm	0.15	ppm
Total Iron (6ppm):	2	ppm	0.4	ppm
Soluble Iron (12ppm):	-	ppm	-	ppm
Total Iron (12ppm):	-	ppm	-	ppm
Sulfide:	0.11	ppm	0	ppm
Dissolved Oxygen:	>2	ppm	2.02	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time:	13:05	
FID Headspace:	0.2	ppm

OBSERVATIONS / COMMENTS:

Sample zero 100% sample water.

Sample Data Sheet

Lcoation Number: TA-06-33

Date: 4/21/97

SAMPLE DEPTH

Time:	14:27	
Total Depth Drilled:	33	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	1.17	ft
Static Water Level (TOP):	13.59	ft
Static Water Level (BGS):	12.42	fl

HYDRAULIC CONDUCTIVITY

Time:	14:35	
Drawdown:	1	ft
Flow Rate	152	mlimin

FLOW CELL READINGS

Time:	14:48	
pH:	5.1	
red/ox:	-440	mV
Dissolved Oxygen:	0.4	ppm
Conductivity	70.9	uS/mS
Temperature:	64.4	°F

Sample Collection

Time	14:50
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time:	14:58			
Water Clarity	Semi-Clear			
	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	2.85	ppm	0.55	ppm
Total Iron (6ppm):	3.55	ppm	1.25	ppm
Soluble Iron (12ppm):	-	ppm	-	ppm
Total Iron (12ppm):	-	ppm	-	ppm
Sulfide:	0.22	ppm	0	ppm
Dissolved Oxygen:	1.88	ppm	1.1	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time:	16:00	
FID Headspace:	22	ppm

OBSERVATIONS /COMMENTS:

Sample zero 100% sample water.

Sample Data Sheet

Lcoation Number: TA-06-38

Date: 4/21/97

SAMPLE DEPTH

Time:	14:20	
Total Depth Drilled:	38	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	2.37	ft
Static Water Level (TOP):	14.76	ft
Static Water Level (BGS):	12.39	ft

HYDRAULIC CONDUCTIVITY

Time:	14:52	
Drawdown:	1	ft
Flow Rate	68	ml/min

FLOW CELL READINGS

Time:	15:24	
pH:	5.2	
red/ox:	-312	mV
Dissolved Oxygen:	0	ppm
Conductivity	157	uS/mS
Temperature:	64.3	°F

Sample Collection

Time	15:26
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time:	15:32			
Water Clarity	Semi-Clear			
	Clear		Sample	
	Zero		Zero	
Soluble Iron (6ppm):	>6	ppm	4.35	ppm
Total Iron (6ppm):	>6	ppm	4.7	ppm
Soluble Iron (12ppm):	7	ppm	0	ppm
Total Iron (12ppm):	7.5	ppm	0.6	ppm
Sulfide:	0.31	ppm	0	ppm
Dissolved Oxygen:	0.68	ppm	0	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time:	16:01	
FID Headspace:	10	ppm

OBSERVATIONS/COMMENTS:

Sample zero 100% sample water.

Data sheet

Lcoation Number: TA-06-43

Date: 4/22/97

SAMPLE DEPTH

Time:	7:45	
Total Depth Drilled:	*43*	ft
Pull Back:	*2*	ft
Screen Extended:	*2*	ft
Pipe Stick Up Above Surface:	*3. 17*	ft
Static Water Level (TOP):	*15. 67*	ft
Static Water Level (BGS):	*12. 5*	ft

HYDRAULIC CONDUCTIVITY

Time:	7:47	
Drawdown:	1	ft
Flow Rate	*93*	mlimin

FLOW CELL READINGS

Time:	8:24	
pH:	4.91	
red/ox:	-447	mV
Dissolved Oxygen:	2.5	ppm
Conductivity	153	uS/mS
Temperature:	*64. 6*	°F

Sample Collection

Time	8:26
1 Liter Amber Jars	
40 ml VOA	4

COLORMETRIC TESTS

Time:	8:45			
Water Clarity	Crystal Clear			
	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	2.1	ppm	1.6	ppm
Total Iron (6ppm):	*2. 05*	ppm	*1. 7*	ppm
Soluble Iron (12ppm):	-	ppm	-	ppm
Total Iron (12ppm):	-	ppm	-	ppm
Sulfide:	0	ppm	0	ppm
Dissolved Oxygen:	*0. 22*	ppm	0.1	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEAOSPACE TEST

Time:	9:12	
FID Headspace:	14	ppm

OBSERVATIONS / COMMENTS:

Installed probe on 4-21-97. Left overnight to recharge.

Sample zero - 100% sample water.

Data sheet

Lcoation Number: TA-06-48

Date: 4/22/97

SAMPLE DEPTH

Time:	7:40	
Total Depth Drilled:	48	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	2.23	ft
Static Water Level (TOP):	14.95	ft
Static Water Level (BGS):	12.72	ft

HYDRAULIC CONDUCTIVITY

Time:	7:54	
Drawdown:	1	ft
Flow Rate	55	ml/min

FLOW CELL READINGS

Time:	8:08	
pH:	5.06	
red/ox:	-428	mV
Dissolved Oxygen:	0	ppm
Conductivity	151	uS/mS
Temperature:	64.3	°F

Sample Collection

Time	8:10
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time:	8:21			
Water Clarity	Cloudy			
	Clear		Sample	
	Zero		Zero	
Soluble Iron (6ppm):	>6	ppm	>6	ppm
Total Iron (6ppm):	36	ppm	>6	ppm
Soluble Iron (12ppm):	>12	ppm	6.1	ppm
Total Iron (12ppm):	>12	ppm	7.1	ppm
Sulfide:	0.46	ppm	0	ppm
Dissolved Oxygen:	1.56	ppm	0.37	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time:	9:11	
FID Headspace:	16	ppm

OBSERVATIONS I COMMENTS:

Installed probe on 4-21-97. Left overnight to redcharge.

Sample zero. 25% clear water, 75% sample water.

SAMPLE DATA SHEET

Location Number: TA-07-30'
Date: 4-8-97

SAMPLE DEPTH

Time:	14:10	
Total Depth Drilled:	30	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	.27	ft
Static Water Level (TOP):	14.05	ft
Static Water Level (BGS):	13.78	ft

HYDRAULIC CONDUCTIVITY

Time:	14:36	
Drawdown:	1	ft
Flow Rate	305.4	ml/min

FLOW CELL READINGS

Time:	1453	
pH:	4.41	
red/ox:	-4	mV
Dissolved Oxygen:	7.6	ppm
Conductivity	104	uS/mS
Temperature:	64.0	°F

COLORMETRIC TESTS

Time: 1505
Water Clarity: CLEAR

	Clear Zero	Sample Zero
Soluble Iron (6ppm):	2.45 ppm	ppm
Total Iron (6ppm):	2.65 ppm	ppm
Soluble Iron (12ppm):	— ppm	ppm
Total Iron (12ppm):	— ppm	ppm
Soluble Iron (6ppm):	— ppm	ppm
Total Iron (6ppm):	— ppm	ppm
Soluble Iron (12ppm):	— ppm	ppm
Total Iron (12ppm):	— ppm	ppm
Sulfide:	ppm?	ppm
Dissolved Oxygen:	> 2.0 ppm	ppm
Manganese (filtered):	Ø ppm	ppm

GROUNDWATER HEADSPACE TEST

Time: 1545
FID Headspace: .4 ppm

OBSERVATIONS / COMMENTS:

Samplenn

Time	1456
1 Liter Amber Jars	3
40 ml VOA	4

SAMPLE DATA SHEET

Location Number: TA-07-35

Date: 4-8-97

SAMPLE

Time:	14:25	
Total Depth Drilled:	35	ft
Pull Back:	2	ft
Screw Extended:	2	ft
Pipe Stick Up Above Surface:	3.19	ft
Static Water Level (TOP):	17.6	ft
Static Water Level (BGS):	14.41	ft

HYDRAULIC CONDUCTIVITY

Time:	14:53	
Drawdown:	1	ft
Flow Rate	157.7	ml/min

FLOW CELL READINGS

Time:	15:19	
pH:	4.80	
red/ox:	-141	mV
Dissolved Oxygen:	1.9	ppm
Conductivity	91.1	uS/mS
Temperature;	66	°F

Sample Collection

Time	1523
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

"time: 15:53

Water Clarity Cleare

	Clear Zero		Sample Zero
Soluble Iron (6ppm):	~~2.05~~	m	ppm
Total Iron (6ppm):	2.2	ppm	ppm
Soluble Iran (12ppm):	—	ppm	ppm
Total Iron (12ppm):	—	ppm	ppm
Soluble Iron (6ppm):	—	ppm	ppm
Total Iron (6ppm):	—	ppm	ppm
Soluble Iron (12ppm):	—	ppm	ppm
Total Iron (12ppm):	—	ppm	ppm
Sulfide:	.16	ppm	ppm
Dissolved Oxygen:	.74	ppm	ppm
Manganese (filtered):	0	ppm	ppm

GROUNDWATER HEADSPACE TEST

Time: 16:00

FID Headspace: .8 ppm

OBSERVATIONS / COMMENTS:

SAMPLE DATA SHEET

Location Number: TA-07-40
Date: 4-8-97

SAMPLE DEPTH

Time:	16:00	
Total Depth Drilled;	40	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick UP Above Surface:	2.25	ft
Static Water Level (TOP):	16.3	ft
Static Water Level (BGS):	14.05	ft

HYDRAULIC CONDUCTIVITY

Time:	16:22	
Drawdown:	1	ft
Flow Rate	381.2	ml/min

FLOW CELL READINGS

Time:	16:33	
pH:	5.11	
red/ox:	75	mV
Dissolved Oxygen:	1.2	ppm
Conductivity	100	uS/mS
Temperature:	66.0	°F

Sample Collection

Time	1636
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time: 1639
Water Clarity: CLEAR

	Clear Zero	Sample Zero
Soluble Iron (6ppm):	4.1 ppm	.8 ppm
Total iron (6ppm):	4.8 ppm	1.45 ppm
Soluble Iron (12ppm):	— ppm	— ppm
Total iron (12ppm):	- - ppm	— ppm
Soluble Iron (6ppm):	- - ppm	— ppm
Total Iron (6ppm):	— ppm	— ppm
Soluble Iron (12ppm):	— ppm	— ppm
Total Iron (12ppm):	— ppm	— ppm
Sulfide:	.4 ppm	Too Bright ppm
Dissolved Oxygen:	.54 ppm	— ppm
Manganese (filtered	ppm 0	— ppm

GROUNDWATER HEADSPACE TEST

Time: 17:10
FID Headspace: 1.2 ppm

OBSERVATIONS / COMMENTS:

SAMPLE DATA SHEET

Location Number: TA-07-45'

Date: 4-8,9-97

SAMPLE

Time:	10:10	
Total Depth Drilled:	45	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	3.13	ft
Static Water Level (TOP):	17.47	ft
Static Water Level (BGS):	14.34	ft

HYDRAULIC CONDUCTIVITY

Time:	9:46	
Drawdown:	1	ft
Flow Rate 1 GAL/60 S	188.6	ml/min

FLOW CELL READINGS

Time:	10:07	
pH:	5.54	
red/ox:	-476	mV
Dissolved Oxygen:	1.0	ppm
Conductivity	40.1	uS/mS
Temperature:	62.5	°F

Sample Collection

Time	10:12
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time: 10:18

Water Clarity SLIGHTLY CLOUDY

	Clear Zero	Sample Zero
Soluble Iran (6ppm):	5.6 ppm	3.45 ppm
Total Iron (6ppm):	36.05 p ppm	p m
Soluble Iron (12ppm):	— ppm	— ppm
Total Iron (12ppm):	— ppm	— ppm
Sulfide:	.20 p p m	TOO BRIGHT ppm
Dissolved Oxygen:	.8 ppm	.2 ppm
Manganese (filtered):	p Ø p m	ppm

GROUNDWATER HEADSPACE TEST

Time: 11:30

FID Headspace: 4.0 ppm

OBSERVATIONS / COMMENTS:

SAMPLE! DATA SHEET

Lcoation Number: TA-08-28

Date: 4-1-97

SAMPLE DEPTH

Date:	4-1-97	
Time:	11:00	
Total Depth Drilled:	28	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	2.31	ft
Static Water Level (TOP):	16.27	ft
Static Water Level (BGS):	13.96	ft

HYDRAULIC CONDUCTIVITY

Drawdown:	1	ft
Time:	13:20	
Flow Rate 84 ml/30s	ml/1608	

COLORMETRIC TESTS

Time:	13:50	
Water Clarity	CLEAR	
Soluble Iron (0-6ppm/un-filtered):	2.85	m
Total Iron (0-6ppm/un-filtered):	2.75	ppm
Soluble Iron (0-12ppm/un-filtered):	—	ppm
Total Iron (0-12ppm/un-filtered):	—	ppm
Soluble Iron (0-6ppm/filtered):	—	ppm
Total Iron (0-6ppm/filtered):	—	ppm
Soluble Iron (0-12ppm/filtered):	—	ppm
Total Iron (0-12ppm/filtered):	—	ppm
Sulfide (un-filtered):	Ø	ppm
Sulfide (filtered):	—	ppm
Dissolved Oxygen:	>2.0	ppm
Manganese (filtered):	Ø	ppm

FLOW CELL READINGS

Time:	13:49	
pH:	5.28	
red/ox:	43	mV
Dissolved Oxygen:	7.9	~~ppm~~ ppm
Conductivity	274	~~ppm~~ µS/mS
Temperature:	66.2	°F

GROUNDWATER HEADSPACE TEST

Time:	14:30	
FID Headspace:	Ø	ppm

Sample Collection

Time	13:45
1 Liter Amber Jars	3
40 ml VOA	4

TARGET ENVIRONMENTAL SERVICES, INC.

SAMPLE DATA SHEET

Lcoation Number: TA-08-33'

Date: 4-1-97

SAMPLE DEPTH

Date:	4-1-97	
Time:	1500	
Total Depth Drilled:	33	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	1.14	ft
Static Water Level (TOP):	15.14	ft
static Water Level (BGS):	14	ft

HYDRAULIC CONDUCTIVITY

Drawdown:	1	ft
Time:	1535	
Flow Rate	128ml/130s	

COLORMETRIC TESTS

Time:	15:38	
Water Clarity	Clear	
Soluble Iron (0-6ppm/un-filtered):	p 2.0	m
Total Iron (0-6ppm/un-filtered):	2.7	ppm
Soluble Iron (0-12ppm/un-filtered):	—	ppm
Total Iron (0-12ppm/un-filtered):	—	ppm
Soluble Iron (0-6ppm/filtered):	—	ppm
Total Iron (0-6ppm/filtered):	—	ppm
Soluble Iron (0-12ppm/filtered):	—	ppm
Total Iron (0-12ppm/filtered):	—	ppm
Sulfide (un-filtered):	0	ppm
Sulfide (filtered):	—	ppm
DissolvedOxygen:	72.0	ppm
Manganese (filtered):	0	ppm

FLOW CELL READINGS

Time:	1548	
pH:	4.97	
red/ox:	37	mV
Dissolved Oxygen:	5.7	ppm
Conductivity	254	µS/mS
Temperature;	65.9	°F

GROUNDWATER HEADSPACE TEST

Time:	16:30	
FID Headspace:	0	ppm

Sample Collection

Time	15:50
1 Liter Amber Jars	3
40 ml VOA	4

SAMPLE DATA SHEET

Location Number: TA-08-38
Date: 4-2-97

SAMPLE DEPTH

Date:	4-2-97	
Time:	0840	
Total Depth Drilled:	38	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	.31	ft
Static Water Level (TOP):	14.33	ft
Static Water Level (BGS):	14.02	ft

HYDRAULIC CONDUCTIVITY

Drawdown:	1	ft
Time:	09:40	
Flow Rate 237ml/ min	ml/119.5	

COLORMETRIC TESTS

Time:	10:15	
Water Clarity	SEMI-CLEAR	
Soluble Iron (0-6ppm/un-filtered):	3.45	ppm
Total Iron (0-6ppm/un-filtered):	3.6	ppm
Soluble Iron (0-12ppm/un-filtered):	—	ppm
Total Iron (0-12ppm/un-filtered):	—	ppm
Soluble Iron (0-6ppm/filtered):	—	ppm
Total Iron (0-6ppm/filtered):	—	ppm
Soluble Iron (0-12ppm/filtered):	—	ppm
Total Iron (0-12ppm/filtered):	—	ppm
Sulfide (un-filtered):	.16	ppm
Sulfide (filtered):	—	ppm
Dissolved Oxygen:	.97	ppm
Manganese (filtered):	ppm Ø	

FLOW CELL READINGS

Time:	10:04	
pH:	5.14	
red/ox:	-50	mV
Dissolved Oxygen:	1.6	ppm
Conductivity	256	µS/mS
Temperature:	65.9	°F

GROUNDWATER HEADSPACE TEST

Time:	10:45	
FID Headspace:	Ø	ppm

Sample Collection

Time	10:10
1 Liter Amber Jars	3
40 ml VOA	4

SAMPLE DATA SHEET

Location Number: TA-08-43
Date: 4-2-97

SAMPLE DEPTH

Date:	4-2-97	
Time:	11:00	
Total Depth Drilled:	43	ft
Pull Back:	2	ft
Screen Extended:	1.5	ft
Pipe Stick Up Above Surface;	3.14	ft
Static Water Level (TOP):	17.12	ft
Static Water Level (BGS):	13.98	ft

HYDRAULIC CONDUCTIVITY

Drawdown:	1	ft
Time:	11:50	
Flow Rate 212mL/180s	68.4	ml/min

COLORMETRIC TESTS

Time:	12:20	
Water Clarity	CLEAR	
Soluble Iron (0-6ppm/un-filtered):	2.45	ppm
Total Iron (0-6ppm/un-filtered):	a-43-ppm	
Soluble Iron (0-12ppm/un-filtered):	—	ppm
Total Iron (0-12ppm/un-filtered):	—	ppm
Soluble Iron (0-6ppm/filtered):	—	ppm
Total Iron (0-6ppm/filtered):	—	ppm
Soluble Iron (0-12ppm/filtered):	—	ppm
Total Iron (0-12ppm/filtered):	—	ppm
Sulfide (un-filtered):	.01	ppm
Sulfide (filtered):	—	ppm
Dissolved Oxygen:	0	ppm
Manganese (filtered):	ppm 0	

FLOW CELL READINGS

Time:	12:12	
pH:	6.26	
red/ax:	20	mV
Dissolved Oxygen:	5.2	ppm
Conductivity	206	µS/mS
Temperature:	68.2	°F

GROUNDWATER HEADSPACE TEST

Time:	12:50	
FID Headspace:	0	ppm

Sample Collection

Time	12:16
1 Liter Amber Jars	3
40 ml VOA	4

SAMPLE DATA SHEET

Location Number: TA-08-48
Date: 4-2-97

SAMPLE DEPTH

Time:	13:15	
Total Depth Drilled:	48	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	2.14	ft
Static; Water Level (TOP):	16.82	
Static water Level (BGS):	13.88	ft

HYDRAULIC CONDUCTIVITY

Drawdown:	.85	ft
Time:	1400	
Flow Rate	764.2	ml/min

FLOW CELL READINGS

Time:	14:24	
pH:	5.55	
red/ox:	13	mV
Dissolved Oxygen:	2.3	ppm
Conductivity	97	µS/mS
Temperature:	68.1	°F

COLORMETRIC TESTS

Time:	1435	
Water Clarity	CLEAR	
Soluble Iron (0-6ppm/un-filtered):	1.55	ppm
Total Iron (0-6ppm/un-filtered):	1.45	ppm
Soluble Iron (0-12ppm/un-filtered):	—	ppm
Total Iron (0-12ppm/un-filtered):	—	ppm
Soluble Iron (0-6ppm/filtered):	—	ppm
Total Iron (0-6ppm/filtered):	—	ppm
Soluble Iron (0-12ppm/filtered):	—	ppm
Total Iron (0-12ppm/filtered):	—	ppm
Sulfide (un-filtered):	.01	ppm
Sulfide (filtered):	—	ppm
Dissolved Oxygen:	1.54	ppm
Manganese (filtered):	0	ppm

GROUNDWATER HEADSPACE TEST

Time:	15:10	
FID Headspace:	1.4	ppm

Sample Collection

Time	14:29
1 Liter Amber Jars	3
40 ml VOA	4

Sample Data Sheet

Lcoation Number: T-A-09-28

Date: 4/28/97

SAMPLE DEPTH

Time:	15:21	
Total Depth Drilled:	28	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	2.1	ft
Static Water Level (TOP):	16.3	ft
Static Water Level (BGS):	14.2	ft

HYDRAULIC CONDUCTIVITY

Time:	15:24	
Drawdown:	1	ft
Flow Rate	50	mlirnin

FLOW CELL READINGS

Time:	15:37	
pH:	5.17	
red/ox:	921	mV
Dissolved Oxygen:	2.4	ppm
Conductivity	243	uS/mS
Temperature:	65	°F

Sample Collection

Time	15:39
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time: 15:48

Water Clarity: Crystal Clear

	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	0.65	ppm	0.25	ppm
Total Iron (6ppm):	1.1	ppm	0.7	ppm
Soluble Iron (12ppm):	-	ppm	-	ppm
Total Iron (12ppm):	-	ppm	-	ppm
Sulfide:	0	ppm	0	ppm
Dissolved Oxygen:	1.18	ppm	1.06	ppm
Manganese (filtered):	0.3	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time: 16:30

FI D Headspace: 1.1 ppm

OBSERVATIONS! COMMENTS:

Pumped dry during purging.

Sample zero - 100% sample water.

Sample Data Sheet

Lcoation Number: TA-09-33

Date: 4/28/97

SAMPLE DEPTH

Time:	15:30	
Total Depth Drilled:	33	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	1.23	ft
Static Water Level (TOP):	14.66	ft
Static Water Level (BGS):	13.43	ft

HYDRAULIC CONDUCTIVITY

Time:	15:35	
Drawdown:	1	ft
Flow Rate	60	ml/min

FLOW CELL READINGS

Time:	15:58	
pH:	4.93	
red/ox:	111	mV
Dissolved Oxygen:	1.8	ppm
Conductivity	153	uS/mS
Temperature:	64.4	°F

Sample Collection

Time	16:00
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time: 16:09

Water Clarity: Crystal Clear

	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	0.4	ppm	0.1	ppm
Total Iron (6ppm):	0.4	ppm	0.2	ppm
Soluble Iron (12ppm):	-	ppm	-	ppm
Total Iron (12ppm):	-	ppm	-	ppm
Sulfide:	0	ppm	0	ppm
Dissolved Oxygen:	0.77	ppm	0.71	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time: 16:33

FID Headspace: 6.2 ppm

OBSERVATIONS / COMMENTS:

Sample zero - 100% sample water,

Sample Data Sheet

Lcoation Number: TA-09-38

Date: 4/29/97

SAMPLE DEPTH

Time:	8:22	
Total Depth Drilled:	38	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	0.31	ft
Static Water Level (TOP):	13.14	ft
Static Water Level (BGS):	12.83	ft

HYDRAULIC CONDUCTIVITY

Time:	a:22	
Drawdown:	1	ft
Flow Rate	400	ml/min

FLOW CELL READINGS

Time:	8:40	
pH:	4.9	
red/ox:	92	mV
Dissolved Oxygen:	0.5	ppm
Conductivity	33.2	uSImS
Temperature:	63.7	°F

Sample Collection

Time	8:42
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time:	8:50			
Water Clarity	Crystal Clear			
	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	0.5	ppm	0.7	ppm
Total Iron (6ppm):	1.65	ppm	1.75	ppm
Soluble Iron (12ppm):	-	ppm	-	ppm
Total Iron (12ppm):	-	ppm	-	ppm
Sulfide:	0.11	ppm	0	ppm
Dissolved Oxygen:	0.94	ppm	0.7	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time:	10:25	
FID Headspace:	3.9	ppm

OBSERVATIONS / COMMENTS:

Sample zero - 100% sample water, Installed on 4-28-97.

Sample Data Sheet

Lcoation Number: TA-09-43

Date: 4/29/97

SAMPLE DEPTH

Time:	0.495833	
Total Depth Drilled:	43	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	3.21	ft
Static Water Level (TOP):	15.14	ft
Static Water Level (BGS):	11.93	ft

HYDRAULIC CONDUCTIVITY

Time:	9:22	
Drawdown:	1	ft
Flow Rate	8	mlimin

FLOW CELL READINGS

Time:	9:44	
pH:	5.57	
red/ox:	-142	mV
Dissolved Oxygen:	0	ppm
Conductivity	20.7	uS/mS
Temperature:	62.8	°F

Sample Collection

Time	9:46
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time:	9:52			
Water Clarity	Cloudy			
	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	4.05	ppm	1.55	ppm
Total Iron (6ppm):	4.45	ppm	1.9	ppm
Soluble Iron (12ppm):	-	ppm	-	ppm
Total Iron (12ppm):	-	ppm	-	ppm
Sulfide:	0.26	ppm	0	ppm
Dissolved Oxygen:	0.99	ppm	0.27	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time:	10:27	
FID Headspace:	0.3	ppm

OBSERVATIONS / COMMENTS:

Sample zero - 100% sample water,
Installed on 4-28-97.
Very slow recharge.

Sample Data Sheet

Lcoation Number: TA-09-48

Date: 4/29/97

SAMPLE DEPTH

Time:	10:12	
Total Depth Drilled:	48	ft
Pull Back:	3	ft
Screen Extended:	3	ft
Pipe Stick Up Above Surface:	3.125	ft
Static Water Level (TOP):	22.1 *	ft
Static Water Level (BGS):		ft

HYDRAULIC CONDUCTIVITY

Time:		
Drawdown:		ft
Flow Rate		ml/min

FLOW CELL READINGS

Time:	10:34	
pH:	5.94	
red/ox:	-67	mV
Dissolved Oxygen:	0.4	ppm
Conductivity	29.5	uS/mS
Temperature:	63.5	°F

Sample Collection

Time	10:36
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time:	10:51			
Water Clarity	Cloudy			
	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	>6	ppm	>6	ppm
Total Iron (6ppm):	>6	ppm	>6	ppm
Soluble Iron (12ppm):	9.7	ppm	3.2	ppm
Total Iron (12ppm):	14.4	ppm	7.7	ppm
Sulfide:	0.86	ppm	0.38	ppm
Dissolved Oxygen:	-	ppm	-	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time:	11:20
FID Headspace:	0.2 ppm

OBSERVATIONS /COMMENTS:

Pulled back an additional 1' - very slow recharge.

* - waited 1 hour, water @ 22.1 ', did not perform hydraulic conductivity test.

Pumped probe dry during flow cell readings, air in sample line - no D.O. reading.

Sample zero - 25% sample / 75% clear water

Collected equipment blank #5, ELQBLK-5, after collection of TA-09-48.

SAMPLE DATA SHEET

Location Number: TB-03-23 1/2
Date: 4-3-97

SAMPLE DEPTH

Time:	15:16	
Total Depth Drilled:	23.5	ft
Pull Rack:	2	ft
Screen Extended:	1.25	ft
Pipe Stick Up Above Surface:	2.53	A
Static Water Level (TOP):	22.6	ft
Static Water Level (BGS):	20.07	ft

HYDRAULIC CONDUCTIVITY

Time:	15:40	
Drawdown:	1	ft
Flow Rate	187.3	ml/min

FLOW CELL READINGS

Time:	15:58	
pH:	5.11	
red/ox:	198	mV
Dissolved Oxygen:	10.5	ppm
Conductivity	113	uS/mS
Temperature:	68.0	°F

COLORMETRIC TESTS

Time: 13:52
Water Clarity: CLEAR

	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	.35	ppm		ppm
Total Iron (6ppm):	.35	ppm		ppm
Soluble Iron (12ppm):	—	ppm		ppm
Total Iron (12ppm):	—	ppm		ppm
Soluble Iron (6ppm):	—	ppm		ppm
Total Iron (6ppm):	—	ppm		ppm
Soluble Iron (12ppm):	- -	ppm		ppm
Total Iron (12ppm):	—	ppm		ppm
Sulfide:	Ø	ppm		ppm
Dissolved Oxygen:	2.9	m		ppm
Manganese (filtered):	Ø	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time: 16:40
FID Headspace: 0 ppm

OBSERVATIONS / COMMENTS:

Sample Collection

Time	1600
1 Liter Amber Jars	3
40 ml VOA	4

SAMPLE DATA SHEET

Location Number: TB-03-28.5

Date: 4-3-97

SAMPLE DEPTH

Time'	1530	
Total Depth Drilled:	28.5	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	1.77	ft
Static Waler Level (TOP):	21.79	ft
Static Water Level (BGS):	20.02	ft

HYDRAULIC CONDUCTIVITY

Time:	16:15	
Drawdown:	1	ft
Flow Rate	366.2	ml/min

FLOW CELL READINGS

Time:	16:30	
pH:	5.9	
red/ox:	170	mV
Dissolved Oxygen:	9.7	ppm
Conductivity	64	uS/mS
Temperature;	67.6	°F

Sample Collection

Time	16:35
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time: 1650

Water Clarity: CLEAR

		Clear Zero	Sample Zero
Soluble Iron (6ppm):	1.0 ppm		ppm
Total Iron (6ppm):	1.0 ppm		ppm
Soluble Iron (12ppm):	— ppm		ppm
Total Iron (12ppm):	. . ppm	ppm	ppm
Soluble Iron (6ppm):	— ppm		ppm
Total Iron (6ppm):	— ppm		ppm
Soluble Iron (12ppm):	— ppm		ppm
Total Iron (12ppm):	— ppm		ppm
Sulfide:	.08 ppm		ppm
Dissolved Oxygen:	>2.0 ppm		ppm
Manganese (filtered?:	0 ppm		ppm

GROUNDWATER HEADSPACE TEST

Time: 17:15

FID Headspace: 0 ppm

OBSERVATIONS i COMMENTS:

SAMPLE DATA SHEET

Location Number: TB-03-33.5
Date: 4-4-97

SAMPLE DEPTH

Time:	0850	
Total Depth Drilled:	33.5	ft
Pull Back:	2	ft
Screen Extended;	2	ft
Pipe Stick Up Above Surface:	.58	ft
Static Water Level (TOP):	20.65	ft
Static Water Level (BGS):	20.07	ft

HYDRAULIC CONDUCTIVITY

Time:	0927	
Drawdown:	1	ft
Flaw Rate	218.8	ml/min

FLOW CELL READINGS

Tire:	09:43	
pH:	5.11	
red/ox:	144	mV
Dissolved Oxygen:	6.9	ppm
Conductivity	192	uS/mS
Temperature:	68.6	°F

COLORMETRIC TESTS

Time: 0930

Water Clarity: CLEAR

	Cleat Zero	Sample Zero
Soluble Iron (6ppm):	.75 ppm	ppm
Total iron (6ppm):	.70 ppm	ppm
Soluble Iron (12ppm):	— ppm	ppm
Total Iron (12ppm):	— ppm	ppm
Soluble Iron (6ppm):	— ppm	ppm
Total Iron (6ppm):	— ppm	ppm
Soluble Iron (12ppm):	— ppm	ppm
Total Iron (12ppm):	— ppm	ppm
Sulfide:	.02 ppm	ppm
Dissolved Oxygen:	>2.0 ppm	ppm
Manganese (filtered):	Ø ppm	ppm

GROUNDWATER HEADSPACE TEST

Time: 10:50

FID Headspace: Ø ppm

OBSERVATIONS / COMMENTS:

Sample Collection

Time	0944
1 Liter Amber Jars	3
40 ml VOA	4

SAMPLE DATA SHEET

Location Number: TB-03-37.5
Date: 4-4-97

SAMPLE DEPTH

Time:	0915	
Total Depth Drilled:	38.5	ft
Pull Back:	3	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	3.67	ft
Static Water Level (TOP):	473-b	ft
Static Water Level (BGS):	19.93	ft

HYDRAULIC CONDUCTIVITY

Time:	10:35	
Drawdown:	1	ft
Flow Rate	121.5	ml/min

FLOW CELL READINGS

Time:	10:46	
pH:	5.13	
red/ox:	85	mV
Dissolved Oxygen:	6.1	ppm
Conductivity	147	uS/mS
Temperature:	70.5	°F

Sample Collection

T i m e	10:47
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time: 11:00
Water Clarity: CLEAR

		Clear Zero	Sample Zero
Soluble Iron (6ppm):	1.4 p m		ppm
Total Iron (6ppm):	1.35 ppm		ppm
Soluble Iron (12ppm):	— ppm		ppm
Total iron (12ppm):	— ppm		ppm
Soluble Iron (6ppm):	— ppm		ppm
Total Iron (6ppm):	— ppm		ppm
Soluble Iron (12ppm):	— ppm		ppm
Total Iron (12ppm):	— ppm		ppm
Sulfide:	.01 ppm		ppm
Dissolved Oxygen:	>2 ppm		ppm
Manganese (filtered):	Ø ppm		ppm

GROUNDWATER HEADSPACE TEST

Time: 12:32
FID Headspace: Ø ppm

OBSERVATIONS / COMMENTS:

1ST ATTEMPT @ 38.5 – PULLED BACK EXTRA 1 FOOT TO INCREASE FLOW

TARGET ENVIRONMENTAL SERVICES, INC.

SAMPLE DATA SHEET

Location Number: TB-03-43.5
Date: 4-4-97

SAMPLE

Time:	10:35	
Total Depth Drilled:	43.5	ft
Pull Back:	2	ft
Screen Extended;	2	ft
Pipe Stick UP Above Surface:	ft 2.69	
Static Water Level (TOP):	22.71	ft
Static water Level (BGS):	20.02	ft

HYDRAULIC CONDUCTIVITY

Time:	12:18	
Drawdown:	1	ft
Flow Rate	65.8	ml/min

FLOW CELL READINGS

Time:	12:33	
pH:	5.65	
redlox:	98	mV
Dissolved Oxygen:	6.5	ppm
Conductivity	147	uS/mS
Temperature:	70.1	°F

Sample Collection

Time	12:35
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time: 12:45
Water Clarity: CLEAR

	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	2.35	ppm		ppm
Total iron (6ppm):	2.45	ppm		ppm
Soluble Iron (12ppm):	—	ppm		ppm
Total Iron (12ppm):	—	ppm		ppm
Soluble Iron (6ppm):	—	ppm		ppm
Total Iron (6ppm):	—	ppm		ppm
Soluble Iron (12ppm):	—	ppm		ppm
Total Iron (12ppm):	—	ppm		ppm
Sulfide:	.03	ppm		ppm
Dissolved Oxygen:	72.0	ppm		ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time: 1510
FID Headspace: 0 ppm

OBSERVATIONS / COMMENTS:

Sample Data Sheet

Lcoation Number: TB-04-27

Date: 4/17/97

SAMPLE DEPTH

Time:	8:44	
Total Depth Drilled:	27	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	3.06	ft
Static Water Level (TOP):	25.15	ft
Static Water Level (BGS):	22.09	ft

HYDRAULIC CONDUCTIVITY

Time:	9:01	
Drawdown:	1	ft
Flow Rate	205	ml/min

FLOW CELL READINGS

Time:	9:17	
pH:	5.48	
red/ox:	151	mV
Dissolved Oxygen:	8.4	ppm
Conductivity	193	uS/mS
Temperature:	61.4	°F

Sample Collection

Time	9:19
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time: 9:30

Water Clarity: Crystal Clear

	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	0.45	ppm	0.05	ppm
Total Iron (6ppm):	0.4	ppm	0	ppm
Soluble Iron (12ppm):	-	ppm	-	ppm
Total Iron (12ppm):	-	ppm	-	ppm
Sulfide:	0.01	ppm	0	ppm
Dissolved Oxygen:	>2	ppm	>2	ppm
Manganese (filtered);	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time: 10:50

FID Headspace: 0.2 ppm

OBSERVATIONS / COMMENTS:

Installed probe on 4-16-97, left overnight to recharge.

Sample zero - 100% sample water.

Sample Data Sheet

Lcoation Number: TB-04-32

Date: 4/17/97

SAMPLE DEPTH

Time:	8:44	
Total Depth Drilled:	32	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	2.25	ft
Static Water Level (TOP):	24.3	ft
Static Water Level (BGS):	22.05	ft

HYDRAULIC CONDUCTIVITY

Time:	9:09	
Drawdown:	1	ft
Flow Rate	632	mlmin

FLOW CELL READINGS

Time:	9:36	
pH:	5.95	
red/ox:	106	mV
Dissolved Oxygen:	8.3	ppm
Conductivity	92.1	uS/mS
Temperature:	62.3	°F

Sample Collection

Time	9:38
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time:	9:45			
Water Clarity	Clear			
	Clear		Sample	
	Zero		Zero	
Soluble Iron (6ppm):	1.55	ppm	0.75	ppm
Total Iron (6ppm):	1.4	ppm	0.6	ppm
Soluble Iron (12ppm):	-	ppm	-	ppm
Total Iron (12ppm):	-	ppm	-	ppm
Sulfide:	0.04	ppm	0	ppm
Dissolved Oxygen:	>2	ppm	>2	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time:	10:53	
FID Headspace:	0.3	ppm

OBSERVATIONS / COMMENTS:

Installed probe on 4-16-97, left overnight to recharge.

Sample zero - 100% sample water.

Sample Data Sheet

Lcoation Number: TB-04-37

Date: 4/17/97

SAMPLE DEPTH

Time:	10:30	
Total Depth Drilled:	37	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	1.15	ft
Static Water Level (TOP):	23.47	ft
Static Water Level (BGS):	2232	ft

HYDRAULIC CONDUCTIVITY

Time:	10:35	
Drawdown:	1	ft
Flow Rate	432	mlimin

FLOW CELL READINGS

Time:	10:43	
pH:	4.71	
red/ox:	231	mV
Dissolved Oxygen:	6.3	ppm
Conductivity	83.6	uS/mS
Temperature:	62.3	°F

Sample Collection

Time	10:45
1 Liter Amber Jars	3
40 ml VOA	A

COLORMETRIC TESTS

Time: 11:00

Water Clarity: Clear

	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	0.8	ppm	0	ppm
Total Iron (6ppm):	0.95	ppm	0.05	ppm
Soluble Iron (12ppm):	-	ppm	-	ppm
Total Iron (12ppm):	-	ppm	-	ppm
Sulfide:	0.04	ppm	0	ppm
Dissolved Oxygen:	>2	ppm	>2	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time: 12:00

FID Headspace: 0 ppm

OBSERVATIONS /COMMENTS:

Sample zero - 100% sample water.

Sample Data Sheet

Lcoation Number: TB-04-42

Date: 4/17/97

SAMPLE DEPTH

Time:	10:44	
Total Depth Drilled:	42	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	2.25	ft
Static Water Level (TOP):	24.4	ft
Static Water Level (BGS):	22.15	ft

HYDRAULIC CONDUCTIVITY

Time:	1055	
Drawdown:	1	ft
Flow Rate	142	ml/min

FLOW CELL READINGS

Time:	11:18	
pH:	5	
red/ox:	74	mV
Dissolved Oxygen:	3.3	ppm
Conductivity	244	uS/mS
Temperature:	62	°F

Sample Collection

Time	11:20
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time:	11:33			
Water Clarity	Semi-Clear			
	Clear		Sample	
	Zero		Zero	
Soluble Iron (6ppm):	5.2	ppm	0.95	ppm
Total Iron (6ppm):	6.65	ppm	2.5	ppm
Soluble Iron (12ppm):	-	ppm	-	ppm
Total Iron (12ppm):	-	ppm	-	ppm
Sulfide:	0.47	ppm	0	ppm
Dissolved Oxygen:	>2	ppm	>2	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time:	12:01	
FID Headspace:	0.2	ppm

OBSERVATIONS / COMMENTS:

Sample zero-100% sample water.

Sample Data Sheet

Lcoation Number: TB-04-47

Date: 4/17/97

SAMPLE DEPTH

Time:	12:25	
Total Depth Drilled:	47	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	0.3	ft
Static Water Level (TOP):	26.15	ft
Static Water Level (BGS):	25.85	ft

HYDRAULIC CONDUCTIVITY

Time:	12:27	
Drawdown:	1	ft
Flow Rate	118	ml/min

FLOW CELL READINGS

Time:	12:38	
pH:	4.39	
red/ox:	-340	mV
Dissolved Oxygen:	5.3	ppm
Conductivity	234	uS/mS
Temperature:	62	°F

Sample Collection

Time	12:40
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time: 12:54

Water Clarity: Cloudy

	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	>6	ppm	4.8	ppm
Total Iron (6ppm):	>6	ppm	5.75	ppm
Soluble Iron (12ppm):	8.4	ppm	1.5	ppm
Total Iron (12ppm):	8.5	ppm	1.6	ppm
Sulfide:	0.69	ppm	0.11	ppm
Dissolved Oxygen:	>2	ppm	>2	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time: 14:oo

FID Headspace: 1.1 ppm

OBSERVATIONS / COMMENTS:

Sample zero - 50% clear I 50% sample water,

Sample Data Sheet

Lcoation Number: TB-05-31.5

Date: 4/15/97

SAMPLE DEPTH

Time:	13:30	
Total Depth Drilled:	31.5	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	2.67	ft
Static Water Level (TOP):	22.05	ft
Static Water Level (BGS):	19.38	ft

HYDRAULIC CONDUCTIVITY

Time:	13:41	
Drawdown:	1	ft
Flow Rate	260	ml/min

FLOW CELL READINGS

Time:	13:49	
pH:	4.85	
red/ox:	103.5	mV
Dissolved Oxygen:		ppm
Conductivity		uS/mS
Temperature:	15.8	°C

Sample Collection

Time	13:51
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time: 14:05

Water Clarity: CLEAR

	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	0.55	ppm	0	ppm
Total Iron (6ppm):	0.65	ppm	0	ppm
Soluble Iron (12ppm):	-	ppm	-	ppm
Total Iron (12ppm):	-	ppm	-	ppm
Sulfide:	0.04	ppm	0	ppm
Dissolved Oxygen:	>2	ppm	>2	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time: 14:55

FID Headspace: 0 ppm

OBSERVATIONS/COMMENTS:

Sample zero - 100% sample water.

Sample Data Sheet

Lcoation Number: TB-05-36.5

Date: 4/15/97

SAMPLE DEPTH

Time:	13:45	
Total Depth Drilled:	36.5	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	1.81	ft
Static Water Level (TOP):	21.21	ft
Static Water Level (BGS):	19.4	ft

HYDRAULIC CONDUCTIVITY

Time:	13:53	
Drawdown:	1	ft
Flow Rate	118	ml/min

FLOW CELL READINGS

Time:	14:05	
pH:	5.02	
red/ox:	93.6	mV
Dissolved Oxygen:		ppm
Conductivity		uS/mS
Temperature:	16.5	°C

Sample Collection

Time	14:07
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time: 14:20

Water Clarity: Clear

	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	2.65	ppm	1.2	ppm
Total Iron (6ppm):	2.4	ppm	1	ppm
Soluble Iron (12ppm):	-	ppm	-	ppm
Total Iron (12ppm):	-	ppm	-	ppm
Sulfide:	0.16	ppm	0	ppm
Dissolved Oxygen:	>2	ppm	>2	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time: 14:57

FID Headspace: 0 ppm

OBSERVATIONS / COMMENTS:

Sample zero - 100% sample water.

Sample Data Sheet

Lcoation Number: TB-05-41.5

Date: 4/15/97

SAMPLE DEPTH

Time:	15:15	
Total Depth Drilled:	41.5	ft
Pull Back:	2	ft
Screen Extended:	1.5	ft
Pipe Stick Up Above Surface:	0.63	ft
Static Water Level (TOP):	20.19	ft
Static Water Level (BGS):	19.56	ft

HYDRAULIC CONDUCTIVITY

Time:	15:21	
Drawdown:	1	ft
Flow Rate	60	mlimin

FLOW CELL READINGS

Time:	15:33	
pH:	5.17	
red/ox:	86	mV
Dissolved Oxygen:		ppm
Conductivity		uS/mS
Temperature:	16	"c

Sample Collection

Time	15:35
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time:	15:52			
Water Clarity	Cloudy			
	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	>6	ppm	>6	ppm
Total Iron (6ppm):	>6	ppm	>6	ppm
Soluble Iron (12ppm):	8.4	ppm	0.1	ppm
Total Iron (12ppm):	12.1	ppm	3.1	ppm
Sulfide:	0.97	ppm	0.18	ppm
Dissolved Oxygen:	>2	ppm	>2	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time:	16:33	
FID Headspace:	0.2	ppm

OBSERVATIONS / COMMENTS:

Sample zero - 50% clear / 50% sample water,

Sample Data Sheet

Lcoation Number: TB-05-46.5

Date: 4/15/97

SAMPLE DEPTH

Time:	15:27	
Total Depth Drilled:	46.5	ft
Pull Rack:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	3.65	ft
Static Water Level (TOP):	23.6	ft
Static Water Level (BGS):	19.95	ft

HYDRAULIC CONDUCTIVITY

Time:	15:36	
Drawdown:	1	ft
Flow Rate	188	ml/min

FLOW CELL READINGS

Time:	15:40	
pH:	4 94	
red/ox:	93.6	mV
Dissolved Oxygen:	-	ppm
Conductivity		uS/mS
Temperature:	15.8	°C

Sample Collection

Time	15:42
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time:	16:05			
Water Clarity	Semi-clear			
	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	2.8	ppm	0.9	ppm
Total Iron (6ppm):	3.2	ppm	1.2	ppm
Soluble Iron (12ppm):	-	ppm	-	ppm
Total Iron (12ppm):	-	ppm	-	ppm
Su tfide:	0.2	ppm	0	ppm
Dissolved Oxygen:	>2	ppm	>2	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time:	16:35	
FID Headspace:	0.3	ppm

OBSERVATIONS / COMMENTS:

Sample zero - 100% sample water.

Sample Data Sheet

Lcoation Number: TB-05-51.5

Date: 4/16/97

SAMPLE DEPTH

Time:	8:30	
Total Depth Drilled:	51.5	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	2.6	ft
Static Water Level (TOP):	22.03	ft
Static Water Level (BGS):	19.43	ft

HYDRAULIC CONDUCTIVITY

Time:	8:43	
Drawdown:	0.19	ft
Flow Rate	688	ml/min

FLOW CELL READINGS

Time:	8:54	
pH:	5.65	
red/ox:	-125	mV
Dissolved Oxygen:	1.5	ppm
Conductivity	28.1	uS/mS
Temperature:	63	°F

Sample Collection

Time	8:56
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time:	9:14			
Water Clarity	Semi-Clear			
	Clear		Sample	
	Zero		Zero	
Soluble Iron (6ppm):	3.2	ppm	1.25	ppm
Total Iron (6ppm):	3.45	ppm	1.45	ppm
Soluble Iron (12ppm):	-	ppm	-	ppm
Total Iron (12ppm):	-	ppm	-	ppm
Sulfide:	0.18	ppm	-	ppm
Dissolved Oxygen:	2.11	ppm	1.61	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time:	10:18	
FID Headspace:	1.2	ppm

OBSERVATIONS / COMMENTS:

Drove probe on 4-15-97, left overnight to recharge.

Sample zero - 25% clear / 75% sample water.

Sample Data Sheet

Lcoation Number: TA-06-33

Date: 4/15/97

SAMPLE DEPTH

Time:	8:34	
Total Depth Drilled:	33	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	1.25	ft
Static Water Level (TOP):	17.4	ft
Static Water Level (BGS):	16.15	ft

HYDRAULIC CONDUCTIVITY

Time:	8:45	
Drawdown:	1	ft
Flow Rate	232	mlirnin

FLOW CELL READINGS

Time:	9:10	
pH:	4.78	
red/ox:	106.2	mV
Dissolved Oxygen:		ppm
Conductivity		uS/mS
Temperature:	15	°C

Sample Collection

Time	9:11
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time:	9:23			
Water Clarity	Crystal Clear			
	Clear		Sample	
	Zero		Zero	
Soluble Iron (6ppm):	1	ppm	0.45	ppm
Total Iron (6ppm):	1.2	ppm	0.65	ppm
Soluble Iron (12ppm):	-	ppm	-	ppm
Total Iron (12ppm):	-	ppm	-	ppm
Sulfide:	0.02	ppm	0	ppm
Dissolved Oxygen:	>2	ppm	>2	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time:	10:09	
FID Headspace:	0	ppm

OBSERVATIONS / COMMENTS:

Installed probe in 4-14-97.

Sample zero - 100% sample water.

Sample Data Sheet

Lcoation Number: TB-06-38

Date: 4/15/97

SAMPLE DEPTH

Time:	8:36	
Total Depth Drilled:	38	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	2.22	ft
Static Water Level (TOP):	18.39	ft
Static Water Level (BGS):	16.17	ft

HYDRAULIC CONDUCTIVITY

Time:	8:50	
Drawdown:	1	ft
Flow Rate	85	ml/min

FLOW CELL READINGS

Time:	9:27	
pH:	5.05	
red/ox:	90.5	mV
Dissolved Oxygen:		ppm
Conductivity		uS/mS
Temperature:	14.8	°C

Sample Collection

Time	9:30
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time:	9:41			
Water Clarity	Clear			
	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	4.5	ppm	3.25	ppm
Total Iron (6ppm):	4.65	ppm	3.4	ppm
Soluble Iron (12ppm):	-	ppm	-	ppm
Total iron (12ppm):	-	ppm	-	ppm
Sulfide:	0.1	ppm	0	ppm
Dissolved Oxygen:	>2	ppm	>2	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time:	10:10	
FID Headspace:	0.8	ppm

OBSERVATIONS/COMMENTS:

Installed probe on 4-14-97, left overnight to recharge.

Sample zero-75% clear / 25% sample water,

Sample Data Sheet

Lcoation Number: TB-06-43

Date: 4/15/97

SAMPLE DEPTH

Time:	10:25	
Total Depth Drilled:	43	ft
Pull Back:	2	ft
Screen Extended:	1	ft
Pipe Stick Up Above Surface:	3.24	ft
Static Water Level (TOP):	19.9	ft
Static Water Level (BGS):	16.66	ft

HYDRAULIC CONDUCTIVITY

Time:	10:32	
Drawdown:	1	ft
Flow Rate	149	ml/min

FLOW CELL READINGS

Time:	10:46	
pH:	4.6	
red/ox:	120	mV
Dissolved Oxygen:		ppm
Conductivity		uS/mS
Temperature:	15.8	°C

Sample Collection

Time	10:48
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time:	10:58			
Water Clarity	CLOUDY			
	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	>6	ppm	'6	ppm
Total Iron (6ppm):	>6	ppm	>6	ppm
Soluble Iron (12ppm):	10.1	ppm	4.6	ppm
Total Iron (12ppm):	11.6	ppm	6.2	ppm
Sulfide:	0.79	ppm	0.34	ppm
Dissolved Oxygen:	2.29	ppm	1.19	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time:	12:00	
FID Headspace:	1.4	ppm

OBSERVATIONS I COMMENTS:

Sample zero - 75% clear/25% sample water.

Purged well prior to cond. test.

Sample Data Sheet

Lcoation Number: TB-46-48

Date: 4/15/97

SAMPLE DEPTH

Time:	11:12	
Total Depth Drilled:	48	ft
Pull Back:	2	ft
Screen Extended:	1	ft
Pipe Stick Up Above Surface:	2.25	ft
Static Water Level (TOP):	19.55	ft
Static Water Level (BGS):	17.3	ft

HYDRAULIC CONDUCTIVITY

Time:	11:17	
Drawdown:	1	ft
Flow Rate	89	mlimin

FLOW CELL READINGS

Time:	11:25	
pH:	5.39	
red/ox:	81.1	mV
Dissolved Oxygen:		ppm
Conductivity		uS/mS
Temperature:	15.4	°C

Sample Collection

Time	11:27
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time:	11:47			
Water Clarity	Very Cloudy			
	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	>6	ppm	>6	ppm
Total Iron (6ppm):	>6	ppm	>6	ppm
Soluble Iron (12ppm):	>12	ppm	10.2	ppm
Total Iron (12ppm):	>12	ppm	>12	ppm
Sulfide:	0.96	ppm	0.38	ppm
Dissolved Oxygen:	42	ppm	>2	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time:	12:01	
FID Headspace:	4.2	ppm

OBSERVATIONS /COMMENTS:

Sample zero - 75% clear / 25% sample water.

Purged well prior to conductivity test.

Sample Data Sheet

Lcoation Number: TB-07-27

Date: 4/16/97

SAMPLE DEPTH

Time:	10:15	
Total Depth Drilled:	27	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	1.21	ft
Static Water Level (TOP):	15.92	ft
Static Water Level (BGS):	14.71	ft

HYDRAULIC CONDUCTIVITY

Time:	10:26	
Drawdown:	1	ft
Flow Rate	300	ml/min

FLOW CELL READINGS

Time:	10:45	
pH:	4.78	
red/ox:	65	mV
Dissolved Oxygen:	3.6	ppm
Conductivity	269	uS/mS
Temperature:	63.6	°F

Sample Collection

Time	10:47
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time: 11:02

Water Clarity: CLOUDY

	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	6.35	ppm	3.1	ppm
Total Iron (6ppm):	>6	ppm	5.35	ppm
Soluble Iron (12ppm):	-	ppm	-	ppm
Total Iron (12ppm):	8.1	ppm	1.5	ppm
Sulfide:	0.96	ppm	0.46	ppm
Dissolved Oxygen:	>2	ppm	>2	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time: 12:45

FID Headspace: 1 ppm

OBSERVATIONS / COMMENTS:

Sample zero-75% clear / 25% sample water.

Sample Data Sheet

Lcoation Number: TB-07-32

Date: 4/16/97

SAMPLE DEPTH

Time:	10:15	
Total Depth Drilled:	32	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	2.17	ft
Static Water Level (TOP):	16.6	ft
Static Water Level (BGS):	14.43	ft

HYDRAULIC CONDUCTIVITY

Time:	10:36	
Drawdown:	1	ft
Flow Rate	23.5	mlimin

FLOW CELL READINGS

Time:	12;47	
pH:	4.4	
red/ox:	-93	mV
Dissolved Oxygen:	0.8	ppm
Conductivity	295	uS/mS
Temperature:	64.7	°F

Sample Collection

Time	12:49
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time:	13:01			
Water Clarity	Clear			
	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	1	ppm	0.05	ppm
Total Iron (6ppm):	1.15	ppm	0.1	ppm
Soluble Iron (12ppm):	-	ppm	-	ppm
Total Iron (12ppm):	-	ppm	-	ppm
Sulfide:	0.09	ppm	0	ppm
Dissolved Oxygen:	0.6	ppm	0.32	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time:	14:25	
FID Headspace:	0	ppm

OBSERVATIONS/COMMENTS:

Sample zero - 100% sample water.

Sample Data Sheet

Lcoation Number: TA-07-37

Date: 4/1 6197

SAMPLE DEPTH

Time:	12:33	
Total Depth Drilled:	37	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	1.17	ft
Static Water Level (TOP):	15.69	ft
Static Water Level (BGS):	14.52	ft

HYDRAULIC CONDUCTIVITY

Time:	12:47	
Drawdown:	1	ft
Flow Rate	537	ml/min

FLOW CELL READINGS

Time:	13:22	
pH:	5.21	
red/ox:	-19	mV
Dissolved Oxygen:	1.4	ppm
Conductivity	194	uS/mS
Temperature	65	°F

Sample Collection

Time	13:24
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time: 13:33

Water Clarity: Cloudy

	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	5.05	ppm	1.45	ppm
Total Iron (6ppm):	6.05	ppm	2.45	ppm
Soluble Iron (12ppm):	-	ppm	-	ppm
Total Iron (12ppm):	-	ppm	-	ppm
Sulfide:	0.48	ppm	0	ppm
Dissolved Oxygen:	>2	ppm	1.47	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time: 14:26

FID Headspace: 0.4 ppm

OBSERVATIONS / COMMENTS:

Sample zero - 25% clear / 75% sample water.

Sample Data Sheet

Lcoation Number: TB-07-42

Date: 4/16/97

SAMPLE DEPTH

Time:	13:40	
Total Depth Drilled:	42	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	2.26	ft
Static Water Level (TOP):	16.97	ft
Static Water Level (BGS):	14.71	ft

HYDRAULIC CONDUCTIVITY

Time:	14:11	
Drawdown:	1	ft
Flow Rate	543	ml/min

FLOW CELL READINGS

Time:	14:21	
pH:	5.1	
red/ox:	-387	mV
Dissolved Oxygen:	0.8	ppm
Conductivity	47.7	uS/mS
Temperature:	66.1	°F

Sample Collection

Time	14:23
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time: 14:32

Water Clarity: Clear

	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	1.75	ppm	0	ppm
Total Iron (6ppm):	2	ppm	0.05	ppm
Soluble Iron (12ppm):	-	ppm	-	ppm
Total Iron (12ppm):	-	ppm	-	ppm
Sulfide:	0.16	ppm	0	ppm
Dissolved Oxygen:	1.11	ppm	0.71	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time: 15:48

FID Headspace: 21 ppm

OBSERVATIONS / COMMENTS:

Sample zero - 100% sample water.

Sample Data Sheet

Lcoation Number: TB-07-47

Date: 4/16/97

SAMPLE DEPTH

Time:	15:01	
Total Depth Drilled:	47	ft
Pull Back:	3	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	0.46	ft
Static Water Level (TOP):	15.35	ft
Static Water Level (BGS):	14.89	ft

HYDRAULIC CONDUCTIVITY

Time:	15:03	
Drawdown:	1	ft
Flow Rate	304	ml/min

FLOW CELL READINGS

Time:	15:12	
pH:	4.46	
red/ox:	- 3 2 4	mV
Dissolved Oxygen:	0.4	ppm
Conductivity	54.5	uS/mS
Temperature:	64.8	°F

Sample Collection

Time	15:14
1 Liter Amber Jars	
40 ml VOA	4

COLORMETRIC TESTS

Time: 15:25

Water Clarity: CLOUDY

	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	>6	ppm	3.2	ppm
Total Iron (6ppm):	>6	ppm	4.25	ppm
Soluble Iron (12ppm):	5.5	ppm	-	ppm
Total Iron (12ppm):	7.5	ppm	0.1	ppm
Sulfide:	0.49	ppm	0	ppm
Dissolved Oxygen:	>2	ppm	1.42	ppm
Manganese (filtered); 0		ppm		ppm

GROUNDWATER HEADSPACE TEST

Time: 15:50

FID Headspace: 26 ppm

OBSERVATIONS / COMMENTS:

Sample zero - 25% clear / 75% sample water,

Very slow recharge w/ 2' pull back. Pulled back extra 1' - good recharge.

Sample Data Sheet

Lcoation Number: TB-08-25.5

Date: 4/18/97

SAMPLE DEPTH

Time:	9:00	
Total Depth Drilled;	25.5	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	0.6	ft
Static Water Level (TOP):	12.34	ft
Static Water Level (BGS):	11.74	ft

HYDRAULIC CONDUCTIVITY

Time:	9:09	
Drawdown:	1	ft
Flow Rate	90	ml/min

FLOW CELL READINGS

Time:	9:33	
pH:	5.06	
red/ox:	73	mV
Dissolved Oxygen:	7.1	ppm
Conductivity	269	uS/mS
Temperature:	594	°F

Sample Collection

Time	9:35
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time:	9:49			
Water Clarity	Crystal Clear			
	Clear		Sample	
	Zero		Zero	
Soluble Iron (6ppm):	0.4	ppm	0.1	ppm
Total Iron (6ppm):	0.5	ppm	0.1	ppm
Soluble Iron (12ppm):	-	ppm	-	ppm
Total Iron (12ppm):	-	ppm	-	ppm
Sulfide:	0	ppm	0	ppm
Dissolved Oxygen:	>2	ppm	>2	ppm
Manganese (filtered):	0.3	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time:	10:37	
FID Headspace:	0.9	ppm

OBSERVATIONS I COMMENTS:

Installed probe on 4-17-97. Left overnight to recharge.

Sample zero - 100% sample water.

Sample Data Sheet

Lcoation Number: TB-08-30.5

Date: 4/18/97

SAMPLE DEPTH

Time:	9:10	
Total Depth Drilled:	30.5	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	3.46	ft
Static Water Level (TOP):	15.13	ft
Static Water Level (BGS):	11.67	ft

HYDRAULIC CONDUCTIVITY

Time:	9:24	
Drawdown:	1	ft
Flow Rate	252	mlmin

FLOW CELL READINGS

Time:	10:01	
pH:	5.1	
red/ox:	-11	mV
Dissolved Oxygen:	3	ppm
Conductivity	273	uS/mS
Temperature:	68.6	°F

Sample Collection

Time	10:03
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time: 10:19

Water Clarity: Crystal Clear

	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	0.75	ppm	0.35	ppm
Total Iron (6ppm):	0.85	ppm	0.45	ppm
Soluble iron (12ppm):	-	ppm	-	ppm
Total Iron (12ppm):	-	ppm	-	ppm
Sulfide:	cl	ppm	0	ppm
Dissolved Oxygen:	>2	ppm	>2	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time: 10:39

FID Headspace: 0.3 ppm

OBSERVATIONS / COMMENTS:

Installed probe on 4-17-97. Left overnight to recharge.

Sample zero - 100% sample water.

Sample Data Sheet

Lcoation Number: TB-08-35.5

Date: 4/18/97

SAMPLE DEPTH

Time:	9:30	
Total Depth Drilled:	35.5	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	2.6	ft
Static Water Level (TOP):	14.21	ft
Static Water Level (BGS):	11.61	ft

HYDRAULIC CONDUCTIVITY

Time:	10:42	
Drawdown:	1	ft
Flow Rate	188	mlimin

FLOW CELL READINGS

Time:	11:06	
pH:	5.2	
red/ox:	-299	mV
Dissolved Oxygen:	0.7	ppm
Conductivity	181	uS/mS
Temperature:	60.8	°F

Sample Collection

Time	11:08
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time: 11:32

Water Clarity: Clear

	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	1.1	ppm	0.4	ppm
Total Iron (6ppm):	1.4	ppm	0.7	ppm
Soluble Iron (12ppm):	-	ppm	-	ppm
Total Iron (12ppm):	-	ppm	-	ppm
Sulfide:	0.03	ppm	0	ppm
Dissolved Oxygen:	0.62	ppm	0.45	ppm
Manganese (filtered):	0.3	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time: 14:10

FID Headspace: 1 ppm

OBSERVATIONS /COMMENTS:

Installed probe on 4-17-97. Left overnight to recharge.

Sample zero - 100% sample water.

Sample Data Sheet

Lcoation Number: TB-08-40.5

Date: 4/1 at97

SAMPLE DEPTH

Time:	11:40	
Total Depth Drilled:	40.5	ft
Pull Back:	2	ft
Screen Extended:	1.5	ft
Pipe Stick Up Above Surface:	1.6	ft
Static Water Level (TOP):	13.75	ft
Static Water Level (BGS):	12.15	ft

HYDRAULIC CONDUCTIVITY

Time:	11:53	
Drawdown:	1	ft
Flow Rate	70	ml/min

FLOW CELL READINGS

Time:	1215	
pH:	5.6	
red/ox:	-485	mV
Dissolved Oxygen:	1.8	ppm
Conductivity	62	uS/mS
Temperature:	61.3	°F

Sample Collection

Time	12:17
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time:	12:33			
Water Clarity	Cloudy			
	Clear		Sample	
	Zero		Zero	
Soluble Iron (6ppmj:	6.45	ppm	3.35	ppm
Total Iron (6ppm):	>6	ppm	4.25	ppm
Soluble Iron (12ppm):	-	ppm	-	ppm
Total Iron (12ppm):	7.9	ppm	0.7	ppm
Sulfide:	0.4	ppm	0	ppm
Dissolved Oxygen:	1.81	ppm	0.99	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time:	14:10	
FID Headspace:	3	ppm

OBSERVATIONS / COMMENTS:

Sample zero 100% sample water.

Sample Data Sheet

Lcoation Number: TB-08-45.5

Date: 4/18/97

SAMPLE DEPTH

Time:	13:45	
Total Depth Drilled:	45.5	ft
Pull Back:	3	ft
Screen Extended:	3	ft
Pipe Stick Up Above Surface:	-	ft
Static Water Level (TOP):		ft
Static Water Level (BGS):		ft

HYDRAULIC CONDUCTIVITY

Time:		
Drawdown:		ft
Flow Rate		ml/min

FLOW CELL READINGS

Time:		
pH:		
red/ox:		mV
Dissolved Oxygen:		ppm
Conductivity		uS/mS
Temperature:		°F

Sample Collection

Time	14:02
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

	Time: 14:30		Sample	
Water Clarity	Cloudy			
	Clear		Sample	
	Zero		Zero	
Soluble Iron (6ppm):	>6	ppm	>6	ppm
Total Iron (6ppm):	>6	ppm	>6	ppm
Soluble Iron (12ppm):	13.9	ppm	7.1	ppm
Total Iron (12ppm):	14.3	ppm	10.3	ppm
Sulfide:	0.27	ppm	0	ppm
Dissolved Oxygen:	-	ppm	-	ppm
Manganese (filtered):	2	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time:

FID Headspace: ppm

OBSERVATIONS / COMMENTS:

Very slow recharge. Pulled back additional 1 foot, no additional flow. Water was very turbid would not clear. Very slow pumping rate, no conductivity test, flow cell or headspace test.

Conducted colormetric test by allowing sample to settle.

SAMPLE DATA SHEET

Location Number: TB-09-29'
Date: 4-7-96

SAMPLE DEPTH

Date:	4-7-96	
Time:	15:28	
Total Depth Drilled:	29	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	1.13	ft
Static Water Level (TOP):	11.18	ft
Static Water Level (BGS):	10.05	ft

HYDRAULIC CONDUCTIVITY

Drawdown:	1	ft
Time:	1600	
Flow Rate 22Hz/43s	312.5	ml/min

COLORMETRIC TESTS

Time:	16:26	
Water Clarity	Semi-Clear	
Soluble Iron (0-6ppm/un-filtered):	1.7	ppm
Total Iron (0-6ppm/un-filtered):	1.85	ppm
Soluble Iron (0-12ppm/un-filtered):	—	ppm
Total Iron (0-12ppm/un-filtered):	—	ppm
Soluble Iron (0-6ppm/filtered):	—	ppm
Total Iron (0-6ppm/filtered):	—	ppm
Soluble Iron (0-12ppm/filtered):	—	ppm
Total Iron (0-12ppm/filtered):	—	ppm
Sulfide (un-filtered):	.14	ppm
Sulfide (filtered):	—	ppm
Dissolved Oxygen;	>2	ppm
Manganese (filtered):	0	ppm

FLOW CELL READINGS

Time:	16:19	
pH:	4.84	
red/ox:	148	mV
Dissolved Oxygen:	6.5	ppm
Conductivity	—	µS/mS
Temperature:	68.0	°F

GROUNDWATER HEADSPACE TEST

Time:	16:52	
FID Headspace:	0	ppm

Sample Collection

Time	16:20
1 Liter Amber Jars	3
40 ml VOA	4

SAMPLE DATA SHEET

Location Number: TB-09-34'
Date: 4-8-97

SAMPLE DEPTH

Date:	4-7-97	
Time:	15:55	
Total Depth Drilled:	34'	ft
Pull Back:	2	ft
Screen Extended:	2'	ft
Pipe Stick Up Above Surface:	33	ft
Static Water Level (TOP):	10.35	ft
Static Water Level (BGS):	10.02	ft

HYDRAULIC CONDUCTIVITY

Drawdown:	1	ft
Time:	8:42	
Flow Rate 2 liters/min	143.9	ml/min

COLORMETRIC TESTS

Time:	0918	
water Clarity	CLEAR	
Soluble Iron (0-6ppm/un-filtered):	1.45	ppm
Total Iron (0-6ppm/un-filtered):	1.55	ppm
Soluble Iron (0-12ppm/un-filtered):	—	ppm
Total Iron (0-12ppm/un-filtered):	—	ppm
Soluble Iron (0-6ppm/filtered):	—	ppm
Total Iron (0-6ppm/filtered):	—	ppm
Soluble Iron (0-12ppm/filtered):	—	ppm
Total Iron (0-12ppm/filtered):	—	ppm
Sulfide (un-filtered):	.07	ppm
Sulfide (filtered):	—	ppm
Dissolved Oxygen:	>2.0	ppm
Manganese (filtered):	0	ppm

FLOW CELL READINGS

Time:	0906	
pH:	5.0	
red/ox:	—	
Dissolved Oxygen:	6.8	ppm
Conductivity	—	
Temperature;	15.4	°C

GROUNDWATER HEADSPACE TEST

Time:	10:20	
FID Headspace:	0	ppm

Comments:
- INSTALLED PIPE ON 4-7-97.
- SAMPLED ON 4-8-97
- LEFT PIPE IN GROUND OVERNIGHT

VERY SLOW RECHARGE.

Sample Collection

Time	0915
1 Liter Amber Jars	3
40 ml VOA	4

SAMPLE DATA SHEET

Location Number: TB-09-39

Date: 4-8-97

SAMPLE DEPTH

Time:	9:28	
Total Depth Drilled:	39	ft
Pull Back:	2	ft
Screen Extended;	1.5	ft
Pipe Stick Up Above Surface:	3.13	ft
Static Water Level (TOP):	13.23	ft
Static Water Level (BGS):	10.10	ft

HYDRAULIC CONDUCTIVITY

Time:	10:07	
Drawdown:	1	ft
Flow Rate Q_1 =	14.52	ml/min

11:20 → Q_2 = 23 mL/min

FLOW CELL READINGS

Time:	11:50	
pH:	5.22	
red/ox:	82.8	mV
Dissolved Oxygen:	7.7	ppm
Conductivity	—	uS/mS
Temperature:	16.6	°C

Sample Collection

Time	11:57
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time: 12:02

Water Clarity: CLEAR

			Clear Zero	Sample Zero
Soluble Iron (6ppm):	2.35	ppm		ppm
Total Iron (6ppm):	3.05	ppm		ppm
Soluble Iron (12ppm):	—	ppm		ppm
Total Iron (12ppm):	—	ppm		ppm
Soluble Iron (6ppm):	—	ppm		ppm
Total Iron (6ppm):	—	ppm		ppm
Soluble Iron (12ppm):	—	ppm		ppm
Total Iron (12ppm):	—	ppm		ppm
Sulfide:	.12	ppm		ppm
Dissolved Oxygen:	>2.0	ppm		ppm
Manganese (filtered):	.3	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time: 12:30

FID Headspace: 3 ppm

OBSERVATIONS / COMMENTS:

DRAWDOWN FLOW RATES WERE MEASURED BEFORE AND AFTER WELL PURGING.

SAMPLE RATA SHEET

Location Number: TB-(89-44

Date: 4-8-97

SAMPLE DEPTH

Time:	10:00	
Total Depth Drilled:	44	ft
Pull Back:	2	ft
Screen Extended:	1.5	ft
Pipe Stick Up Above Surface:	2.08	ft
Static Water Level (TOP):	12.37	ft
static Water Level (BGS):	10.29	ft

HYDRAULIC CONDUCTIVITY

Time:	10:58	
Drawdown:	1	ft
Flow Rate	34.9	ml/min

FLOW CELL READINGS

Time:	11:14	
pH:	5.65	
red/ox:	64.2	mV
Dissolved Oxygen:	6.6	ppm
Conductivity	—	uS/mS
Temperature:	15.1	°C

COLORMETRIC TESTS

Time: 11:50

Water Clarity: Cloudy

	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	>6	ppm		ppm
Total Iron (6ppm):	>6	ppm		ppm
Soluble Iron (12ppm):	8.6	ppm		ppm
Total Iron (12ppm):	10.9	ppm		ppm
UNFILTERED Soluble Iron (6ppm):	4.6	ppm		ppm
Total Iron (6ppm):	4.85	ppm		ppm
Soluble Iron (12ppm):	—	ppm		ppm
Total iron (12ppm):	—	ppm		ppm
Sulfide:	Ø	ppm		ppm
Dissolved Oxygen:	>20	ppm		ppm
Manganese (filtered):	Ø	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time: 12:30

FID Headspace: .8 ppm

OBSERVATIONS / COMMENTS:

Sample Collection

Time	11:17
1 Liter Amber Jars	3
40 ml VOA	4

Sample Data Sheet

Lcoation Number: TB- 1 O-28

Date: 4/25/97

SAMPLE DEPTH

Time:	14:16	
Total Depth Drilled:	28	ft
Pull Back:	2	ft
Screen **Extended:**	2	ft
Pipe Stick Up Above Surface:	2.17	ft
Static Water Level (TOP):	13.11	ft
Static Water Level (BGS):	10.94	ft

HYDRAULIC CONDUCTIVITY

Time:	14:23	
Drawdown:	1	ft
Flow Rate	51	ml/min

FLOW CELL READINGS

Time:	14:36	
pH:	4.69	
red/ox:	19	mV
Dissolved Oxygen:	8.6	ppm
Conductivity	464	uS/mS
Temperature:	65.5	°F

Sample Collection

Time	14:38
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time:	14:45			
Water Clarity	Crystal clear			
	Clear		Sample	
	Zero		Zero	
Soluble Iron (6ppm):	>6	ppm	>6	ppm
Total Iron (6ppm):	26	ppm	>6	ppm
Soluble iron (12ppm):	>12	ppm	>12	ppm
Total Iron (12ppm):	>12	ppm	>12	ppm
Sulfide:	0.05	ppm	0	ppm
Dissolved Oxygen:	0.92	ppm	0.77	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time:	15:37	
FID Headspace:	420	ppm

OBSERVATIONS / COMMENTS:

Strange odor coming from sample.

With pump at max flow, pumped probe dry

Sample zero - 1 00% sample water.

Sample Data Sheet

Lcoation Number: TB-1 O-33

Date: 4/25/97

SAMPLE DEPTH

Time:	14:25	
Total Depth Drilled:	33	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	1.13	ft
Static Water Level (TOP):	12.03	ft
Static Water Level (BGS):	10.9	ft

HYDRAULIC CONDUCTIVITY

Time:	14:28	
Drawdown:	1	ft
Flow Rate	340	ml/min

FLOW CELL READINGS

Time:	14:49	
pH:	4.62	
red/ox:	-95	mV
Dissolved Oxygen:	0.3	ppm
Conductivity	443	uS/mS
Temperature:	66	°F

Sample Collection

Time	14:51
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time: 15:00

Water Clarity: Semi-clear

	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	2.35	ppm	0.6	ppm
Total Iron (6ppm):	2.45	ppm	0.7	ppm
Soluble Iron (12ppm):	-	ppm	-	ppm
Total Iron (12ppm):	-	ppm	-	ppm
Sulfide:	0.15	ppm	0	ppm
Dissolved Oxygen:	1	ppm	0.53	ppm
Manganese (filtered):	>2	ppm	. .	ppm

GROUNDWATER HEADSPACE TEST

Time: 15:39

FID Headspace: 90 ppm

OBSERVATIONS /COMMENTS:

Sample zero - 100% sample water.

Collected equipment blank #4, ELQBLK-4 @ 15:13.

just after collecting TB-1 O-33.

Sample Data Sheet

Lcoation Number: TB-1 O-38

Date: 4/28/97

SAMPLE DEPTH

Time:	9:02	
Total Depth Drilled:	38	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	3.56	ft
Static Water Level (TOP):	14.5	ft
Static Water Level (BGS):	10.94	ft

HYDRAULIC CONDUCTIVITY

Time:	9:15	
Drawdown:	1	ft
Flow Rate	10	ml/min

FLOW CELL READINGS

Time:	9:39	
pH:	5.41	
red/ox:	-326	mV
Dissolved Oxygen:	8.8	ppm
Conductivity	335	uS/mS
Temperature:	65.8	°F

Sample Collection

Time	9:41
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time: 10:03

Water Clarity: Cloudy

			Clear Zero		Sample Zero	
Soluble Iron (6ppm):	>6	ppm	>6	ppm	4.95	ppm
Total Iron (6ppm):	>6	ppm	>6	ppm	5.5	ppm
Soluble Iron (12ppm):	8.1	ppm	8.1	ppm	-	ppm
Total Iron (12ppm):	9.3	ppm	9.3	ppm	-	ppm
Sulfide:	0.48	ppm	0.48	ppm	0	ppm
Dissolved Oxygen:	>2	ppm	>2	ppm	1.47	ppm
Manganese (filtered):	0.8	ppm	0.8	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time: 11:45

FID Headspace: 80 ppm

OBSERVATIONS / COMMENTS:

Installed on 4/25/97.

Pumped probe dry during purging and flow cell readings.

Sample zero - 100% sample water.

Sample Data Sheet

Lcoation Number: TB-1 O-43

Date: 4/28/97

SAMPLE DEPTH

Time:	9:04	
Total Depth Drilled:	43	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	4.08	ft
Static Water Level (TOP):	14.85	ft
Static Water Level (BGS):	10.77	ft

HYDRAULIC CONDUCTIVITY

Time:	10:25	
Drawdown:	1	ft
Flow Rate	26	mlimin

FLOW CELL READINGS

Time:	10:37	
pH:	5.95	
red/ox:	-377	mV
Dissolved Oxygen:	0	ppm
Conductivity	184	uS/mS
Temperature	66	°F

Sample Collection

Time	10:39
1 Liter Amber Jars	2
40 ml VOA	4

COLORMETRIC TESTS

Time:	10:57			
Water Clarity	Cloudy			
	Clear		Sample	
	Zero		Zero	
Soluble Iron (6ppm):	>6	ppm	>6	ppm
Total Iron (6ppm):	>6	ppm	>6	ppm
Soluble Iron (12ppm):	11.3	ppm	3.7	ppm
Total Iron (12ppm):	13.6	ppm	5.7	ppm
Sulfide:	0.69	ppm	0.11	ppm
Dissolved Oxygen:	>2	ppm	1.48	ppm
Manganese (filtered):	0.6	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time:	11:47	
FID Headspace:	60	ppm

OBSERVATIONS /COMMENTS:

Sample zero - 50% sample / 50% clear water.

Installed on 4/25/97.

Bubbles in sample line during purge and flow cell readings.

Refusal @ 43'.

Sample Data Sheet

Lcoation Number: TB-1 O-48

Date: 4/25/97

SAMPLE DEPTH

Time: _____

Total Depth Drilled: _____ ft

Pull Back: _____ ft

Screen Extended: _____ ft

Pipe Stick Up Above Surface: _____ ft

Static Water Level (TOP): _____ ft

Static Water Level (BGS): _____ ft

HYDRAULIC CONDUCTIVITY

Time: _____

Drawdown: _____ ft

Flow Rate _____ ml/min

FLOW CELL READINGS

Time: _____

pH: _____

red/ox: _____ mV

Dissolved Oxygen: _____ ppm

Conductivity _____ uS/mS

Temperature: _____ °F

Sample Collection

Time _____

1 Liter Amber Jars _____

40 ml VOA _____

COLORMETRIC TESTS

Time: _____

Water Clarity _____

	Clear Zero	Sample Zero
Soluble Iron (6ppm):	_____ ppm	_____ ppm
Total Iron (6ppm):	_____ ppm	_____ ppm
Soluble Iron (12ppm):	_____ ppm	_____ ppm
Total Iron (12ppm):	_____ ppm	_____ ppm
Sulfide:	_____ ppm	_____ ppm
Dissolved Oxygen:	_____ ppm	_____ ppm
Manganese (filtered):	_____ ppm	_____ ppm

GROUNDWATER HEADSPACE TEST

Time: _____

FID Headspace: _____ ppm

OBSERVATIONS /COMMENTS:

Probe refusal @ 43'. No sample / data collected.

SAMPLE DATA SHEET

Location Number: TC-01-25'
Date: 4-4-97

SAMPLE DEPTH

Time:	13:30	
Total Depth Drilled:	25	ft
Pull Back:	2	ft
Screen Extended:	1.5	ft
Pipe Stick Up Above Surface:	1.48	ft
Static Water Level (TOP):	ft 15.9	
Static Water Level (BGS):	14.42	ft

HYDRAULIC CONDUCTIVITY

Time:	1410	
Drawdown:	1	ft
Flow Rate	205.3	ml/min

FLOW CELL READINGS

Time:	14:33	
pH:	5.57	
red/ox:	-9	mV
Dissolved Oxygen:	8.3	ppm
Conductivity	82.2	uS/mS
Temperature:	69.8	°F

COLORMETRIC TESTS

Time: 14:46
Water Clarity: Clear

	Clear Zero	Sample Zero
Soluble Iron (6ppm):	2.8 ppm	ppm
Total Iron (6ppm):	3.0 ppm	ppm
Soluble Iron (12ppm):	— ppm	ppm
Total Iron (12ppm):	— ppm	ppm
Soluble Iron (6ppm):	— ppm	ppm
Total iron (6ppm):	— ppm	ppm
Soluble Iron (12ppm):	— ppm	ppm
Total Iron (12ppm):	— ppm	ppm
Sulfide:	.05 ppm	ppm
Dissolved Oxygen:	2.6	ppm
Manganese (filtered):	0 ppm	ppm

GROUNDWATER HEADSPACE TEST

Time: No Reading
FID Headspace: _____ ppm

OBSERVATIONS/COMMENTS:

Sample Collection

Time	14:35
1 Liter Amber Jars	3
40 ml VOA	4

SAMPLE DATA SHEET

Location Number: TC-01-30
Gate: 4-4-97

DEPTHE

Time:	13:50	
Total Depth Drilled;	30	ft
Pull Back:	2	ft
Screen Extended:	1.5	ft
Pipe Stick Up Above Surface:	.37	ft
Static Water Level (TOP):	15'	ft
Static Water Level (BGS):	14.63	ft

HYDRAULIC/ITY

Time:	1431	
Drawdown:	1	ft
Flow Rate	440	ml/min

FLOW CELL READINGS

Time.:	1456	
pH:	5.17	
red/ox:	19	mV
Dissolved Oxygen:	5.1	ppm
Conductivity	71.0	uS/mS
Temperature;	69.6	°F

Sample Collection

Time	1459
1 liter Amber Jars	3
40 ml VOA	4

COLORMETRIC

Time: 1510
Water Clarity: CLEAR

	Clear Zero	Sample Zero
Soluble Iron (6ppm):	2 3 5 ppm	ppm
Total Iron (6ppm):	2.5 ppm	ppm
Soluble Iron (12ppm):	— ppm	ppm
Total Iron (12ppm):	— ppm	ppm
Soluble Iron (6ppm):	— ppm	ppm
Total Iron (6ppm):	— ppm	ppm
Soluble Iron (12ppm):	— ppm	ppm
Total Iron (12ppm):	— ppm	ppm
Sulfide:	.07 ppm	ppm
Dissolved Oxygen:	>2.0 m	ppm
Manganese (filtered)	0p m	ppm

GROUNDWATER HEADSPACE TEST

Time: 15:34
FID Headspace: 0 ppm

OBSERVATIONS / COMMENTS:

Sample Data Sheet

Lcoation Number: TC-02-27

Date: 4/24/97

SAMPLE DEPTH

Time:	14:15	
Total Depth Drilled:	27	ft
Pull Back:	2	ft
Screen Extended:	1	ft
Pipe Stick Up Above Surface:	3.88	ft
Static Water Level (TOP):	20.03	ft
Static Water Level (BGS):	16.15	ft

HYDRAULIC CONDUCTIVITY

Time:	14:24	
Drawdown:	1	ft
Flow Rate	42	mlirnin

FLOW CELL READINGS

Time:	14:32	
pH:	5.66	
red/ox:	-204	mV
Dissolved Oxygen:	2.9	ppm
Conductivity	120	uS/mS
Temperature:	61.3	°F

Sample Collection

Time	14:34
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time:	14:45			
Water Clarity	Clear			
	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	4.4	ppm	3.9	ppm
Total Iron (6ppm):	4.35	ppm	3.9	ppm
Soluble Iron (12ppm):	-	ppm	-	ppm
Total Iron (12ppm):	-	ppm	-	ppm
Sulfide:	0.03	ppm	0	ppm
Dissolved Oxygen:	2.04	ppm	1.9	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time:	15:35	
FID Headspace:	4	ppm

OBSERVATIONS /COMMENTS:

Pumped probe dry while taking flow cell readings, reduced flow rate.

Sample zero - 100% sample water.

Sample Data Sheet

Lcoation Number: TC-02-32

Date: 4/24/97

SAMPLE DEPTH

Time:	14:20	
Total Depth Drilled:	32	ft
Pull Back:	2	ft
Screen Extended:	1.5	ft
Pipe Stick Up Above Surface:	2.2	ft
Static Water Level (TOP):	18.35	ft
Static Water Level (BGS):	16.15	ft

HYDRAULIC CONDUCTIVITY

Time:	14:27	
Drawdown:	1	ft
Flow Rate	55	mlitnin

FLOW CELL READINGS

Time:	14:45	
pH:	5.29	
red/ox:	-99	mV
Dissolved Oxygen:	1.6	ppm
Conductivity	74.4	uS/mS
Temperature:	62	°F

Sample Collection

Time	14:47
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time:	15:02			
Water Clarity	Clear			
	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	1.75	ppm	1.2	ppm
Total Iron (6ppm):	2.05	ppm	1.6	ppm
Soluble Iron (12ppm):	-	ppm	-	ppm
Total Iron (12ppm):	-	ppm	-	ppm
Sulfide:	0.01	ppm	0	ppm
Dissolved Oxygen:	1.99	ppm	1.89	ppm
Manganese (filtered):	0.3	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time:	15:37	
FID Headspace:	1.8	ppm

OBSERVATIONS / COMMENTS:

Sample zero - 100% sample water.

Sample Data Sheet

Lcoation Number: TC-02-37

Date: 4/24/97

SAMPLE DEPTH

Time:	15:54	
Total Depth Drilled:	37	ft
Pull Rack:	2	ft
Screen Extended:	1	ft
Pipe Stick Up Above Surface:	1.98	ft
Static Water Level (TOP):	18.1	ft
Static Water Level (BGS):	16.12	ft

HYDRAULIC CONDUCTIVITY

Time:	15:58	
Drawdown:	1	ft
Flow Rate	110	mlimin

FLOW CELL READINGS

Time:	16:10	
pH:	4.53	
red/ox:	-73	mV
Dissolved Oxygen:	2	ppm
Conductivity	72.8	uS/mS
Temperature:	64.1	°F

Sample Collection

Time	16:12
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time: 16:16

Water Clarity: Cloudy

	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	5.5	ppm	1.65	ppm
Total Iron (6ppm):	7.1	ppm	3.05	ppm
Soluble Iron (12ppm):	-	ppm	-	ppm
Total Iron (12ppm):	-	ppm	-	ppm
Sulfide:	0.44	ppm	0	ppm
Dissolved Oxygen:	>2	ppm	>2	ppm
Manganese (filtered):	0.3	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time:

FID Headspace: ppm

OBSERVATIONS I COMMENTS:

No FID reading.

Sample zero - 100% sample water.

Sample Data Sheet

Lcoation Number: TC-02-42

Date: 4/24/97

SAMPLE DEPTH

Time:	16:59	
Total Depth Drilled:	42	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	1.25	ft
Static Water Level (TOP):	17.7	ft
Static Water Level (BGS):	16.45	ft

HYDRAULIC CONDUCTIVITY

Time:	17:04	
Drawdown:	0.88	ft
Flow Rate	582	mlimin

FLOW CELL READINGS

Time:	17:14	
pH:	4.84	
fed/ox:	-70	mV
Dissolved Oxygen:	3.9	ppm
Conductivity	69.2	uS/mS
Temperature:	62.7	°F

Sample Collection

Time	17:16
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time: 17:28

Water Clarity: Semi-clear

	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	2.35	ppm	0.45	ppm
Total Iron (6ppm):	3	ppm	1.05	ppm
Soluble Iron (12ppm):	-	ppm	-	ppm
Total Iron (12ppm):	-	ppm	-	ppm
Sulfide:	0.21	ppm	0	ppm
Dissolved Oxygen:	>2	ppm	>2	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time:

FID Headspace: ppm

OBSERVATIONS /COMMENTS:

Drawdown: 17.7' to 18.58' BGS

No FID reading,

Sample zero - 100% sample water.

Sample Data Sheet

Lcoation Number: TC-03-29

Date: 4/24/97

SAMPLE DEPTH

Time:	8:40	
Total Depth Drilled:	29	ft
Pull Back:	2	ft
Screen Extended:	1.29	ft
Pipe Stick Up Above Surface:	15.5	ft
Static Water Level (TOP):	18.33	ft
Static Water Level (BGS):	17.04	ft

HYDRAULIC CONDUCTIVITY

Time:	8:57	
Drawdown:	1	ft
Flow Rate	176	ml/min

FLOW CELL READINGS

Time:	9:12	
pH:	5.38	
red/ox:	-104	mV
Dissolved Oxygen:	8.4	ppm
Conductivity	104	uS/mS
Temperature:	61	°F

Sample Collection

Time	9:14
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time:	9:20			
Water Clarity	Semi-clear			
	Clear		Sample	
	Zero		Zero	
Soluble Iron (6ppm):	1.35	ppm	0.45	ppm
Total Iron (6ppm):	1.5	ppm	0.5	ppm
Soluble Iron (12ppm):	-	ppm	-	ppm
Total Iron (12ppm):	-	ppm	-	ppm
Sulfide:	0.07	ppm	0	ppm
Dissolved Oxygen:	>2	ppm	>2	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time:	10:52
FID Headspace:	0.4 ppm

OBSERVATIONS / COMMENTS:

Installed on 4/23/97.

Sample zero - 100% sample water.

Sample Data Sheet

Lcoation Number: TC-03-34

Date: 4/24/97

SAMPLE DEPTH

Time:	8:45	
Total Depth Drilled:	34	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	2.37	ft
Static Water Level (TOP):	19.46	ft
Static Water Level (BGS):	17.09	ft

HYDRAULIC CONDUCTIVITY

Time:	9:06	
Drawdown:	1	ft
Flow Rate	107	ml/min

FLOW CELL READINGS

Time:	9:28	
pH:	5.38	
red/ox:	-25	mV
Dissolved Oxygen:	6.6	ppm
Conductivity	93.1	uS/mS
Temperature:	60.8	°F

Sample Collection

Time	9:30
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time:	9:40			
Water Clarity	Clear			
	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	1.1	ppm	0.55	ppm
Total Iron (6ppm):	1.2	ppm	0.65	ppm
Soluble Iron (12ppm):	-	ppm	-	ppm
Total Iron (12ppm):	-	ppm	-	ppm
Sulfide:	0.01	ppm	0	ppm
Dissolved Oxygen:	>2	ppm	>2	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time:	10:54	
FID Headspace:	0.8	ppm

OBSERVATIONS / COMMENTS:

Installed on 4/23/97

Sample zero - 100% sample water.

Sample Data Sheet

Lcoation Number: TC-03-34

Date: 4/24/97

SAMPLE DEPTH

Time:	11 :oo	
Total Depth Drilled:	39	ft
Pull Back:	2	ft
Screen Extended:	1	ft
Pipe Stick Up Above Surface:	3.23	ft
Static Water Level (TOP):	20.7	ft
Static Water Level (BGS):	17.47	ft

HYDRAULIC CONDUCTIVITY

Time:	11:02	
Drawdown:	1	ft
Flow Rate	110	mlimin

FLOW CELL READINGS

Time:	11:13	
pH:	5.46	
red/ox:	-57	mV
Dissolved Oxygen:	4.1	ppm
Conductivity	88.2	uS/mS
Temperature:	62.6	°F

Sample Collection

Time	11:15
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time: 11:23

Water Clarity: Cloudy

	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	>6	ppm	6.6	ppm
Total Iron (6ppm):	>6	ppm	>6	ppm
Soluble Iron (12ppm):	7.8	ppm	2.1	ppm
Total Iron (12ppm):	12	ppm	6.1	ppm
Sulfide:	0.74	ppm	0.28	ppm
Dissolved Oxygen:	>2	ppm	>2	ppm
Manganese (filtered):	>2	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time: 12:31

FID Headspace: 0.6 ppm

OBSERVATIONS I COMMENTS:

Sample zero - 50% clear / 50% sample water,

Sample Data Sheet

Lcoation Number: TC-03-44

Date: 4/24/97

SAMPLE DEPTH

Time:	11:41	
Total Depth Drilled:	44	ft
Pull Back:	3	ft
Screen Extended:	3	ft
Pipe Stick Up Above Surface:	3.4	ft
Static Water Level (TOP):	22.09	ft
Static Water Level (BGS):	18.69	ft

HYDRAULIC CONDUCTIVITY

Time:	11:46	
Drawdown:	1	ft
Flow Rate	40.8	ml/min

FLOW CELL READINGS

Time:	11:56	
pH:	5.09	
red/ox:	-37	mV
Dissolved Oxygen:	28	ppm
Conductivity	77.7	uS/mS
Temperature:	62.4	°F

Sample Collection

Time	11:58
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time:	12:065			
Water Clarity	Semi-clear			
	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	2.85	ppm	0.75	ppm
Total Iron (6ppm):	3.5	ppm	1.4	ppm
Soluble Iron (12ppm):	-	ppm	-	ppm
Total Iron (12ppm):	-	ppm	-	ppm
Sulfide:	0.19	ppm	0	ppm
Dissolved Oxygen:	>2	ppm	2.2	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time:	12:32	
FID Headspace:	0.7	ppm

OBSERVATIONS I COMMENTS:

Pulled back 2' - no recharge

Pulled back additional 1' - goad recharge.

Sample zero - 100% sample water.

Sample Data Sheet

Lcoation Number: TC-04-30

Date: 4/23/97

SAMPLE DEPTH

Time:	9:30	
Total Depth Drilled:	30	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	0.25	ft
Static Water Level [TOP]:	14.17	ft
Static Water Level (BGS):	13.92	ft

HYDRAULIC CONDUCTIVITY

Time:	9:35	
Drawdown:	1	ft
Flow Rate	70	mlimin

FLOW CELL READINGS

Time:	9:46	
pH:	5	
red/ox:	142	mV
Dissolved Oxygen:	6.1	ppm
Conductivity	135	uS/mS
Temperature:	63.3	°F

Sample Collection

Time	9:48
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time:	9:58			
Water Clarity	Cloudy			
	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	1.1	ppm	0.25	ppm
Total Iron (6ppm):	1.05	ppm	0.3	ppm
Soluble Iron (12ppm):	-	ppm	-	ppm
Total Iron (12ppm):	-	ppm	-	ppm
Sulfide:	0.04	ppm	0	ppm
Dissolved Oxygen:	>2	ppm	>2	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time:	10:30	
FID Headspace:	0	ppm

OBSERVATIONS/COMMENTS:

Sample zero - 100% sample water.

Sample Data Sheet

Lcoation Number: TC-04-35

Date: 4/23/97

SAMPLE DEPTH

Time:	10:10	
Total Depth Drilled:	35	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	3.3	ft
Static Water Level (TOP):	17.2	ft
Static Water Level (BGS):	13.9	ft

HYDRAULIC CONDUCTIVITY

Time:	10:14	
Drawdown:	1	ft
Flow Rate	144	mlimin

FLOW CELL READINGS

Time:	10:32	
pH:	5.13	
red/ox:	2	mV
Dissolved Oxygen:	8.8	ppm
Conductivity	16-i	uS/mS
Temperature:	62.8	°F

Sample Collection

Time	10:34
I Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time:	10:39			
Water Clarity	Crystal Clear			
	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	0.65	ppm	0.3	ppm
Total Iron (6ppm):	0.9	ppm	0.5	ppm
Soluble Iron (12ppm):	-	ppm	-	ppm
Total Iron (12ppm):	-	ppm	-	ppm
Sulfide:	0.01	ppm	0	ppm
Dissolved Oxygen:	>2	ppm	>2	ppm
Manganese (filtered):	0.3	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time:	10:35	
FID Headspace:	0	ppm

OBSERVATIONS / COMMENTS:

Sample zero - 100% sample water.

Sample Data Sheet

Lcoation Number: TC-04-40

Date: 4/23/97

SAMPLE DEPTH

Time:	10:50	
Total Depth Drilled:	40	ft
Pull Back:	3	ft
Screen Extended:	3	ft
Pipe Stick Up Above Surface:	3.55	ft
Static Water Level (TOP):	17.5	ft
Static Water Level (BGS):	13.95	ft

HYDRAULIC CONDUCTIVITY

Time:		
Drawdown:		ft
Flow Rate		mlirnin

FLOW CELL READINGS

Time:	11:15	
pH:	5.11	
red/ox:	179	mV
Dissolved Oxygen:	5.5	ppm
Conductivity	*100*	uS/mS
Temperature:	63.3	°F

Sample Collection

Time	11:17
1 Liter Amber Jars	3
40 ml VOA	A

COLORMETRIC TESTS

		Clear Zero		Sample Zero	
Time:	11:22				
Water Clarity	Semi-clear				
Soluble Iron (6ppm):		1.05	ppm	0	ppm
Total Iron (6ppm):		1.2	ppm	0	ppm
Soluble Iron (12ppm):		-	ppm	-	ppm
Total Iron (12ppm):		-	ppm	-	ppm
Sulfide:		0.1	ppm	0	ppm
Dtssolved Oxygen:		>2	ppm	>2	ppm
Manganese (filtered):		0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time:	12:36
FID Headspace:	0 ppm

OBSERVATIONS/COMMENTS:

Little recharge w/ 2' of pull back. Pulled back additional 1' - good recharge.

Attempted drawdown test: pumped at max flow but produced no drawdown

Sample zero - 100% sample water.

Sample Data Sheet

Lcoation Number: TC-05-27

Date: 4/23/97

SAMPLE DEPTH

Time:	14:05	
Total Depth Drilled:	27	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	3.33	ft
Static Water Level (TOP):	13.29	ft
Static Water Level (BGS):	9.96	ft

HYDRAULIC CONDUCTIVITY

Time:	14:10	
Drawdown:	1	ft
Flow Rate	77	mlmin

FLOW CELL READINGS

Time:	14:19	
pH:	5.45	
red/ox:	163	mV
Dissolved Oxygen:	6.3	ppm
Conductivity	170	uS/mS
Temperature:	61.7	°F

Sample Collection

Time	14:21
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time:	14:30			
Water Clarity	Clear			
	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	2.9	pprrl	1.5	ppm
Total Iron (6ppm):	3.2	ppm	1.8	ppm
Soluble Iron (12ppm):	-	ppm	-	ppm
Total Iron (12ppm):	-	ppm	-	ppm
Sulfide:	0.11	ppm	0	ppm
Dissolved Oxygen:	>2	ppm	>2	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time:		
FID Headspace:		ppm

OBSERVATIONS / COMMENTS:

Flame out on FID - no reading.

Sample zero - 100% sample water.

Sample Data Sheet

Lcoation Number: TC-05-30

Date: 4/23/97

SAMPLE DEPTH

Time:	14:07	
Total Depth Drilled:	30	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	0.23	ft
Static Water Level (TOP):	10.18	ft
Static Water Level (BGS):	9.95	ft

HYDRAULIC CONDUCTIVITY

Time:	14:18	
Drawdown:	1	ft
Flow Rate	19	mlirnin

FLOW CELL READINGS

Time:	14:30	
pH:	5.73	
red/ox:	-215	mV
Dissolved Oxygen:	3.5	ppm
Conductivity	187	uS/mS
Temperature:	62	°F

Sample Collection

Time	14:32
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time:	14:50			
Water Clarity	Semi-clear			
	Clear Zero		Sample Zero	
Soluble Iron (6pptn):	4.75	ppm	3.5	ppm
Total Iron (6ppm):	5.5	ppm	4.2	ppm
Soluble Iron (12ppm):	-	ppm	-	ppm
Total Iron (12ppm):	-	ppm	-	ppm
Sulfide:	0.09	ppm	0	ppm
Dissolved Oxygen:	>2	ppm	>2	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time: _____

FID Headspace: _____ ppm

OBSERVATIONS / COMMENTS:

Very hard probing. Refusal @ 30 feet BGS.

FID Flame out - no reading.

Sample zero - 100% sample water.

Sample Data Sheet

Lcoation Number: TC-05-37

Date: 4/23/97

SAMPLE DEPTH

Time: _____

Total Depth Drilled: _____ ft

Pull Back: _____ ft

Screen Extended: _____ ft

Pipe Stick Up Above Surface: _____ ft

Static Water Level (TOP): _____ ft

Static Water Level (BGS): _____ ft

HYDRAULIC CONDUCTIVITY

Time: _____

Drawdown: _____ ft

Flow Rate _____ ml/min

FLOW CELL READINGS

Time: _____

pH: _____

red/ox: _____ mV

Dissolved Oxygen: _____ ppm

Conductivity _____ uS/mS

Temperature: _____ °F

Sample Collection

Time _____

1 Liter Amber Jars _____

40 ml VOA _____

COLORMETRIC TESTS

Time: _____

Water Clarity _____

	Clear Zero	Sample Zero
Soluble Iron (6ppm):	_____ ppm	_____ ppm
Total Iron (6ppm):	_____ ppm	_____ ppm
Soluble Iron (12ppm):	_____ ppm	_____ ppm
Total Iron (12ppm):	_____ ppm	_____ ppm
Sulfide:	_____ ppm	_____ ppm
Dissolved Oxygen:	_____ ppm	_____ ppm
Manganese (filtered):	_____ ppm	_____ ppm

GROUNDWATER HEADSPACE TEST

Time: _____

FID Headspace: _____ ppm

OBSERVATIONS / COMMENTS:

Probe refusal @ 30 feet BGS. No sample / data collecte

Sample Data Sheet

Lcoation Number: TC-06-26.5

Date: 4/25/97

SAMPLE DEPTH

Time:	9:42	
Total Depth Drilled:	2	ft
Pull Back:	2	ft
Screen Extended:	3.65	ft
Pipe Stick Up Above Surface:	13.24	ft
Static Water Level (TOP):	9.62	ft
Static Water Level (BGS):		ft

HYDRAULIC CONDUCTIVITY

Time:	9:45	
Drawdown:	1	ft
Flow Rate	148	mlimin

FLOW CELL READINGS

Time:	9:57	
pH:	4.56	
redtox:	151	mV
Dissolved Oxygen:	3	ppm
Conductivity	167	uS/mS
Temperature:	62.6	°F

Sample Collection

Time	9:59
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time:	10:10			
Water Clarity	Semi-clear			
	Clear		Sample	
	Zero		Zero	
Soluble Iron (6pptn):	1.8	ppm	0.1	ppm
Total Iron (6ppm):	2	ppm	0.25	ppm
Soluble Iron (12ppm):	-	ppm	-	ppm
Total Iron (12ppm):	-	ppm	-	ppm
Sulfide:	0.15	ppm	0	ppm
Dissolved Oxygen:	32	ppm	>2	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time:	10:56	
FID Headspace:	5	ppm

OBSERVATIONS /COMMENTS:

Sample zero - 100% sample zero.

Sample Data Sheet

Lcoation Number: TC-06-3 1

Date: 4/25/97

SAMPLE DEPTH

Time:	9:50	
Total Depth Drilled:	31	ft
Pull Back:	2	ft
Screen Extended:	1	ft
Pipe Stick Up Above Surface:	3.9	ft
Static Water Level (TOP):	13.32	ft
Static Water Level (BGS):	9.42	ft

HYDRAULIC CONDUCTIVITY

Time:	9:54	
Drawdown:	1	ft
Flow Rate	178	mlimin

FLOW CELL READINGS

Time:	10:11	
pH:	4.55	
red/ox:	-35	mV
Dissolved Oxygen:	4.4	ppm
Conductivity	176	uS/mS
Temperature:	62.7	°F

Sample Collection

Time	10:13
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time:	10:27			
Water Clarity	Semi-clear			
	Clear		Sample	
	Zero		Zero	
Soluble Iron (6ppm):	2.6	ppm	1.55	ppm
Total Iron (6ppm):	2.7	ppm	1.7	ppm
Soluble Iron (12ppm):	-	ppm	-	ppm
Total Iron (12ppm):	-	ppm	-	ppm
Sulfide:	0.06	ppm	0	ppm
Dissolved Oxygen:	>2	ppm	>2	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time:	10:55	
FID Headspace:	2.1	ppm

OBSERVATIONS / COMMENTS:

Sample zero - 100% sample water.

Sample Data Sheet

Lcoation Number: TC-06-35

Date: 4/25/97

SAMPLE DEPTH

Time:	11:18	
Total Depth Drilled:	35	ft
Pull Back:	2	ft
Screen Extended:	2	ft
Pipe Stick Up Above Surface:	3.35	ft
Static Water Level (TOP):	13.15	ft
Static Water Level (BGS):	9.8	ft

HYDRAULIC CONDUCTIVITY

Time:	11:21	
Drawdown:	1	ft
Flow Rate	220	mlirnin

FLOW CELL READINGS

Time:	11:30	
pH:	5.2	
red/ox:	-33	mV
Dissolved Oxygen:	4.8	ppm
Conductivity	75	uS/mS
Temperature:	65	°F

Sample Collection

Time	11:32
1 Liter Amber Jars	3
40 ml VOA	4

COLORMETRIC TESTS

Time:	11:38			
Water Clarity	Semi-clear			
	Clear Zero		Sample Zero	
Soluble Iron (6ppm):	5.45	ppm	2.6	ppm
Total Iron (6ppm):	6.45	ppm	3.65	ppm
Soluble iron (12ppm):	-	ppm	-	ppm
Total Iron (12ppm):	-	ppm	-	ppm
Sulfide:	0.33	ppm	0	ppm
Dissolved Oxygen:	>2	ppm	>2	ppm
Manganese (filtered):	0	ppm		ppm

GROUNDWATER HEADSPACE TEST

Time:	13:00	
FID Headspace:	4.5	ppm

OBSERVATIONS / COMMENTS:

Refusal @ 35"

Initially only pulled back I', very slow recharge.

Pulled back an additional 1' - good recharge.

SAMPLE DATA SHEET

Location Number: TC-97-26.5'
Date: 4-7-97

SAMPLE DEPTH

Date:	4-7-94	
Time:	0940	
Total Depth Drilled:	26.5	ft
Pull Back:	2'	ft
Screen Extended:	1'	ft
Pipe Stick Up Above Surface:	3.6"	ft
Static Water Level (TOP):	ft 13.8'	
Static Water Level (BGS):	10.2	ft

HYDRAULIC CONDUCTIVITY

Drawdown:	1	ft
Time:	10:17	
Flow Rate (70mL/560s)	18.2	ml/min

COLORMETRIC TESTS

Time:	11:18	
Water Clarity	SEMI CLEAR	
Soluble Iron (0-6ppm/un-filtered):	1.75	ppm
Total Iron (0-6ppm/un-filtered):	1.95	ppm
Soluble Iron (0-12ppm/un-filtered):	X	m
Total Iron (0-12ppm/un-filtered):	X	ppn
Soluble Iron (0-6ppm/filtered):	X	ppm
Total Iron (0-6ppm/filtered):	X	ppm
Soluble Iron (0-12ppm/filtered):	X	ppm
Total Iran (0-12ppm/filtered):	X	ppm
Sulfide (un-filtered):	1	ppm
Sulfide (filtered):	X	ppm
Dissolved Oxygen:	>2.0	ppm
Manganese (filtered):	0	ppm

FLOW CELL READINGS

Time:	10:40	
pH:	4.85	
red/ox:	16	mV
Dissolved Oxygen:	—	ppm
Conductivity	—	mS/cm
Temperature:	71.4	°F

GROUNDWATER HEADSPACE TEST

Time:	11:52	
FID Headspace:	.8	ppm

COMMENTS:
VERY SLOW RECHARGE.
FLOW CELL D.O. AND COND. PROBES NOT WORKING

Sample Collection

Time	10:50
1 Liter Amber Jars	3
40 ml VOA	4

SAMPLE RATA SHEET

Location Number: TC-07-31.5
Date; 4-7-97

SAMPLE DEPTH

Date:	4-7-97	
Time:	11:23	
Total Depth Drilled:	31.5	ft
Pull Back:	2'	ft
Screen Extended:	.75	ft
Pipe Stick-Up Above Surface:	2.54	ft
Static Water Level (TOP):	12.8	ft
Static Water Level (BGS):	10.26	ft

HYDRAULIC CONDUCTIVITY

Drawdown:	1	ft
Time:	1305	
Flow Rate 182ml/125s	087.36	ml/min

COLORMETRIC TESTS

Time:	13:39	
Water Clarity	Semi Cloudy	
Soluble Iron (0-6ppm/un-filtered):	0.0	ppm
Total Iron (0-6ppm/un-filtered):	0.35	ppm
Soluble Iron (0-12ppm/un-filtered):	3.5	ppm
Total Iron (0-12ppm/un-filtered):	4.8	ppm
Soluble Iron (0-6ppm/filtered):	———	ppm
Total Iron (0-6ppm/filtered):	———	ppm
Soluble Iron (0-12ppm/filtered):	———	ppm
Total Iron (0-12ppm/filtered):		ppm
Sulfide (un-filtered):	.12	ppm
Sulfide (filtered):	- - -	ppm
Dissolved Oxygen:	>2.0	ppm
Manganese (filtered):		ppm

FLOW CELL READINGS

Time:	1335	
pH:	4.6	
red/ox:	-188	mV
Dissolved Oxygen:	0.3	ppm
Conductivity	—	µS/cm
Temperature:	70.4	°F

GROUNDWATER HEADSPACE TEST

Time:	1617	
FID Headspace:	2.6	ppm

1ST ATTEMPT: FORGOT TO PUT SCREEN IN PIPE - PIPE FILLED WITH COARSE SAND.

Sample Collection

Time	1340
1 tier Amber Jars	3
40 ml VOA	4

TARGET ENVIRONMENTAL SERVICES, INC.

SAMPLE DATA SHEET

Location Number: TC-07-36.5
Date: 4-7-97

SAMPLE DEPTH

Pate:	4-7-97	
Time:	11:53	
Total Depth Drilled:	36.5	ft
Pull Back:	2	ft
Screen Extended:	1.3	ft
Pipe Stick Up Above Surface:	1.81	ft
Static Water Level (TOP):	18.12	ft
Static Water Level (BGS):	10.31	ft

HYDRAULIC CONDUCTIVITY

Drawdown:	1	ft
Time:	1316	
Flow Rate 190ml/180s	63.2	ml/min

COLORMETRIC TESTS

Time:	13:57	
Water Clarity	Cloudy	
Soluble Iron (0-6ppm/un-filtered)	ppm 6	
Total Iron (0-6ppm/un-filtered):	7.6 p	m
Soluble Iron (0-12ppm/un-filtered):	7.6	ppm
Total Iron (0-1 2ppm/un-filtered):	10.3	ppm
Soluble Iran (0-6ppm/filtered):	6.35	ppm
Total Iron (0-6ppm/filtered):	6.35	ppm
Soluble Iron (0-12ppm/filtered):	4.5	ppm
Total Iron (0-12ppm/filtered):	5.4	ppm
Sulfide (un-filtered):	.55	ppm
Sulfide (filtered):	Ø	ppm
Dissolved Oxygen:	>2.0	ppm
Manganese (filtered):	Ø	ppm

FLOW CELL READINGS

Time:	1347	
pH:	4.71	
red/ox:	—	mV
Dissolved Oxygen;	5.7	ppm
Conductivity	—	µS/mS
Temperature:	69.8	°F

GROUNDWATER HEADSPACE TEST

Time:	1618	
FID Headspace:	2.2	ppm

Sample Collection

Time	1348
1 Liter Amber Jars	3
40 ml VOA	4

APPENDIX B

CALCULATED HYDRAULIC CONDUCTIVITIES

Transect Hydraulic Conductivities Determined by Method of Cho, et al, 2000
Dover Air Force Base, Delaware

Sample	Flow Rate Q (ml/sec)	Drawdown s (cm)	Specific Capacity S (ml/sec/cm)	Hydraulic Conductivity* K (cm/sec)	Hydraulic Conductivity* K (ft/day)
TC-07-31.5	1.46	30.48	0.05	Not Calculated	Not Calculated
TC-07-26.5	0.30	30.48	0.01	1.07E-04	0
TC-02-27	0.70	30.48	0.02	2.48E-04	1
TA-09-43	0.13	30.48	0.00	2.65E-04	1
TA-09-48	NA	NA	NA	2.65E-04	1
TB-10-38	0.17	30.48	0.01	3.31E-04	1
TA-04-26	0.24	30.48	0.01	4.71E-04	1
TA-02-36.5	0.22	26.52	0.01	4.91E-04	1
TB-06-48	1.48	30.48	0.05	5.25E-04	1
TC-05-30	0.32	30.48	0.01	6.29E-04	2
TB-09-39	0.38	30.48	0.01	6.32E-04	2
TC-02-37	1.83	30.48	0.06	6.49E-04**	2**
TC-03-39	1.83	30.48	0.06	6.49E-04**	2**
TB-07-32	0.39	30.48	0.01	7.78E-04	2
TB-10-43	0.43	30.48	0.01	8.61E-04**	2**
TB-06-43	2.48	30.48	0.08	8.80E-04	2
TB-09-44	0.58	30.48	0.02	9.58E-04	3
TC-06-31	2.97	30.48	0.10	1.05E-03	3
TA-05-29	0.55	30.48	0.02	1.09E-03	3
TA-05-24	0.57	30.48	0.02	1.13E-03	3
TA-04-31	NA	NA	NA	1.24E-03	4
TC-03-44	0.68	30.48	0.02	1.35E-03	4
TC-07-36.5	1.05	30.48	0.03	1.40E-03	4
TC-02-32	0.92	30.48	0.03	1.51E-03	4
TB-05-41.5	1.00	30.48	0.03	1.65E-03	5
TA-03-42.5	0.83	30.48	0.03	1.66E-03	5
TA-03-47.5	NA	NA	NA	1.66E-03	5
TA-03-51.5	NA	NA	NA	1.66E-03	5
TA-09-28	0.83	30.48	0.03	1.66E-03	5
TA-01-42	4.71	30.48	0.15	1.67E-03	5
TB-10-28	0.85	30.48	0.03	1.69E-03	5
TA-06-48	0.92	30.48	0.03	1.82E-03	5
TA-02-46.5	0.93	30.48	0.03	1.85E-03	5
TA-08-43	1.14	30.48	0.04	1.88E-03	5
IR-06D	0.00	0.00	0.00	1.90E-03	5
TB-08-40.5	1.17	30.48	0.04	1.92E-03	5
TB-08-45.5	NA	NA	NA	1.92E-03	5
TA-04-46	0.98	30.48	0.03	1.94E-03	5
TA-04-36	0.98	30.48	0.03	1.95E-03	6
TA-08-33	0.99	30.48	0.03	1.96E-03	6
TA-09-33	1.00	30.48	0.03	1.99E-03	6
TA-04-51	1.05	30.48	0.03	2.09E-03	6
TB-03-43.5	1.10	30.48	0.04	2.18E-03	6
TA-06-38	1.13	30.48	0.04	2.25E-03	6
TC-04-30	1.17	30.48	0.04	2.32E-03	7
TC-05-27	1.28	30.48	0.04	2.55E-03**	7**
DM-360D	0.00	0.00	0.00	2.68E-03	8
TB-06-38	1.42	30.48	0.05	2.81E-03	8
TB-08-25.5	1.50	30.48	0.05	2.98E-03	8
TA-06-43	1.55	30.48	0.05	3.08E-03	9
TC-03-34	1.78	30.48	0.06	3.54E-03	10
TC-03-29	2.93	30.48	0.10	3.57E-03	10
TA-04-56	2.20	30.48	0.07	3.62E-03	10
TA-03-27.5	1.87	30.48	0.06	3.72E-03	11
TB-03-23.5	3.12	30.48	0.10	3.79E-03	11

* Hydraulic Conductivity estimated from Specific Capacity by K=S*0.21

** Hydraulic Conductivity estimated from average of surrounding data

Transect Hydraulic Conductivities Determined by Method of Cho, et al, 2000
Dover Air Force Base, Delaware

Sample	Flow Rate Q (ml/sec)	Drawdown s (cm)	Specific Capacity S (ml/sec/cm)	Hydraulic Conductivity* K (cm/sec)	Hydraulic Conductivity* K (ft/day)
TB-04-47	1.97	30.48	0.06	3.91E-03	11
TB-05-36.5	1.97	30.48	0.06	3.91E-03	11
TA-08-38	1.99	30.48	0.07	3.96E-03	11
TB-03-37.5	2.03	30.48	0.07	4.02E-03	11
TA-06-23	2.10	30.48	0.07	4.17E-03	12
TA-03-37.5	2.19	30.48	0.07	4.35E-03	12
TB-04-42	NA	NA	NA	4.70E-03**	13**
TB-09-34	2.40	30.48	0.08	4.76E-03	14
TC-04-35	2.40	30.48	0.08	4.77E-03	14
TA-01-37	2.40	30.48	0.08	4.77E-03	14
TC-06-26.5	2.47	30.48	0.08	4.90E-03	14
TA-06-33	2.53	30.48	0.08	5.03E-03	14
TA-05-34	2.57	30.48	0.08	5.10E-03	14
TA-07-35	2.63	30.48	0.09	5.22E-03	15
TA-04-41	2.68	30.48	0.09	5.32E-03	15
TA-08-28	2.80	30.48	0.09	5.56E-03	16
TC-01-25	3.42	30.48	0.11	5.64E-03	16
TA-05-39	3.13	30.48	0.10	6.23E-03	18
TB-05-46.5	3.13	30.48	0.10	6.23E-03	18
TB-08-35.5	3.13	30.48	0.10	6.23E-03	18
TA-07-45	3.14	30.48	0.10	6.25E-03**	18**
TA-02-31.5	3.17	30.48	0.10	6.29E-03	18
TA-03-32.5	3.40	30.48	0.11	6.76E-03	19
TB-04-27	3.42	30.48	0.11	6.79E-03	19
TB-03-33.5	3.65	30.48	0.12	7.25E-03	21
TC-06-35	3.67	30.48	0.12	7.28E-03	21
TB-06-33	3.87	30.48	0.13	7.68E-03	22
TB-08-30.5	4.20	30.48	0.14	8.34E-03	24
TB-05-31.5	4.33	30.48	0.14	8.61E-03	24
TA-01-32	4.65	30.48	0.15	9.24E-03	26
TB-07-27	5.00	30.48	0.16	9.93E-03	28
TB-07-47	5.07	30.48	0.17	1.01E-02	29
TA-07-30	5.09	30.48	0.17	1.01E-02	29
TB-09-29	5.21	30.48	0.17	1.03E-02	29
TB-10-33	5.67	30.48	0.19	1.13E-02	32
TC-01-30	7.33	30.48	0.24	1.21E-02	34
TB-03-28.5	6.10	30.48	0.20	1.21E-02	34
TA-07-40	6.35	30.48	0.21	1.26E-02	36
TA-09-38	6.67	30.48	0.22	1.32E-02	38
TA-02-41.5	NA	NA	NA	1.42E-02**	40**
TB-04-37	7.20	30.48	0.24	1.43E-02	41
TB-07-37	8.95	30.48	0.29	1.78E-02	50
TB-07-42	9.05	30.48	0.30	1.80E-02	51
TA-06-28	9.71	30.48	0.32	1.93E-02	55
TB-04-32	10.53	30.48	0.35	2.09E-02	59
TC-02-42	9.70	26.82	0.36	2.19E-02	62
TA-05-44	11.50	30.48	0.38	2.28E-02	65
IR-07D	0.00	0.00	0.00	2.90E-02	82
TA-08-48	12.74	25.91	0.49	2.98E-02	84
TB-05-51.5	11.47	5.79	1.98	1.20E-01	340
TC-04-40	MAX	0.00	0.00	5.22E-03	15

* Hydraulic Conductivity estimated from Specific Capacity by K=S*0.21

** Hydraulic Conductivity estimated from average of surrounding data

APPENDIX C

MASS FLUX CALCULATIONS FROM MONITORING WELL DATA

Tetrachloroethylene

Transect	Concentration (for Cj+1/Cj) (umole/day)	Distanc btw Transects (feet)	R1 Travel Time btw Transects (year)	R2 Travel Time btw Transects (year)	R1 Biodegradation Rate /(day)	R1 Biodegradation Half Life (years)	R2 Biodegradation Rate /(day)	R2 Biodegradation Half Life (years)
A	0.00E+00							
		1200	11.6	18.7	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
B	0.00E+00							
		1400	13.5	21.8	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
C	0.00E+00							
A - C			25.1	40.5	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Trichloroethylene

Transect	Concentration (for Cj+1/Cj) (umole/day)	Distanc btw Transects (feet)	R1 Travel Time btw Transects (year)	R2 Travel Time btw Transects (year)	R1 Biodegradation Rate /(day)	R1 Biodegradation Half Life (years)	R2 Biodegradation Rate /(day)	R2 Biodegradation Half Life (years)
A	2.60E+05							
		1200	10.7	16.9	-0.0005	4.1	-0.0003	6.4
B	4.20E+04							
		1400	12.5	19.7	0.0000	-251.0	0.0000	-397.4
C	4.35E+04							
A - C			23.2	36.7	-0.0002	9.0	-0.0001	14.2

cis-1,2-Dichloroethylene

Transect	Concentration (for Cj+1/Cj) (umole/day)	Distanc btw Transects (feet)	R1 Travel Time btw Transects (year)	R2 Travel Time btw Transects (year)	R1 Biodegradation Rate /(day)	R1 Biodegradation Half Life (years)	R2 Biodegradation Rate /(day)	R2 Biodegradation Half Life (years)
A	3.07E+05							
		1200	9.8	12.5	-0.0013	1.5	-0.0010	1.9
B	3.17E+03							
		1400	11.4	14.5	-0.0003	6.1	-0.0002	7.7
C	8.61E+02							
A - C			21.2	27.0	-0.0008	2.5	-0.0006	3.2

Vinyl Chloride

Transect	Concentration (for Cj+1/Cj) (umole/day)	Distanc btw Transects (feet)	R1 Travel Time btw Transects (year)	R2 Travel Time btw Transects (year)	R1 Biodegradation Rate /(day)	R1 Biodegradation Half Life (years)	R2 Biodegradation Rate /(day)	R2 Biodegradation Half Life (years)
A	1.45E+04							
		1200	8.9	8.9	-0.0007	2.7	-0.0007	2.7
B	1.45E+03							
		1400	10.4	10.4	#VALUE!	#VALUE!	#VALUE!	#VALUE!
C	0.00E+00							
A - C			19.3	19.3	#NUM!	#NUM!	#NUM!	#NUM!

Total Chlorocarbons

Transect	Concentration (for 1/(Cj+1/Cj))* (umole/day)	Distanc btw Transects (feet)	R1 Travel Time btw Transects (year)	R2 Travel Time btw Transects (year)	R1 Biodegradation Rate /(day)	R1 Biodegradation Half Life (years)	R2 Biodegradation Rate /(day)	R2 Biodegradation Half Life (years)
A	5.82E+05							
		1200	8.9	8.9	-0.0008	2.4	-0.0008	2.4
B	4.66E+04							
		1400	10.4	10.4	0.0000	143.1	0.0000	143.1
C	4.43E+04							
A - C			19.3	19.3	-0.0004	5.2	-0.0004	5.2

SITE WIDE

K (ft/day)=	68
porosity	0.35
i (ref: D&M 5/93)	0.0019
Velocity	0.37

	Retardation Factor R1 (foc=0.00025)	R2 (foc=0.001)
PCE	1.3	2.1
TCE	1.2	1.9
cis-1,2-DCE	1.1	1.4
Vinyl Chloride	1	1

* Vinyl chloride was not detected at Transect C, biodegradation rate calculation is based on detection limit (0.5 ug/L) and represents a minimum rate.